Testing the Speed and Accuracy of Navigating Layouts of Web Page Elements Through the Use of an Eye Tracking and Speech Recognition Mechanism

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Abstract

The use of world wide web has increased rapidly over the past few years. In addition, websites covering many topics, are the first source of information. The content of these websites are designed in creative ways to help the web users navigate quickly and easily along with using the input mechanisms. New input mechanisms have been introduced to the field of computer interaction such as mouse, keyboard, touch pad, touch screen and touch pen. Since then computer users have been increasingly using these new techniques to communicate with computers. This tendency pushed computer engineers to come up with more intuitive ways to facilitate interaction mechanism. Moreover, there remains significant demand to meet the needs of physically challenged users in communicating with computers. Furthermore, the traditional methods of navigating websites lack the ability to sense our attention. Hence there must be new alternative input mechanisms to navigate web pages rather than using a mouse and keyboard (KB). Among these mechanisms are the ones that interact with our capabilities, such as voice, and our senses such as sight. This motivated us to think of alternative methods to navigate web pages other than using traditional methods. For this purpose, eight basic layouts of page elements were designed with seven tasks, and each task represented one of the these layouts. Human-Computer Interaction (HCI) techniques and evaluation methods were followed to test the speed and accuracy of navigating the layouts through the use of eye tracking and speech recognition mechanisms.

Keywords: Basic layouts of page elements, Input mechanisms. Alternative input mechanisms, Eye tacking, Speech recognition mechanisms

I dedicate my thesis work to my family and many friends. A special feeling of gratitude to my loving parents, Jeary and Mastora whose words of encouragement and push for tenacity ring in my ears. My brothers Mansor, Mohammed and my sister Mona have never left my side and are very special.

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1.0 Introduction

The use of world wide web has increased rapidly over the past few years. Undoubtedly, websites with its categories are the first source of information. Different type of layouts of web page elements have been designed to achieve particular goals of web design such as visual hierarchy, visual flow, focal point, grouping and alignment [52]. In addition, these patterns were constructed to help web users navigate easily and intuitively along with using the input mechanisms. Hence, users can quickly and easily find information that they seek in reasonable time.

Input mechanisms play a key role in computer applications. In fact, computer software in which input mechanisms play a vital role can be considered the main driving force behind the rise of computer revolution in last two decades [1]. Today we interact with computers in a variety of fields in our daily lives and in our business in which input mechanisms are the center of the operations. In the past, computer architects focused on inventing devices that can transfer people's interactions into reactions that can be viewed on screen [2]. One of the most important inventions was the mouse, which senses movement across a surface, along with the keyboard, which detects a contact closure when the user presses a key. In the last decade, computers engineers put more stress on coming up with new input mechanisms to communicate with computers. This interest centered around two aspects: the device and the communication techniques. The latter relies on users' cognitive abilities and the body part that users can use for interacting with computers. As a result of this focus, new input mechanisms have been introduced to the field of computer interaction, such as touchpad, touchscreen and touch pen. Since then computer users have been increasingly using these new techniques to communicate with computers. This tendency pushed computer engineers to search and come up with more intuitive ways that can facilitate the interaction mechanism. Moreover there remains significant demand to meet the needs of physically challenged users in communicating with computers rather than using a mouse and keyboard. Recently, new input techniques are

released in the field of human computer interaction. Among these techniques are the ones that interact with our capabilities, such as voice and our senses such as sight.

Everyday we use our eyes and voice to understand and interact with the world around us. Doing so is natural and effortless that we do not think about it. The traditional methods of navigating websites lack the ability to sense our attention. Eye tracking and speech recognition mechanisms will change this. Eye tracking devices and speech recognition applications transition from expensive lab equipment into everyday products. Nowadays both mechanisms can be used to interact with and navigate websites in ease. By the use of these input mechanisms, websites will behave more intuitively. Both technologies are integrated into a wide range of devices like tablets and big screens. In simple words, eye trackers can tell where someone is looking with the position about the size of a fingertip and help control a mouse cursor. Whereas speech recognition applications can transcribe spoken words into actions at the location of the mouse cursor. These technologies motivated us to think of the best alternative way to navigate web pages other than using the traditional methods of navigation. This thesis investigates the speed and accuracy of navigating the basic layout of web page elements through the use of eye tacking and speech recognition mechanisms.

For this purpose, eight Layouts were designed for the experiment. In response we intended to involve users in the test to complete some tasks. All these tasks were performed through the use of three input mechanisms (mouse and keyboard, eye tracking, and speech recognition). The results from the participants' experiments were used to record the time taken to achieve the tasks on the layouts.

The remainder of the thesis is structured as follows. Chapter 2 presents the related work in the basic layouts of web page elements such as: grid of equals, module tabs,wizard, movable panel, center stage, accordion, radio button and check-box, and collapsible panel. In addition, it presents the related work in eye tracking and speech recognition software. Chapter 3 details the

process of designing the web pages, the layouts of the experiment, and the programming languages used. It then illustrates how the data was collected and the evaluation methods that were used. Furthermore, it gives details of how the subjects participated in the experiment and what task they were asked to accomplish. Chapter 4 expresses the findings that were gained from the participants' performance in the experiment. In Chapter 5, the findings that were shown in Chapter 4 are discussed in details in order to understand the results. In Chapter 6, the conclusions of the study are presented. This study was supported by Research Ethics Board - Laurentian university. In the appendices, we provided the code that was used to design the layouts of web page elements . Also, we provided HCI Lab questionnaire and some web pages from the experiment.

2.0 Literature Review

In this chapter, the basic layout of web page elements and the history of input mechanisms will be presented. In addition, eye tracking and speech recognition techniques will be presented. We will begin with presenting the history of input mechanisms.

2.1 The history of input devices

2.1.1 Punch-cards

The generation of input devices has greatly developed since the introduction of the first automated computing devices which was over the past period. However, this development can easily be forgotten since one is only needed to slide fingers over the smartphone screens or talk to the computer rather than typing at it. Nevertheless, less change was observed in reading the paperback was innovated long after the invention of the printing press in 1440 [1] where the e-book was also recently introduced. Before, data was stored permanently and programs retrieved easily through the keypunch and punch cards which were the first technologies to be greatly embraced. However, there was introduction of switches and dials to enter data into computer. Since the 1890 Census contained 80 questions and creation of the modern punch card by Herman Hollerith to organize the results, a legacy that existed on both in periods of 80 column computer screens and in the company he established resulting to be a part of IBM [2], 80 columns were identified in many cards. A letter or number, which was generally printed at the top of the column for reading purposes [2], was represented by many punches in every column. For programming, each card usually contained one statement, so that re-organizing code could often be done by re-ordering the cards. One of the final models commonly applied in the past was the table-sized IBM Model 026 keypunch (refer to figure2.1), which is displayed at the computer history museum.

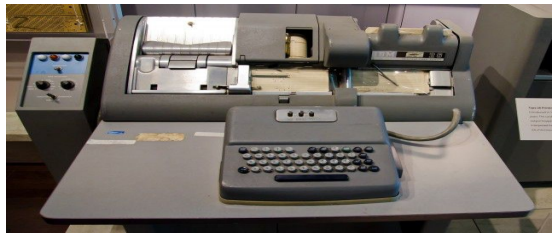

Figure 2.1 The table-sized IBM Model 026 keypunch [77]

2.1.2 Electric Keyboards

The MULTICS computer, a time-sharing, multi-user system having VDT, a video display terminal was created by Bell Labs and M.I.T in 1964 [3]. In comparison to the past teletype techniques of input, efficiency was observed in communicating commands, programs, and controls to computers as text was directly observable on the screen. Thus, VDT and electric keyboards were adopted by all computers by the late 1970s [4]. This is because it was the most effective technique based on computer interaction. In the 1970s, there was introduction of the first keyboards where they were built from scratch and they were weighty because they were completely mechanical. These keyboards were built only for function as their creation was time-consuming and the target market was chiefly computer programmers and engineers. As shown in figure 2.2, these keyboards were more or less exposed as they had no covers. Also, there were, during that period, keyboards that were built into personal computers.

Figure 2.2 1960s UNIVAC computer in operation. Notice the teletype input device to his left. [77]

The first small PCs for consumer application [5], which is commonly known as the S100 computer systems, was created by Imsai and Altair in the mid-1970s. The basic essentials were offered by these machines as they were built from scratch, piece by piece. However, data could

not be saved on them since the first machines had no hard drives or floppy discs. The front panel of the computer was the location of the keyboard with a collection of key switches. A converted electric typewriter was sold by IBM to users who needed a standard keyboard. Nevertheless, there was limitation in supplies as the product had not high demands and thus, many users opted to convert their own electric typewriters. Also, data entry services needed a second keyboard where the users were needed to build their own [5] (refer to figure 2.3).

Figure 2.3 1970s Altiar computer with exposed keyboard courtesy of the computer history museum [77]

A notion that every computer came with a keyboard implying that the keyboards are the chief, standard input devices was made effective in the late 1970s by Apple, Radio Shack and Commodore where they started developing keyboards for their computers as they saw large market in computer keyboards [6]. The first PC to be released by IBM was in 1981. The PC, in 1986, came having the Model M keyboard [6] (refer to figure 2.4). This keyboard was user-friendly and therefore it was widely used as it makes work easier for users.

Figure 2.4 1986 IBM model M keyboard [77]

In the 1990s membrane switches began to replace the mechanical key switch, as it was quieter, weighed less, and suited the needs of the new laptop generation. The production of these keyboards was much cheaper and thus benefiting the manufactures. Unluckily, superficial keyboard aesthetics were introduced exceeding that keyboard's quality. Today's keyboards come in all shapes, sizes, and colors but it is good that we remember that they resulted from original, simple, powerhouse mechanical IBM keyboards.

2.1.3 The Entry of the Mouse

Douglas Engelbart and Bill English invented the mouse in about 50 years ago at SRI [7]. The mouse was then associated with a multi-windowed desktop, most notably at Xerox PARC linked to the Xerox Alto (refer to figure 2.5). Steve Jobs and Apple Computer were given the concept of using a mouse-driven interface [8], first for the $10,000 Lisa computer in 1983 and then cheaper, and definitely effective, Macintosh introduced in 1984 and 1979 by a tour of PARC as well as Smalltalk-80 on the Xerox Al illustration. Rather than using more expensive early optical versions, which needed devoted mouse pads with embedded lines, mice with comparatively low-quality rubber ball-based versions were applied. Later on, there was introduction of other types of optical mice that are, currently, the most common ones since they operate on normal surface.

Figure 2.5 Alto mouse [77]

2.1.4 TouchPad

A touchpad, by 1982, was built in Apollo desktop computers where it was located on the keyboard's right side [9]. The Gavilan SC was introduced a year later where the touchpad was above the keyboard. In 1989, there was development of a touchpad for Psion's MC 200/400/600/WORD Series. In 1994, GlidePoint, which was the first commonly available touchpad, was introduced by cirque [9]. Also in 1994, touchpads were introduced by Apple Inc to the present laptop in the PowerBook series through Cirque's GlidePoint technology [10]. Then later, Apple-developed trackpads would be applied by PowerBooks and MacBooks. Sharp was another primary adopter of the GlidePoint pointing device. Then, touchpad of Synaptics was introduced to the market branding the TouchPad. A primary adopter of this product was Epson. As touchpads began to be introduced in laptops in the 1990s, there was often confusion as to what the product should be called. The applied names including glidepoint, touch sensitive input device, touchpad, trackpad, and pointing device were not constant [11].

2.1.5 Touch Screen

Before, touchscreen technology was contained in science fiction books and film. Currently, we use tablet or smartphone in our daily activities where they are widely used by almost everyone including children. Touchscreens are found in homes, restaurants, stores, cars and planes. Johnson was the one who invented the very first finger-driven touchscreen at the Royal Radar Establishment in Malvern, United Kingdom back in 1965 [12]. Touch display, an input/output device novel for computers, which was published in *Electronics Letters*, was an article used by Johnson to describe his work.

2.1.6 Light Pen

An input device applied with a cathode-ray tube display to point at items that are on the screen or to draw new items or adjust current ones is called light pen [13]. The top illumination that shows when focus point is passed by the CRT scanning spot is a response of a sensor at the tip of the light pen. To establish the light pen positions, pulse timing from the photo sensor with the displayed object was connected by the display. Apart from LCD screens, projectors and additional display devices, a light pen can perform with any CRT-based display.

The popularity of the light pen rose in the early 1980s [13]. Its application in the Fairlight CMI, and the BBC Micro was not successful. The first polyphonic digital sampling synthesizer [13] was the first Fair light CMI (Computer Musical Instrument). Peter Vogeland Kim Ryrie, the founders of Fairlight designed it in 1979 under Tony Furse's dual microprocessor computer which was designed in Sydney, Australia. Light pens, specifically those of Thomson's TO7 and TO7/70 computers, were given to various consumer products. Nevertheless, the light pen was no longer applicable as an input device since the user was needed to hold the arm in front of the screen much longer.

The New Trend to Recognize Other Input Devices for Average and Physically Challenged Users

It is important to have input devices limiting physical strains where the environment you are in does not count. Blind or visually challenged users fit for voice recognition. Conversely, users with limited hand mobility to control a computer fit for eye tracking devices. Two other Input technologies playing an important role in Human Computer Interaction field are briefly introduced below:

2.2 Eye Tracking

Testers are enhanced to establish eye movement and eye-fixation patterns of an individual by eye tracking. In other words, eye activity is assessed by eye tracking. Which direction do the individuals look? What are the various things that are ignored? How do diverse stimuli affect the pupil? What exactly do the individuals view? Complications, even though the method is simple, can be identified in the process and understanding [19]. The system is being adjusted to particular applicants and eye-managing drift through drift correction by two significant features of eye tracking. The process of applicants looking an image such as a dot or a fixation cross in a familiar location is called calibration. Image's actual location to the point where the applicant's gaze on the screen is detected is compared by the eye tracking system where applicable correction for future fixations is also applied. The difference between applicant's gaze and a chief point "drifts" over a short period of time is assessed by drift correction. Factors including exhaustion and alterations in body (head) position can facilitate the occurrence of drift. Furthermore, less specific gaze recording is achieved when a view session takes much time as occurrence of drift will increase [20]. Devices and applications are using eye tracking to facilitate computer interaction and the comprehension of human conduct.

2.2.1 Eye Tracking Process

A remote or head-mounted 'eye tracker' connected to a computer is used to collect eye tracking data. Two general components, a light source and a camera, are contained in non-intrusive eye trackers. Direct to the eye is the light source (normally infrared). The light source reflection is tracked by the camera with observable ocular features including pupil. The eyes' rotation and eventually gaze direction is inferred by the collected data. The eye tracker also detects further information, e.g. blink frequency and pupil diameter change [21]. A file that is well-suited with eye-tracking analysis software contains the combined data.

2.2.2 Eye Tracking History in HCI

The extensive application of computers by about 100 years is pre-dated by eye movement study [14]. Initially, the location of eye fixations was performed through techniques that were invasive. This means that direct mechanical contact with the cornea was involved. Light reflected from the cornea was used by Dodge and Cline to develop the first specific, non-invasive eye tracking technique [15]. Nevertheless, the applicant's head was needed to be still since only horizontal eye position was recorded onto a falling photographic plate by that system. The sequential feature of eye movements in two dimensions were recorded by Judd, McAllister and Steel later using motion picture photography [16]. Consequently, a small white speck of material implanted into the applicants' eyes was recorded instead of light that reflected straight from the cornea. In the first half of the twentieth century, the corneal reflection and motion picture methods were then combined by these and other scholars as they focused on eye movements [16].

To examine eye movements in reading, Miles Tinker and his colleagues applied photographic methods in the 1930s [17]. They examined the resulting impacts on reading speed and patterns

of eye movements by mixing typeface, print size, page layout, and so on. Since cockpit controls and instruments were used by pilots to land an airplane, motion picture cameras, in 1947, were applied by Paul Fitts and his colleagues to examine the pilot's eyes [18]. Therefore, the initial application of eye tracking which is called *usability engineering*, the methodical examination of users cooperating with products to advance product design, is represented by the Fitts study. The first head-mounted eye tracker was invented by Hartridge and Thompson in that same time [53]. Consequently, eye tracking study applicants were freed from tight restraints on head movement as the method was improved. Head-mounted eye tracking systems were made less obtrusive and thus reducing constraints on participant head movement by Shackel and Mackworth and Thomas in the 1960s where they improved their concept [54]. A system to record eye movements covered on the changing visual scene seen by the applicant was invented by Mackworth and Mackworth (1958). In the 1970s, success of the eye movement research and eye tracking was observed where both eye tracking technology and psychological theory to connect eye tracking data to cognitive practices was also made effective. Books, whose source is eye movement conferences in this period, are a good example to show the aforementioned success [55]. Research in psychology and physiology was focused on by a higher percentage of the work where the operation of the eye was also explored and what can be obtained regarding perceptual and cognitive practices. However, calm in activity associated with eye tracking to usability engineering was indicated by publication records from the 1970s. This was mainly contributed by the engaged effort to collect data as well as to analyze it. Normally, data that was collected within minutes is processed in days [55]. The shortcomings associated with eye tracking technology and data analysis were focused on by work in various human factors / adoptable laboratories, specifically those connected to military aviation. U.S. military technical reports contained work of researchers who were in laboratories [56]. To improve exactness and accuracy and decrease the influence of the trackers on the tracked eyes, technical advancement was the focus of various significant works in the 1970s. Tracking accuracy and preparation of base developments making applicant movement

to be flexible was increased by the find that many reflections from the eye could be applied to disconnect the rotations of the eye from head movement [57]. A remote eye tracking system, which radically decreased tracker obtrusiveness and its restraints on the contributor, was developed by two combined military/industry teams based on the find [58]. Also, the automation of eye tracking data analysis was enhanced by these teams and others. The applicable resources for the purpose of high-speed processing were given by the minicomputer advent in that overall time frame. The origin of eye tracking data application in real-times was the aforementioned innovation [59]. Instead of using data in real-time, almost all eye tracking work before this applied the data only on reflection. Many commercially obtainable eye tracking systems today are reflect of the technological development in eye tracking in the 1960s and 70s [60]. Cognitive factors including, memory, learning, workload, and attention deployment were intended to be avoid by psychologists who specialized in eye movements and fixations before the 1970s. However, they concentrated on relations between eye movements and properties of common visual stimulus properties including target movement, contrast, and location. They concluded that the issue of higher-level cognitive factors can be solved through, ignorance, reduction, or delay of the consideration of establishing models of the allegedly simpler lower-level practices, specifically, sensorimotor relations and their fundamental functioning [61]. Nevertheless, gradual change in attitude was observed in the 1970s. The study of relations between fixations and cognitive activity was started by psychologists whilst eye tracking technology was being advance by engineers. Consequently, various simple, theoretical models for connecting fixations to precise cognitive practices were obtained [62]. During this era, the only location for computers was scientific, educational, and engineering laboratories. Thus, the study of human-computer interaction was not yet involved in eye tracking. The main form of human-computer interaction were teletypes for command line entry, punched paper cards and tapes, and printed lines of alphanumeric output.

Since the 1950s, new issues in each period have been solved by the application of eye tracking [63]. There was no exception for the 1980s. An investigation on how problems of

human-computer interaction could be solved through eye tracking field was conducted by researches as private computers become common. The strategy used by users in search for commands in computer menus was shown by the technology [64]. Eye tracking, in real time, was embraced as a way of human-computer interaction in the 1980s. However, disabled individuals were the main focus in this area [65]. Also, a large, ultra-high resolution display was tried to be stimulated by work in flight simulators through offering a high resolution when the observer was preoccupying as well as lower resolution in the margin [66]. Also, there was, in the 1980, establishment of the combination of real-time eye movement data with other mores straight modes of user-computer communication [67][68]. Modest development has been identified in eye tracking human-computer interaction in present times. To address questions regarding usability and act a computer input device, eye tracking was, again, adopted by researchers because of technological development [69].

2.2.3 The Interpretation of Eye Tracking Data

Eye data can be interpreted using various approaches. Assessing the visual path of one or more contributors across an interface is amongst the approaches. The observed eye data is interpreted into a collection of pixel coordinates. Then, examination of the presence or absence of eye data pointing in various screen areas is facilitated. Consequently, the kind of aspects observed, attention capturing, eyes' movement speed, unnoticed content and any other question connected to gaze is established. Visualization of such things is enhanced by graphics including GazeSpots and GazeTraces. To calculate the participants' cognitive states and workload, there can be investigation of eye data. Amongst the commonly applied metrics is patented Index of Cognitive Activity (ICA) of eye-tracking. Mental effort has been assessed through this process, proving its effectiveness. Information wealth gathered using careful eye study has been illustrated by revolutionary tools including the ICA [23].

2.2.4 Eye Tracking Metrics

Eye tracking metrics, which are applicable to the tasks and the characteristic cognitive activities for each usability study separately, must be chosen by the usability researcher [22]. We have tried to utilize a general range of definitions instead of stating the same idea using different terms and they are as follows:

- ***Fixation***: A fairly steady eye-in-head position in some threshold of dispersion over some least period (normally 100-200 ms), and with a speed below some threshold (normally 15-100 degrees per second).
- ***Gaze Duration***: Increasing period and normal spatial location of successions of successive fixations in the area of interest. Various fixations represent gaze duration that many involve the fairly least time for the short saccades between the fixations. The completion of the gaze is shown by a fixation happening outside the area of interest. "Gaze duration" has been replaced with "dwell", "glance", or "fixation cycle" [22].
- ***Area of interest***: Area of a show or visual location, which is valued by the research or design team; hence, described by them.
- ***Scan Path***: Spatial organization of a series of fixations .
- ***Number of fixations, overall:*** Search efficiency is connected with number of fixations overall negatively [24]. Less effective search probably caused by a poor organization of display components is shown by large fixations' number. The relation of fixations' number to task time should be considered by the experimenter.
- ***Gaze % (proportion of time) on each area of interest:*** The significance of an element could be shown by time proportion based on a specific display element. Frequency of gazing on a display element with gazes' duration should be identified by researcher applying this metric. They should be treated differently with duration showing struggle of information generation and frequency showing the significance of that area of the display [25].

- ***Number of fixations on each area of interest:*** This metric has a close relation with gaze rate where it is applied to study fixations' numbers across tasks of different overall duration. The significance of the element should be reflected by fixations' number on a specific display element. Fixation of more significant display elements will be done more often [25].
- ***Gaze duration mean, on each area of interest:*** This is amongst the primary metrics in Fitts et al [25] . They anticipated that longer gazes on a particular display element would be experienced if struggle is seen when the contributor is generating or understanding information from that display element.
- ***Fixation rate overall (fixations / S):*** This metric has a close relation with fixation duration. Fixation should be regarding the opposite of fixation duration as the time between fixations (normally short duration saccadic movements of the eye) is fairly small when compared to the time spend fixating, fixation rate.

2.2.5 Eye Tracking for HCI Input

There has been investigation of eye movements usage for human-computer interaction in real time mostly based on disable users who utilize eye for input reasons [26][27] making the main focus of the study to be on disable users [28]. The subsequent interfaces are slow and complex to utilize for non-disabled people as the rest of user communication modes are inaccessible. Though, the targeted users experience a great benefit. The creation of the illusion of a useful graphic display forms another way in which real-time eye movement data has been utilized in an interface [66]. A large, ultra-high resolution display was tried to be simulated by earlier work in flight simulators. As a result, display portion that is presently being observed is shown with high resolution whilst the extended surrounding area is showed in lower resolution. Though, an improved display device is simulated by the eye movements where the common user-computer dialogue is not alter. The more common application of real-time eye movement data in HCI in more conservative user-computer dialogues, unaided or in conjunction with other input

modalities has been given attention by a fairly small amount of work. Various innovative eye movements' uses were illustrated by Richard Bolt after performing some of the initial work [67]. Various tracking works concerning moving targets were performed by Floyd Glenn through eye movement. An experiment where simple target selection and cursor positioning operations were conducted about twice as fast with an eye tracker than with conservative cursor positioning devices was reported by Ware and Mikaelian [70]. Two differences, based on the nature of the eye movements of the users and the nature of the responses, can be draw in measuring research in eye movement-based human-computer interaction where each of these could be observed as natural (in terms of a consistent real-world analogy) or unnatural (no actual world counterpart). It is effective to draw similarities, based on the eye movements as with the rest of interface design of the user, which utilize individuals' already-present abilities for working in the normal environment and then employ them in computer communication. Similarities are draw by direct manipulation to already-obtainable human abilities e.g. grabbing, pointing, moving objects, instead of trained behaviors showing its flourishment. Also, present navigation and manipulation of physical capabilities of individuals are exploited by virtual reality interfaces. As limited items in the actual world react to individuals' eye movements, the extension of the notifications proves to be difficult to eye movement-based interaction. Other individuals are the primary exclusion as they discover and react to being stared at straight as well as to a much reduced specific extent to another object an individual may be staring at. The eye movements of the user and the system responses can be viewed distinctly as natural or unnatural:

- *User's eye movements*: Eyes, in the world made by interface based on an eye movement, could be moved by users to image, the act just like in the real world where the existence of equipment of eye tracking could not affect natural eye movement. Alternatively, to activate the system (unnatural or learned eye movements), users can be instructed in regard to interface based on the eye movement to move eyes in specific directions, not essentially those that they would need to apply if they were on their own.

- *Nature of the response*: User's eye movements could be responded by objects naturally. This means that objects react to the user's staring at similar direction as objects. As mentioned, the drawing of such similarities in the actual world is from a limited domain. Unnatural response is the alternative where objects react in distinct ways not seen naturally. Hence, a taxonomy of four possible styles of eye movement-based interface is suggested:
  a. *Natural eye movement/Natural response*: Struggles are observed in this area since it uses an incomplete and understated domain for drawing analogies, that is, it relies on people's reaction to gazes from other people. A better instance of this mode is offered by Starker and Bolt where they draw from similarity of a tour attendant or host anticipates the desires of the visitors through gazing [29]. The utilization of eye movements in videoconferencing systems is another example [30]. Transmission of the actual eye position from one user to another through manipulation of the camera angle of video image processing is the aim to enhance a natural reaction from the recipient.
  b. *Natural eye movement/Un-natural response*: Eye movements were utilized as contribution in Jacob, R.J.K. work [31]. Though, different from those in the actual world. Hence, cooperation between complete artificial interface and whole similarity to the actual world is identified. Users were enhanced to view the display using usual scanning devices. However, reactions from the computer, usually not shown by actual world objects are induced by such scans.
  c. *Un-natural eye movement/Un-natural response*: Learned ("unusual") eye movements have been employed in operations by many past eye movement-based systems causing unnatural responses. Hands-busy and disabled applications has been observed to have such work in that, the achievement of an else difficult new capability repays the learning cost of the needed eye movements. Nevertheless, it is trusted that the actual benefits associated with interaction of the eye movement for many users will be in its spontaneity, variability, low rational load, and nearly unresponsive operation. Fairly aware, eye movements are essential as these benefits are weakened if unnatural.

d. *Un-natural eye movement/Natural response*: This taxonomy creates another category that is irregular and not seen in practice.

2.2.6 Visualization of Eye Tracking Data

The eye movement of the user across the screen, fixation by fixation, is represented by a ***Gaze Plot***. If "fixation" of the gaze of the user is registered at a particular screen point, every "dot" of the Gaze Plot is drawn. Thus, each is shown by a different dot and a number determined by fixations' sequence. The time taken by a user to fix or dwell on that particular spot is shown by the size of the Gaze Plot dot. In other words, the longer the dwelling, the bigger the dot and thus that screen spot is focused on [32].

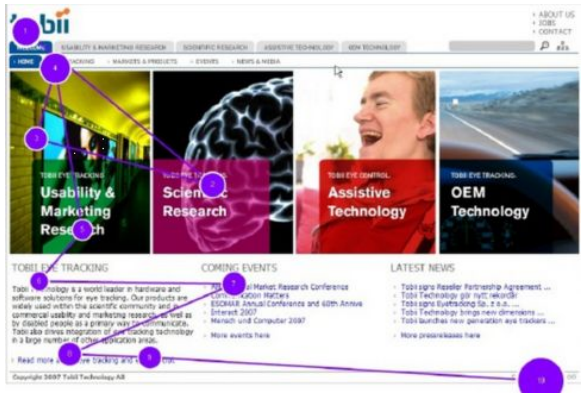

Figure 2.6 Tobii case study of Tobii website [78]

The various areas of the screen which have mostly been focused on by the user are shown by a ***Heat Map***. Green, Yellow, Orange and Red colored areas will be observed on the screen once a Heat Map is produced and thereby showing the most focused parts by the user for a specific period. As the least time focused on an area is represented by Green and the most time focused on an area of the screen is represented by Red, shifting of colors fluidly is observed from Green to Yellow to Orange to Red. The most focused areas by the user are represented by the Red areas, the "Hot Spots" in the Heat Map [33].

Figure 2.7 Tobii case study of Prada – LG mobile [79]

2.2.7 Current Applications of Eye Tracking for HCI Input

- **Shopping Behavior and Store Navigation**

Understanding claimed versus actual behavior.

It is hard to determine the exact items observed and read by people whilst they are shopping. In contrast to what shoppers claim to observe, the achievement of full understanding of how individuals interact with their surrounding and the impacts on the process of making decision is enhanced by eye tracking [34].

- **Packaging and Design**

For a product to succeed in a busy retail environment, it must be visible. A consumer is attracted to a product, in less than three seconds, on a supermarket shelf by its packing. You are enhanced to view a customer's reaction towards items on the shelf through eye tracking technology [35].

Figure 2.8 Tobii case study of eye-movement map in a supermarket [79]

- **Advertising and Sponsorship**

Advertisement opportunity is very narrow as many clients skip ads the moment they identify them where its source does not matter. The effectiveness of your marketing effort and how they are regarded by your audience can be determined by eye tracking [36] (see figure 2.7).

- **Usability Testing**

This refers to a research method, which assesses the simplicity use of a product. Customers are enhanced to attain their objectives faster, effectively, and with contentment by usable products. Real tasks, through the product, are tried by a representative sample of real or possible end users during usability testing. What contributors utter and do is viewed and recorded by researchers. Quantitative and qualitative performance and preference measures form the collected data. Issues associated with usability are detected using data. Then, to prevent the encountered problems, recommendations are provided by the researchers for improvement purpose. There is administering of differing types of usability tests for every phase of the product improvement life cycle. To evaluate initial design ideas based on prototypes or models, there is conduction of exploratory tests. To assess how the design idea was applied, evaluation tests are performed central into the improvement cycle. Lastly, to confirm how the real product relates to a standard, benchmark, or other products, confirmation tests are performed. The test becomes more quantitative and less qualitative [37] (see figure 2.6).

2.2.8 Future Directions of Eye Tracking for HCI Input

Much time has been utilized in studying eye movements in HCI. However, the major utilization of eye movement interfaces or widespread embrace of eye trackers in the marketplace has not yet been identified. The invention and widespread application of new input or output technologies was observed to have long term delay. For instance, the mouse was initially established as input device [38]. Its development took about ten years in other research labs and maybe its usage outside the research world took twenty years before it would be widely known. Instead of experimental computer vision algorithms and unusual video

processing hardware, simple mechanical values, which were well known from the beginning, formed the mouse base. Two major issues were identified by Jacob and his colleagues when they began work regarding this issue in 1988 at the Naval Research [38]. One was effective and cheaper eye tracking hardware and the other interface methods and directions of eye movements' usage in interface design. Expecting that the first would be developed by the eye tracker industry, they started working on the second issue using obtainable large, gawky, and expensive eye trackers. They intended to establish methods to be used in the existence of new equipment. Unluckily, the new equipment has not yet arrived. The improvement of eye trackers is slow partially because of eye tracker industry's nature where it entails small companies without large capital investment. Tens or hundreds of eye trackers can be sold yearly. Consequently, investing in the large engineering effort proves to be difficult as a favorable unit would be required. Limitations will thus be identified in the market due to absence of such a breaking of the cycle. A video camera, frame grabber, and a processor that can examine the video in real time are the common eye tracker hardware components. For teleconferencing purposes, normal computer workstations are usually integrated with the first two components. Standard components of desktop workstations are identified to be small video cameras and modest quality frame grabbers. They can also be applied in eye tracking. Additionally, the required processing can be performed directly by the existing CPU chips. Though, a few difficulties are observed. A frame buffer impartially high resolution and pixel depth is required where it should not be colored. To achieve adequate resolution to differentiate pupil's direction, the focus of the camera must be firmly on the eye which is difficult to attain. To solve this, a servo mechanism is used to point the camera a chinrest for user stability. This issue can, someday, be solved by a camera with wide field of view and very high resolution. To offer the corneal reflection, a small infrared light aimed at the eye is needed. Even though it is easier to provide it, it is not a default component of present camera-equipped desktop workstations. Limitation is observed in the essential eye tracker accuracy, which is effective in a real-time interface. This is because a user is required not to position his or her eye more

precisely than nearly one degree to see an object sharply. Eye tracking practical accuracy is limited by the normal jittering (microsaccades) of the eye and slow drift movements. Averaging over a fixation can develop accuracy; though, not in a real-time interface. One-degree effective limit is approached by the exactness of the best obtainable eye trackers applicable in these applications. Nevertheless, much is left to be anticipated by *stability* and *repeatability* of the measurements. The failing of the eye tracker shortly from time to time is tolerable in a research study where an experimental trial is needed to be discarded where the user is required to be informed of the issue. The obtainable backup modes can be opted by the user after realizing that he can no longer depend on the fact that he or she is the determinant of where the eye will be pointing at and this is observed in an interactive interface. Improvement of eye trackers has not been convening even though their prices seem to have dropped. Major limits are the main cause of poor performance.

2.3 Speech Recognition

2.3.1 What Is Voice Recognition?

This is a substitute of typing on a keyboard where one is only needed to talk to the computer and the uttered words will show on the screen. The aim of the software is to ease typing process and assist disabled people. Mostly, those people with physical disabilities benefit from it. Additionally, individuals with spelling difficulties such as including users with dyslexia are assisted as identified words are mostly spelled accurately [39].

2.3.2 History of Voice-Recognition

- **1950s and 1960s: Baby Talk**

Digits were the only recognizable characters by the initial recognition systems. This is logical as numbers were the first to be focused on by discoverers and engineers based on human language complexity. In 1952, Bell Laboratories created the "Audrey" system that identified

digits spoken through a single voice [40]. In 1962, "Shoebox" machine that could comprehend 16 words in English was illustrated by IBM after 10 years of recognition systems' introduction [40].

- **1970s: Speech Recognition Success**

In 1970s, main strides were made by speech recognition technology influenced by concern and support based on money from the U.S. Department of Defense [41]. One of the main speech recognition from 1971 to 1976 is The DoD's DARPA Speech Understanding Research (SUR) program where it was also in charge of Carnegie Mellon's "Harpy" speech-understanding system. 1011 words, which were almost the same vocabulary as of a three years old child, were recognized by harpy [42]. This is because a more effective search method known as *beam search* was introduced with an aim of proving the finite-state network concerning potential sentences. Development in search methodology and technology is related to speech recognition history since current devices have Google voice [43].

- **1980s: Speech Recognition Turns To Expectation**

The improvement of understanding based on the information given by individuals led to a development in speech recognition where multiple thousand words could now be recognized to an extent of having the capacity to recognize limitless words. Amongst the factors that contributed to this development is a new numerical approach called the *hidden Markov model*. The probability of unrecognized sounds was considered as words by HMM instead of applying prototypes for words and searching for sound patterns. This establishment would be ready for the subsequent two years. [44, 45]

Speech recognition began to enter into profitable applications for corporate and specific industry such as medical use after the expansion of vocabulary. Additionally, this expansion was observed at homes based on Julie doll Worlds of Wonder (1987) where training of children could happen to react to their voice.

- **1990s: The Mass Experiences Automatic Speech Recognition**

Computers containing faster processors were finally introduced in the 1990s where common people were also able to gain access to speech recognition software. The initial user speech recognition product, Dragon Dictate was launched by Dragon in 1990 for unlikely amount of $9000 [46]. Then, Dragon NaturallySpeaking with much improvement was introduced after seven years. Constant speech was recognized by this application as you could communicate effectively, naturally producing 100 words per minute. Nevertheless, the program was also expensive and you had to train for 45 minutes.

- **2000s: Plateaus of Speech Recognition - Till Google Follow**

An accuracy of 80 percent was identified in computer speech recognition by 2001 where there were some delays in the technology's progress almost at the end of the period. Limitation of the language made recognition systems to perform well; though, statistical models enabled them to guess. As Internet developed, same-sounding words and the familiar language world showed development. Voice Search on Android phones were added “personalized recognition” by Google in 2010 to enhance recording of the users’ voice through the software and generate a more precise speech model [47]. In mid-2011, Chrome browser was also integrated Voice Search by the company. As mentioned earlier, the development of voice recognition began with 10 to 100 words which then improved to a thousand. Currently, 230 billion words are integrated by English voice search system of Google from queries of the real user.

2.3.3 Voice-Recognition Software

The process of examining sounds and changing them to text is performed by voice-recognition software programs. Also, they employ the concept of English understanding to establish the words spoken by the speaker. About 95% of the spoken words in a clear way should be identified by the systems immediately it is set up effectively. Voice recognition is provided by various available programs. Mostly, Windows operating systems use these systems. Nevertheless, Mac OS X is also served by various programs. Windows Vista and Windows 7

operating systems sometimes come with built-in voice-recognition programs. The software, a microphone headset, a manual and a quick reference card are contained in various specialist voice applications. The microphone is connected to the computer through either sound card or a USB or same link.

Common User Interfaces of Speech Recognition

1-Windows Speech Recognition

The process entering and formatting text using a microphone is enhanced by Windows Speech Recognition software (Speech). Instead of applying the mouse and keyboard, you can speak by dictating text and give commands. Windows Vista program can accommodate speech recognition. Disabled individuals are therefore provided with new options by this new feature [48].

Features

A user is enhanced to have control over a computer by Windows Speech Recognition. A user can dictate text in documents as well as in e-mail messages, fill out forms, manage the operating system user interface, apply keyboard shortcuts, and use the mouse cursor through speech recognition.

Table 2.1 Frequently used commands in Windows Speech Recognition [49]

To do this	Say this
Click any item by its name	Click File; Start; View
Click any item	Click Recycle Bin; Click Computer; Click file name
Double-click any item	Double-click Recycle Bin; Double-click Computer; Double-click file name
Switch to an open program	Switch to Paint; Switch to WordPad; Switch to program name; Switch application
Scroll in one direction	Scroll up; Scroll down; Scroll left; Scroll right
Insert a new paragraph or new line	New paragraph; New line

in a document	
Select a word in a document	Select word
Select a word and start to correct it	Correct word
Select and delete specific words	Delete word
Show a list of applicable commands	What can I say?
Make the computer listen to you	Start listening

2- Dragon NaturallySpeaking

Dragon Systems of Newton, Massachusetts developed Dragon NaturallySpeaking which is a speech recognition software package that combined with Lernout and Hauspie Speech Products which was then attained by Nuance Communications, previously called ScanSoft [50]. Windows personal computers run the program. Version 13 that supports32-bit and 64-bit editions of Windows 7 and 8 is the most current package. DragonDictate or Dragon for Mac is the terms used to refer to the Mac OS version.

Features

It applies a less user interface where dictated text, as they are spoken, appear in in a floating tooltip; though, speed can be increased by suppressing the display. The words are then transcribed into the active window at the cursor location by the program. Three main areas of functionality are identified in the software: dictation, text-to-speech and command input. Dictation is performed by the user where speech is transcribed as written word. Also, there is a document created as an audio stream, or give commands, which are identified like that by the program. Additionally, differing computers in a networked environment can be used to access voice profiles, even though there must be compatibility between the audio hardware and configuration [50]. To have control over programs or functions that are not built into NaturallySpeaking, custom commands are created through professional version.

Controlling the Microphone: • Go to sleep/Stop listening • Wake up/Listen to me • Microphone off	**Getting Help:** • Give me help • What can I say • Display sample commands
Selecting and Correcting: • Select <xyz> • Select again • Select the next <number> characters • Select previous paragraph • Select document • Correct <word> • Select all • Unselect that	**Inserting Lines and Spaces:** • New line • New paragraph • Press Enter • Press Tab key
Capitalizing: • Capitalize that; Cap that • All caps on • All caps off • No caps	**Editing and Formatting Text:** • Cut that • Copy that • Copy all to clipboard • Paste it here
Moving Around in Your Document: • Move left <number> words • Move down <number> lines • Go to end of line • Page up • Page down • Insert before <xyz>	**Undoing and Deleting:** • Scratch that • Delete that • Undo that • Backspace <n>

Table 2.2 Frequently used commands in Dragon NaturallySpeaking [51]

2.4 The Simple Designs of Web Page Elements

The art of influencing the attention of the user on a page to transfer meaning, sequence, and interaction points is called page layout. Even if it is finally an art, layout of a good page has more rationality beyond our imaginations. The next title will elaborate more on various significant ideas from graphic design where we will be guided on layout of pages to enhance our understand how page layout is used by editors to influence user's attention. Visual hierarchy, visual flow and focal points, and grouping and arrangement will discussed. Solid ways to utilize those high-level ideas to interface design are described by eight patterns.

The Patterns

2.4.1 Grid of Equals

What are grid of equals?

Items are arranged in a grid or matrix. A mutual template should be followed by each item where their weight should be equal [52]. Connect to jump pages as needed.

When can it be used?

Various content items having same style and significance including products, news articles, blog posts, or subject areas are entailed in the page [52]. To make the user preview and choose these items, you are needed to offer rich opportunities.

Why is it needed?

Equal significance of a grid is identified when every item is offered equal space. The user is shown similarity in items by the mutual templated for items in the grid [52]. Hence, a great visual hierarchy matching your content's semantics is developed by these methods.

Grids look attractive meeting the desired style site or application.

How can it be used?

Think of how each item in the grid should be outlined and be creative. Then, use different ways to test if all the need information fir into a comparatively small space and then use that template to the needed items. Then, arrange the items in a grid using either a single row or a matrix that is wide, fitting two, three, or more items [52]. As you perform this design, consider page width. Grid items can be highlighted either statically or dynamically to stress on item. It is not recommended that you change the positions, sizes, or other structural features of the grid items; though, you can apply color and other stylistic modifications.

Example

Nike uses a rigid template for each item. The overall effect is rhythmic and calming. Note how the site uses a different balance of text and imagery.

Figure 2.9. Nike [52]

2.4.2 Module Tabs

What is module tab?

Use a small tabbed area to put content modules to view one module at a specific time [52]. Differing modules are brought to the top by the user through clicking on the tabs.

When can it be used?

Much heterogeneous content are available to be shown on the page where some page content are in groups or modules [52]. The following characteristics are of those modules:

- Only one module should be viewed at a time
- Have same length and height
- They are less modules
- Modules' set is impartially static
- Some relation maybe seen in their contents

Why is it needed?

Desktop interfaces and websites contain tabs therefore easing the understanding of their operation [52]. Generally, a useful method for interface decluttering is grouping and hiding content chunks.

How to use it?

Firstly, have decluttering an interface straight. If it has not been performed, separate the content into logical chunks and name them with unforgettable titles. Users might be required to switch back and forth between tabs when comparing them or in search for information if the separation was incorrectly done. Do not make a mistake when indicating the selected tab. Instead, make it attaching with the panel. Though, it is not a must that tabs be accurate or be at the top of the modules' stack. They can be put facing sideways.

Example

MapQuest uses the tabs, instead of the traditional menu and toolbars

Figure 2.10 MapQuest [52]

2.4.3 Wizard

What is wizard?

A user is enhanced to perform tasks in a recommended order [52].

When can it be used?

The designing of a UI for some task which is long and complex will normally be new to users as they are not used to do something of that sort. The designer, according to your perception, will have more knowledge of how to get the tasks done than the user. Tasks that fit this method seem to be branched or tedious. The trick is that there must be willingness from the user to give in control over what occurs when. As decision making is an unwanted burden, the trick turn out to be effective in many cases. For instance, it is easier to follow a sequence of signs in an uncommon airport instead of thinking about the whole structure of the airport [52]. Wizards

are regarded as annoyingly stiff and limiting by expert users. Software that offer support to creative processes including coding are a good example. Also, users are not shown by wizards what their intended actions are or the application stage to be change when making choices. This can irritate some of them and therefore, be familiar with your users.

Why is it needed?

The task is made easier when you divide the task into a series of chunks where each can be handled by the user through a separate "mental space" [52]. A user is spared the effort of thinking the structure of the task by making a preplanned road map over the task.

Though, some complications can be associated with the task, an effective solution can be seen when a task is simplified by making a few button clicks to perform the trick [52].

How to use it?

Task "Chunking"

Split the operations establishing the task into a sequence of chunks or operations' groups for suitability purpose [52]. Screens for product choice, payment information, a billing address, and a shipping address are contained in a thematic analysis for an online purchase. Earlier choices do not determine later choices and therefore presentation order does not matter that much. Forms being filled out by individuals are simplified through the combination of associated choices. To alter the downstream steps through user choices, the task can be divided at decision points, which is optional. For instance, the user, in a software installation wizard, can opt to install desirable packages needing more choices. Alternatively, those steps can be skipped if a custom installation is not needed. Since the user will never see any inapplicable thing from the choice made, branched tasks are effectively presented by dynamic UIs.

The tricky part in designing this kind of UI is forming a balance between chunks sizes and their number. Having a 2-step wizard is meaningless where a 15-step wizard is then wearisome [52]. Though, every chunk considerably large to avoid the loss of various benefits related to the pattern.

2.4.4 Movable Panels

What is movable panel?

Put content modules into flexible boxes. You should freely arrange the boxes on the page and enhance them to be custom configured by the user [52].

When can it be used?

A desktop application or a website that many users sign in to is designed. Movable Panels is frequently by news portal, Dashboard, and Canvas Plus Palette applications [52]. You intend to make users feel comfortable when applying the software. The main part of the app or site is the page in question. The page can contain mixed content such as text blocks, lists, buttons, form controls, or images. Though, not everything will fit. Various content of the page are in groups or modules. The following are characteristics of those modules:

- Multiple modules will be expected to be seen by the user at a time
- Users value them differently.
- The modules are of different sizes.
- The users might be concerned with the modules' position
- A viewer might be confused by the many modules available and therefore, desirable ones should be chosen by you or the user.
- Various modules can be hidden or unhidden from the view by the users.
- The modules may relate to a tool palette or other rational system of interactive elements.

Why is it needed?

Interests differ from users. When individuals choose desirable content, it proves the importance of websites including dashboards and portals [52].

Individuals using a desktop application can arrange the environment to favor them. They can apply Spatial Memory to retrieve things, place applicable tools to a desirable position, or hide inapplicable things. Users are enhanced to perform actions effectively by Movable Panels. Individuals are appealed by this type of personalization on various levels. The applicable

environments for them are rarely visited websites. Involvement and buy-in can be increased by personalization. Lastly, new modules presented over time are accommodated by Movable Panels design.

How to use it?

Give every module a name, a title bar, and a default size, and arrange them as needed. Give the user an option to move modules freely [52]. Allow the opening and closing of each module to be through a simple gesture. Your desirable design may enhance users to place the pieces at any place and time. You may also desire a pre-defined layout grid contain "slots" enabling drag and drop of pieces; hence, maintaining page alignment and saving user's time. Ghosting, big drop targets appearing are also used by various designs animatedly. Enable the removal of modules completely by the user where this can be achieved through an "X" button [52]. Allow users to add modules, maybe new one chosen from a list of accessible modules that can be attained through browsing and searching. Customization may be facilitated by modules by providing settings editor to change some parameters for content or observing. This is made available by various designs where they locate a button or drop-down menu on the title bar of the module. Opened and closed modules' state between sessions must be preserved by Movable Panels in an application or a website signed in to by the user.

Example

iGoogle, shown in figure 2.11, demonstrates the mechanics of dragging and dropping a Movable Panels around a page. A user grabs the title bar of a panel; at the beginning of the drag operation, a dotted-line "ghost" shows the place where the panel had been.

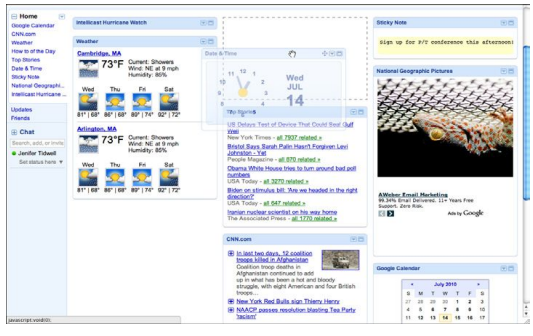

Figure 2.11 iGoogle, after starting a panel drag [52]

2.4.5 Center Stage

What is center stage?

Put the significant UI part into the main subsection of the page or window by grouping secondary tools and content in smaller sections [52].

When can it be used?

The user is enabled to see a single unit of coherent information by the page. Secondary information is other content and functions. A Center Stage can be used by various types of interfaces. Therefore, web pages showing single articles, images, or features should be your priority [52].

Why is it needed?

Instead of moving around the page in confusion, the user's eyes should be immediately be guided by the design to the start of vital information/task [52]. User's focus is anchored by clear central entity. UI purpose is determined by the entity in Center Stage. The items in the margin will then be evaluated by the user based on how they connect to what is in the center. This makes it easier for the user.

How to use it?

Develop a visual hierarchy containing the chief content or document controlling everything. These specific factors should be considered when designing a Center Stage

- *Size*: The content of the Center Stage should roughly be twice as wide as the item in its side borders and twice as tall as its top and bottom borders. The user may change its size in some UIs. Remember to observe the fold carefully as a small screen might be used. The Center Stage should occupy more space of the above-the-fold.
- *Color*: Apply color that compares with the objects in the margins. Window grey corresponds well with white in desktop UIs [52]. As other colors are applied by ads and navigation bars as their backgrounds, white is best for web pages as web users are familiar with plain text on a white background.

- *Headlines*: The eye of the user can be drawn to the Center Stage top by big headlines since they are focal points [52]. This is also seen in print media.
- *Context*: What content is expected to be found by the user when the page is opened? Utilize those presumptions by putting the expected in Center Stage. As a result, other rule concerning visual opinions will be surpassed. Therefore, the main content should be put in a considerable area so that the user does not need to look for it, it should be visible.

Normally, center is the main used position especially when the Center Stage is just sufficient. Conventions regarding what is to go into which margins are contained in well-developed genres. You should be very careful as you apply your creativity. If you are not sure of the layout, take a screenshot and look for reviews from someone else, asking suggestion of where to start the main content.

Examples

Figure 2.12. TED-associated websites, with related but slightly different visual frameworks [52]

2.4.6 Accordion

What is accordion?

Use a collinear mass of panels that are flexible in opening and closing, to put modules' content [52].

When can it be used?

Everything cannot be accommodated as you have much varied content to display on the page [52]. Various page content are normally in modules or groups. The following are characteristics

of those modules:

- Multiple modules will be expected to be seen by the user at a time
- Modules are not of the same size but they have the same width.
- Modules also belong to a tool palette, two-level menu, or other clear system of cooperative components.
- There is some relation in module's content.
- Modules' linear order can be preserved.

The screen or window may be scrolled off by the labels found on the Accordion's bottom when large or multiple modules are open. Use another solution if that proves to be a problem to your users.

Why is it needed?

Web pages are now found to have adopted Accordion nearly to be common like Module Tabs and drop-down menus. Though, they are not really reliable. To control long lists of pages and groups, Accordion are implemented by various websites in their menu systems [52].

Generally, interface decluttering can be achieved by grouping and hiding content chunks. Accordion are also found in Module Tabs, Movable Panels and Collapsible Panels [52]. Even though Accordion shine in desktop application, they can be effective in web page navigation systems. Specifically, Accordion as well as Movable Panels works well with tool palettes. Users are enhanced to change modules' "living area" by Accordion as they can open them. However, infrequently applied module can be easy to reopen when required.

How to use it?

The modules should be arranged vertically to suit your application or site. Each module should be given a brief and expressive title, putting it into a horizontal bar to enhance the user to click and be able to pin the module open and close [52]. You can use a rotating triangle icon to show the "openability" of a module title bar. Enable the opening of one module at a time. Though, this differs from designers. In accordance with my perception, users should be enabled to open

many modules at a time. As a result, the unexpected and sudden vanishing of an earlier open module is avoided [52]. An Accordion chooses to maintain its opened and closed modules' state between sessions when it is used in an application or user is logged in to a site. Though, it is not significant for navigation menus. If additional subdivision is needed by module contents, Accordion can be nested; however, they seem to look undecided. Distinguishing the dissimilarity between an "outer" accordion panel and an "inner" accordion panel seem to be hard for users. This is because the containment hierarchy has no clarity as everything is contained in one column. If required, one flat collection of accordion modules and other arranging pattern inside a module can be applied. The existence of this method is roughly from 1993 or earlier [52]. Closable panels are used by UIM/X (User Interface Management/ Experience) which is the Motif-based GUI builder.

Example

CNN uses an Accordion to show personalized material.

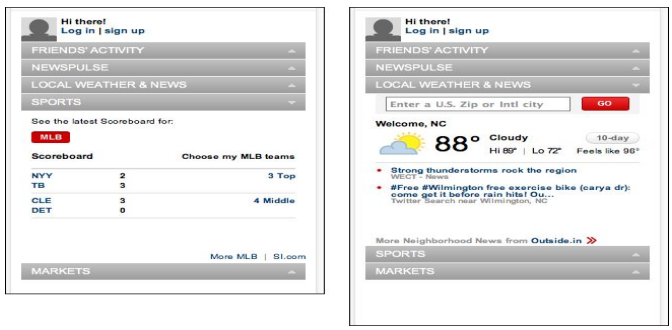

Figure 2.13 CNN sidebar [52]

2.4.7 Collapsible Panels

What is collapsible panels?

Use panels to put secondary or free material which are flexible based on opening and closing [52].

When can it be used?

Everything cannot be accommodated as you have much varied content to display on the page

and the space is limited. Nevertheless, Center Stage content might be available, which requires to take visual significance [52]. Various page content are normally in modules or groups. The following are characteristics of those modules:

- Content in the central part of the page is annotated, modified, explained, or supported by their content.
- The modules might proof to be insignificant for any of them to be operated through default.
- Their importance may differ from user to user as there are those who will care to view specific module whilst other will not show concern.
- A module may be effective at a particular time to the user and the other times may seem ineffective. Its space suits to be used by the chief content of the page when it is not open.
- Opening of more than one module during similar time can be the desire of users.

The modules do not really depend on each other. Modules are grouped together when Module Tabs or Accordion are applied, showing that, to some point, they have a relation, however, they are not grouped together by Collapsible Panels.

Why is it needed?

The interface is simplified by hiding non-crucial pieces of content. The chief content is given back the space when a module that maintains the content is hidden by the user as it only collapses. Thus, this illustration in an example of the progressive disclosure principle where hidden content are shown "right in time", as when and where it is required [52].

Generally, interface decluttering can be achieved by grouping and hiding content chunks. This can be achieved through Module Tabs, Accordion and Movable Panels where Collapsible Panels is part of them.

How to use it?

Use a panel to every supporting module which can be opened and closed by the user through a single click. Use the name of the module or just "More" to label the button or link and you can use a V-shape or rotating triangle to show more hidden content [52]. Devote the space applied by the panel when the panel is closed by the user to other content. You should animate the

panels when they open and close. Less dislocating is observed when the panels' zip open and close again. You could combine the modules on one panel together with Module Tabs or an Accordion if the module you want to hide is more than one. Alternatively, you can put them separately on the central page. Also, switch Collapsible Panels to be opened by default if you realize that majority of the users are opening it where it had previously been closed.

Examples

Mozilla Firefox, shown in figure 2.16 , demonstrates how useful it can be to collapse a panel that's outlived its usefulness

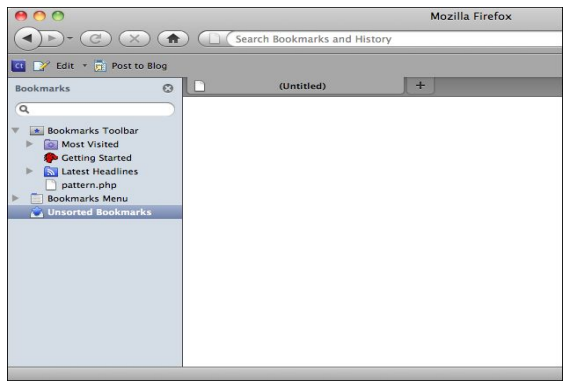

Figure 2.14 Firefox bookmarks sidebar [52]

2.4.8 Radio Button and Check-Box

What are radio buttons and check boxes?

- The user is enabled to select only one of a pre-described collection of options by a graphical control element known as a radio button or option button [75].
- The user is allowed to make a binary option, an option between one or two probable equally exclusive options by a GUI widget called a checkbox [75]. For instance, a yes or no question can be answered by the user by 'yes' (checked) or 'no' (not checked).

When can it be used?

- **Radio buttons** are applied in existence of a list of two or more choice, which are equally exclusive where one choice has to be selected by the user [75]. This means that a previously

selected item in the list will be deselected by clicking a non-selected radio button.

- **Checkboxes** are applied in existence of a list of options where any kind of number of choices such as zero, one, or more may be selected by the user [75]. This means that every checkbox stands on its own in the list and therefore, no box is affected when one is unchecked.

How to use it?

- **Apply standard visual representations:** There must be a small square containing a checkmark or an X when selected, in a checkbox. Present visually groups of choices as groups and separate them clearly from other groups that are on similar page [75]. Since the layout makes the two checkboxes seem to be addressing different topics when they are essentially alternate options for a particular topic, the given guideline is violated by the boxed instance.
- **Apply subheads to split a long list of checkboxes** into reasonable groups. As a result, choices are made faster to scan and simple to comprehend. However, this method has a risk factor as each subgroup might be viewed by the user as a distinct set of option where this is not essentially serious for checkboxes as each box depends on its own choice [75]. Though, a list of radio buttons have to be combined to enable you not to use subheads with a purpose of splitting it.
- **Lay out your lists vertically** using one option per line: You have to space buttons and labels if you have to apply a horizontal layout with many optional choices per line to make it understandable which choice matches with which label. For instance, it is hard to view the correct radio button to click for option four in the following list.
- **Use positive and active wording** for the purpose of checkbox labels to make it understandable what will follow if the user turns the checkbox on.
- To enhance the user to understand what will happen when they check a specific box and

what will follow when they do not check it, write checkbox labels.

- Alternatively, you can apply two radio buttons whose purpose is to have the feature on and off. Those two cases should have clear labels.
- **If possible, apply radio buttons instead of drop-down menus**: The existence of lower cognitive load enables radio buttons to make all choices lastingly visible to enhance the users to compare them easily. Also, users who face hard times when moving the mouse can use radio buttons as they make the operations easier [75].
- **Always offer a default selection for radio button lists**: You should never display radio buttons without a default selection as they constantly have precisely one selected option. On the other hand, checkboxes frequently default to having unselected options [75].
- You should offer a radio button with an option of renouncing as users might view it as an effective option. You can use a checkbox labeled "None." It is also effective to have users click an option instead of making them to just leave an option from being selected in the list. This is because, in the end, the rule of having precisely one option selected is violated.

Why is it needed?

What if you prefer the use to select only one amongst many options? The RadioButton control will be useful in this particular scenario. This is because radio button which is termed as option button, constantly function as a contributor to the group [75]. All other radio button contained in the group will be cleared when one radio is selected. The user is directed to a collection of choices by describing a group of radio buttons where one and only one can be chosen. To enhance users to select between exclusive options, you can apply a group of RadioButton controls. You can collect information regarding the status of the RadioButton control from the RadioButton just like in the case of a CheckBox. There is a relation between the check box control and the radio button control where each is applied to specify a selection made by the user. On the other hand, they have a difference where only one radio button in a group can be selected at a particular time [75]. Nevertheless, any number of check boxes, in check box

control, may be chosen. Simple data binding can be applied to connect a check box to components in a database. The GroupBox control may be applied to group many check boxes. As a result, visual appearance and user interface design will benefit from that as grouped controls can be moved together based on the form designer.

Example

The below figure presents the use of radio button in an online survey.

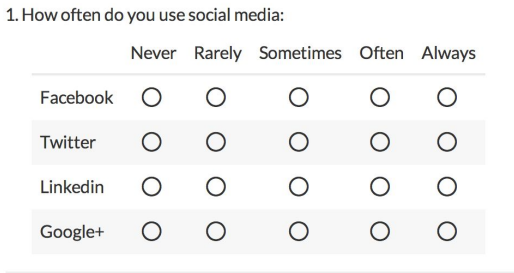

Figure 2.15 Radio buttons are used in surveygizmo.com

The below figure presents the use of Check-box in an online survey.

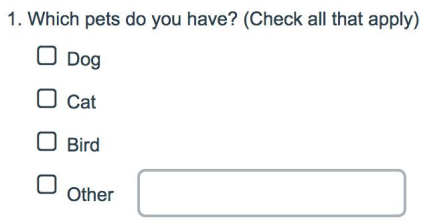

Figure 2.16 Check-boxes are used in surveygizmo.com

3.0 Methodology

In this chapter, we will discuss the equipment used in the study, in addition to considering the participants who took part in the study. The objective of the study and the hypotheses will also be discussed in this chapter. We will further illustrate the methodology that was utilized for the experiment and the design of the web pages.

3.1 Gadgets

It was important that the gadgets used for both conducting an experiment and gathering the data were completely available. The gadgets included a Windows tablet, eye tracker, headset with microphone, monitor, keyboard and mouse.

The experiment room

The experiment room was reserved to conduct the study. It can be seen below in figure 3.1. The lab contained a table with a Windows tablet, eye tracker, microphone, monitor, keyboard and mouse. Since disturbance and interruption can affect the experiment results, we had to make sure that we selected the room with the quietest atmosphere. Furthermore, the same atmosphere and conditions were provided for all participants. Also, Laurentian University provided a key for the room to ensure that access was secure.

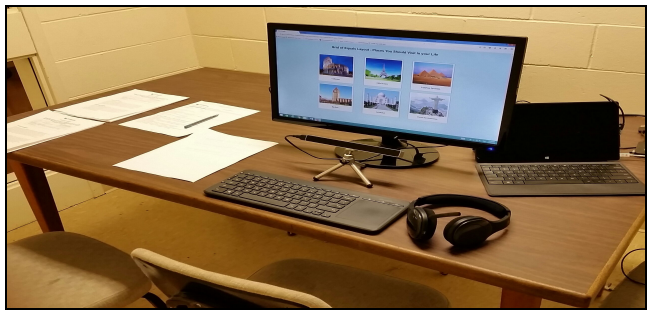

Figure 3.1 Typical experiment room with computer, windows tablet, eye tracker, microphone, monitor and keyboard

Windows Tablet

A 64 bit - Windows tablet with 4 GB of RAM and 1.70 GHz of i5 processor was used to conduct the experiment. The tablet had 32.1 GB of free hard disk space. A Windows wireless keyboard and mouse were used in the experiment.

Monitor

In the study, a brand new Samsung HD LED monitor with screen size of 21.5 inches and with resolution of 1920x1080 enabled the participants to navigate in a wider view using the eye tracker. The monitor was connected to the tablet through an HD cable.

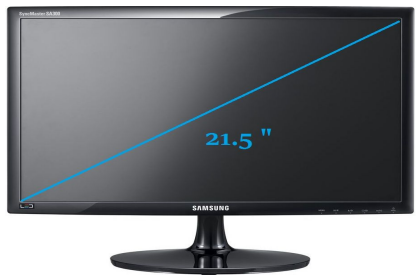

Figure 3.2 Samsung HD LED screen

Eye tracker

In the experiment, the eye tribe tracker was used. This is the world's first affordable eye tracker, costing $99, with full software development kit. The eye tracker was provided with USB 3.0 port and cable which enabled easy connection to the tablet. The following are some of its characteristics:

• Sampling rate: 30 / 60 Hz
• Accuracy: 0.5 – 1 degrees
• Working range: 45 – 75 cm
• Trackbox: 40 x 30 cm at 65 cm distance (30Hz)
• Screen sizes: Up to 24"

Minimum system requirements:
• PC version: Windows 7/8
• Mac version: Mountain Lion 10.8.4
• USB 3.0 port
• Core i5/i7 processor (or similar)
• 1GB RAM or more

• Internet connection

Figure 3.3 The eye tribe tracker

The use of the eye tribe tracker

In the experiment, the eye tracker was fixed in front of the screen to catch participant eye movement. The participant sat on a chair and started navigating the web pages through the use of the eye tracker instead of the mouse and keyboard.

Figure 3.4 Pictures that show how the eye tracker was used in the experiment

Microphone

In the experiment, logitech headset with microphone along with Dragon NaturallySpeaking software were used as speech input mechanism.

Figure 3.5 Logitech headset with microphone

3.2 Collection of Data

The process of preparing and gathering data is called data collection. Accurate data collection is one of the major principles of any type of research study. The results of a study can be influenced by collecting inaccurate data and lead to invalid results. In order to obtain accurate results, this study used a software to record participants' performance. BlueBerry FlashBack (BB FlashBack) was used in the experiment to record screen video for participants' performance and their voices during the experiment. Furthermore, this software provided us with a time frame that helped track actions taken by participants such as clicks, hovers, drag and drop, typing a letter in milliseconds as well as how long it took them to finish a particular task. Using BB FlashBack, we were able to accurately measure the time taken in each task.

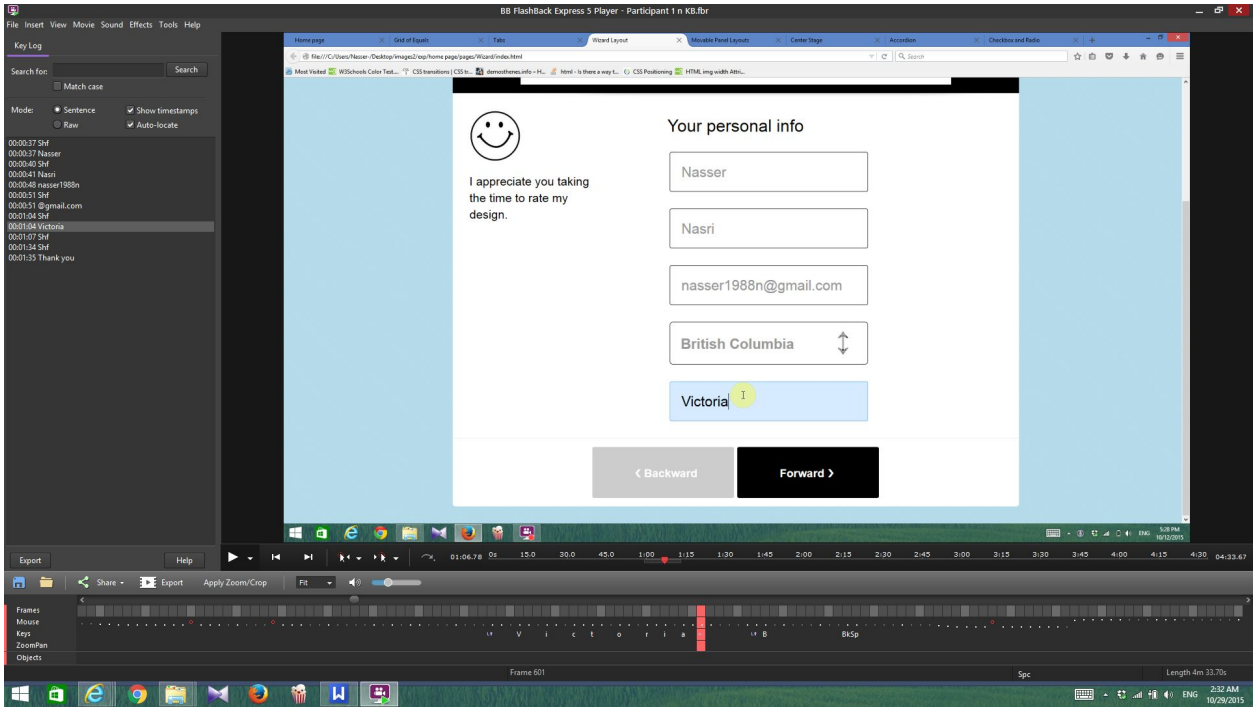

Figure 3.6.A screen shot of one of the participant's perform using BlueBerry FlashBack during the pilot study

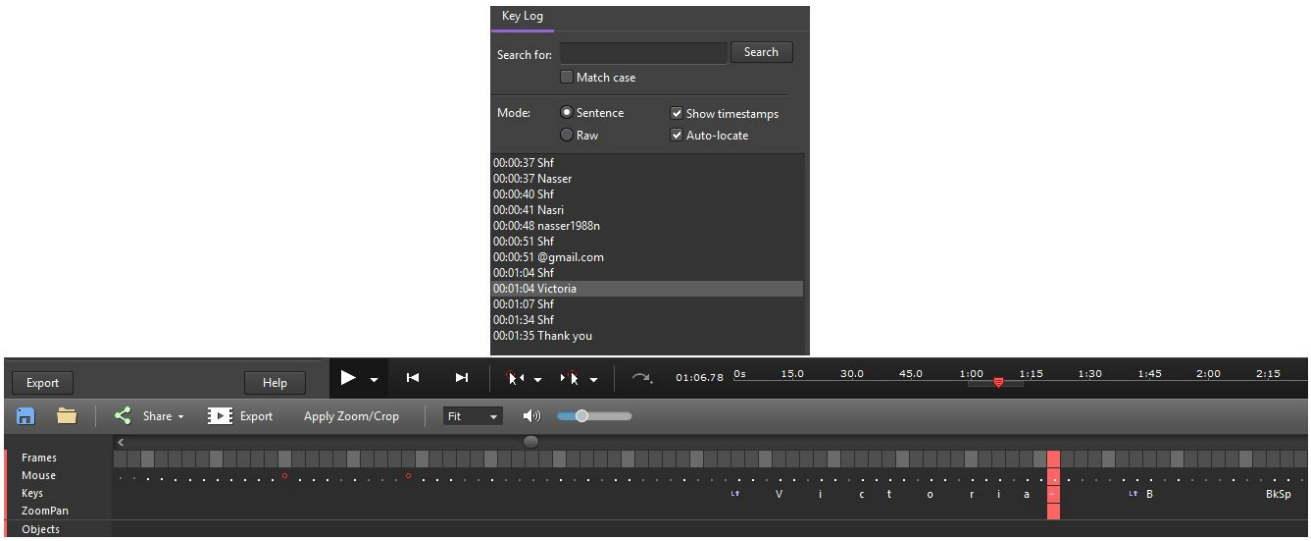

Figure 3.7. An example from the pilot study showing the time taken to type in the wizard using the keyboard

A questionnaire was another method that was used to collect the data. After the experiment, it was given to the participants to capture their feedback regarding the experiment. It contained various questions, such as the age of the participant, which input method they preferred, and the level of their education (undergraduate or graduate student) (see appendix D for the questionnaire).

3.3 Pilot Study

The main goal of the study was to conduct the experiment for navigating the basic layout of web page elements using keyboard, eye tracker and speech recognition software. We started the study after designing eight layouts of web page elements. A pilot study was conducted before the actual experiment to evaluate feasibility, time, cost, possible adverse events, and to make sure everything was in alignment before running the main experiment. Five participants were involved in the pilot study to determine whether the experiment procedure would be successful and to validate if the layouts would perform smoothly. The pilot study had revealed some issues including the fact that too much brightness in the room can affect the eye tracker function of detecting eye position. In addition, the needed commands for speech recognition interface were provided to the participants for review before starting. This was removed during the test and, as such, it was difficult for them to retain and recall the commands. As a result, a page with written commands was given to them to help them retain the data during the experiment. Overall, the pilot study had revealed that the required time for each participant to learn to use the two input mechanisms and to perform in the study ranged from 50 minutes to 1 hour.

After running this test, the data that was collected from the five participants was not considered for analysis. All of the pilot study participants' data was ignored and not involved in the real experiment. Those five participants were not involved in the main experiment in that they were trained to perform the tasks and that could have potentially affected the results.

3.4 Participants

The experiment involved students from Laurentian University. In the study we did not look for a particular type of participant; therefore we picked average students who use the Internet on a regular basis. In order to recruit users to participate, permission was granted from the Research Ethics Board at Laurentian University. (see appendix B to review the certificate of approval).

Both males and females were part of the study. The participants were required to perform the same seven tasks for each input mechanism: mouse and keyboard, eye tracker and speech recognition. Therefore, this information was considered in order to predict the number of participants that we needed in the study to obtain the findings that we were seeking. Wisely, the experiments were conducted with a counterbalanced measures design to avoid the pitfalls of standard repeated measures in the experiments. Since the experiment has three input mechanisms: 3! (3*2*1 = 6) and seven tasks: 7! (7*6*5*4*3*2*1= 5040).

1= Mouse and keyboard
2= Eye tracker
3= Speech recognition interface

The Case			
A	1	2	3
B	1	3	2
C	2	1	3
D	2	3	1
E	3	1	2
F	3	2	1

First 6 participants	F	E	D	C	B	A
Second 6 participants	F	A	E	B	D	C
Third 6 participants	A	B	F	C	E	D
Fourth 6 participants	B	C	A	D	F	E
Fifth 6 participants	C	D	B	E	A	F

Table 3.1 Input mechanisms counterbalancing

In addition, a random generation along with the Balanced Latin Square was used in designing the experiment in order to avoid carryover effects of one task to another. For the experiments with an odd number of conditions, the first row of the Latin Square will follow the formula 1, 2, n, 3, n-1, 4, n-2…, where n is the number of conditions. For subsequent rows, one is added to the previous number, returning to 1 after n. The first seven rows were created in this way, the second seven are a mirror image, and the rest is a random generation.

Size = 7 tasks to be preformed by 30 participants.

Participant	KB	Eye tracker	Speech recognition
1	1 2 7 3 6 4 5	2 1 3 4 5 6 7	2 4 6 3 7 5 1
2	2 3 1 4 7 5 6	3 5 7 1 6 2 4	1 2 7 3 6 4 5
3	3 4 2 5 1 6 7	4 3 5 2 6 1 7	7 6 5 4 3 2 1
4	4 5 3 6 2 7 1	1 5 2 6 3 7 4	2 3 1 4 7 5 6
5	5 6 4 7 3 1 2	3 2 4 1 5 7 6	4 7 3 6 2 5 1
6	6 7 5 1 4 2 3	4 7 3 6 2 5 1	3 4 2 5 1 6 7
7	7 1 6 2 5 3 4	2 1 3 7 4 6 5	1 5 2 6 3 7 4
8	5 4 6 3 7 2 1	7 6 5 4 3 2 1	4 5 3 6 2 7 1
9	6 5 7 4 1 3 2	1 7 2 6 3 5 4	5 3 7 1 6 2 4
10	7 6 1 5 2 4 3	2 4 6 3 7 5 1	5 6 4 7 3 1 2
11	1 7 2 6 3 5 4	1 2 7 3 6 4 5	1 2 3 4 5 6 7
12	2 1 3 7 4 6 5	7 6 1 5 2 4 3	4 3 5 2 6 1 7
13	3 2 4 1 5 7 6	2 3 1 4 7 5 6	7 1 6 2 5 3 4
14	4 3 5 2 6 1 7	6 5 7 4 1 3 2	3 2 4 1 5 7 6
15	1 2 3 4 5 6 7	3 4 2 5 1 6 7	5 4 6 3 7 2 1
16	3 5 7 1 6 2 4	5 4 6 3 7 2 1	2 1 3 7 4 6 5
17	1 5 2 6 3 7 4	4 5 3 6 2 7 1	6 5 7 4 1 3 2
18	4 7 3 6 2 1 5	7 1 6 2 5 3 4	1 7 2 6 3 5 4
19	7 6 5 4 3 2 1	5 6 4 7 3 1 2	7 6 1 5 2 4 3
20	2 4 6 3 7 5 1	6 7 5 1 4 2 3	6 7 5 1 4 2 3
21	1 3 2 5 4 7 6	3 5 6 7 1 4 2	4 3 5 2 6 1 7
22	5 1 6 3 2 4 2	2 3 4 1 6 7 5	7 4 6 3 1 5 2
23	1 2 3 7 4 6 5	6 7 4 5 3 2 1	7 1 6 2 3 4 5
24	4 2 3 6 1 5 7	1 2 7 3 6 4 5	5 7 6 4 2 1 3
25	2 3 1 7 4 5 6	2 5 3 4 1 7 6	6 4 2 5 1 3 7
26	5 2 4 3 7 1 2	4 5 3 6 2 7 1	1 4 6 2 5 3 7
27	5 6 4 7 3 1 2	2 7 5 1 4 6 3	7 1 2 3 6 4 5
28	7 6 5 3 4 1 2	4 3 5 2 6 1 7	5 6 7 4 1 3 2
29	2 1 3 7 4 6 5	4 3 5 2 6 1 7	4 5 3 6 2 7 1
30	5 4 6 3 7 2 1	2 4 3 6 7 5 1	3 2 4 1 5 7 6

Table 3.2 Tasks counterbalancing

Voluntarily, the participants were asked to read and sign the informed consent to gain their participation before starting the experiment. What is more, they were given the right to withdraw from the experiment at any time and for any reason such as getting nervous, frustrated, or even before starting the study. The participants were told that there was a software program working in the background to record their performance. The informed consent stated the purpose of the research, the benefits from participating, the risks of participating, the required time for the experiment, the confidentiality of data and a brief description of the tasks that they will perform. After the experiment, a questionnaire was

handed out to the participants to answer some questions related to the experiment. Five groups were created for the experiment, each group consisting of 6 participants, resulting in 30 participants in total. The number of participants in each group was picked based on the counterbalanced measures design as it illustrated previously.

3.5 Objective

The objective of conducting this study is to investigate the speed and accuracy of navigating the basic layout of web page elements using eye tracking and speech recognition mechanisms. Eight layouts were designed for this experiment and they are as follows: grid of equals, module tabs, wizard, movable panel, center stage, accordion, radio button and check-box, and collapsible panel. These layouts were designed in a particular way so that they can be navigated through the use of the eye tracker and also through the use of speech recognition interface. Each task was designed to measure the time that an average participant would take to perform using the three input mechanisms. In addition, three other tasks were designed to test the accuracy of navigating these layouts.

Testing the Speed

- Task 1: The objective of this task was to measure the time taken for the participants to point at three items of grid of equals' pattern and open them. The same task was performed to point at and open three headlines of center stage pattern.

- Task 2: This task was designed to let us know how long it takes an average user to complete a form of wizard.

- Task 3: The objective of this task was to measure the time taken to drag and drop two movable panels at the right spots. This task was performed on the movable pattern.

- Task 4: The objective of this task was to measure the time taken to open one title on the collapsible panels, followed by opening a particular subsequent title.

- Task 5: This task was designed to observe how an average user would interact with the radio buttons and check boxes. In this task, participants had to decide their answers before starting the navigation.

- Task 6: In this task, the participants had to navigate to a particular sport tab and play a video that is related to that tab. The time taken to point at the tab and open the related video were measured.

- Task 7: The objective of this task was to measure the time taken to navigate accordions' layout and open the headlines and then close them.

Testing the Accuracy

To test the accuracy of pointing, we picked the smallest elements in the layout of web page elements to investigate how easy it is to point at these elements through the use of eye tracking and speech recognition. Accuracy, number of target re-entry, steering law, movement time and total time measures were applied to task a and task b.

- Task a: The objective of this task was to measure the accuracy of pointing to the first term of rating the layouts which was implemented in the wizard layout.
- Task b: This task was designed to measure the accuracy of pointing to the first radio button which was implemented in the radio buttons and check boxes layout.
- Task c: In this task, the participants had to steer the cursor through the tunnel of the collapsible panel. This layout was a fit pattern to apply steering law.

3.6 Hypotheses

Before starting the study we had a hypothesis for each task. After conducting the experiment, we could see whether to accept the null hypothesis or reject it.

Null Hypothesis A : There is no difference in time taken by the participants when performing all of the tasks through the use of the eye tracker and speech recognition interface not including mouse and keyboard since it is known that mouse and keyboard are faster than the other two mechanisms. However, we still do not know how fast mouse and keyboard is compared to the other two mechanisms. Therefore, seven tasks, with seven null hypotheses were initiated. Each task had a null hypothesis as the following:

Null Hypothesis for Task 1:

Task 1 was divided into two subtasks. In the first subtask, the participants had to navigate the page and open three items of grid of equals and then close it. In the second subtask, the participants had to open three items of center stage layout and close it. The null hypothesis of this task is that there is no difference in the time taken to finish these subtasks through the use of the eye tracking and speech recognition mechanisms.

Null Hypothesis for Task 2: There is no difference in the time taken to complete a form of wizard through the use of the eye tracking and speech recognition mechanisms.

Null Hypothesis for Task 3: There is no difference in the time taken to drag and drop two movable panels at the right spots.

Null Hypothesis for Task 4: There is no difference in the time taken to open one title on the collapsible panels, followed by opening a subsequent title through the use of the eye tracking and speech recognition mechanisms.

Null Hypothesis for Task 5: There is no difference in the time taken to interact with the radio buttons and check boxes and answer the questions through the use of the eye tracking and speech recognition mechanisms.

Null Hypothesis for Task 6: There is no difference in the time taken to navigate to a particular tab and play a video using the eye tracking and speech recognition mechanisms.

Null Hypothesis for Task 7: There is no difference in the time taken to open three accordions and close them through the use of the eye tracking and speech recognition mechanisms.

Null Hypothesis B: There is no difference in accuracy of pointing through the use of the eye tracking and speech recognition mechanisms.

3.7 Method

After receiving the approval from the Research Ethics Board – Laurentian University for conducting the study, we were ready to recruit participants and start the experiment. Before starting, the use of the experiment room was obtained and the participants were given the informed consent documents to sign. At the end of the experiment, the participants were given a questionnaire regarding the experiment. HTML, CSS, JQuery and JavaScript were the main languages that were needed to create and design the web pages. The combination of these three languages enabled us to design a full website that contained many pages, each page containing one basic layout of web page elements. The contents of the layouts of web page elements were designed to be larger than the normal size. In addition, most of layout elements were built near each other in order to improve the efficiency of pointing through the use of both input mechanisms. It has been proven scientifically that eye movements are not a steady sweep, but tend to be a series of little jumps with intervening fixation pauses [71]. Since Fixation and ScanPath need to be taken into account in navigation through the use of an eye tracker, we designed the main items of each web page in appropriate sizes to meet that need. It is a scientific fact that light blue is associated with health, healing, tranquility, understanding and softness. Therefore, it was selected to be the main color for the background of the web pages, and light purple was chosen for highlighting the items. Black was decided on for the colour of the buttons and white for the items colour (see figure 3.8). MB-Ruler software was used in the

study in order to measure the distance between the web page elements. In addition, SAS (Statistical Analysis System) was used for analysis of variance.

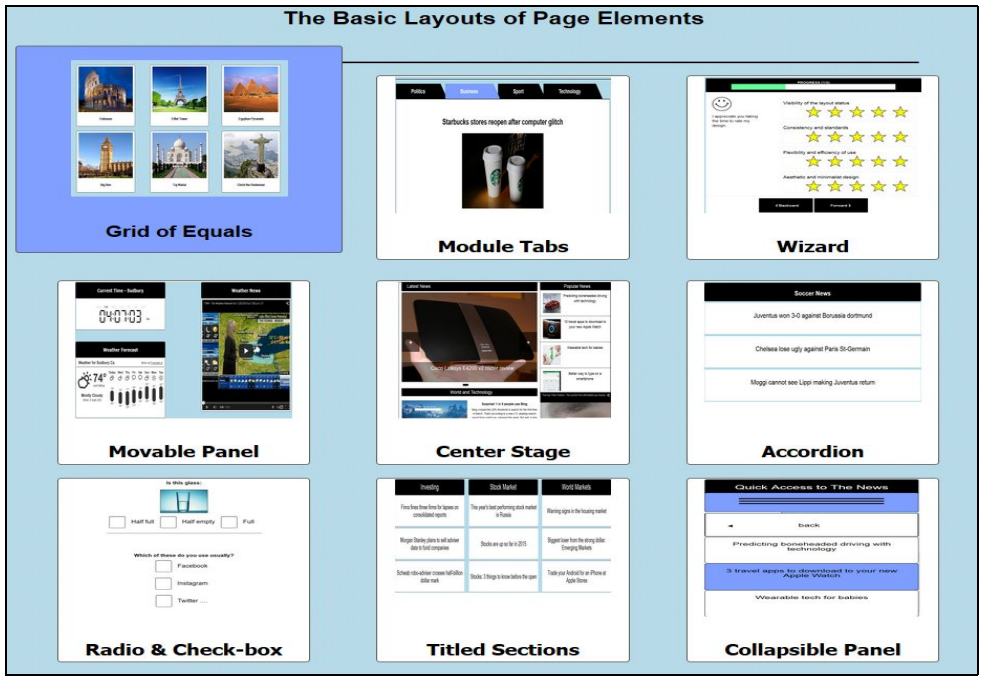

Figure 3.8 The home page of the basic layout of web page elements

3.7.1 Running EyeTribe UI

Placing the eye tracker under the monitor and directing it towards a user's face for optimal tractability was the first step that we needed to do before running the system. Once we completed this step, we needed to click on the tracking system icon. There are two ways through which a user can run EyeTribe UI application. One way is to click on the icon on the desktop and another way is to have access to the EyeTribe folder located in the start menu inside All Programs. By tracking down this folder location C:\Program Files (x86)\EyeTribe\ - we were able to find two sub folders, Client and Server. Once we opened the EyeTribe UI, the server started to get the system automatically ready for detecting eyes and start the calibration. Figure 3.9 shows the white icon for EyeTribe UI and the black icon for EyeTribe Server.

Figure 3.9 EyeTribe UI and EyeTribe Server icons

The EyeTribe UI provides a set of information that a user can change such as the number of points that a user has to follow during the calibration, the size of the screen, background color of the calibration mode and other options like activating the use of eye tracking to control the cursor. When the calibration is done, this UI provides direct feedback of the current tracking state with the ability to change the default settings to fit the user's needs.

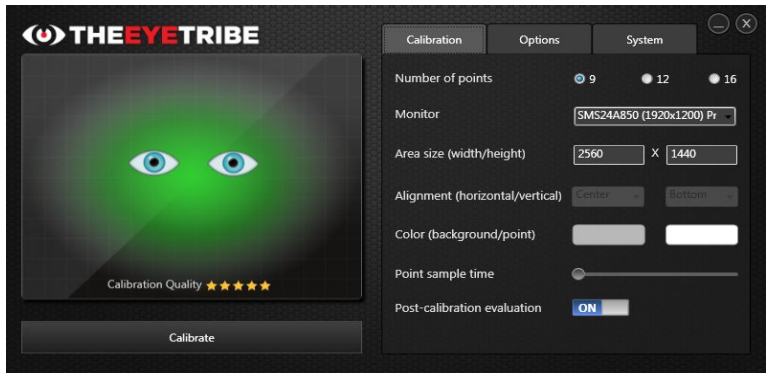

Figure 3.10 screenshot of EyeTribe UI user interface

3.7.2 The Trackbox

When we opened EyeTribe UI, we came across the trackbox on the left-hand side of the interface. The animated eyes in the trackbox represent the position of participant's eyes relative to the tracker. It also worked as a guide to determine whether the participant's eyes were within the tracking range of the system. In addition, it provided continuous feedback on the current tracking quality. The server kept tracking eye movements continuously and reflected that in a form of eyes animation in the trackbox. That was indicated by showing none, one or two eyes in the trackbox with a background that changed its color based on the tracking quality. Two eyes with a green background indicated that the tracking quality was acceptable besides providing physical movements in real time. One eye with a background shimmering in color from green to yellow indicated that the tracking quality was poor and a participant needed to be

in the range of the eye tracking device. A cross out sign with a red background indicated that participant's eyes were not in the range of the system at all. The background with an error message indicated that the eye tracker was not connected to the computer (see figure 3.11).

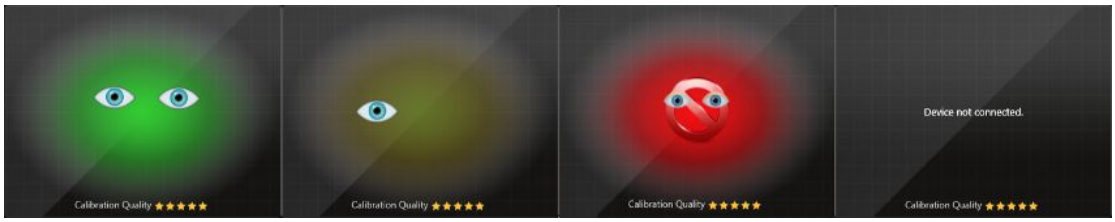

Figure 3.11 Four cases of tracking that show good, limited, bad tracking and an error message.

3.7.3 Calibration

After the participants positioned themselves correctly, they had to go through a personal calibration process. The reason for this is that each person has different eye characteristics, and the eye tracking software needs to model these in order to estimate gaze accurately. This process of calibration requires an average participant to take approximately 20 seconds to complete, and consists of looking at a circular target that is displayed at different locations of the screen on a blank background for intervals of approximately 2 seconds each. The participants had to follow the circle, as this was displayed on the screen. The calibration process was completed when all the calibration circles had been displayed on the screen. The system started providing (x, y) coordinates of the participant's gaze point through the API (application program interface).

It is important to know that the eye tracker was not moved once the participant had finished the calibration successfully. In case the participant had moved the eye tracker to a different spot, he/she would need to re-calibrate in order for the eye tracking system to update the calibration parameters to match the new location of the tracker. Figure 3.12 shows the pattern once the participant finishes the calibration successfully. A minimum of 9 calibration circles that covered most of the screen needed to be followed by eye to ensure the collaboration was done

successfully. Using more circles (e.g. 12 or 16) helped to improve the accuracy of the gaze coordinates computed by the system.

Figure 3.12 The EyeTribe UI evaluation window.

Once the participants had finished the calibration process, the action panel was displayed in the lower bottom of the window to show the evaluation. It consisted of a rating control and two options to either accept the rating if the calibration done successfully or re-calibrate to improve if the calibration was poor. The calibration rating table (see table 3.3) shows the accuracy of the possible calibration results which vary from five-star to zero-star ratings.

Rating	Message	Description
★★★★★	Perfect	This is an optimal calibration result. No recalibration is needed. (< 0.5°).
★★★★☆	Good	This calibration result is well-suited for eye eye tracking (< 0.7°).
★★★☆☆	Moderate	This calibration result is acceptable but you should try to improve your result with a re-calibration (< 1°).
★★☆☆☆	Poor	This is not an optimal calibration result. You should try to improve your result by re-calibrating (< 1.5°).
★☆☆☆☆	Re Calibrate	Your current calibration result is no good for eye tracking. Re-calibrate after verifying that you have good tracking.
☆☆☆☆☆	Un Calibrated	You are not calibrated. If you see this after a calibration you need to restart EyeTribe UI.

Table 3.3 Calibration rating

3.7.4 Mouse Actions Toolbar

Before starting the process of navigation we had to find a way to perform the mouse actions through the use of the eye tracker. As a result of the investigations, we came across a mouse actions toolbar that is written in C++ language and is compatible with the eye tribe tracker. The toolbar application was obtained from tobii.com. After the program is started and a supported device was selected, the toolbar can be seen on the right side of the screen, and there is a transparent window with the cursor inside it, which follows your eye movements. The toolbar is divided into ten squares and each square has its own function. The top and the bottom squares are used to navigate up and down through the bar. The other squares are related to the mouse functions such as left click, double left click, right click, drag, scroll, keyboard and a square that can move the bar to the left side based on the user's preferences (see figure 3.13). The dimensions of each square are 6 cm x 6 cm. To pick up a mouse function, the participants had to fixate their eyes on the square they wanted for two seconds before the function would be ready for use. Next, the participants had to look at the intended element on the layout and fixate on it for two seconds to perform the action. This process is applied to all functions.

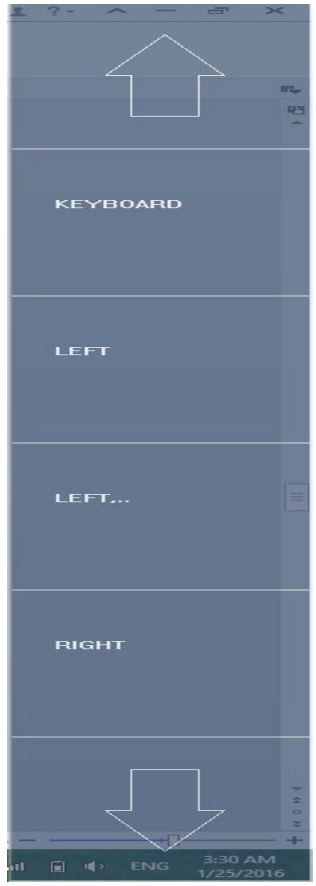

Figure 3.13 Mouse actions toolbar

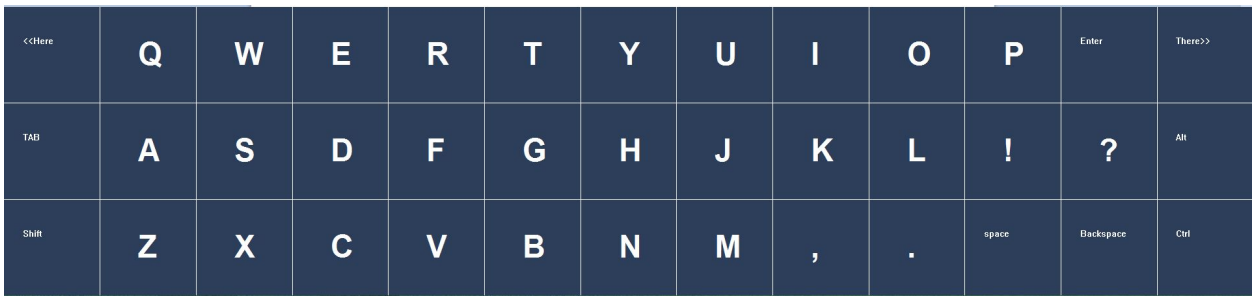

Figure 3.14 The keyboard that was used for typing through the use of the eye tacker

3.7.5 Testing The Speed

Task 1 (Open three items of grid of equals and center stage)

This task represented the main idea of navigating various content items having same style and significance and determining how long it would take a user to open and close three particular items. The user needs to move the cursor to reach the first item, then open it. Once a user opens the first item, a popup panel will appears to display more information regarding the item. The popup panel is provided with a close button to assist the user in closing the panel. The same idea was applied to the other items. The main items were designed with dimension of 6.90 * 6.98 cm. In this task, the user has to open the first, third and fourth items. The distance between the first item and the third one is 17.69 cm. Whereas the distance between third and the fourth item was19.58 cm (see figure3.9). The time taken for the participant to interact with this layout and travel from one item to another was recorded in the software for analysis. The same approach was applied to center stage layout where the user has to open three particular titles. Each title takes a user to a new page to read more about it. Each title page is provided with a return button to the home page. The distance between the second and the 12th title is 38.81 cm. and the distance between twelfth and the sixth item is 19.24 cm.

Figure 3.15 The layout of task 1- Grad of Equals

Figure 3.16 The layout of task1 - Center Stage

Task 2 (Fill in forms and rate the layout)

This task is focused on navigating a form in a recommended order and determining how long it will take a user to complete filling in forms. The wizard was designed to take a user through three steps. In the first step, a user was asked to fill in forms where he/she needs to move the cursor to reach the text-fields and type in the first name, the nickname, the email address, the area and the city. The user was given the option of writing either any related information or type in the following information: First name: jeary, Nickname: Jea, Email address: Jeary@gmail.com, Area: Ontario and City: Sudbury. Most of the participants opted to write their own personal information. Once a user finish filling the forms correctly, he/she will be forwarded to the second step of the wizard where he/she has to rate the layout. In the third step,

a user is asked to write a quick comment like ‘thank you’, then submit the forms (see figure 3.11- 3.12). The time taken for the participant to complete interacting with this layout and travel from one step to another was recorded in the software for analysis.

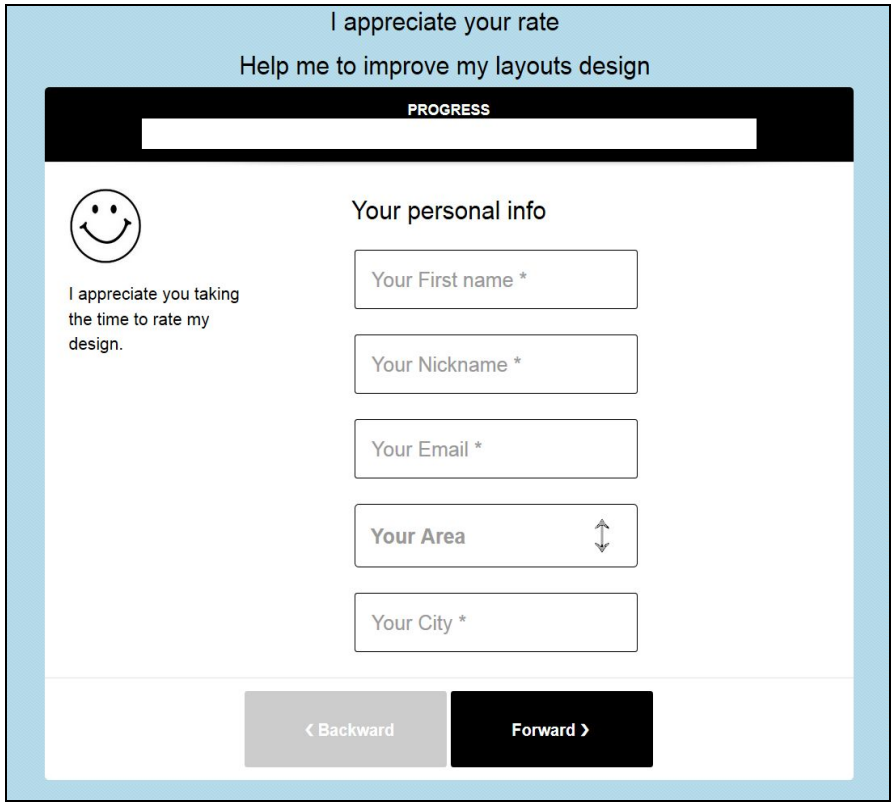

Figure 3.17 The layout of task 2 - Wizard - step 1 : Fill in forms

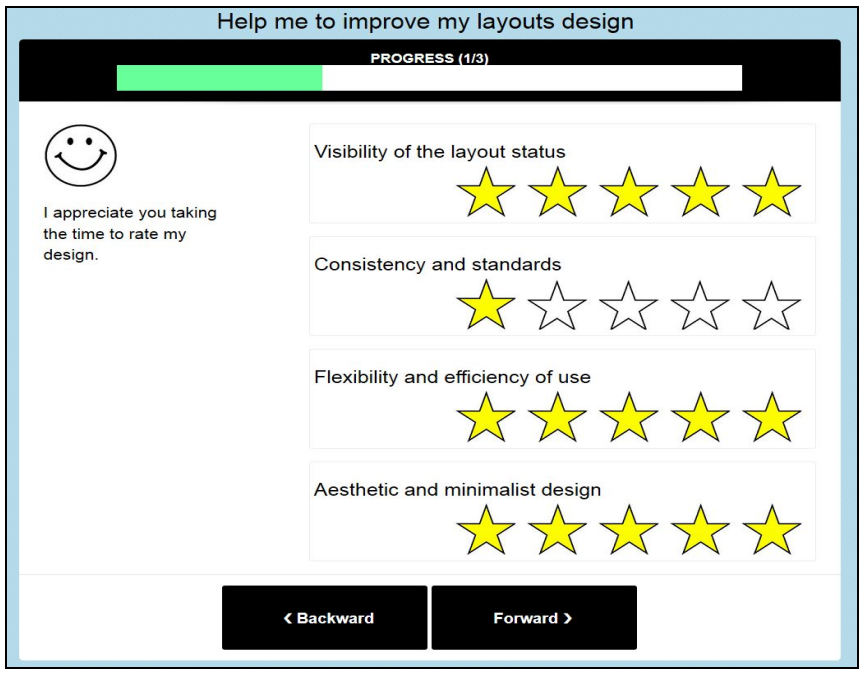

Figure 3.12 The layout of task 2 - Wizard - step 2 : Rate the layout

Task 3 (Drag and drop the movable panels)

This task represented the main idea of freely arranging the boxes on the page and enhancing them to be custom configured by the user. The movable panel layout was designed to be open and closed as the participant likes. Two invisible columns were designed for the purpose of drag and drop and each column had panels that can be dragged. In the first step a user was asked to drag one of the panels on the right and drop it on the left column, then drag one of the panels on the left and drop it on the right column (see figure 3.13). The time taken for the participant to complete the whole task was recorded in the software for analysis.

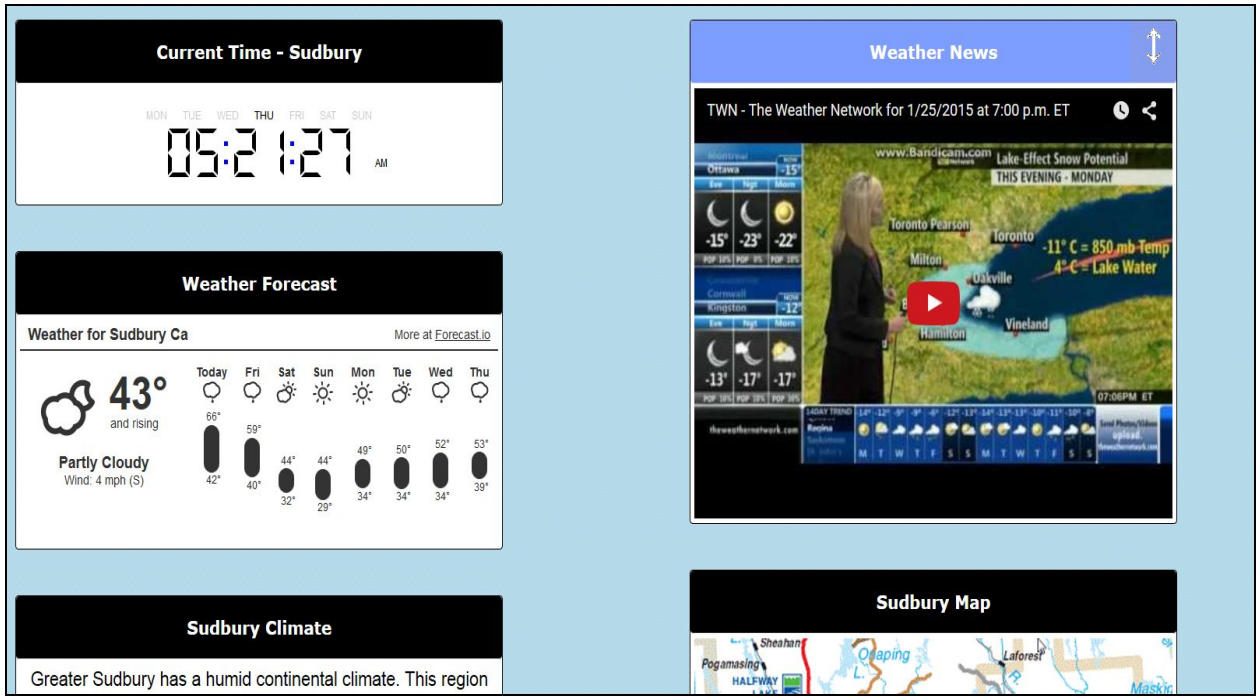

Figure 3.18 Part of the layout of task 3 - Movable Panels

Task 4 (Navigate through collapsible panels)

This task is concerned with navigating secondary panels which are flexible based on opening and closing. In this task we would know how long it will take a user to open the panel and reach a particular item on that panel. The user needs to move the cursor to reach the (Quick Access to The News) panel. Once a user reaches the panel and clicks it, the panel will collapse

automatically to show the user three types of news (latest news, popular news and world technology news). The user is asked to navigate to world and technology news and open the last headlines there, where he/she will be directed to new page that contain the related clicked topic. The whole panel is provided with a back button to support the user returning to the main panel (see figure 3.14). The time taken for the participant to finish this task was recorded in the software for analysis.

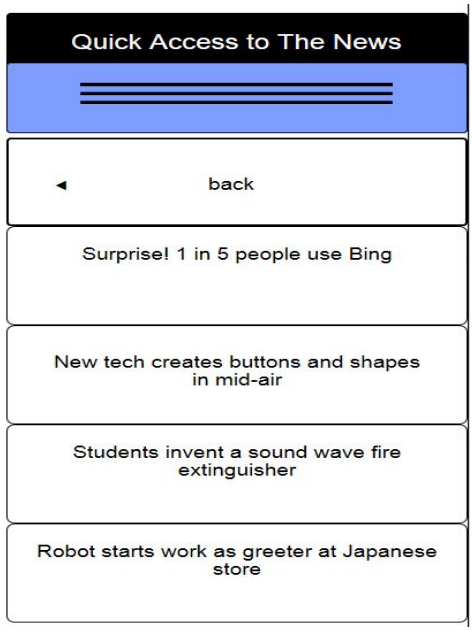

Figure 3.19 The layout of task 4 - Collapsible Panels

Task 5 (Interact with radio buttons and check-boxes)

This task involved interacting with radio buttons and check-boxes and how long it would take a user to answer the questions based on marking the radio and check boxes. In this task, a user needed to know his/her answers before starting the task. Once a user knew the answers, he/she has to move the cursor to reach the radio buttons and check-boxes to mark the answers. When a user answers the questions, he/she has to click on the submit button to finish the task. The radio button and check-boxes are designed with the dimension of 1.29 * 1.50 cm (see figure 3.15). The time taken for the participant to finish this task was recorded in the software for analysis.

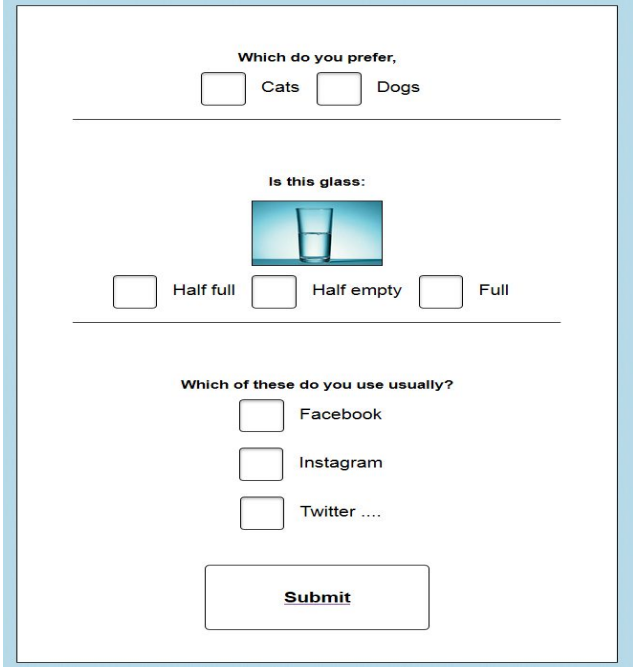

Figure 3.20 The layout of task 5 - Radio Buttons and Check Boxes

Task 6 (Navigate through the module tabs)

This task is concerned with navigating a small tabbed area to view one module at a specific time. In this task we determined how long it will take a user to point to and open a particular tab to see its contents. In this task, a user needs to move the cursor to reach the sport tab. Once a user open this tab, he/she has to open the video which is attached to that tab (see figure 3.16). The time taken for the participant to finish this task was recorded in the software for analysis.

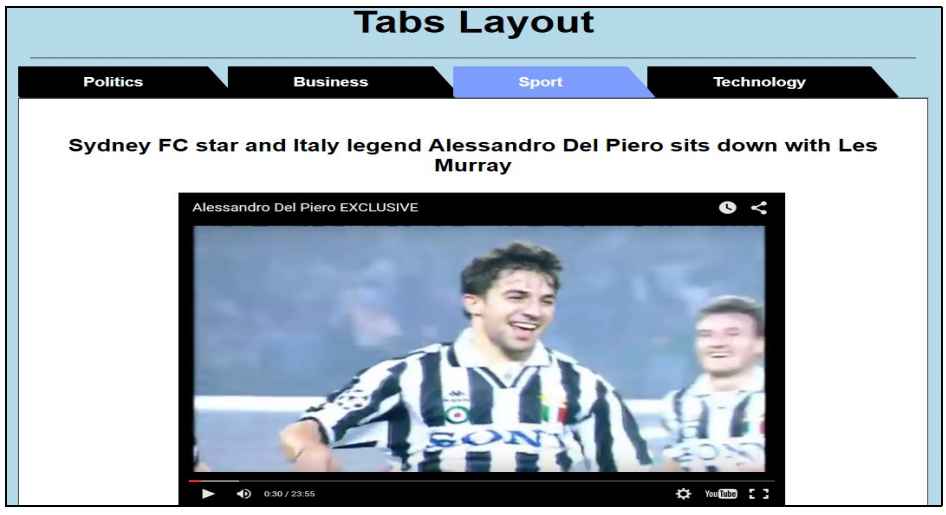

Figure 3.20 The layout of task 6 - Tabs Modules

Task 7 (Open and close three accordions)

This task is interested in measuring the time taken when a user interacts with a collinear mass of panels that are flexible in opening and closing. The user needs to move the cursor to reach the first accordion then open it. Once a user opened the first accordion, he/she had to scroll down the page, then continue opening the rest of the accordions. When the user finishes opening the three accordions, he/she would be asked to close them gradually. Each accordion is designed with the dimension of 2.72 * 21.45 cm (see figure3.17). The time taken for the participant to interact with this layout and travel from one item to another was recorded in the software for analysis.

Figure 3.21 The layout of task 7 - Accordions

3.7.6 Testing The Accuracy of Pointing

To test the accuracy of pointing, we picked the smallest elements in the layout of web page elements to investigate how easy it is to point at these elements through the use of eye tracking and speech recognition. The accuracy, number of target re-entry, steering law, movement time, throughput and total time were the main measure to investigate the accuracy of pointing. The definition of these parameters are described as followings:

- **Accuracy (%):** accuracy here is reported as an error rate - the percentage of selections with the cursor outside the target. A correct selection is defined as the participant moves the cursor moving into the target area and clicks in the target area [72].

- **Number of Target Re-entry (TRE):** is defined as the numbers of cursor re-entry the target before clicking [73]. For example if this behavior is recorded twice in a sequence of ten trials, *TRE* is reported as 0.2. The more number of target re-entry, the less accurate the mechanism is.

Figure 3.22 Target re-entry

- **Steering Law (SL):** SL in HCI is defined as the predictive time taken to steer a cursor through a tunnel of length A and width W. It can be expressed as the following relation :

$$T = b\frac{A}{W}$$

Steering law is a predictive model that is derived from Fitts' law where *b* is identified as the slope of the movement time for the cursor and that is equal to 200 ms/bit [74].

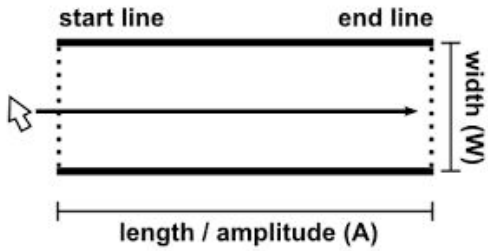

Figure 3.23 Steering law parameters

- **Movement Time(MT):** is defined as the time that the participant spend from beginning of cursor movement to the cursor reach the edge of a target [72].
- **Throughput (TP):** in bits per second, is a composite measure derived from Fitts' law

representing both the speed and accuracy of participant performance [72].

$$TP = \frac{ID}{MT}$$

$$\text{Where } ID = \log_2\left(\frac{D}{W} + 1\right)$$

The term *ID* is the index of difficulty, in "bits". It is calculated from *D*, the distance to the target, and *W* , the width of the target.

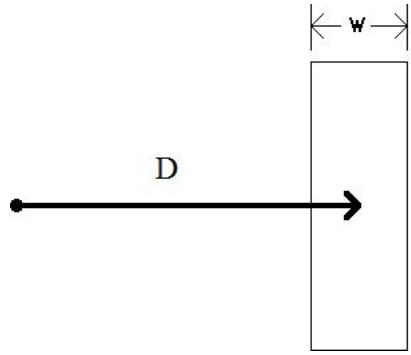

Figure 3.24 The distance and the width of the target in the index of difficulty

- **Total Time (TT):** is defined as the time the participants take to complete a task of pointing then clicking.

The previous measures were applied to the first term of rating which was implemented in the wizard layout (Task a) (see figure 3.25). These were also applied to the feature of answering the first question of the radio buttons and check boxes layout (Task b) (see figure 3.26). Moreover, the collapsible panel was a fit layout to apply steering law and was considered to be task c. The results of the predictive time are compared to the actual time that is taken by the participants to steer through the tunnel (see figure 3.27).

Figure 3.25 Task a - The first term of rating the layouts (wizard layout)

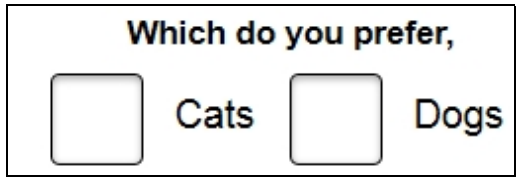

Figure 3.26 Task b - The first question in radio buttons and check boxes layout

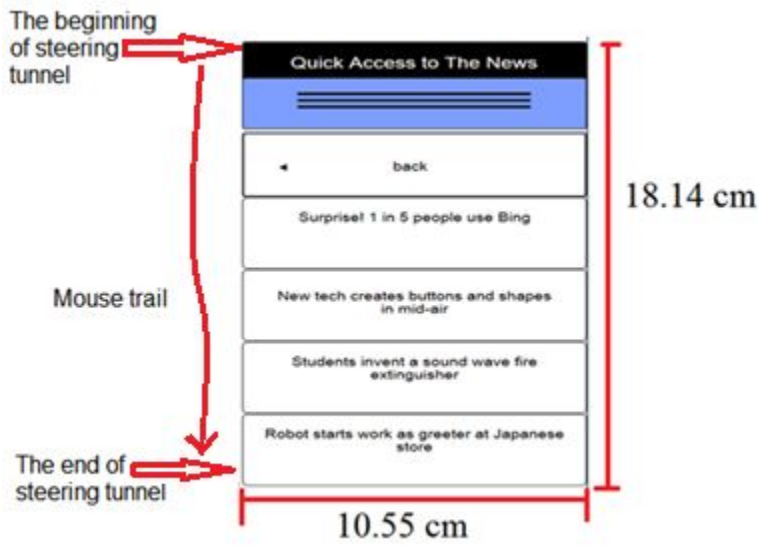

Figure 3.27 Task c - the length and the width of the tunnel

4.0 Result

4.1 The Result of Testing The Speed

Task 1

As discussed in the previous chapter, Task 1 represented the purpose of navigating various content items having same style and significance and how long it would take a user to open and close three particular items. After analyzing the data for Task 1, a number of outliers were found in the data on the two mechanisms:

1. Eye tracker = 2 outliers were found in grid of equals whereas 3 outliers were found in center stage layout.

2. Speech recognition = 5 outliers were found in grid of equals and the same number of outliers were found in center stage layout. As a result, we had to remove these outliers from the measures and then do the calculations. The overall mean time taken to complete the task on the three input mechanisms was calculated. This can be seen in Figure 4.1.

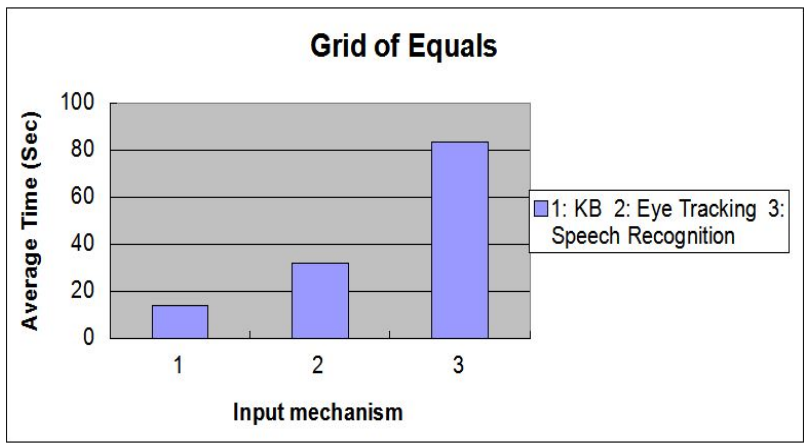

Figure 4.1 The mean time taken to perform Task 1 per input mechanism (time in seconds)

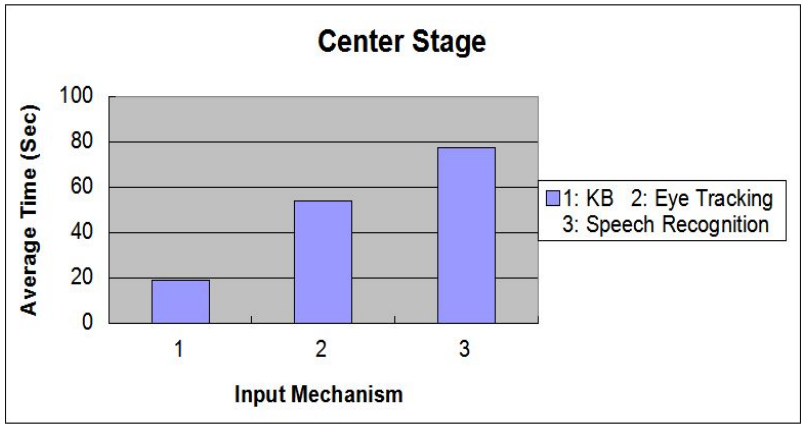

Figure 4.2 The mean time taken to perform Task 1 per input mechanism (time in seconds)

The bar chart indicates that the participants took less time to perform the task through the use of the mouse and keyboard (KB), with 13.99 and 19.17 seconds in case of center stage. However, the mean time taken to complete the task using the eye tracker was 32.10 and 54.17 seconds in navigating center stage. Whereas the speech recognition response was 83.76 and 77.50 seconds in navigating center stage. The Task 1 statistics on the three input mechanisms can be seen in Table 4.1. In the table, you will see the three input mechanisms specified in the first column. In the second column you will see the value of N which indicates the number of participants in the study and the characteristics of the data are viewed in the other columns.

Grid of Equals	N	Mean	Std. Deviation	Std. Error	Min	Max	95% Confidence Interval for Mean	
							Lower Bound	Upper Bound
KB	30	13.99	1.72	0.31	9.96	16.56	13.37	14.61
Eye tracking	28	32.10	8.28	1.56	20.07	52.60	29.03	35.17
Speech recognition	25	83.76	28.27	5.65	43.33	143.4	72.68	94.84
Total samples	83							

Table 4.1 Task 1 characteristics of the data per input mechanism (time in seconds)

Center stage	N	Mean	Std. Deviation	Std. Error	Min	Max	95% Confidence Interval for Mean	
							Lower Bound	Upper Bound
KB	30	19.17	4.40	0.80	12.42	29.11	17.6	20.74
Eye tracking	27	54.17	16.13	3.10	35.06	90	48.09	60.25
Speech recognition	25	77.50	20.27	4.05	42.47	127.12	69.55	85.45
Total samples	82							

Table 4.2 Task 1 characteristics of the data per input mechanism (time in seconds)

The results of the ANOVA are presented in an ANOVA table, which has columns labeled as Sum of Squares, df (degrees of freedom), Mean Square, F (for F-ratio) and Sig (significance level value). The only column that is critical for interpretation is the last (Sig). The others are used mainly for intermediate computational purposes. The p-value corresponding to the F-statistic of one-way ANOVA is lower than 0.05, suggesting that there is a significant difference in the time taken for the participants to perform task 1, $F(1,51) = 85.45$, $p = 1.7530e\text{-}12$ whereas $F(1,50) = 21.23$, $p = 2.8369e\text{-}5$. The statistics for the time taken through the use of the three input mechanisms are viewed in Table 4.3.

Grid of Equals	Sum of Squares	df	Mean Square	F-ratio	Sig.
Between Groups	35247.42	1	35247.42	85.45	1.7530e-12
Within Groups	21036.16	51	412.47		
Total	56283.58	52			

Center stage	Sum of Squares	df	Mean Square	F-ratio	Sig.
Between Groups	7,063.7722	1	7,063.7722	21.2305	2.8369e-05
Within Groups	16,635.8989	50	332.7180		
Total	23,699.6711	51			

Table 4.3 One-way ANOVA statistics for the time taken to perform task 1

Task 2

Task 2 is concerned in navigating a form through a recommended order and assessing how long it will take a user to complete filling in forms. After analyzing the data for Task 2, a number of outliers were found in the data on the two mechanisms:

1. Eye tracker = 5 outliers found.
2. Speech recognition = 6 outliers found.

As a result, we had to remove these outliers from the measures and then do the calculations. The overall mean time taken to complete the task on the three input mechanisms was calculated. This can be seen in Figure 4.3

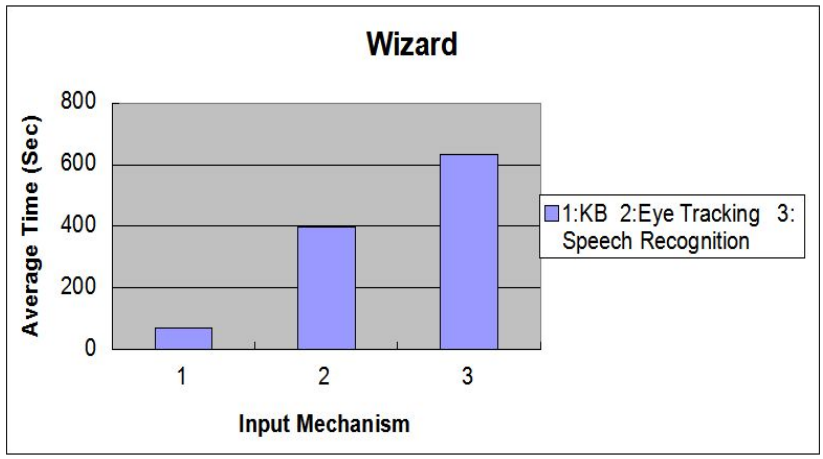

Figure 4.3 The mean time taken to perform Task 2 per input mechanism (time in seconds)

The bar chart indicates that the participants took less time to perform the task through the use of the KB device, with 71.15 seconds (1.18 minutes). However, the meantime taken to complete the task using the eye tracker was 396.40 seconds (6.60 minutes) whereas the speech recognition was timed at 630.80 seconds (10.51 minutes). The task 2 statistics on the three input mechanisms can be seen in Table 4.4.

Table 4.4 Task 2 characteristics of the data per input mechanism (time in seconds)

Wizard	N	Mean	Std. Deviation	Std. Error	Min	Max	95% Confidence Interval for Mean	
							Lower Bound	Upper Bound
KB	30	71.15	17.64	3.22	46.60	130.22	64.84	77.46
Eye tracking	25	396.40	68.45	13.69	310.85	570	369.57	423.23
Speech recognition	24	630.80	151.13	30.84	415.53	918	570.34	691.26
Total samples	79							

The p-value corresponding to the F-statistic of one-way ANOVA is lower than 0.05, suggesting that there is a significant difference in the mean time taken for the participants to perform task 2, $F(1,47) = 49.57$, $p = 7.0812e-09$. The statistics for the time taken through the use of the three input mechanisms are viewed in Table 4.5.

Table 4.5 One-way ANOVA statistics for the time taken to perform Task 2

Wizard	Sum of Squares	df	Mean Square	F-ratio	Sig.
Between Groups	672,765.0257	1	672765.02	49.5769	7.0812e-09
Within Groups	637,795.5561	47	13570.11		
Total	1310,560.5	48			

Task 3

Task 3 is concerned with freely arranging the boxes on the page and enhancing them to be custom configured by the user. After analyzing the data for Task 3, a number of outliers were found in the data on the two mechanisms:

1. Eye tracker = 3 outliers found.
2. Speech recognition = 6 outliers found.

As a result, we had to remove these outliers from the measures and then do the calculations. The overall mean time taken to complete the task on the three input mechanisms was calculated. This can be seen in Figure 4.4.

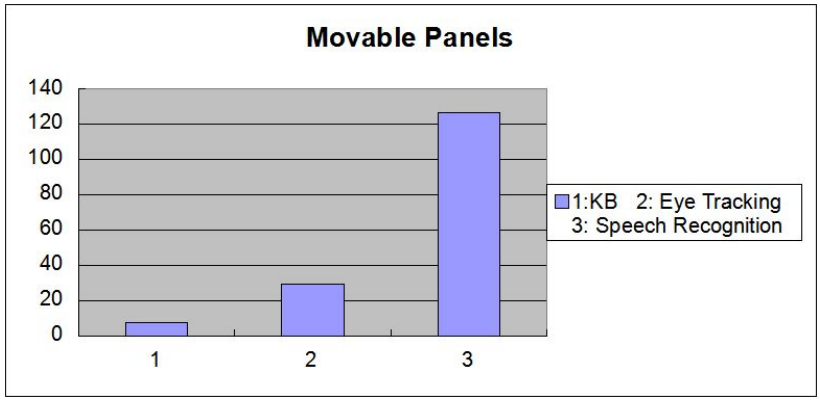

Figure 4.4 The mean time taken to perform Task 3 per input mechanism (time in seconds)

The bar chart indicates that the participants took less time to perform the task through the use of the KB device, with =7.40 seconds. However, the mean time taken to complete the task using the eye tracker was =28.09 seconds where as the Speech recognition was =126.81 seconds. The task 3 statistics on the three input mechanisms can be seen in Table 4.6.

Table 4.6 Task 3 characteristics of the data per input mechanism (time in seconds)

Movable panels	N	Mean	Std. Deviation	Std. Error	Min	Max	95% Confidence Interval for Mean	
							Lower Bound	Upper Bound
KB	30	7.40	1.8313	0.3344	5.21	9.46	6.74	8.06
Eye tracking	27	28.09	8.1165	1.5620	9.60	44.47	25.03	31.15
Speech recognition	24	126.81	32.3282	6.5990	72	199.93	113.88	139.74
Total samples	81							

The p-value corresponding to the F-statistic of one-way ANOVA is lower than 0.05, suggesting that there is a significant difference in the mean time taken for the participants to

perform task 3, F(1,49) = 235.64 , The P value is 1.1102e-16. The statistics for the time taken through the use of the three input mechanisms are viewed in Table 4.7.

Table 4.7 One-way ANOVA statistics for the time taken to perform Task 3

Movable panels	Sum of Squares	df	Mean Square	F-ratio	Sig.
Between Groups	123837.15	1	123837.15	235.64	1.1102e-16
Within Groups	25750.41	49	525.51		
Total	149587.57	50			

Task 4

Task 4 is concerned with navigating secondary panels which are flexible based on opening and closing. After analyzing the data for Task 4, a number of outliers were found in the data on the two mechanisms:

1. Eye tracker = 3 outliers found.

2. Speech recognition = 5 outliers found.

As a result, we had to remove these outliers from the measures and then do the calculations. The overall mean time taken to complete the task on the three input mechanisms was calculated. This can be seen in Figure 4.5.

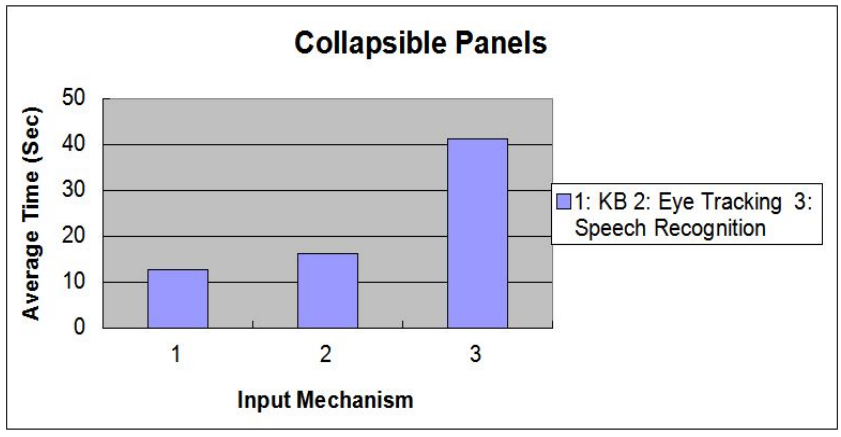

Figure 4.5 The mean time taken to perform Task 4 per input mechanism (time in seconds)

The bar chart indicates that the participants took less time to perform the task through the use of the KB device, with 12.76 seconds. However, the mean time taken to complete the task using the eye tracker was 16.35 seconds where as the Speech recognition was timed at 41.30 seconds. The task 4 statistics on the three input mechanisms can be seen in Table 4.8.

Table 4.8 Task 4 characteristics of the data per input mechanism (time in seconds)

Collapsible panels	N	Mean	Std. Deviation	Std. Error	Min	Max	95% Confidence Interval for Mean	
							Lower Bound	Upper Bound
KB	30	12.76	3.56	0.6501	6.47	18.87	11.49	14.03
Eye tracking	27	16.35	5.69	1.0959	9.80	35	14.2	18.5
Speech recognition	25	41.30	17.12	3.4251	25.55	87	34.59	48.01
Total samples	82							

The p-value corresponding to the F-statistic of one-way ANOVA is lower than 0.05, suggesting that there is a significant difference in the mean time taken for the participants to perform task 4, $F(1,50) = 51.23$, $p = 3.4011e\text{-}09$. The statistics for the time taken through the use of the three input mechanisms are viewed in Table 4.9.

Table 4.9 One-way ANOVA statistics for the time taken to perform Task 4

Collapsible panels	Sum of Squares	df	Mean Square	F-ratio	Sig.
Between Groups	8076.09	1	8076.09	51.23	3.4011e-09
Within Groups	7881.82	50	157.63		
Total	15957.92	51			

Task 5

Task 5 encompassed the main idea of interacting with radio buttons and check-boxes and how long it will take a user to answer the questions based on marking the radio and check boxes. After analyzing the data for Task 5, a number of outliers were found in the data on the two mechanisms:

1. Eye tracker = 4 outliers found.

2. Speech recognition = 6 outliers found.

As a result, we had to remove these outliers from the measures and then do the calculations. The overall mean time taken to complete the task on the three input mechanisms was calculated. This can be seen in Figure 4.6.

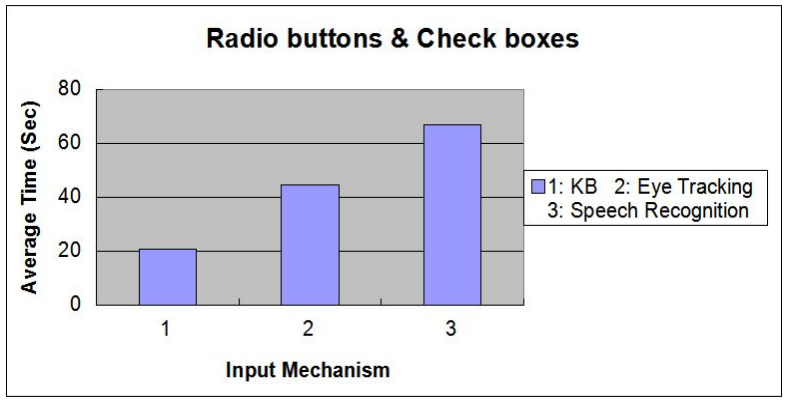

Figure 4.6 The mean time taken to perform Task 5 per input mechanism (time in seconds)

The bar chart indicates that the participants took less time to perform the task through the use of the KB device, with 20.82 seconds. However, the mean time taken to complete the task using the eye tracker was 44.90 seconds where as the Speech recognition was timed at 67.03 seconds. The task 5 statistics on the three input mechanisms can be seen in Table 4.10.

Table 4.10 Task 5 characteristics of the data per input mechanism (time in seconds)

Radio Button & Check Box	N	Mean	Std. Deviation	Std. Error	Min	Max	95% Confidence Interval for Mean	
							Lower Bound	Upper Bound
KB	30	20.82	7.0309	1.2837	9.37	35.18	18.3	23.34
Eye tracking	26	44.90	10.4306	2.0456	30.40	63.60	40.89	48.91
Speech recognition	24	67.03	27.3829	5.5895	31.75	122.40	56.07	77.99
Total samples	80							

The p-value corresponding to the F-statistic of one-way ANOVA is lower than 0.05, suggesting that there is a significant difference in the mean time taken for the participants to perform task 5, $F(1,48) = 14.69$, $p = 0.0004$. The statistics for the time taken through the use of the three input mechanisms are viewed in Table 4.11.

Table 4.11 One-way ANOVA statistics for the time taken to perform Task 5

Radio Button & Check Box	Sum of Squares	df	Mean Square	F-ratio	Sig.
Between Groups	6113.01	1	6113.01	14.69	0.0004
Within Groups	19965.91	48	415.95		
Total	26078.92	49			

Task 6

Task 6 is concerned with navigating small tabbed areas in order to view one module at a specific time. After analyzing the data for Task 6, a number of outliers were found in the data on the two mechanisms:

1. Eye tracker = 3 outliers found.
2. Speech recognition = 5 outliers found.

As a result, we had to remove these outliers from the measures and then do the calculations. The overall mean time taken to complete the task on the three input mechanisms was calculated. This can be seen in Figure 4.7.

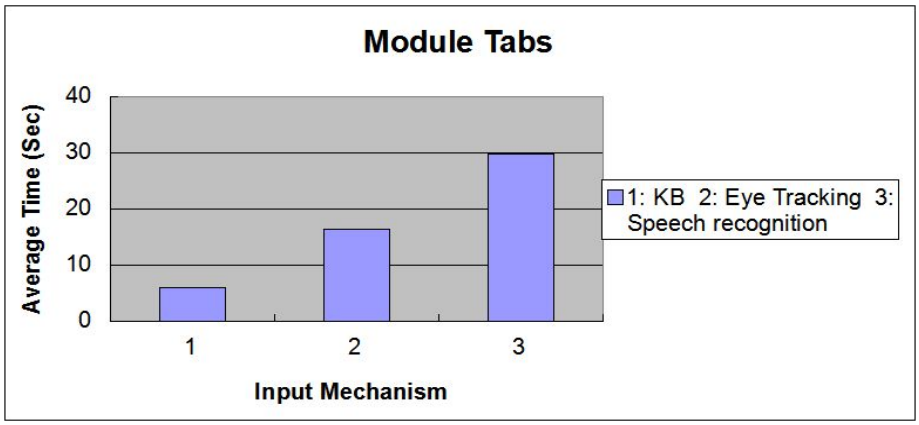

Figure 4.7 The mean time taken to perform Task 6 per input mechanism (time in seconds)

The bar chart indicates that the participants took less time to perform the task through the use of the KB device, with 6.14 seconds. However, the mean time taken to complete the task using the eye tracker was 16.37 seconds where as the Speech recognition was timed at 29.78 seconds. The task 6 statistics on the three input mechanisms can be seen in Table 4.12.

Table 4.12 Task 6 characteristics of the data per input mechanism (time in seconds)

Module Tabs	N	Mean	Std. Deviation	Std. Error	Min	Max	95% Confidence Interval for Mean	
							Lower Bound	Upper Bound
KB	30	6.14	0.9768	0.1783	4..39	8.70	5.79	6.49
Eye tracking	27	16.37	9.9419	1.9133	7.33	56.73	12.62	20.12
Speech recognition	25	29.78	8.6717	1.7343	17.28	53.60	26. 38	to 33.18
Total samples	82							

The p-value corresponding to the F-statistic of one-way ANOVA is lower than 0.05, suggesting that there is a significant difference in the mean time taken for the participants to perform task 6, F(1,50) = 26.68 , p = 4.1849e-06. The statistics for the time taken through the use of the three input mechanisms are viewed in Table 4.13.

Table 4.13 One-way ANOVA statistics for the time taken to perform Task 6

Module Tabs	Sum of Squares	df	Mean Square	F-ratio	Sig.
Between Groups	2334.63	1	2334.63	26.68	4.1849e-06
Within Groups	4374.62	50	87.49		
Total	6709.25	51			

Task 7

Task 7 is interested in measuring the time taken when a user interacts with a collinear mass of panels that are flexible in opening and closing. After analyzing the data for Task 7, a number of outliers were found in the data on the two mechanisms:

1. Eye tracker = 3 outliers found.
2. Speech recognition = 5 outliers found.

As a result, we had to remove these outliers from the measures and then do the calculations. The overall mean time taken to complete the task on the three input mechanisms was calculated. This can be seen in Figure 4.8.

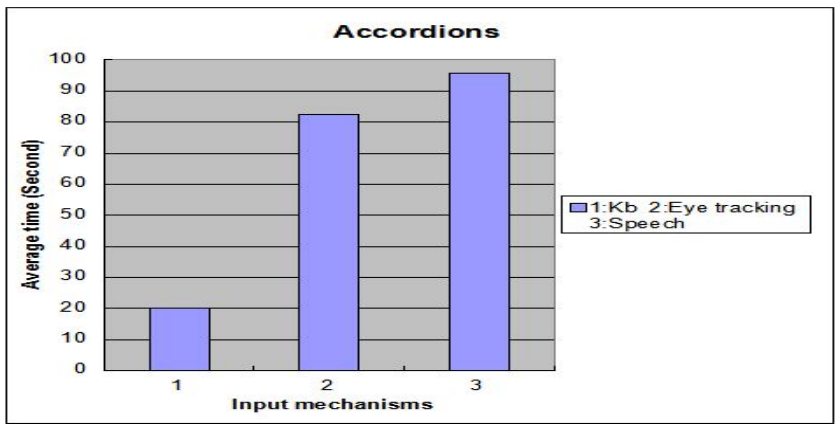

Figure 4.8 The mean time taken to perform Task 7 per input mechanism (time in seconds)

The bar chart indicates that the participants took less time to perform the task through the use of the KB device, with 20.16 seconds. However, the mean time taken to complete the task using the eye tracker was 82.56 seconds where as the Speech recognition was 98.47 seconds. The task 7 statistics on the three input mechanisms can be seen in Table 4.14.

Table 4.14 Task 7 characteristics of the data per input mechanism (time in seconds)

Accordions	N	Mean	Std. Deviation	Std. Error	Min	Max	95% Confidence Interval for Mean	
							Lower Bound	Upper Bound
KB	30	20.16	3.87	0.70	15.34	31.20	18.78	21.54
Eye tracking	27	82.56	27.57	5.29	36.20	149.4	72.16	92.96
Speech recognition	25	98.47	35.10	7.02	32.60	195.6	84.72	112.23
Total samples	82							

The P value is higher than 0.05 and the one-way ANOVA indicates that this difference is considered to be not quite statistically significant, $F(1,50) = 52.13$, $p = 0.0739$. The statistics for the time taken through the use of the three input mechanisms are viewed in Table 4.15.

Table 4.14 One-way ANOVA statistics for the time taken to perform Task 7

Accordions	Sum of Squares	df	Mean Square	F-ratio	Sig.
Between Groups	3283.791	1	3283.791	3.33	0.0739
Within Groups	49274.653	50	985.493		
Total	52558.44	51			

4.2 The Result of Testing The Accuracy

Accuracy (%)

As mentioned previously task (a) is applied to the first term of rating the layouts which were implemented in wizard layout and task (b) is applied to the feature of answering the first question of the radio buttons and check boxes layout. The accuracy here is reported as an error rate - the percentage of selections with the participant moves the cursor outside the target of the first parameter in the wizard layout. Whereas a correct response in task (b) is defined as the participant moves the cursor moving into the intended radio button and clicks it to answer the first question. As the results are displayed in tables 4.15 - 4.16, the percentage of error selections for task (a) was % 36 for eye tracking and % 12.5 for speech recognition mechanism. In task (b) the percentage of error selections was % 30.76 for eye tracking and % 12.5 in case of the speech recognition.

Table 4.15 Task (a) The accuracy results (time in seconds)

Task(a)	%	TRE	MT	TT
Eye Tracking	36	1.53	4.66	6.66
Speech Recognition	12.5	0	11.60	13.63

Table 4.16 Task (b) The accuracy results (time in seconds)

Task(b)	%	TRE	MT	TP	TT
Eye Tracking	30.76	1.17	5.21	0.76	7.25
Speech Recognition	12.5	0	10.26	0.39	12

Table 4.17 Task (c) The average steering time (in seconds)

Task (c)	SL
Eye Tracking	**4.52**
Speech Recognition	**20.6**

Number of Target Re-entry (TRE)

TRE represents the numbers of cursor re-entry the target before clicking. The numbers of cursor re-entry the target before clicking in task (a) was 40 for 26 participants with the mean of 1.53 (see tables 4.15 - 4.16). The numbers of cursor re-entry the target before clicking in task (b) was 27 as for 23 participants with the mean of 1.17.

Steering Law (SL)

As previously discussed steering time is the time taken by the participants to move the cursor through the tunnel of the collapsible panel. The tunnel has a length of 18.14 cm and a width of 10.55 cm. The actual average steering time through the use of the eye tracking was found to be 4.52 sec., whereas the actual average steering time through the use of speech recognition was 20.6 seconds.

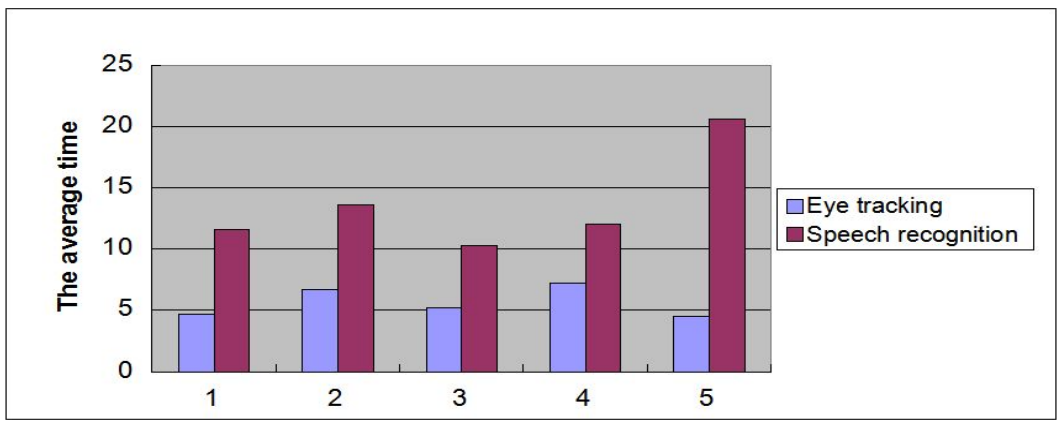

Figure 4.9 The average time chart - 1: MT for task(a), 2: TT for task(a), 3: MT for task(b), 4:TT for task(b), 5: Steering time for task (c) (Time in seconds)

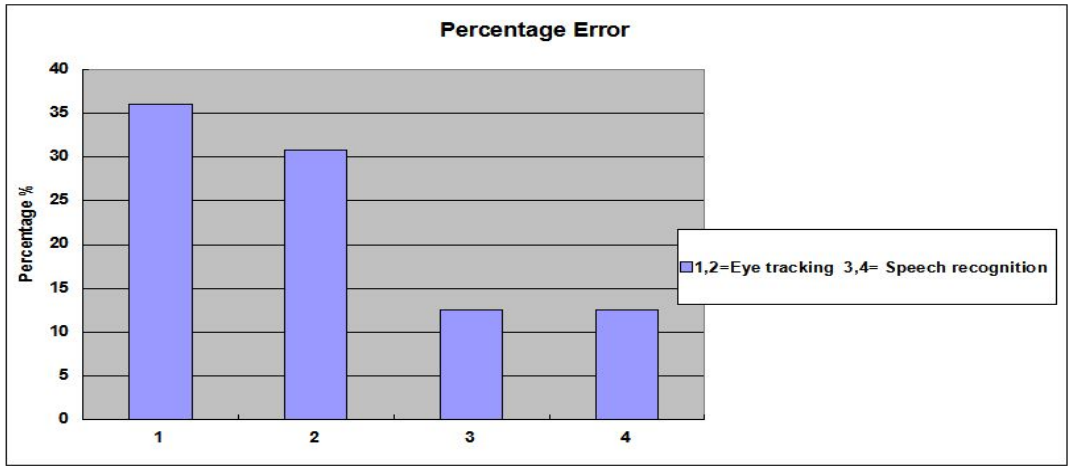

Figure 4.10 Accuracy bar chart- 1: eye tracking in task a, 2: eye tracking in task b, 3,4: speech recognition in task a and b

Movement Time (MT)

MT is defined as the time from beginning of cursor movement to the time the cursor reaches the edge of the intended star in task (a). In task (b) MT is defined as the time from the beginning of cursor movement to the cursor reaching the edge of the intended radio button. The mean time taken to move the cursor to reach the edge of intended star in task (a) through the use of the eye tracker was 4.66 seconds and 11.60 seconds through the use of speech recognition (see tables 4.15 - 4.16). In the other task, the mean time taken to move the cursor to reach the edge of intended radio button through the use of the eye tracker was 5.21 seconds and 10.26 seconds through the use of speech recognition.

Throughput (TP)

In task (b) the width of the radio button was 15 millimeter . The index of difficulty varied from one participant to another due to the starting point, so the average of index of difficulty was 4.004 bit. The mean of movement time through the use of the eye tracker was 5.21 seconds and 10.26 seconds through the use of speech recognition. Through the use of the eye tracker, the throughput was found to be 0.76 bps and 0.39 bps in case of the use of speech recognition (see tables 4.15 - 4.16).

Total Time (TT)

The mean time the participants spent in completing pointing and clicking task (a) through the use of the eye tracker was 6.66 seconds and 13.63 seconds for the speech recognition. In the case of task (b) the mean time was 7.25 seconds. for the eye tracking and 12 seconds for the speech recognition (see table 4.15 - 4.16).

4.3 Quantitative and Qualitative Data Obtained from the Questionnaire

After participating in the experiment, the participants were given a questionnaire in which to answer nine questions related to the experiment. By analyzing the responses, we were able to collect data regarding the participants. Thirty participants took part in the experiment from different academic programs such as Mechanical Engineering, Nursing, Computer Science, Mining Engineering, Economics, Chemical Engineering and Biology. The participants consisted of 22 males and 8 females. There were 5 participants from the Computer Science program and 25 participants from other programs. There were 5 graduate participants and 25 undergraduate participants. There were also 28 participants who were 27 years old or less and 2 participants who were older than 27 years old. Generally, the majority of the participants indicated that they navigate the web between 5 to 8 times/day. Surprisingly, none of the participants had ever interacted with an eye tracker device before taking part in the experiment. However, 12 participants have used speech recognition technology before. Interestingly, 13 participants found that navigating the layouts through the use of the eye tracker to be enjoyable and 14 participants found it to be motivating, whereas 3 participants found it to be challenging (see figure 4.11).

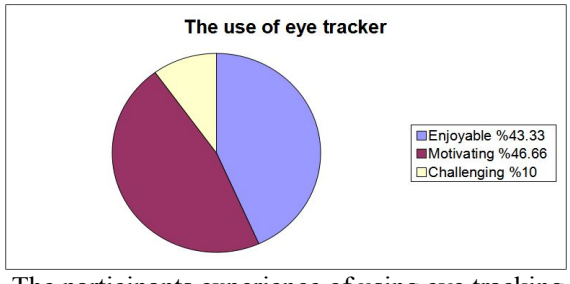

Figure 4.11 The participants experience of using eye tracking mechanism

Moreover, 26 participants somewhat agreed that in the future they would consider buying a laptop or screen with a built in eye tracker. On the other hand, 13 participants have found navigating through the use of the speech recognition software to be challenging. Specifically, 11 participants found it to be frustrating and 6 participants found it to be boring (see figure 4.12). Furthermore, 19 participants neither agreed nor disagreed to consider navigating the web through the use of speech recognition mechanism.

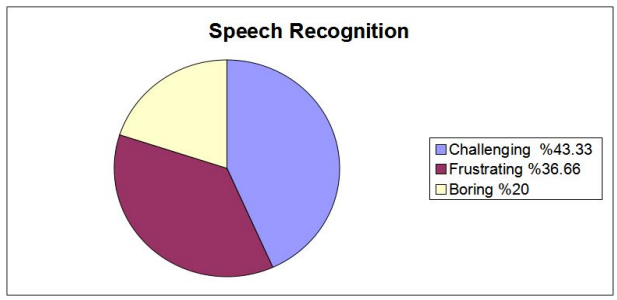

Figure 4.12 The participants experience of using speech recognition mechanism

5.0 Discussion

5.1 The Speed Tasks

In the experiment, all participants were given 10 minutes to practice using both mechanisms in addition to showing them a simple demonstration on how to use them. The participant were told that they can blink normally during the use of eye tracker and that would not affect the control of the cursor. Prior to the use of the eye tracker, all participants went through a phase of calibration in order to use the eye tracker. In addition, all participants were trained to use the toolbar to perform mouse actions. Although all participants were given simple demonstrations on how to navigate through the use of the eye tracker, some participants were moving their heads in order to move the cursor instead of moving their eyes. It is interesting that most of the participants navigated intuitively through the use of the eye tracker. On the other hand, although the participants were provided with the sheet that had the required commands, many of them spent time to retain and recall the commands during the experiment. When the participants used the speech recognition mechanism, many of them spent time just to decide which square to pick in order to point at the target.

At the beginning of the study we started with the null hypothesis that states there should be no difference in time taken for the participants when performing all of the tasks through the use of the eye tracker and speech recognition mechanisms. In this chapter, we will be going through each task and see whether to remain with the null hypothesis or reject it. The findings of each task that were presented in chapter 4 will be discussed individually.

Task 1 (Open three items of grid of equals)

The time taken for the participant to complete Task 1 was measured and analyzed through the use of BlueBerry Flashback Express software. The time taken for navigating and pointing indicated that Task 1 is an easy task to perform. The reason behind this is that each element on the page contains a picture along with the title of the element and that escalated the process of navigation(see figure 5.1). Regardless of the use of mouse and KB, the experimental results indicate that the eye tracking technique provided the best navigation. Moreover, the participants performed much better in pointing at the area of interest through the use of the eye tracker than the use of speech recognition. In this task, three types of pointing were used to accomplish the task and they were mouse movement, eye movement, and voice control. Although the participants used only one command to navigate in this task, the experimental results suggested that using speech recognition technique took longer time for pointing than other mechanisms. The reason behind this is that pointing through the use of speech recognition requires the use of a mouse-grid(see figure 5.2). The participants spent time to retain and recall the commands along with the decisions they took to determine which square to pick that can lead them to click the area of interest.

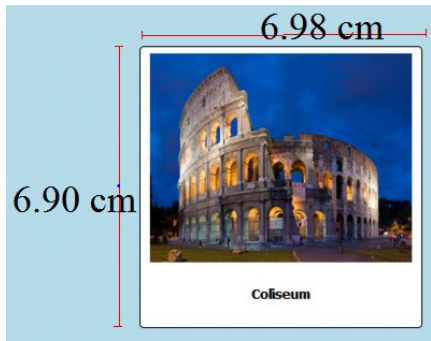

Figure 5.1 The dimensions of gird of equals' element

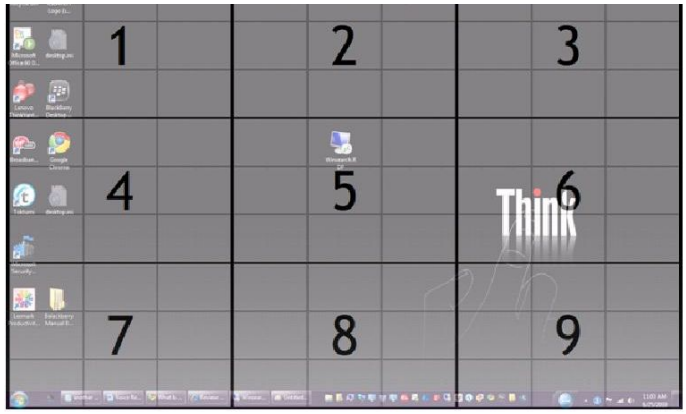

Figure 5.2 The mouse-grad in Dragon Natural Speaking

In a comparison between eye tracking and speech recognition methods, the experimental results recorded that the maximum time taken occurred while employing the speech recognition technique while the minimum time of utilization occurred using the eye tracker mechanism. According to the findings, the null hypothesis is rejected in favor of the alternative hypothesis: there was a significant difference in the time taken to accomplish the task through the use of the eye tracker and speech recognition mechanisms. The findings indicate that the eye tracking was faster in this task.

Task 2 (Fill in forms and rate the layout)

The time taken for navigating and the method of pointing to fill in the forms indicates that Task 2 is a difficult task to perform. The reason is that each text-box on the layout required the utilization of two techniques, the first is to point at the intended text-box and the second is to fill it in with the text. In the case of speech recognition, the mouse-grid was used for pointing and the command to click on the field, in addition to speech to fill in the field. Whereas in the case of eye tracking, the eye movement and the function of left-click that picked up from the toolbar were used to click on the intended field along with digital keyboard to type in the field. In comparison, the eye tracking technique provided faster performance than speech recognition. Since the layout was designed using three stages, the participants spent more time in the first

stage of filling in forms than in the time they spent to rate and write a comment about the layout. In many cases, the speech recognition function couldn't recognize the voice of some participants while they were dictating their personal information in the first stage so they had to repeat the speech until the software recognized it. Speaking with a non-native speaker of English with a strong accent and/or speaking with a lisp were reasons to slow the process of navigation through the use of the speech recognition mechanism. In such cases the participants went through the process of spilling to enter their information in the fields which affected the speed of navigation.

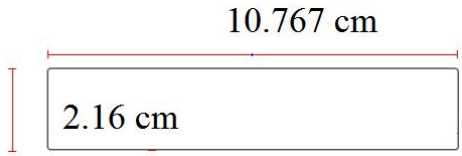

Figure 5.3 The dimensions of text-box on the wizard layout

In comparing eye tracking and speech recognition, the experimental results recorded that the maximum time taken occurred during the speech recognition technique while the minimum time took place using the eye tracker mechanism. According to the findings, the null hypothesis is rejected in favor of the alternative hypothesis: there was a significant difference in the time taken to accomplish the task through the use of the eye tracker and speech recognition mechanisms. The findings indicate that eye tracking was much faster in this instance.

Task 3 (Drag and drop the movable panels)

The time taken for navigating and the method of pointing to drag two panels indicates that Task 3 is an easy task to accomplish on the eye tracker and a difficult task to perform on speech recognition. The reason is that when the participants used the eye tracker, they selected the mouse function (drag) and directly used their eyes to pick up the panel then drop it at a

particular spot. Whereas in the case of speech recognition, the participants had to use the mouse-grid command to pick up the panel then give another command to the software to drag it. Subsequently, the participants had to direct the panel through the use of the commands then wait for it to reach the intended spot then give another command to drop it. In fact, that dragging process was slow compared to the dragging process of the eye tracker. Even in this case, the speech recognition mechanism couldn't recognize the voice of some participants while they were saying the commands, so they had to continue repeating the commands till the software recognized it

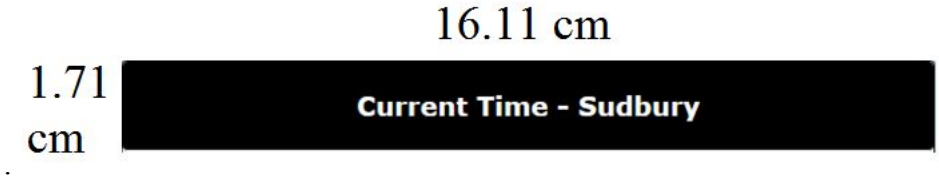

Figure 5.4 The size of the panel after being closed

In comparison between eye tracking and speech recognition methods, the experimental results recorded that the maximum time taken occurred on the speech recognition technique while the minimum time taken occurred on the eye tracker mechanism. According to the findings, the null hypothesis is rejected in favor of the alternative hypothesis: there was a significant difference in the time taken to accomplish the task through the use of the eye tracker and speech recognition mechanisms. The findings indicates the eye tracking was much faster in accomplishing this task.

Task 4 (Navigate through collapsible panels)

Although most of the participants took a longer time to finish the task, the participants agreed with the fact that Task 4 was an easy task to perform through both eye tracking and speech recognition modes.

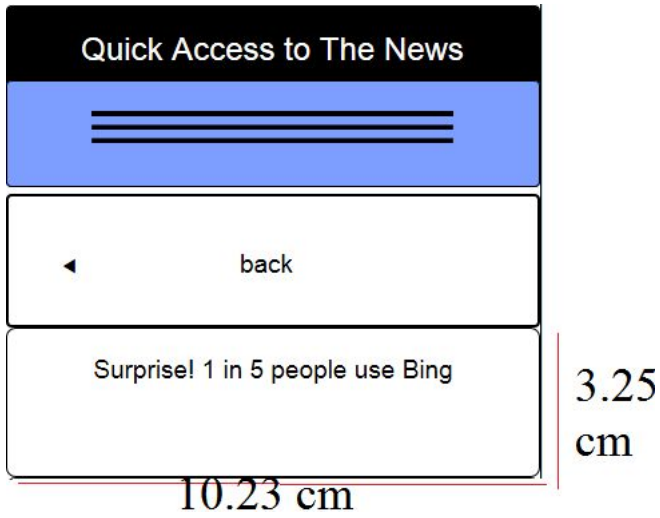

Figure 5.5 The dimensions of one subject on the collapsible panel

There was a significant difference in the time taken to navigate through collapsible panels on both techniques. The time that the participants needed to spend through the use of the eye tracker was less than the time they needed to spend through the use of speech recognition. In this case, the null hypothesis is rejected in favor of the alternative hypothesis.

Task 5 (Interact with radio buttons and check-boxes)

The results indicated that the time taken for the participants was different in the favor of eye tracking. The explanation that is the participants picked up the left-click function only one time and applied it to all of the buttons and boxes when they used the eye tracker. They needed two commands to check each radio button and check box in the case of speech recognition. Based on these results, the null hypothesis is rejected in favor of the alternative hypothesis: there is a difference in the time taken to achieve the task on these two mechanisms.

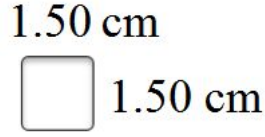

Figure 5.6 The dimensions of the radio button

Task 6 (Navigate through the module tabs)

The results suggest that the majority of the participants agreed with the fact that Task 6 was an easy task to perform on both mechanisms. In addition, the experiment recorded this task as the quickest to be accomplished. Based on these results, the null hypothesis is rejected in favor of the alternative hypothesis: there is a significant difference in the time taken to finish the task on two mechanisms.

Task 7 (Open and close three accordions)

The results were as expected: there was no difference in the time taken for the participants to perform the task through the use of the eye tracker and speech recognition mechanisms. The reason is that the single accordion was wide enough to escalate the process of pointing, whether eye tracking or speech recognition was used. Therefore, we remained with the null hypothesis: there is no difference in time taken for the participants when performing the task through the use of the eye tracker and speech recognition methods.

Figure 5.7 The dimensions of one accordion

5.2 Accuracy Tasks

The experiment recorded that the percentage of error selections through the use of both mechanisms were in different in tasks (a) and (b) in favor of speech recognition. On the other hand, the use of eye tracker recorded a high percentage of cursor re-entries to the target before clicking. This was due to the nature of eye movements which are not a steady sweep, but tend to be a series of little jumps with intervening fixation pauses. However, eye tracking recorded faster time from the beginning of cursor movement to the point when the cursor reached the edge of target. Based on the findings of the speed and accuracy in responses, eye tracking recorded a higher throughput than speech recognition. In comparison between the findings of the steering time taken through the use of eye tracker and speech recognition mechanisms, the actual average steering of eye tracker (4.52 sec) was found to be faster than the one through the use of speech recognition (20.6 sec). And the predictive steering time was found to be 0.34 sec which is close to the steering time taken through the use of mouse and KB.

6.0 Conclusion

This study sought to think of an alternative way to navigate web pages other than using the traditional methods of navigation. The speed and accuracy of navigating the basic layout of web page elements using eye tracking and speech recognition mechanisms were considered. For this purpose, eight layouts were designed for the experiment. These layouts were designed in a particular way so that they can be navigated by both mechanisms. An experiment was conducted to achieve the goal, and seven tasks were designed to test the speed and accuracy of each method. Participants were recruited to conduct tasks in the tests. Each task represented a different method of navigation based on the nature of the layout. All tasks were performed using the three input mechanisms. The study concentrated more on the eye tracking and speech recognition mechanisms rather than the mouse and keyboard. The time taken for the participants to accomplish each task in addition to the cursor's trail were the main focus for data collection and analysis. After conducting the experiment, large sets of video recordings were obtained and analyzed to investigate the consumed time for each task. Task 1 represented the main postulate of navigating various content items having the same style and significance and determining how long it will take a user to open and close three particular items. The findings of Task 1 disproved the hypothesis that the performance of participants was identical on both mechanisms. Task 2 was interested in navigating a form in a recommended order and how long it would take a user to complete filling in forms. The wizard was designed to take a user through three steps. The findings of Task 2 rejected the null hypothesis that the time taken for the participants to complete the task was almost identical on both mechanisms. Task 3 represented the concept of freely arranging the boxes on the page and enhancing them to be custom configured by the user. The experiment findings for Task 3 disproved the null hypothesis that the performance of participants was identical on both mechanisms. Task 4 is concerned with navigating secondary panels which are flexible based on opening and closing. In this task we determined how long it will take a user to open the panel and reach particular

item on that panel. Task 5 represented the main idea of interacting with radio buttons and check-boxes and how long it will take a user to answer the questions based on marking the radio and check boxes. The experimental findings for Task 5 disproved the null hypothesis that the performance of participants was identical on both mechanisms. Task 6 was concerned with navigating a small tabbed area to view one module at a specific time. In this task we assessed how long it will take a user to point at and open a particular tab to see its contents. The experimental findings for Task 6 disproved the null hypothesis that the performance of participants was identical on both mechanisms. Task 7 is interested in measuring the time taken when a user interacts with a collinear mass of panels that are flexible in opening and closing. The findings of Task 7 confirmed the null hypothesis that there is no significant difference in the time taken for the participants to complete the task when using the eye tracking and speech recognition. Task (a), Task (b) and Task (c) focused on testing the accuracy of pointing at the smallest elements in the layouts. The accuracy results proved that eye tracking was more efficient and faster in movement but less accurate in pointing at a particular target, whereas speech recognition was slower in movement but more accurate in pointing at a particular target. Although these mechanisms are not smooth in the use like mouse and keyboard, they can be effective alternative input mechanisms. In the future, a combination of both techniques can be used as a vital input mechanism to achieve an intuitive web navigation specifically for people who suffer from limited hand mobility.

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Appendix A

The code of the homepage of the website

```
<!DOCTYPE html>
<html lang="en" class="no-js">
	<head>
		<title>Home page</title>

		<link rel="stylesheet" type="text/css" href="css/default.css" />
		<link rel="stylesheet" type="text/css" href="css/component.css" />
		<script type="text/javascript">
		$(function() {
   $(window).on('resize', function resize()  {
      $(window).off('resize', resize);
      setTimeout(function () {
         var content = $('#content');
         var top = (window.innerHeight - content.height()) / 2;
         content.css('top', Math.max(0, top) + 'px');
         $(window).on('resize', resize);
      }, 50);
   }).resize();
});
		</script>
	</head>

	<body>
	<div id="content">
	<h3>The Basic Layouts of Page Elements </h3>
<b>_____</b>


			<header>

			</header>
			<div class="main clearfix">
				<div class="column">

				</div>
				<div class="column">
					<a href="pages/Grid of equales/grid of equles (2).html"><button
class="md-trigger" STYLE="position: absolute; TOP:25px; LEFT: 50px; z-index:79;overflow:auto"
data-modal="modal-1"><img src="pictures/h1.png" width="231px" height="200px"> <h4>Grid of
Equals</h4> </button></a>
					<a href="pages/tabs/css3tabs1.html"><button
class="md-trigger" STYLE="position: absolute; TOP:25px; LEFT:390px; z-index:79;overflow:auto"
data-modal="modal-2"><img src="pictures/h2.png" width="231px" height="200px" ><h4>Module Tabs
</h4></button></a>
					<a href="pages/Wizard/index.html"><button class="md-trigger"
STYLE="position: absolute; TOP:25px; LEFT:720px; z-index:79;overflow:auto"
data-modal="modal-3"><img src="pictures/h3.png" width="231px" height="200px" ><h4>Wizard
</h4></button></a>
					<a href="pages/Movable Panel 2/index.html"><button
class="md-trigger" STYLE="position: absolute; TOP:325px; LEFT:50px; z-index:79;overflow:auto"
data-modal="modal-4"><img src="pictures/h4.png" width="231px" height="200px" ><h4>Movable Panel
</h4></button></a>
					<a href="pages/collapsable panel/Center stage.html"><button
```

```
class="md-trigger" STYLE="position: absolute; TOP:325px; LEFT:390px; z-index:79;overflow:auto"
data-modal="modal-5"><img src="pictures/h5.png" width="231px" height="200px" ><h4>Center Stage
</h4></button></a>
                                        <a href="pages/Accordion/Accordion2.html"><button
class="md-trigger" STYLE="position: absolute; TOP:325px; LEFT:720px; z-index:79;overflow:auto"
data-modal="modal-6"><img src="pictures/h6.png" width="231px" height="200px"
><h4>Accordion</h4></button></a>
                                    <a href="pages/Radio button/index2.html"><button class="md-trigger"
STYLE="position: absolute; TOP:615px; LEFT:50px; z-index:79;overflow:auto"
data-modal="modal-6"><img src="pictures/h7.png" width="231px" height="200px" ><h4>Radio &
Check-box</h4></button></a>
                                        <a href="pages/titled sections/titled section.html"><button
class="md-trigger" STYLE="position: absolute; TOP:615px; LEFT:390px; z-index:79;overflow:auto"
data-modal="modal-6"><img src="pictures/h8.png" width="231px" height="200px" ><h4>Titled
Sections</h4></button></a>
                                        <a href="pages/collapsable panel/Center stage.html"><button
class="md-trigger" STYLE="position: absolute; TOP:615px; LEFT:720px; z-index:79;overflow:auto"
data-modal="modal-6"><img src="pictures/h9.png" width="231px" height="200px" ><h4>Collapsible
Panel</h4></button></a>



                                    </div>
                            </div>
                    </div><!-- /container -->

                    </div>
            </body>
</html>



/* CSS file */

@font-face {
            font-family: 'codropsicons';

            font-weight: normal;
            font-style: normal;
}


.clearfix:before, .clearfix:after { content: " "; display: table; }
.clearfix:after { clear: both; }

body {
            font-family:  Arial;
            color: black;
            background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
  background-color: #ade0f4;
  text-align:center;
  font-size:22px;
}

/* hidden continer around the whole boxes*/
.continer1 {
   width: 1000px;
            height:500px;
```

```
   margin-top: 200px;

   margin-bottom: 30px;
  margin-left: auto ;
 margin-right: auto ;


            background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
  background-color: #ade0f4;
}



a {
            color:white;
            text-decoration: none;
}



button {
            border: none;
            padding: 1.em 6em;   /* heading size */
            width:270px;
   height:270px;
   background-color:white;


position:absolute;
left:650px;
top:230px;
-moz-transition: all 550ms ease;
-webkit-transition: all 550ms ease;
            -moz-transition: all 550ms ease;
            -o-transition: all 550ms ease;
            -ms-transition: all 550ms ease;
            transition: all 550ms ease;


            font-size:22px;
            cursor: pointer;

            margin: 3px 2px;
            border-radius: 4px; /* edge border */
            border: 1.5px solid #5B5B5B;
            margin: 100px;  /* to make it expand from the middle*/
}

button:hover {
            background: #7D9DFF;
   width:350px;
   height:305px;
   text-align:center;
   font-size:23px;
   font-weight:199px;
   font-family:Arial;
    padding:20px;
             margin: 55px;  /* to make it expand from the middle*/
```

```
}


#content {
   max-width: 1230px;
   margin: auto;
   left: 1%;
   right: 1%;
   position: absolute;
}
```

The code of accordion layout

```
<!DOCTYPE html>

<html lang="en">
   <head>
      <title> Accordion</title>
      <style type="text/css">


                     /* body background */
body {
  background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
   background-color: #ade0f4;
   margin-left: auto;
    margin-right: auto;
          text-align:center;
font-size:18px;
font-family: Arial;
}




.accordion{
          width:700px;
          margin: 85px auto;   /* distance between headings and section title */
           margin-right: 20%;
   margin-left: 0%;
font-size:16px;

}
.accordion label{
          font-family: Arial;
          padding: 20px 25px;
          position: relative;
          display: block;
          height: 50px;
          cursor: pointer;
          color: black;
          line-height: 33px;
          font-size: 19px;
          background: white;
   border: 3px solid #aedae7;
```

```
}
.accordion label:hover{
	background: #7D9DFF;
	 border: 12px solid #7D9DFF;

}
.accordion input + label {
	-webkit-transition: all 0.4s ease-in-out;
	-moz-transition: all 0.4s ease-in-out;
	-o-transition: all 0.4s ease-in-out;
	-ms-transition: all 0.4s ease-in-out;
	transition: all 0.4s ease-in-out;
}
.accordion input:checked + label,
.accordion input:checked + label:hover{
	background: #7D9DFF;
	color: black;  /* text color of heading */
	box-shadow:
		0px 0px 0px 1px rgba(155,155,155,0.3),
		0px 2px 2px rgba(0,0,0,0.1);
}
.accordion input{
	display: none;
}
.accordion .article{
	background: rgb(255, 255, 255);
	overflow: hidden;
	height: 0px;
	-webkit-transition: all 0.4s ease-in-out;
	-moz-transition: all 0.4s ease-in-out;
	-o-transition: all 0.4s ease-in-out;
	-ms-transition: all 0.4s ease-in-out;
	transition: all 0.4s ease-in-out;

}
.accordion .article p{
	 font-family: Arial;
	color: black;
	line-height: 23px;
	font-size: 16px;
	padding: 5px;
}
.accordion input:checked ~ .article{
	-webkit-transition: all 0.5s ease-in-out;
	-moz-transition: all 0.5s ease-in-out;
	-o-transition: all 0.5s ease-in-out;
	-ms-transition: all 0.5s ease-in-out;
	transition: all 0.5s ease-in-out;
}
.accordion input:checked ~ .article.ac-small{
	height:500px;
}
.accordion input:checked ~ .article.ac-medium{
	height: 500px;
}
.accordion input:checked ~ .article.ac-large{
	height: 500px;
}
```

```
.item-section{
width:695px;
border-radius: 4px;
   height:38px;
 background-color: black;
  border-bottom: 1px solid #666;

  color: white;  /* font color*/
  padding-bottom:15px;
                        }

                        /* hidden wapper around the whole box*/

#wrapper {
   background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
  background-color:#ade0f4 ;
   width: 700px;
           position: absolute;


   left:300px;
   top: 110px;
}
#content {
   max-width: 1300px;
   margin: auto;
   left: 10%;
   right: 10%;
   position: absolute;
}


                        </style>
                        <script type="text/javascript">
                        $(function() {
   $(window).on('resize', function resize()  {
      $(window).off('resize', resize);
      setTimeout(function () {
         var content = $('#content');
         var top = (window.innerHeight - content.height()) / 2;
         content.css('top', Math.max(0, top) + 'px');
         $(window).on('resize', resize);
      }, 50);
   }).resize();
});
                        </script>
      <script>
        (function(i,s,o,g,r,a,m){i['GoogleAnalyticsObject']=r;i[r]=i[r]||function(){
        (i[r].q=i[r].q||[]).push(arguments)},i[r].l=1*new Date();a=s.createElement(o),
        m=s.getElementsByTagName(o)[0];a.async=1;a.src=g;m.parentNode.insertBefore(a,m)
        })(window,document,'script','//www.google-analytics.com/analytics.js','ga');

        ga('create', 'UA-38151043-3', 'bradsknutson.com');
        ga('send', 'pageview');

      </script>
   </head>
   <body>
```

```
        <div id="content">
        <h2>Accordion Layout - Sport News</h2>

<h6>_____
_____</h6>

    <div id="wrapper">
                        <div class="accordion">
                        <section class="item-section"  STYLE="position: absolute; TOP:30px;
LEFT:2px; z-index:78;font-family:Arial;">
    <h3>Soccer News</h3>
  </section>
                                <div>

                                        <input id="ac-1" name="accordion-1" type="checkbox" />
                                        <label for="ac-1">Juventus won 3-0 against Borussia
dortmund</label>
                                        <div class="article ac-small">
                                        <center><img src="Juve1.jpg" width="400px" height="200px"
border="1px"></center>

                                                <h6>  ...Tuesday 24 February 2015</h6>
                                                <p>The Juve striker smashed in from 30 yards early on,
giving his side a 3-1 aggregate lead and a key away goal.

The home side pressed but created little and Tevez squared for Alvaro Morata to finish after half-time.

It left Dortmund needing four in the final 20 minutes and Tevez compounded their misery, firing in from 18
yards.

The former Manchester United and Manchester City player opened the scoring three weeks ago in Turin and
his early blast at Dortmund's Westfalenstadion provided Juve with a platform to seal their third Champions
League quarter-final spot in nine seasons.

Massimiliano Allegri's side - twice winners of the competition - will be an opponent few will relish being
paired with in Friday's draw as with a 14-point cushion in Serie A, they can afford to focus fully on a tilt at a
first European Cup win since 1996.
</p>
                                        </div>
                                </div>
                                <div>
                                        <input id="ac-2" name="accordion-1" type="checkbox" />
                                        <label for="ac-2">Chelsea lose ugly against Paris St-Germain
</label>
                                        <div class="article ac-medium">
                                        <center><img src="ch1.jpg" width="400px" height="200px"
border="1px"></center>
                                        <h6>  ...Tuesday 24 February 2015</h6>
                                                <p>Chelsea manager Jose Mourinho has turned the trick
of winning ugly into an art form - but there is no merit in losing ugly and that is exactly what his side did as
Paris St-Germain deservedly dismissed them from the Champions League.

As the cards stacked up against PSG, the need for an away goal piled on top of the harsh first-half dismissal
of talisman Zlatan Ibrahimovic, it was the Premier League leaders who cracked under pressure, a fact
acknowledged by a despairing Mourinho in the aftermath.

In a last-16 second leg that was dramatic and dreadful in equal measure, Chelsea made an undignified exit on
away goals after a 2-2 draw at Stamford Bridge and a 3-3 aggregate result.
It was an eyesore of a performance that also demonstrated the dark side of a fine team's personality.
</p></div>
```

```
                                    </div>

                                    <div>
                                            <input id="ac-4" name="accordion-1" type="checkbox" />
                                            <label for="ac-4">Moggi cannot see Lippi making Juventus
return</label>
                                            <div class="article ac-large">
                                            <center>            <img src="mo2.jpg" width="400px"
height="200px" border="1px"> </center>
                                            <h6>  ...Tuesday 24 February 2015</h6>
                                                    <p>Luciano Moggi cannot see Marcello Lippi returning
to Juventus.

There has been a lot of speculation ever since last summer that Lippi would become a Juventus director after
the finals in South Africa, something he has denied.

But former Juve sports director Moggi says: "At the end of the season Lippi will not return to Juventus either
as a Coach or as a director."

"He might do little in South Africa because the material available to him isn't extraordinary, but it certainly
won't be his fault."

"As for his recent argument with Inter, I say that he did well in not going to Appiano Gentile because there
are no Italian players at Inter who enter into his plans."

"For now, Santon and Balotelli are not part of the Italy squad."
 </p>     </div>
                                            </div>
                                    </div>
        </div>
            </div>
    </body>
</html>


/* CSS file */
<html>
<body>
<p style="font-size:6px;">test 6px</p>
<p style="font-size:7px;">test 7px</p>
<p style="font-size:8px;">test 8px</p>
<p style="font-size:9px;">test 9px</p>
<p style="font-size:10px;">test 10px</p>
<p style="font-size:11px;">test 11px</p>
<p style="font-size:12px;">test 12px</p>
<p style="font-size:13px;">test 13px</p>
<p style="font-size:14px;">test 14px</p>
<p style="font-size:15px;">test 15px</p>
<p style="font-size:16px;">test 16px</p>
</body>
</html>
```

The code of center stage layout

```
<!doctype html>


<html lang="en">


<head>
<title>Center Stage </title>
        <meta charset="UTF-8">                        <!-- covers almost all of the characters and symbols in
the world  -->
        <meta name="description" content="" >
        <meta name="author" content="">
        <meta name="viewport" content="width=device-width, initial-scale=1">
        <title>Center stage- Technology & Science News </title>
        <link rel="stylesheet" type="text/css" href="css/bootstrap.min.css">
        <link rel="stylesheet" type="text/css" href="css/bootstrap-theme.min.css">
        <link rel="stylesheet" type="text/css" href="css/font-awesome.min.css">
        <link rel="stylesheet" type="text/css" href="css/style.css">
        <!--[if lt IE 9]>
                <script src="js/html5shiv.js"></script>
        <![endif]-->
<script>
$(function() {
   $(window).on('resize', function resize()  {
      $(window).off('resize', resize);
      setTimeout(function () {
         var content = $('#content');
         var top = (window.innerHeight - content.height()) / 2;
         content.css('top', Math.max(0, top) + 'px');
         $(window).on('resize', resize);
      }, 50);
   }).resize();
});
</script>
<style>
#content {
   max-width: 1500px;
   margin: auto;
   left: 1%;
   right: 1%;
   position: absolute;
}
</style>
</head>

<body>
<div id="content">
<h1><strong>Center Stage Layout - Technology News</strong></h1>
<h6><strong>_____
_____</strong></
h6>
<div id="fb-root"></div>
<script>(function(d, s, id) {
  var js, fjs = d.getElementsByTagName(s)[0];
  if (d.getElementById(id)) return;
```

```
  js = d.createElement(s); js.id = id;
  js.src = "all.js";
  fjs.parentNode.insertBefore(js, fjs);
}(document, 'script', 'all.js'));</script>



<section id="ccr-main-section">

<h1></h1>
<h2>    </h2>

            <div class="container">



                        <section id="ccr-left-section" class="col-md-8">



                                    <div class="ccr-last-update">
                                                <div class="update-ribon"></div> <!-- /.update-ribon -->
                                                <span class="update-ribon-right"></span> <!-- /.update-ribon-left -->
                                                <div class="update-news-text" id="update-news-text">
                                                            <ul id="latestUpdate"><font color="white"</font>
                                                              <font color="white"; size="5px";
style="margin-left:20px;">Latest News</p></font>
                                                            </ul>
                                                </div> <!-- /.update-text -->


                                                <div class="update-right-border"></div> <!-- /.picture slider -->
                                    </div>


                                    <section id="ccr-slide-main" class="carousel slide" data-ride="carousel">


                                                <!-- Carousel items -->
                                                <div class="carousel-inner">
                                                            <div class="active item">
                                                                        <div class="container slide-element"
onclick="window.location='subpage.html'">
                                                                                    <img src="wn1.jpg"
style="height:450px; width:770px;" alt="Main Slide Image 1">
                                                                                    <p><a href="subpage.html">Tobii
EyeX Engine: creating a unified user experience</a></p>
                                                                        </div> <!-- /.slide-element -->
                                                            </div> <!--/.active /.item -->

                                                            <div class="item">
                                                                        <div class="container slide-element"
onclick="window.location='subpage - Copy.html'">
                                                                                    <img src="wn2.jpg"
style="height:450px; width:770px;" alt="Main Slide Image 1">
                                                                                    <p><a href="subpage -
Copy.html">Cisco Linksys E4200 v2 router review</a></p>
                                                                        </div> <!-- /.slide-element -->
                                                            </div> <!--  /.item -->
```

```
                                                <div class="item">
                                                        <div class="container slide-element"
onclick="window.location='subpage - Copy (2).html'">
                                                                <img src="wn3.png"
style="height:450px; width:770px;" alt="Main Slide Image 1">
                                                                <p><a href="subpage - Copy
(2).html">HTC M9 smartphone: Why it's worth a closer look</a></p>
                                                        </div> <!-- /.slide-element -->
                                                </div> <!-- .item -->

                                                <div class="item">
                                                        <div class="container slide-element"
onclick="window.location='subpage - Copy (3).html'">
                                                                <img src="wn4.jpg"
style="height:450px; width:770px;" alt="Main Slide Image 1">
                                                                <p><a href="subpage - Copy
(3).html">Lawmakers want Google to give up its search code </a></p>
                                                        </div> <!-- /.slide-element -->
                                                </div> <!-- /.item -->


                                        </div> <!-- /.carousel-inner -->

                                        <!-- slider nav -->
                                        <a class="carousel-control left" href="#ccr-slide-main"
data-slide="prev"><i class="fa fa-arrow-left"></i></a>
                                        <a class="carousel-control right" href="#ccr-slide-main"
data-slide="next"><i class="fa fa-arrow-right"></i></a>

                                        <ol class="carousel-indicators">
                                                <li data-target="#ccr-slide-main" data-slide-to="0"
class="active"></li>
                                                <li data-target="#ccr-slide-main"
data-slide-to="1"></li>
                                                <li data-target="#ccr-slide-main"
data-slide-to="2"></li>
                                                <li data-target="#ccr-slide-main"
data-slide-to="3"></li>
                                        </ol> <!-- /.carousel-indicators -->


                        </section><!-- /#ccr-slide-main -->




                                <section class="bottom-border">
                                </section> <!-- /#bottom-border -->




                                <section id="ccr-world-news">
                                        <div class="ccr-gallery-ttile" style=" ;">
                                                <span></span>
                                                <font color="white"; size="5px";
style="margin-left:20px;">World and Technology </p></font>
                                        </div> <!-- .ccr-gallery-ttile -->
```

```
                                        <section class="featured-world-news">
                                                <div class="featured-world-news-img"><img
src="wn5.jpg"></div>
                                                <div class="featured-world-news-post">
                                                <h5>Surprise! 1 in 5 people use Bing </h5>
                                                Bing crossed the 20% threshold in search for the first
time in March.

That's according to a new U.S. desktop search report from comScore, released this week.
But wait, it gets even more surprising. Since Microsoft (MSFT, Tech30) also serves Bing results on Yahoo...
                                                        <div class="like-comment-readmore">


                                                                <a class="read-more" href="subpage -
Copy (9).html">Read More</a>
                                                        </div> <!-- /.like-comment-readmore -->
                                                </div>
                                        </section> <!-- /#featured-world-news -->


                                        <ul>
                                                <li>

                                                                <div class="ccr-thumbnail">
                                                                        <img src="wn6.jpg"
alt="thumbnail-small-1.jpg">
                                                                        <p><a href="subpage - Copy
(10).html">
                                                                         New tech creates buttons and
shapes in mid-air</a></p>
                                                                </div>

                                                </li>
                                                <li>

                                                                <div class="ccr-thumbnail">
                                                                        <img src="wn77.jpg"
alt="thumbnail-small-1.jpg">
                                                                        <p><a href="subpage - Copy
(11).html">
Students invent a sound wave fire extinguisher </a></p>
                                                                </div>

                                                </li>
                                                <li>

                                                                <div class="ccr-thumbnail">
                                                                        <img src="wn7.png"
alt="thumbnail-small-1.jpg">
                                                                        <p><a href="subpage - Copy
(12).html">Robot starts work as greeter at Japanese store</a></p>
                                                                </div>

                                                </li>
                                                <li>

                                                                <div class="ccr-thumbnail">
                                                                        <img src="wn8.jpg"
alt="thumbnail-small-1.jpg">
                                                                        <p><a href="subpage - Copy
```

```
(13).html">
Google changes search algorithm - Mobilegeddon </a></p>
                                                    </div>

                                                </li>
                                                <li>

                                                    <div class="ccr-thumbnail">
                                                        <img src="wn9.png"
alt="thumbnail-small-1.jpg">
                                                        <p><a href="subpage - Copy
(14).html">NASA's New Horizons spacecraft nears Pluto </a></p>
                                                    </div>

                                                </li>
                                                <li>

                                                    <div class="ccr-thumbnail">
                                                        <img src="wn10.jpg"
alt="thumbnail-small-1.jpg">
                                                        <p><a href="subpage - Copy
(15).html">Japan's maglev train sets world record: 603 kph</a></p>
                                                    </div>

                                                </li>
                                                <li>

                                                    <div class="ccr-thumbnail">
                                                        <img src="wn11.jpg"
alt="thumbnail-small-1.jpg">
                                                        <p><a href="subpage - Copy
(16).html">
Netflix becomes accessible for visually impaired </a></p>
                                                    </div>

                                                </li>
                                                <li>

                                                    <div class="ccr-thumbnail">
                                                        <img src="wn12.jpg"
alt="thumbnail-small-1.jpg">
                                                        <p><a href="subpage - Copy
(17).html">Meet the man who builds houses with water</a></p>
                                                    </div>

                                                </li>
                                            </ul>

                                        </section> <!-- / #ccr-world-news -->




                                        <section class="bottom-border"></section>
```

```
</section><!-- /.col-md-8 / #ccr-left-section -->

                    <section id="sidebar-popular-post" style="background-color:white;">
                        <div class="ccr-gallery-ttile">
                            <span></span>

                            <font color="white"; size="5px";
style="margin-left:20px;">Popular News</p></font>
                        </div> <!-- .ccr-gallery-ttile -->
                        <ul>
                                <a href="subpage - Copy (5).html"> <li
onclick="window.location='subpage - Copy (5).html'">
                                <img src="pn1.jpg" style="height:100px;
width:100px;" alt="Avatar" >
                                <a href="subpage - Copy (5).html">Predicting
boneheaded driving with technology</a>

                            </li></a>
                            <a href="subpage - Copy (6).html"> <li
onclick="window.location='subpage - Copy (6).html'">
                                <img src="pn2.jpg" style="height:100px;
width:100px;" alt="Avatar">
                                <a href="subpage - Copy (6).html">10 travel apps to
download to your new Apple Watch</a>

                            </li></a>
                            <a href="subpage - Copy (7).html"> <li
onclick="window.location='subpage - Copy (7).html'">
                                <img src="pn3.jpg" style="height:100px;
width:100px;" alt="Avatar">
                                <a href="subpage - Copy (7).html">
Wearable tech for babies </a>

                            </li></a>
                            <a href="subpage - Copy (8).html"> <li
onclick="window.location='subpage - Copy (8).html'">
                                <img src="pn4.png" style="height:100px;
width:100px;" alt="Avatar">
                                <a href="subpage - Copy (8).html">
Better way to type on a smartphone </a>

                            </li></a>


                            <div class="video-container">
        <iframe width="395" height="450" src="https://www.youtube.com/embed/2q9DarPET0o"
frameborder="0" allowfullscreen></iframe>
                    </div>
```

```
                        </section> <!-- /#sidebar-popular-post -->


                    </aside><!-- / .col-md-4  / #ccr-right-section -->


            </div><!-- /.container -->
</section><!-- / #ccr-main-section -->




            <script src="js/jquery-1.9.1.min.js"></script>
            <script src="js/bootstrap.min.js"></script>
            <script src="js/custom.js"></script>
</div>
</body>
</html>



/*Subpage one */
<html>
<head>
<title>Center stage</title>
<script>
$(function() {
   $(window).on('resize', function resize()  {
      $(window).off('resize', resize);
      setTimeout(function () {
         var content = $('#content');
         var top = (window.innerHeight - content.height()) / 2;
         content.css('top', Math.max(0, top) + 'px');
         $(window).on('resize', resize);
      }, 50);
   }).resize();
});
</script>


<style type="text/css">

body {
  background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
   background-color: #ade0f4;
   font-family: "Arial;
}


#container {                /* a container for the all elements */
            max-width: 1170px;
            max-height:auto;
            padding:20px;
            margin-top:10px;
```

```
            margin-left:150px;
            margin-right:150px;
             background-color: white;
             font-size:20px;
             font-family: arial;
             border-left:1px solid black;
             border-right:1px solid black;
             border-top:1px solid black;
             border-bottom:1px solid black;
             text-align:center;
   margin-left: auto;
    margin-right: auto;

}
#homeicon{
width: 50%;
height:15%;
 margin-left: auto;
    margin-right: auto;
            padding:5px;

 border-radius: 3.5px;
text-align:center;
color:black;
font-size:23px;
font-family:"Arial";
 text-align:center;
 border:2px solid  black;
 background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
   background-color: #ade0f4;
}

#homeicon:hover {
background-color:#7D9DFF;
 background-image:none;
}

#content {
    max-width: 1500px;
    margin: auto;
    left: 1%;
    right: 1%;
    position: absolute;
}


</style>
</head>

<body>
<div id="content">
<a href="Center stage.html">
<div id="homeicon"> <h4>Return To Homepage</h4>
</div>
</a>

<div id="container">
```

<h2>Meet the man who builds houses with water</h2>
<IMG STYLE="position:relative; height:200px; width:600px; " SRC="wn12.jpg">
<h6></h6>

Would you build a house with water?

Hungarian architect Matyas Gutai believes that water is the perfect material for keeping a house at a comfortable temperature.

And while that doesn't mean that he can do away with traditional materials like bricks, cement, and plaster, his system promotes a whole new idea of engineering.

Gutai built a prototype house in his hometown of Kecskemet, south of Budapest, with his high school friend Milan Berenyi, after years of research and development.

The house was built with a grant from the EU, and showcases the "liquid engineering" concepts Gutai has written about extensively.
<h1></h1>

How does it work?
<h1></h1>

Panels, some of steel, and some of glass, make up the structure of the house and a sheet of water is trapped between the inner layers, which equalizes the temperature across the building.

The house is actually able to reheat itself, when its hot excess heat is stored either in the foundations of the building or in external storage, to be brought back to the walls when the temperature drops.

The indoor temperature can also be modified using a monitoring system similar to central heating.

<h1></h1>
This is a very efficient and sustainable system: the house can produce its own energy and be more independent of energy suppliers, which could reduce carbon emissions.

"Our panel can heat and cool the building itself -- the water inside the panel does the very same job as heating," says Gutai.

"It saves energy, when you compare it to a similar building with large glass surfaces -- it's a very clean and sustainable solution."
The initial idea

,while studying sustainable architecture at the University of Tokyo, in 2003, Gutai got the idea for his water house from a visit to the open air hot baths.

Despite the snowfall outside the pool, Gutai remained comfortably warm inside it -- it was then he realized the importance of water's surface temperature and its potential use in architecture.

</body>
</html>

```
/* CSS file */

body {
  background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
   background-color: #ade0f4;
            text-align:center;
            color:black;

}

@font-face
{
font-family: Arial;


}
body, h1, h2, h3, h4, h5, h6, a, p, div, article,
aside, details, figcaption, figure, footer,
header, hgroup, nav, section, summary{
            font-family: "Arial;

            margin: 5;
            padding: 5;
}

.container {                  /* a container for the all elements */
            max-width: 1190px;
            padding:0px;
            margin-top:5px;
            background-color:white;
            border: 1px solid black;


}

a{
            color: black;  /*headlines font color - the popular news*/
            -webkit-transition: all .25s ease-in;
                        -moz-transition: all .25s ease-in;
                         -ms-transition: all .25s ease-in;
                          -o-transition: all .25s ease-in;
                             transition: all .25s ease-in;
                                    font-size:18px;

}
a:hover{
            text-decoration: none;
            color: black;
}

ul{
            list-style: none;
            padding-left: 0px;
```

```
}
img {
	width: 100%;
}
.center {
	text-align: center;
}
.bottom-border{
	width: 100%;
	padding-top: 0px;
	margin-bottom: 1px;
	border-bottom: 1px solid #e3e2e2;
}
.ccr-gallery-ttile{   /*healines section for the popular and world news + video */
	width:100%;
	height:40px;
	line-height:40px;
	background:black;
	 border-radius: 3px;

}







.like-comment-readmore .read-more,  /* read more button for world news*/
.read-more a{
	color: black;
	background-color:#DBE0E6;
	display: inline-block;
	padding: 0px 70px;
	line-height: 95px;
	 border-radius: 1.5px;
}
.like-comment-readmore .read-more:hover,
.read-more a:hover{
	background-color: #7D9DFF;
	color: black;
	-webkit-transition: all .15s ease-in;
	  -moz-transition: all .15s ease-in;
	   -ms-transition: all .15s ease-in;
	    -o-transition: all .15s ease-in;
	       transition: all .15s ease-in;
}
.like-comment-readmore .read-more{
	float: right;
}



.ccr-thumbnail a{   /*read more for world news*/
	color:black;

	padding:5px 5px;
	display:block;
	height: 90px;
```

```
        width:174px;
  border-bottom: 1px solid black;


}
.ccr-thumbnail a:hover{

        background-color: #7D9DFF;

         border-radius: 1.5px;
}


/* ccr-left-section
----------------------------------------------------------------------- */

#ccr-left-section .ccr-last-update{   /* Last news headline */
        background-color:black;
        width: 100%;
        height: 45px;
        overflow: hidden;
        margin-top: 0;
        color:white;
        border-radius:3px;
}


#ccr-left-section .update-news-text{
        float: left;
        padding-left: 10px;

}
#ccr-left-section .update-news-text ul{
        line-height: 40px;

}
#ccr-left-section .update-right-border{
        width: 0;
        height: 40px;
        border-right:5px solid black;
        float: right;

}


/* - ccr-right-section
----------------------------------------------------------------------- */
#ccr-main-section #ccr-right-section.col-md-4{
        padding-left: 15px;
        margin-top: 40px;
}
#ccr-main-section #ccr-right-section.col-md-4.ccr-home{
        margin-top: 15px;
}



/* Right Sidebar
----------------------------------------------------------------------- */
```

```
/* - sidebar-popular-post
---------------------------------------------------------------------- */
#sidebar-popular-post,
#sidebar-older-post{
	overflow: hidden;
}
#sidebar-popular-post li,
#sidebar-older-post li{
	padding: 15px;
	width: 100%;
	float:left;
	border-left: 1px solid  black;
	border-right: 1px solid  black;
}
#sidebar-popular-post li img,
#sidebar-older-post li img{
	width: 65px;
	height: 65px;
	float: left;
	margin-right: 8px;

}
#sidebar-popular-post li:last-child,
#sidebar-older-post li:last-child {
	border-bottom: 1px solid black;
	margin-bottom: 115px;



}
#sidebar-popular-post li:nth-child(even),
#sidebar-older-post li:nth-child(even){
	background-color: white;
	border-bottom:1px solid  black;
}
#sidebar-popular-post li:nth-child(even):hover {
background-color:#7D9DFF;
}
/* - sidebar-video-post and sidebar-entertainment-post
---------------------------------------------------------------------- */


video {

	height: auto;
}
.video-container {

	padding-bottom: 56.25%;
	padding-top: 15px;
	height: 0;
	overflow: hidden;
	position:absolute;
   top: 43.5%;
   left: 63.2%;

	 margin-left: auto;
   margin-right: auto;
   margin-top: 70px;
	 margin-bottom: 0px;
```

```
}

.video-container frame,
.video-container object,
.video-container embed {
	position:absolute;
	top: 0;
	left: 0;
	width: 100%;
	height: 100%;

}




/* - ccr-slide-main	picture slider
---------------------------------------------------------------------- */
#ccr-slide-main{
	position: relative;
	margin: 1px 1px 30px 1px;  /* right left top bottom */
}
#ccr-slide-main p{
	position: absolute;
	bottom: 0;
	background-color: rgba(0,0,0, .4);  /*Red Green Blue Alpha.*/
	width: 100%;
	min-height: 100px;
	line-height: 60px;
	margin-bottom: 0px;
}
#ccr-slide-main p:hover{
background-color: #7D9DFF;
}

#ccr-slide-main p a{
	color: white;
	font-size: 2em;
	padding-left: 30px;
}
#ccr-slide-main .carousel-indicators{
	bottom:-40px;
}
#ccr-slide-main .carousel-indicators li{
	width: 30px;
	height: 10px;
	margin: 5px;
	border: 1px solid rgba(0,0,0,.1);
	border-radius: 0px;
}
#ccr-slide-main .carousel-indicators .active{
	background-color: black;
}
#ccr-slide-main .carousel-control{    /* indicators righ left */
	text-shadow:none;
	display: inline-block;
	background: black;
```

```
	line-height:36px!important;
	-moz-line-height:36px!important;
	height:100px;
	width:100px;
	top:45%;
	opacity: 0.6;
	padding: 34px;
}
#ccr-slide-main .carousel-control:hover{
	background-color: #7D9DFF;
	opacity:1;
}



/* 7.3 - ccr-world-news
------------------------------------------------------------------------ */
#ccr-world-news{
	overflow: hidden;
	background-color:white;
	color:black;

}
#ccr-world-news .featured-world-news{
	width: 100%;
	overflow: hidden;
	margin: 20px 0px;
}
#ccr-world-news .featured-world-news img{
	width: 100%;
}
#ccr-world-news .featured-world-news-img {
	width: 48.5%;
	float: left;
	height:252px;
}
#ccr-world-news .featured-world-news-post{
	position: relative;
	border-bottom: 1px solid black;
	height:252px;
	width: 48.5%;
	float: right;

}
#ccr-world-news .featured-world-news-post h5{
	margin-bottom: 10px;
	font-weight: 700;

}
#ccr-world-news h5{
	margin-bottom: 10px;
	font-size: 1.2em;

}
#ccr-world-news li{
	width: 22.75%;
	float: left;
	margin-bottom: 10px;

}
```

```
#ccr-world-news li:nth-child(4n+1),
#ccr-world-news li:nth-child(4n+2),
#ccr-world-news li:nth-child(4n+3){
	margin-right: 3%;
}


/* Javascript code */

try {window.FB || (function(window) {
var self = window, document = window.document;
var undefined = void 0;
var setTimeout = window.setTimeout, setInterval = window.setInterval,clearTimeout =
window.clearTimeout,clearInterval = window.clearInterval;var __DEV__ = 0;
function emptyFunction() {};
var __transform_includes = {};
var __annotator, __bodyWrapper;
var __w, __t;
(function(){var a=function(e,f){if(!e&&!f)return null;var g={};if(typeof e!=='undefined')g.type=e;if(typeof
f!=='undefined')g.signature=f;return g;},b=function(e,f){return a(e&&/^[A-Z]/.test(e)?e:(void
0),f&&((f.params&&f.params.length)||f.returns)?'function('+(f.params?f.params.map(function(g){return
(/\?/).test(g)?'?'+g.replace('?',''):g;}).join(','):'')+')'+(f.returns?':'+f.returns:''):(void
0));},c=function(e,f,g){if(typeof __transform_includes==='undefined')return e;if('sourcemeta' in
__transform_includes)e.__SMmeta=f;if('typechecks' in __transform_includes){var h=b(f?f.name:(void
0),g);if(h)__w(e,h);}return e;},d=function(e,f,g,h){if(typeof __transform_includes==='undefined')return
g.apply(e,f);var i='typechecks' in __transform_includes;if(i&&h&&h.params)__t.apply(e,h.params);var
j=g.apply(e,f);if(i&&h&&h.returns)__t([j,h.returns]);return j;};__annotator=c;__bodyWrapper=d;})();
__t=function(a){return a[0];};__w=function(a){return a;};
var require,__d;(function(a){var
b={},c={},d=['global','require','requireDynamic','requireLazy','module','exports'];require=function(e,f){if(c.
hasOwnProperty(e))return c[e];if(!b.hasOwnProperty(e)){if(f)return null;throw new Error('Module '+e+'
has not been defined');}var g=b[e],h=g.deps,i=g.factory.length,j,k=[];for(var l=0;l<i;l++){switch(h[l]){case
'module':j=g;break;case 'exports':j=g.exports;break;case 'global':j=a;break;case
'require':j=require;break;case 'requireDynamic':j=require;break;case
'requireLazy':j=null;break;default:j=require.call(null,h[l]);}k.push(j);}g.factory.apply(a,k);c[e]=g.exports;r
eturn g.exports;};require.__markCompiled=function(){};__d=function(e,f,g,h){if(typeof
g=='function'){b[e]={factory:g,deps:d.concat(f),exports:{}};if(h===3)require.call(null,e);}else
c[e]=g;};})(this);
__d("ES5ArrayPrototype",[],function(a,b,c,d,e,f){b.__markCompiled&&b.__markCompiled();var
g={};g.map=function(h,i){if(typeof h!='function')throw new TypeError();var j,k=this.length,l=new
Array(k);for(j=0;j<k;++j)if(j in this)l[j]=h.call(i,this[j],j,this);return
l;};g.forEach=function(h,i){g.map.call(this,h,i);};g.filter=function(h,i){if(typeof h!='function')throw new
TypeError();var j,k,l=this.length,m=[];for(j=0;j<l;++j)if(j in
this){k=this[j];if(h.call(i,k,j,this))m.push(k);}return m;};g.every=function(h,i){if(typeof
h!='function')throw new TypeError();var j=new Object(this),k=j.length;for(var l=0;l<k;l++)if(l in
j)if(!h.call(i,j[l],l,j))return false;return true;};g.some=function(h,i){if(typeof h!='function')throw new
TypeError();var j=new Object(this),k=j.length;for(var l=0;l<k;l++)if(l in j)if(h.call(i,j[l],l,j))return
true;return false;};g.indexOf=function(h,i){var j=this.length;i|=0;if(i<0)i+=j;for(;i<j;i++)if(i in
this&&this[i]===h)return i;return -1;};e.exports=g;},null);
__d("ES5FunctionPrototype",[],function(a,b,c,d,e,f){b.__markCompiled&&b.__markCompiled();var
g={};g.bind=function(h){if(typeof this!='function')throw new TypeError('Bind must be called on a
function');var i=this,j=Array.prototype.slice.call(arguments,1);function k(){return
i.apply(h,j.concat(Array.prototype.slice.call(arguments)));}k.displayName='bound:'+(i.displayName||i.nam
e||'(?)');k.toString=function l(){return 'bound: '+i;};return k;};e.exports=g;},null);
__d("ES5StringPrototype",[],function(a,b,c,d,e,f){b.__markCompiled&&b.__markCompiled();var
g={};g.trim=function(){if(this==null)throw new TypeError('String.prototype.trim called on null or
undefined');return String.prototype.replace.call(this,/^\s+|\s+$/g,'');};g.startsWith=function(h){var
i=String(this);if(this==null)throw new TypeError('String.prototype.startsWith called on null or
undefined');var j=arguments.length>1?Number(arguments[1]):0;if(isNaN(j))j=0;var
```

```
k=Math.min(Math.max(j,0),i.length);return i.indexOf(String(h),j)==k;};g.endsWith=function(h){var
i=String(this);if(this==null)throw new TypeError('String.prototype.endsWith called on null or
undefined');var j=i.length,k=String(h),l=arguments.length>1?Number(arguments[1]):j;if(isNaN(l))l=0;var
m=Math.min(Math.max(l,0),j),n=m-k.length;if(n<0)return false;return
i.lastIndexOf(k,n)==n;};g.contains=function(h){if(this==null)throw new
TypeError('String.prototype.contains called on null or undefined');var
i=String(this),j=arguments.length>1?Number(arguments[1]):0;if(isNaN(j))j=0;return
i.indexOf(String(h),j)!=-1;};g.repeat=function(h){if(this==null)throw new
TypeError('String.prototype.repeat called on null or undefined');var
i=String(this),j=h?Number(h):0;if(isNaN(j))j=0;if(j<0||j===Infinity)throw RangeError();if(j===1)return
i;if(j===0)return '';var k='';while(j){if(j&1)k+=i;if((j>>=1))i+=i;}return k;};e.exports=g;},null);
__d("ES5Array",[],function(a,b,c,d,e,f){b.__markCompiled&&b.__markCompiled();var
g={};g.isArray=function(h){return Object.prototype.toString.call(h)=='[object
Array]';};e.exports=g;},null);
__d("ie8DontEnum",[],function(a,b,c,d,e,f){b.__markCompiled&&b.__markCompiled();var
g=['toString','toLocaleString','valueOf','hasOwnProperty','isPrototypeOf','prototypeIsEnumerable','construc
tor'],h=({}).hasOwnProperty,i=function(){};if(({toString:true}).propertyIsEnumerable('toString'))i=functi
on(j,k){for(var l=0;l<g.length;l++){var m=g[l];if(h.call(j,m))k(m);}};e.exports=i;},null);
__d("ES5Object",["ie8DontEnum"],function(a,b,c,d,e,f,g){b.__markCompiled&&b.__markCompiled();va
r h=({}).hasOwnProperty,i={};function j(){}i.create=function(k){var l=typeof
k;if(l!='object'&&l!='function')throw new TypeError('Object prototype may only be a Object or
null');j.prototype=k;return new j();};i.keys=function(k){var l=typeof
k;if(l!='object'&&l!='function'||k===null)throw new TypeError('Object.keys called on non-object');var
m=[];for(var n in k)if(h.call(k,n))m.push(n);g(k,function(o){return m.push(o);});return
m;};e.exports=i;},null);
__d("ES5Date",[],function(a,b,c,d,e,f){b.__markCompiled&&b.__markCompiled();var
g={};g.now=function(){return new Date().getTime();};e.exports=g;},null);
/**
```

The code of Collapsible panels layout

```
<!doctype html>



<html lang="en" class="no-js">

<head>
<title>collapsible panel </title>
        <meta charset="UTF-8">                    <!-- covers almost all of the characters and symbols in
the world  -->
        <meta name="description" content="" >
        <meta name="author" content="">
        <meta name="viewport" content="width=device-width, initial-scale=1">
        <title>collapsible panel </title>
        <link rel="stylesheet" type="text/css" href="css/bootstrap.min.css">
        <link rel="stylesheet" type="text/css" href="css/bootstrap-theme.min.css">
        <link rel="stylesheet" type="text/css" href="css/font-awesome.min.css">
        <link rel="stylesheet" type="text/css" href="css/style.css">

                <script src="js/html5shiv.js"></script>
        <script>
$(function() {
   $(window).on('resize', function resize()  {
      $(window).off('resize', resize);
      setTimeout(function () {
         var content = $('#content');
         var top = (window.innerHeight - content.height()) / 2;
         content.css('top', Math.max(0, top) + 'px');
```

```
        $(window).on('resize', resize);
      }, 50);
   }).resize();
});
</script>

          <!-- collapsible panel  -->
<meta charset="UTF-8" />
                    <meta http-equiv="X-UA-Compatible" content="IE=edge,chrome=1">
                    <meta name="viewport" content="width=device-width, initial-scale=1.0">
                    <title>Responsive Multi-Level Menu - Demo 2</title>
                    <meta name="description" content="Responsive Multi-Level Menu: Space-saving
drop-down menu with subtle effects" />
                    <meta name="keywords" content="multi-level menu, mobile menu, responsive,
space-saving, drop-down menu, css, jquery" />
                    <meta name="author" content="Codrops" />
                    <link rel="shortcut icon" href="../favicon.ico">
                    <link rel="stylesheet" type="text/css" href="css/default.css" />
                    <link rel="stylesheet" type="text/css" href="css/component.css" />
                    <script src="js/modernizr.custom.js"></script>
</head>




                                        <div id="dl-menu" class="dl-menuwrapper" style="
position:absolute; top:703px; left:944px;">
                                        <b><h3>Quick Access to The News</h3></b>
                                                <button class="dl-trigger">Open Menu</button>
                                                <ul class="dl-menu">
                                                        <li>
                                                                <a href="#" style="height:112px;
padding:40px; border-style:solid; border-width:1px; border-radius:7px;">Latest News</a>
                                                                <ul class="dl-submenu">
                                                                        <li>
                                                                                <li><a
href="subpage.html"style="height:112px; padding:20px; border-style:solid; border-width:1px;
border-radius:7px;">Tobii EyeX Engine: creating a unified user experience</a></li>

                                                                        </li>
                                                                        <li>
                                                                                <li><a
href="subpage - Copy.html"style="height:112px; padding:20px; border-style:solid; border-width:1px;
border-radius:7px;">Cisco Linksys E4200 v2 Maximum Performance Dual-Band N900 router
review</a></li>

                                                                        </li>
                                                                        <li>
                                                                                <li><a
href="subpage - Copy (2).html"style="height:112px; padding:20px; border-style:solid; border-width:1px;
border-radius:7px;">HTC One M9 smartphone review: Why it's worth a closer look</a></li>

                                                                        </li>
                                                                        <li>
                                                                                <li><a
href="subpage - Copy (3).html"style="height:112px; padding:20px; border-style:solid; border-width:1px;
border-radius:7px;">French lawmakers want Google to give up its search code</a></li>
```

```
                                                    </li>
                                                </ul>
                                            </li>
                                            <li>
                                                <a href="#" style="height:112px;
padding:40px; border-style:solid; border-width:1px; border-radius:7px;">Popular News</a>
                                                <ul class="dl-submenu">
                                                    <li><a href="subpage - Copy
(5).html"style="height:112px; padding:20px; border-style:solid; border-width:1px;
border-radius:7px;">Predicting boneheaded driving with technology</a></li>
                                                    <li><a href="subpage - Copy
(6).html"style="height:112px; padding:20px; border-style:solid; border-width:1px; border-radius:7px;">3
travel apps to download to your new Apple Watch</a></li>
                                                    <li><a href="subpage - Copy
(7).html"style="height:112px; padding:20px; border-style:solid;
border-width:1px;border-radius:7px;">Wearable tech for babies</a></li>
                                                    <li><a href="subpage - Copy
(8).html"style="height:112px; padding:20px; border-style:solid;
border-width:1px;border-radius:7px;">Better way to type on a smartphone</a></li>
                                                </ul>
                                            </li>
                                            <li>
                                                <a href="#"style="height:112px;
padding:40px; border-style:solid; border-width:1px; border-radius:7px;">World and Technology </a>
                                                <ul class="dl-submenu">
                                                    <li>


                                                    </li>
                                                    <li>


                                                    </li>
                                                    <li><a href="subpage - Copy
(9).html"style="height:112px; padding:20px; border-style:solid;
border-width:1px;border-radius:7px;">Surprise! 1 in 5 people use Bing</a></li>
                                                    <li><a
href="subpage - Copy (10).html"style="height:112px; padding:30px; border-style:solid; border-width:1px;
border-radius:7px;">New tech creates buttons and shapes in mid-air</a></li>
                                                    <li><a
href="subpage - Copy (11).html"style="height:112px; padding:20px; border-style:solid; border-width:1px;
border-radius:7px;">Students invent a sound wave fire extinguisher</a></li>

                                                <li><a href="subpage - Copy (12).html"style="height:112px; padding:20px; border-style:solid;
border-width:1px; border-radius:7px;">Robot starts work as greeter at Japanese store</a></li>
                                            </li>
                                                </ul>
                                            </li>

                                        </ul>
                                    </div><!-- /dl-menuwrapper -->
```

The code of grid of equals layout

```
<!DOCTYPE html>
<html lang="en" class="no-js">
	<head>
		<title>Grid of Equals</title>

		<link rel="stylesheet" type="text/css" href="css/default.css" />
		<link rel="stylesheet" type="text/css" href="css/component.css" />
		<script src="js/modernizr.custom.js"></script>
	</head>

	<body>
	<div id="content">
	<h3>Grid of Equals Layout - Places You Should Visit In your Life </h3>


			<div class="continer1">


		<div class="md-modal md-effect-1" id="modal-1">

			<div class="md-content">

				<h3>Coliseum</h3>
				<div>
					<p>Italy- Rome</p>
					<ul>

					<img src="1.jpg" width="380px" height="200px"
border="1px">
						<p>The Colosseum or Coliseum, also known as the
Flavian Amphitheatre (Latin: Amphitheatrum Flavium; Italian: Anfiteatro Flavio or Colosseo) is an
elliptical amphitheatre in the centre of the city of Rome, Italy. Built of concrete and stone, it is the largest
amphitheatre in the world, and is considered one of the greatest works of architecture and engineering</p>
					</ul>
					<button1 class="md-close"><h1>X</h1></button1>
				</div>
			</div>

		</div>   <!-- this for what happen after clicking on the heading -->

		<div class="md-modal md-effect-1" id="modal-2">

			<div class="md-content">

				<h3>Eiffel Tower</h3>
				<div>
					<p>France-Paris</p>
					<ul>

					<img src="2.jpg" width="380px" height="200px"
border="1px">
						<p>The Eiffel Tower (French: La tour Eiffel, is an iron
lattice tower located on the Champ de Mars in Paris. It was named after the engineer Gustave Eiffel, whose
company designed and built the tower. Erected in 1889 as the entrance arch to the 1889 World's Fair, it was
initially criticised by some of France's leading artists and intellectuals for its design, but has become both a
```

global cultural icon of France and one of the most recognizable structures in the world.
<button1 class="md-close"><h1>X</h1></button1>

 <!-- this for what happen after clicking on the heading -->

<h3>Egyptian Pyramids</h3>

Egypt-Giza

<img src="3.jpg" width="380px" height="200px"
border="1px">
The Egyptian pyramids are ancient pyramid-shaped
masonry structures located in Egypt.

As of November 2008, there are sources citing both 118 and 138 as the number of identified Egyptian pyramids. Most were built as tombs for the country's pharaohs and their consorts during the Old and Middle Kingdom periods.

<button1 class="md-close"><h1>X</h1></button1>

 <!-- this for what happen after clicking on the heading -->

<h3>Big Ben</h3>

 England-London

<img src="4.jpg" width="380px" height="200px"
border="1px">
 Big Ben is the nickname for the Great Bell of the
clock at the north end of the
Palace of Westminster in London, and often extended to
refer to the clock and the clock tower.

The tower is officially known as the Elizabeth Tower, renamed as such to celebrate the
Diamond Jubilee of Elizabeth II (prior to being renamed in 2012 it was known as simply "Clock Tower").
The tower holds the second largest four-faced chiming clock in the world (Minneapolis City Hall being the first).
The tower was completed in 1858 and had its 150th anniversary on 31 May 2009, during which celebratory events took place.

<button1 class="md-close"><h1>X</h1></button1>

 <!-- this for what happen after clicking on the heading -->

```
                    <div class="md-content">

                        <h3>Taj Mahal</h3>
                        <div>
                            <p>India-Agra</p>
                            <ul>

                            <img src="5.jpg" width="380px" height="200px"
border="1px">
                                <p>The Taj Mahal "crown of palaces", pronounced
"the Taj") is a white marble mausoleum located in Agra, Uttar Pradesh, India.

Commissioned in 1632 by the Mughal emperor Shah Jahan to house the tomb of his third wife, Mumtaz
Mahal, the Taj Mahal stands on the
southern bank of the Yamuna River. The mausoleum is widely recognized as "the jewel of Muslim art in
India" and remains as one of the
world's most celebrated structures and a symbol of India's rich history.
</p>
                            </ul>
                            <button1 class="md-close"><h1>X</h1></button1>
                        </div>
                    </div>

                </div>    <!-- this for what happen after clicking on the heading -->
                <div class="md-modal md-effect-1" id="modal-6">

                    <div class="md-content">

                        <h3>Christ the Redeemer</h3>
                        <div>
                            <p>Brazil-Rio de</p>
                            <ul>

                            <img src="6.jpg" width="380px" height="200px"
border="1px">
                            <p>Christ the Redeemer (Portuguese: Cristo Redentor is an Art
Deco statue of Jesus
                            Christ in Rio de Janeiro, Brazil, created by French sculptor Paul
Landowski and built by the
                            Brazilian engineer Heitor da Silva Costa, in collaboration with
the French engineer Albert Caquot.
                            It is 30 metres (98 ft) tall, not including its 8-metre (26 ft)
pedestal, and its arms stretch 28 metres (92 ft) wide.</p>
                                </ul>
                            <button1 class="md-close"><h1>X</h1></button1>
                        </div>
                    </div>

                </div>    <!-- this for what happen after clicking on the heading -->



                <div class="container">
                    <!-- Top Navigation -->
                    <div class="codrops-top clearfix">

                    </div>
                    <header>
```

```
                        </header>
                        <div class="main clearfix">
                                <div class="column">

                                </div>
                                <div class="column">
                                        <button class="md-trigger" STYLE="position: absolute;
TOP:10px; LEFT: 50px; z-index:79;overflow:auto" data-modal="modal-1"><img src="1.jpg"
width="250px" height="200px" ><h4>Coliseum</h4> </button>
                                        <button class="md-trigger" STYLE="position: absolute;
TOP:10px; LEFT:390px; z-index:79;overflow:auto" data-modal="modal-2"><img src="2.jpg"
width="250px" height="200px" ><h4>Eiffel Tower </h4></button>
                                        <button class="md-trigger" STYLE="position: absolute;
TOP:10px; LEFT:720px; z-index:79;overflow:auto" data-modal="modal-3"><img src="3.jpg"
width="250px" height="200px" ><h4>Egyptian Pyramids </h4></button>
                                        <button class="md-trigger" STYLE="position: absolute;
TOP:300px; LEFT:50px; z-index:79;overflow:auto"  data-modal="modal-4"><img src="4.jpg"
width="250px" height="200px" ><h4>Big Ben </h4></button>
                                        <button class="md-trigger" STYLE="position: absolute;
TOP:300px; LEFT:390px; z-index:79;overflow:auto" data-modal="modal-5"><img src="5.jpg"
width="250px" height="200px" ><h4>Taj Mahal </h4></button>
                                        <button class="md-trigger" STYLE="position: absolute;
TOP:300px; LEFT:720px; z-index:79;overflow:auto" data-modal="modal-6"><img src="6.jpg"
width="250px" height="200px" ><h4> Christ the Redeemer</h4></button>


                                </div>
                        </div>
                </div><!-- /container -->
                <div class="md-overlay"></div><!-- this makes the pop up window lighter and the rest of
the page is darker -->


                </div>

                <!-- classie.js by @desandro: https://github.com/desandro/classie -->
                <script src="js/classie.js"></script>
                <script src="js/modalEffects.js"></script>

                <!-- for the blur effect -->
                <!-- by @derSchepp https://github.com/Schepp/CSS-Filters-Polyfill -->
                <script>
                        // this is important for IEs
                        var polyfilter_scriptpath = '/js/';
                </script>
                <script src="js/cssParser.js"></script>
                <script src="js/css-filters-polyfill.js"></script>

                        <script>
                $(function() {
   $(window).on('resize', function resize()  {
      $(window).off('resize', resize);
      setTimeout(function () {
         var content = $('#content');
         var top = (window.innerHeight - content.height()) / 2;
         content.css('top', Math.max(0, top) + 'px');
         $(window).on('resize', resize);
      }, 50);
   }).resize();
});
```

```
	</script>
		</div>
	</body>
</html>

/*CSS code */

@import url(http://fonts.googleapis.com/css?family=Lato:300,400,700);

@font-face {
	font-family: 'codropsicons';

	font-weight: normal;
	font-style: normal;
}


.clearfix:before, .clearfix:after { content: " "; display: table; }
.clearfix:after { clear: both; }

body {
	font-family:  Arial;
	color: black;
	background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
  background-color: #ade0f4;
  text-align:center;
  font-size:22px;
}

.continer1 {
   width: 1000px;
	height:500px;
   margin-top: 200px;
background-color:green;
   margin-bottom: 30px;
  margin-left: auto ;
 margin-right: auto ;


	 background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
  background-color: #ade0f4;
}


#box {			/* black section */

   width:392px;
   height:40px;
   background-color:black;
	 border-radius: 1.5px;
	text-align: center;
	padding-top: 2px;
	font-size:1.6em;
	font-family: Helvetica;

}
```

```
a {
	color:white;
	text-decoration: none;
}

button1 {	/* close me button */
	display: block;
	width : 90px;
	height:75px;
	position: absolute;

	top: 0px;
	background-color:#990000;

	font-family:  Arial;
	color:white;
	text-align:center;
	left:868px;
	margin: 0 auto;
	font-size:  0.6em;
	border: 1px solid #DADAFF;
}


button1:hover {
	background: #FF5050;

}

button {
	border: none;
	padding: 1.em 6em;   /* heading size */
	width:270px;
   height:270px;
   background-color:white;


position:absolute;
left:650px;
top:230px;
-moz-transition: all 550ms ease;
-webkit-transition: all 550ms ease;
	-moz-transition: all 550ms ease;
	-o-transition: all 550ms ease;
	-ms-transition: all 550ms ease;
	transition: all 550ms ease;



	cursor: pointer;

	margin: 3px 2px;
	border-radius: 4px; /* edge border */
	border: 1px solid black;
	margin: 100px;  /* to make it expand from the middle*/
}

button:hover {
```

```
        background: #7D9DFF;
    width:350px;
    height:305px;
    text-align:center;
    font-size:23px;
    font-weight:199px;
    font-family:Arial;
     padding:20px;
         margin: 55px;  /* to make it expand from the middle*/

}



#content {
    max-width: 1230px;
    margin: auto;
    left: 1%;
    right: 1%;
    position: absolute;
}


/* General styles for the modal */

.md-perspective,
.md-perspective body {
        height: 100%;
        overflow: hidden;
}

.md-perspective body  {
        background: #222;
        -webkit-perspective: 600px;
        -moz-perspective: 600px;
        perspective: 600px;
}

.md-modal {                     /* pop up box style*/
        position: fixed;
        top: 50%;
        left: 50%;
        width: 50%;
        max-width: 1100px;
        min-width: 1100px;
        height: auto;
        z-index: 2000;
        visibility: hidden;
        -webkit-backface-visibility: hidden;
        -moz-backface-visibility: hidden;
        backface-visibility: hidden;
        -webkit-transform: translateX(-50%) translateY(-50%);
        -moz-transform: translateX(-50%) translateY(-50%);
        -ms-transform: translateX(-50%) translateY(-50%);
        transform: translateX(-50%) translateY(-50%);
}

.md-show {
        visibility: visible;
}
```

```
.md-overlay {
	position: fixed;
	width: 100%;
	height: 100%;
	visibility: hidden;
	top: 0;
	left: 0;
	z-index: 1000;
	opacity: 0;
	background: black;
	-webkit-transition: all 0.5s;
	-moz-transition: all 0.0s;
	transition: all 0.5s;
}

.md-show ~ .md-overlay {
	opacity: 0.8;
	visibility: visible;
}

/* Content styles */
.md-content {
	color: black;
	background: white;
	position: relative;
	border-radius: 3px;
	margin: 0 auto;
}

.md-content h3 {		/*  the header of pop up box  */
	margin: 0;
	padding: 0.4em;
	text-align: center;
	font-size: 2.4em;
	font-weight: 300;
	opacity: 0.8;
	background: rgba(0,0,0,0.1);
	border-radius: 3px 3px 0 0;

}

.md-content > div {		/*  pop up box content  */
	padding: 15px 40px 30px;
	margin: 0;
	font-weight: 300;
	font-size: 1.15em;

}

.md-content > div p {		/*  in the pop up box content, the distance between the first line and the rest  */
	margin: 10px;
	padding: 10px 0;

}

.md-content > div ul {
	margin: 0;
	padding: 0 0 30px 20px;
}
```

```
.md-content > div ul li {
	padding: 5px 0;
}

.md-content button1 {		/* close me button */
	display: block;
	width : 115px;
	height:102px;
	top: 0px;
	font-family:  Arial;
	left:983px;
	margin: 0 auto;
	font-size:  0.6em;
	border: 1px solid #DADAFF;
}

/* Individual modal styles with animations/transitions */

/* Effect 1: Fade in and scale up */
.md-effect-1 .md-content {
	-webkit-transform: scale(0.7);
	-moz-transform: scale(0.7);
	-ms-transform: scale(0.7);
	transform: scale(0.7);
	opacity: 0;
	-webkit-transition: all 0.3s;
	-moz-transition: all 0.3s;
	transition: all 0.3s;
}

.md-show.md-effect-1 .md-content {
	-webkit-transform: scale(1);
	-moz-transform: scale(1);
	-ms-transform: scale(1);
	transform: scale(1);
	opacity: 1;
}


/* Javascript code*/


( function( window ) {

'use strict';


function classReg( className ) {
  return new RegExp("(^|\\s+)" + className + "(\\s+|$)");
}
var hasClass, addClass, removeClass;

if ( 'classList' in document.documentElement ) {
  hasClass = function( elem, c ) {
    return elem.classList.contains( c );
  };
  addClass = function( elem, c ) {
    elem.classList.add( c );
  };
```

```
  removeClass = function( elem, c ) {
    elem.classList.remove( c );
  };
}
else {
  hasClass = function( elem, c ) {
    return classReg( c ).test( elem.className );
  };
  addClass = function( elem, c ) {
    if ( !hasClass( elem, c ) ) {
      elem.className = elem.className + ' ' + c;
    }
  };
  removeClass = function( elem, c ) {
    elem.className = elem.className.replace( classReg( c ), ' ' );
  };
}

function toggleClass( elem, c ) {
  var fn = hasClass( elem, c ) ? removeClass : addClass;
  fn( elem, c );
}

var classie = {
  // full names
  hasClass: hasClass,
  addClass: addClass,
  removeClass: removeClass,
  toggleClass: toggleClass,
  // short names
  has: hasClass,
  add: addClass,
  remove: removeClass,
  toggle: toggleClass
};

// transport
if ( typeof define === 'function' && define.amd ) {
  // AMD
  define( classie );
} else {
  // browser global
  window.classie = classie;
}

})( window );
```

```
var ModalEffects = (function() {

        function init() {

                var overlay = document.querySelector( '.md-overlay' );

                [].slice.call( document.querySelectorAll( '.md-trigger' ) ).forEach( function( el, i ) {

                        var modal = document.querySelector( '#' + el.getAttribute( 'data-modal' ) ),
```

```
                close = modal.querySelector( '.md-close' );

            function removeModal( hasPerspective ) {
                classie.remove( modal, 'md-show' );

                if( hasPerspective ) {
                    classie.remove( document.documentElement, 'md-perspective' );
                }
            }

            function removeModalHandler() {
                removeModal( classie.has( el, 'md-setperspective' ) );
            }

            el.addEventListener( 'click', function( ev ) {
                classie.add( modal, 'md-show' );
                overlay.removeEventListener( 'click', removeModalHandler );
                overlay.addEventListener( 'click', removeModalHandler );

                if( classie.has( el, 'md-setperspective' ) ) {
                    setTimeout( function() {
                        classie.add( document.documentElement,
'md-perspective' );
                    }, 25 );
                }
            });

            close.addEventListener( 'click', function( ev ) {
                ev.stopPropagation();
                removeModalHandler();
            });

        } );

    }

    init();

})();
```

The code of movable panels layout

```
<!DOCTYPE html >

<meta http-equiv="Content-Type" content="text/html; charset=UTF-8" />
<title>Movable Panel Layouts</title>

<!-- The main CSS file for digital clock -->
    <meta charset="utf-8"/>
        <link href="digital clock/css/style.css" rel="stylesheet" />
    <!--end -->

<script type="text/javascript" src="js/jquery-1.3.2.js" ></script>
<script type="text/javascript" src="js/jquery-ui-1.7.2.custom.min.js" ></script>
<link rel="stylesheet" type="text/css" href="styles.css" />

<script type="text/javascript">
$(document).ready(function() {
```

```
setInterval( function() {
	// Create a newDate() object and extract the seconds of the current time on the visitor's
	var seconds = new Date().getSeconds();
	// Add a leading zero to seconds value
	$("#sec").html(( seconds < 10 ? "0" : "" ) + seconds);
	},1000);

setInterval( function() {
	// Create a newDate() object and extract the minutes of the current time on the visitor's
	var minutes = new Date().getMinutes();
	// Add a leading zero to the minutes value
	$("#min").html(( minutes < 10 ? "0" : "" ) + minutes);
   },1000);

setInterval( function() {
	// Create a newDate() object and extract the hours of the current time on the visitor's
	var hours = new Date().getHours();
	// Add a leading zero to the hours value
	$("#hours").html(( hours < 10 ? "0" : "" ) + hours);
   }, 1000);

});
</script>

<script type="text/javascript" >
$(function(){
	$('.dragbox')
	.each(function(){
		$(this).hover(function(){
			$(this).find('h2').addClass('collapse');
		}, function(){
			$(this).find('h2').removeClass('collapse');
		})
		.find('h2').hover(function(){
			$(this).find('.configure').css('visibility', 'visible');
		}, function(){
			$(this).find('.configure').css('visibility', 'hidden');
		})
		.click(function(){
			$(this).siblings('.dragbox-content').toggle();
		})
		.end()
		.find('.configure').css('visibility', 'hidden');
	});
	$('.column').sortable({
		connectWith: '.column',
		handle: 'h2',
		cursor: 'move',
		placeholder: 'placeholder',
		forcePlaceholderSize: true,
		opacity: 0.4,
		stop: function(event, ui){
			$(ui.item).find('h2').click();
			var sortorder='';
			$('.column').each(function(){
				var itemorder=$(this).sortable('toArray');
				var columnId=$(this).attr('id');
				sortorder+=columnId+'='+itemorder.toString()+'&';
			});
```

```
                        /*Pass sortorder variable to server using ajax to save state*/
                }
        })
        .disableSelection();
});
</script>
</head>
<body>
<h6>.</h6>
        <h1>Movable Panel Layout- Weather News</h1>
        <h4>_____
_____</h4>
        <div class="column" id="column1">
                <div class="dragbox" id="item1" >
                        <h2>Current Time - Sudbury</h2>
                        <div class="dragbox-content" >
                        <div id="clock" class="light">
                        <div class="display">
                                <div class="weekdays"></div>
                                <div class="ampm"></div>
                                <div class="alarm"></div>
                                <div class="digits"></div>
                        </div>
                </div>
                                        </div>
                </div>
                <div class="dragbox" id="item2" >
                        <h2><span class="configure" ><a href="#" ></a></span>Weather Forecast</h2>
                        <div class="dragbox-content" >
                          <iframe id="forecast_embed" type="text/html" frameborder="0" height="245"
width="100%" src="http://forecast.io/embed/#lat=46.4900&lon=-81.0100&name=Sudbury Ca">
</iframe>
                                        </div>
                </div>
                <div class="dragbox" id="item3" >
                        <h2>Sudbury Map</h2>
                        <div class="dragbox-content" >
                         <img src="sud.gif" width="100%" height="100%">
                                        </div>
                </div>
        </div>
        <div class="column" id="column2" >
                <div class="dragbox" id="item4" >
                        <h2>Weather News</h2>
                        <div class="dragbox-content" >
                        <iframe width="100%" height="470px"
src="https://www.youtube.com/embed/F_Gv0ttkOU0" frameborder="0" allowfullscreen></iframe>
                                        </div>
                </div>
                <div class="dragbox" id="item5" >
                        <h2>Sudbury Climate</h2>
                        <div class="dragbox-content" >
                          <p>Greater Sudbury has a humid continental climate. This region has warm and
often hot summers with long, cold and snowy winters. It is situated north of the Great Lakes, making it prone
to arctic air masses. Monthly precipitation is equal year round with snow cover expected six months of the
year. Although extreme weather events are rare, one of the worst tornadoes in Canadian history struck the
city and its suburbs on August 20, 1970, injuring 200 people, and causing over C$17 million in damages.
</p>
                                        </div>
```

```
                </div>
        </div>

        <hr style="clear:both;" />

<!-- JavaScript for digital clock -->

                <script
src="http://cdnjs.cloudflare.com/ajax/libs/moment.js/2.0.0/moment.min.js"></script>
                <script src="digital clock/js/script.js"></script>
    <!--end -->
</body>
</html>


/*CSS code */

body {
  background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
   background-color: #ade0f4;
   margin-left: auto;
    margin-right: auto;
        text-align:center;
font-size:18px;
font-family: Arial;
color:black;
}

.column{
        width:35%;
        margin-right:.5%;
        margin-left:10%;
        min-height:200px;
        background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
   background-color: #ade0f4;
        float:left;
}
.column .dragbox{
        margin:20px 20px  50px;
        background:white;
        position:relative;
        border:1.5px solid black;
        border-radius: 4px;
        -moz-border-radius:5px;
        -webkit-border-radius:5px;
}
.column .dragbox h2{
        margin:0;
        font-size: 20px;
        padding: 21px;
        background: black;
        border-radius: 4px;
        color:white;
        border-bottom:1px solid #eee;
        font-family:Verdana;
        cursor:move;
```

```
}
.dragbox-content{
	background:white;
	min-height:100px; margin:5px;
	font-family:'Arial'; font-size:1.2em; line-height:1.5em;

}
.column  .placeholder{

	border:2px dashed black;
}
.dragbox h2.collapse{
	background:#7D9DFF url('collapse.png') no-repeat top right;
}
```

```
/* digital clock */

/*-------------------------
	Simple reset
-------------------------*/


*{
	margin:0;
	padding:0;
}


/*-------------------------
	General Styles
-------------------------*/

body{
	font: Arial;
	color: #4f4f4f;
	z-index:1;
}


a:hover{
	text-decoration:none;
}

section, footer, header, aside{
	display: block;
}


/*-------------------------
	The clocks
-------------------------*/


#clock{
	width:370px;
	padding:4px;
	margin:1px auto 1px;
	position:relative;
}
```

```
#clock:after{
	content:'';
	position:absolute;
	width:400px;
	height:20px;
	border-radius:100%;
	left:50%;
	margin-left:-200px;
	bottom:2px;
	z-index:-1;
}


#clock .display{
	text-align:center;
	padding: 40px 20px 20px;
	border-radius:6px;
	position:relative;
	height: 54px;
}


/*-------------------------
	Light color theme
-------------------------*/


#clock.light{
	background-color:white;

}

#clock.light:after{
	box-shadow:0 4px 10px rgba(0,0,0,0.15);
}

#clock.light .digits div span{
	background-color:black;
	border-color:black;
}

#clock.light .digits div.dots:before,
#clock.light .digits div.dots:after{
	background-color:blue;
}



#clock.light .display{
	background-color:white;
	color:black;
	}


/*-------------------------
	Dark color theme
-------------------------*/
```

```
#clock.dark{
	background-color:white;
	color:black;
}

#clock.dark:after{
	box-shadow:0 4px 10px rgba(0,0,0,0.3);
}

#clock.dark .digits div span{
	background-color:white;
	border-color: white;
}

#clock.dark .alarm{
	background:url('../img/alarm_dark.jpg');
}

#clock.dark .display{
	background-color:#0f1620;
	box-shadow:0 1px 1px rgba(0,0,0,0.08) inset, 0 1px 1px #2d3642;
}

#clock.dark .digits div.dots:before,
#clock.dark .digits div.dots:after{
	background-color:white;
}


/*-------------------------
	The Digits
--------------------------*/


#clock .digits div{
	text-align:left;
	position:relative;
	width: 28px;
	height:50px;
	display:inline-block;
	margin:0 4px;
}

#clock .digits div span{
	opacity:0;
	position:absolute;

	-webkit-transition:0.25s;
	-moz-transition:0.25s;
	transition:0.25s;
}

#clock .digits div span:before,
#clock .digits div span:after{
	content:'';
	position:absolute;
	width:0;
	height:0;
	border:5px solid transparent;
}
```

```
#clock .digits .d1{                    height:5px;width:16px;top:0;left:6px;}
#clock .digits .d1:before{border-width:0 5px 5px 0;border-right-color:inherit;left:-5px;}
#clock .digits .d1:after{   border-width:0 0 5px 5px;border-left-color:inherit;right:-5px;}

#clock .digits .d2{                    height:5px;width:16px;top:24px;left:6px;}
#clock .digits .d2:before{border-width:3px 4px 2px;border-right-color:inherit;left:-8px;}
#clock .digits .d2:after{   border-width:3px 4px 2px;border-left-color:inherit;right:-8px;}

#clock .digits .d3{                    height:5px;width:16px;top:48px;left:6px;}
#clock .digits .d3:before{border-width:5px 5px 0 0;border-right-color:inherit;left:-5px;}
#clock .digits .d3:after{   border-width:5px 0 0 5px;border-left-color:inherit;right:-5px;}

#clock .digits .d4{                    width:5px;height:14px;top:7px;left:0;}
#clock .digits .d4:before{border-width:0 5px 5px 0;border-bottom-color:inherit;top:-5px;}
#clock .digits .d4:after{   border-width:0 0 5px 5px;border-left-color:inherit;bottom:-5px;}

#clock .digits .d5{                    width:5px;height:14px;top:7px;right:0;}
#clock .digits .d5:before{border-width:0 0 5px 5px;border-bottom-color:inherit;top:-5px;}
#clock .digits .d5:after{   border-width:5px 0 0 5px;border-top-color:inherit;bottom:-5px;}

#clock .digits .d6{                    width:5px;height:14px;top:32px;left:0;}
#clock .digits .d6:before{border-width:0 5px 5px 0;border-bottom-color:inherit;top:-5px;}
#clock .digits .d6:after{   border-width:0 0 5px 5px;border-left-color:inherit;bottom:-5px;}

#clock .digits .d7{                    width:5px;height:14px;top:32px;right:0;}
#clock .digits .d7:before{border-width:0 0 5px 5px;border-bottom-color:inherit;top:-5px;}
#clock .digits .d7:after{   border-width:5px 0 0 5px;border-top-color:inherit;bottom:-5px;}


/* 1 */

#clock .digits div.one .d5,
#clock .digits div.one .d7{
        opacity:1;
}

/* 2 */

#clock .digits div.two .d1,
#clock .digits div.two .d5,
#clock .digits div.two .d2,
#clock .digits div.two .d6,
#clock .digits div.two .d3{
        opacity:1;
}

/* 3 */

#clock .digits div.three .d1,
#clock .digits div.three .d5,
#clock .digits div.three .d2,
#clock .digits div.three .d7,
#clock .digits div.three .d3{
        opacity:1;
}

/* 4 */

#clock .digits div.four .d5,
```

```
#clock .digits div.four .d2,
#clock .digits div.four .d4,
#clock .digits div.four .d7{
	opacity:1;
}

/* 5 */

#clock .digits div.five .d1,
#clock .digits div.five .d2,
#clock .digits div.five .d4,
#clock .digits div.five .d3,
#clock .digits div.five .d7{
	opacity:1;
}

/* 6 */

#clock .digits div.six .d1,
#clock .digits div.six .d2,
#clock .digits div.six .d4,
#clock .digits div.six .d3,
#clock .digits div.six .d6,
#clock .digits div.six .d7{
	opacity:1;
}


/* 7 */

#clock .digits div.seven .d1,
#clock .digits div.seven .d5,
#clock .digits div.seven .d7{
	opacity:1;
}

/* 8 */

#clock .digits div.eight .d1,
#clock .digits div.eight .d2,
#clock .digits div.eight .d3,
#clock .digits div.eight .d4,
#clock .digits div.eight .d5,
#clock .digits div.eight .d6,
#clock .digits div.eight .d7{
	opacity:1;
}

/* 9 */

#clock .digits div.nine .d1,
#clock .digits div.nine .d2,
#clock .digits div.nine .d3,
#clock .digits div.nine .d4,
#clock .digits div.nine .d5,
#clock .digits div.nine .d7{
	opacity:1;
}

/* 0 */
```

```
#clock .digits div.zero .d1,
#clock .digits div.zero .d3,
#clock .digits div.zero .d4,
#clock .digits div.zero .d5,
#clock .digits div.zero .d6,
#clock .digits div.zero .d7{
	opacity:1;
}


/* The dots */

#clock .digits div.dots{
	width:5px;
}

#clock .digits div.dots:before,
#clock .digits div.dots:after{
	width:5px;
	height:5px;
	content:'';
	position:absolute;
	left:0;
	top:14px;
}

#clock .digits div.dots:after{
	top:34px;
}


/*-------------------------
	The Alarm
-------------------------*/


#clock .alarm{
	width:16px;
	height:16px;
	bottom:20px;
	background:white;
	position:absolute;
	opacity:0.2;
}

#clock .alarm.active{
	opacity:1;
}


/*-------------------------
	Weekdays
-------------------------*/


#clock .weekdays{
	font-size:12px;
	position:absolute;
	width:100%;
```

```
	top:10px;
	left:0;
	text-align:center;
}


#clock .weekdays span{
	opacity:0.2;
	padding:0 10px;
}

#clock .weekdays span.active{
	opacity:1;
}


/*-------------------------
		AM/PM
-------------------------*/


#clock .ampm{
	position:absolute;
	bottom:20px;
	right:20px;
	font-size:12px;
}

/* digital clock javascript */
$(function(){

	// Cache some selectors

	var clock = $('#clock'),
		alarm = clock.find('.alarm'),
		ampm = clock.find('.ampm');

	// Map digits to their names (this will be an array)
	var digit_to_name = 'zero one two three four five six seven eight nine'.split(' ');

	// This object will hold the digit elements
	var digits = {};

	// Positions for the hours, minutes, and seconds
	var positions = [
		'h1', 'h2', ':', 'm1', 'm2', ':', 's1', 's2'
	];

	// Generate the digits with the needed markup,
	// and add them to the clock

	var digit_holder = clock.find('.digits');

	$.each(positions, function(){

		if(this == ':'){
			digit_holder.append('<div class="dots">');
		}
		else{
```

```
                var pos = $('<div>');

                for(var i=1; i<8; i++){
                        pos.append('<span class="d' + i + '">');
                }

                // Set the digits as key:value pairs in the digits object
                digits[this] = pos;

                // Add the digit elements to the page
                digit_holder.append(pos);
        }

});

// Add the weekday names

var weekday_names = 'MON TUE WED THU FRI SAT SUN'.split(' '),
        weekday_holder = clock.find('.weekdays');

$.each(weekday_names, function(){
        weekday_holder.append('<span>' + this + '</span>');
});

var weekdays = clock.find('.weekdays span');


// Run a timer every second and update the clock

(function update_time(){

        // Use moment.js to output the current time as a string
        // hh is for the hours in 12-hour format,
        // mm - minutes, ss-seconds (all with leading zeroes),
        // d is for day of week and A is for AM/PM

        var now = moment().format("hhmmssdA");

        digits.h1.attr('class', digit_to_name[now[0]]);
        digits.h2.attr('class', digit_to_name[now[1]]);
        digits.m1.attr('class', digit_to_name[now[2]]);
        digits.m2.attr('class', digit_to_name[now[3]]);
        digits.s1.attr('class', digit_to_name[now[4]]);
        digits.s2.attr('class', digit_to_name[now[5]]);

        // The library returns Sunday as the first day of the week.
        // Stupid, I know. Lets shift all the days one position down,
        // and make Sunday last

        var dow = now[6];
        dow--;

        // Sunday!
        if(dow < 0){
                // Make it last
                dow = 6;
        }

        // Mark the active day of the week
        weekdays.removeClass('active').eq(dow).addClass('active');
```

```
                // Set the am/pm text:
                ampm.text(now[7]+now[8]);

                // Schedule this function to be run again in 1 sec
                setTimeout(update_time, 1000);

        })();

        // Switch the theme

        $('a.button').click(function(){
                clock.toggleClass('light dark');
        });

});
```

The code of radio button & check boxes layout

```
<!DOCTYPE html>
<html>
<head>
        <title>Checkbox and Radio</title>

        <link rel="stylesheet" href="css/style.css">
</head>
<body>
<h1>Radio and Checkbox </h1>
<h1>_____</h1>
        <div class="wrapper">

                <h3> Which do you prefer,</h3>
                <h1></h1>
                <div class="radio">
                        <input id="Cats" type="radio" name="animal" value="Cats">
                        <label for="Cats">Cats</label>
                        <input id="Dogs" type="radio" name="animal" value="Dogs">
                        <label for="Dogs">Dogs</label>
                </div>
<h6>_____
____</h6>
                <br></br>
                <h3>Is this glass:</h3>
                <img src="half-full-glass.jpg" alt=" R Grewal" width="150px" height="100px"
border="1px">
                <br></br>
                <div class="radio">
                        <input id="half full" type="radio" name="volume" value="half full">
                        <label for="half full">Half full</label>
                        <input id="Half empty" type="radio" name="volume" value="Half empty">
                        <label for="Half empty">Half empty</label>
                        <input id="Full" type="radio" name="volume" value="Full">
                        <label for="Full">Full</label>
                </div>

        <h6>_____
_____</h6>
                <br></br>
```

```
                    <h3>Which of these do you use usually?</h3>
                    <h1></h1>
                    <div class="checkbox">
                            <input id="check1" type="checkbox" name="check" value="check1">
                            <label for="check1">Facebook</label>
                            <br>
                            <input id="check2" type="checkbox" name="check" value="check2">
                            <label for="check2">Instagram</label>
                            <br>

                            <input id="check4" type="checkbox" name="check" value="check4">
                            <label for="check4"> Twitter ....</label>
                            <br>
                            <br>
<a href="page1.html">
<div id="submitbutton"> <h4>Submit</h4>
</div>
</a>
</div>

                    </div>
            </div>
</body>
</html>


/* subpage */
<html>
<head>
<title>Checkbox and Radio</title>

<style>
body {
background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
  background-color: #ade0f4;
   font-family: Arial;
          text-align:center;
          margin-top:150px;
          }


#submitbutton {
width:250px;
height:90px;
 margin-left: auto;
   margin-right: auto;
          padding:5px;
border:2px solid black;
 border-radius: 6px;
text-align:center;
color:black;
background-color:#ade0f4;
 background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
font-size:23px;
font-family:"Arial";
```

```
  background-color: #ade0f4;
}

#submitbutton:hover{

background-color:#7D9DFF;
background-image: none;

}
        </style>

        <body>
        <h1>Thank you for answering the questions</h1>
        <a href="index2.html">
<div id="submitbutton"> <h4>Return to Homepage</h4>
</div>
        </body>



/*  CSS code */

@font-face {
   font-family: Arial;

   font-weight: normal;
   font-style: normal;
}
body {
         background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
  background-color: #ade0f4;
   font-family: Arial;
        text-align:center;
}


/*Styling Radio Input*/
label {
        display: inline-block;
        cursor: pointer;
        position: relative;
        padding-left: 70px;
        margin-right: 15px;
        font-size: 22px;
}
.wrapper {
   padding: 50px;
        width: 600px;
        margin: 50px auto;
        border-top: 1px solid black;
        border-left: 1px solid black;
        border-right: 1px solid black;
        border-bottom: 1px solid black;
        background-color:white;
}
input[type=radio],
input[type=checkbox] {
        display: none;
```

```
}
label:before {
	content: "";
	display: inline-block;
	width: 50px;
	height: 50px;

	margin-right: 50px;
	position: absolute;
	left: 0;
	bottom: -15px;
	background-color: white;
	box-shadow: inset 0px 2px 3px 0px rgba(0, 0, 0, .3), 0px 1px 0px 0px rgba(255, 255, 255, .8);
	border:1px solid black;
}

.radio label:before {
	border-radius: 5px;
}
.checkbox label {
	margin-bottom: 50px;
}
.checkbox label:before {
   border-radius: 5px;
}

input[type=radio]:checked + label:before {
   content: "\2022";  /* the dot*/
   color: black;
   font-size: 100px;
   text-align: center;
   line-height: 50px;
}

input[type=checkbox]:checked + label:before {
	content: "\2713"; /* the check */
	text-shadow: 1px 1px 1px rgba(0, 0, 0, .2);
	font-size: 55px;
	color: black;
	text-align: center;
   line-height: 50px;
}

#submitbutton {
width:250px;
height:90px;
 margin-left: auto;
   margin-right: auto;
	padding:5px;
border:2px solid black;
 border-radius: 6px;
text-align:center;
color:black;
background-color:white;

 font-size:23px;
font-family:Arial;


}
```

```
#submitbutton:hover{

background-color:#7D9DFF;
background-image: none;

}
```

The code of module tabs layout

```
<html>
<head>
	<title>Tabs</title>
	<style>
	body {
	  width: 1050px;
	  margin: 30px auto 0 auto;
	  font-family: Arial;
	  font-size: small;
	  text-align:center;
	  background-color: #ade0f4;
	  background-image:
url(
AAAINhG4nudroGJBRsYcxKAA7);
	}


	/* ---------------------------------------------- */

	#tabs {

	  overflow: hidden;
	  width: 100%;

	  margin: 0;  /* -distance between tabs and box */
	  padding: 0;  /* -distance between tabs and box */
	  list-style: none;
	   font-size: 1.5em;
	  font-weight: bold;


	}

	#tabs li {


	  float: left;
	  margin: 0 -10px 0 0;  /* -distance between tabs */


	}

	#tabs a {
	  float: left;
	  border-radius: 4px;
	  position: relative;
	  padding: 0 75px;          /* -tab's position from the top */
	  height: 0;
```

```
  line-height: 50px;
  text-decoration: none;
  color:white;       /* -tab's text */
  border-right: 33px solid transparent;
  border-bottom: 50px solid black;
  border-bottom-color:black;
  opacity:1;
  filter: alpha(opacity=30);  /* tab's shape*/

}

#tabs a:hover,
#tabs a:focus {

  -webkit-transition: all 0.4s ease-in-out;
-moz-transition: all 0.4s ease-in-out;
-o-transition: all 0.4s ease-in-out;
-ms-transition: all 0.4s ease-in-out;
transition: all 0.4s ease-in-out;



}

#tabs a:focus {
  outline: 0;
border--radius: 1px solid black;
}

#tabs #current {
  z-index: 3;
  border-bottom-color:#7D9DFF;   /* current tab color */
  filter: alpha(opacity=100);
 -webkit-transition: all 0.4s ease-in-out;
-moz-transition: all 0.4s ease-in-out;
-o-transition: all 0.4s ease-in-out;
-ms-transition: all 0.4s ease-in-out;
transition: all 0.4s ease-in-out;


}

/* ----------- */
#content {

   background: #fff;
   border-top: 2px solid #3d3d3d;
         border-left: 1px solid #3d3d3d;
         border-right: 1px solid #3d3d3d;
         border-bottom: 1px solid #3d3d3d;
   padding: 2em;
   /*height: 220px;*/
         text-align:center;
         font-size:18px;

}

#content h1 {
   margin: 0 0 15px 0;
        height:20cm;
```

```
                -webkit-transition: all 0.4s ease-in-out;
        -moz-transition: all 0.4s ease-in-out;
        -o-transition: all 0.4s ease-in-out;
        -ms-transition: all 0.4s ease-in-out;
        transition: all 0.4s ease-in-out;

        }

        /* out of the tabs */
        #about {

           color: #999;
           text-align: center;
           font: 0.9em Arial;

        }

        #about a {
           color: white;
        }



video {

        height: auto;
        width:auto;
}
.video-container {

        padding-bottom: 56.25%;
        padding-top: 5px;
        height: 0;
        overflow: hidden;
        position:absolute;
   top: 1%;
   left: 40%;
   margin-top: -1px;
   margin-left: -50px;
        position: relative;
   top: 50%;
   left: 1%;
   margin-top: 20px;
   margin-left: 0px;

}

.video-container frame,
.video-container object,
.video-container embed {
        position:absolute;
        top: 0;
        left: 0;
        width: 100%;
        height: 100%;

}

        </style>
</head>
```

```
<body>
<font size="14"><b>Tabs Layout</b></font>
<strong><p>_____
_____</p></strong>

 <ul id="tabs">
    <li><a href="#" name="#tab1">Politics</a></li>
    <li><a href="#" name="#tab2">Business</a></li>
    <li><a href="#" name="#tab3">Sport</a></li>
    <li><a href="#" name="#tab4">Technology</a></li>
 </ul>

 <div id="content">
    <div id="tab1">
       <h2>What to expect in Obama's speech Saturday night</h2>
                  <img src="tab1.jpg" style="position:relative; height:250px; width:400px;">
       <p>
Washington - Expect some swagger from President Barack Obama at Washington's big prom Saturday night.

Dark humor in troubled political times has usually been on the menu for Obama at the annual White House Correspondents' Association Dinner. But this year there's a lighter mood in the West Wing.
</p>
                  <p>Obama heads into his penultimate bill-topping role at the glitzy gala on an upswing, despite GOP refrains that his foreign policy is a disaster and he's guilty of an executive branch power grab.

Since Democrats lost the midterm elections in November, Obama has managed to defy the historical handcuffs of the lame duck presidency.

So he's sure to remind the White House press corps that its predictions of his demise were greatly exaggerated -- as he lashes the absurdities and pretensions of official Washington, a town with which he has never gelled.

Obama has also cast a bemused eye on the media's coverage of the early stages of the race to replace him and may rib reporters for their obsession with Hillary Clinton's trip to Chipotle
</p>
                  <p>The killing of American hostage Warren Weinstein in a U.S. drone strike on al Qaeda targets, meanwhile, will not temper the tone of Saturday's speech, given that Obama publicly addressed the tragedy in more formal settings before the dinner.

His material this year is being marshaled by 28-year-old White House speechwriter David Litt, a senior administration official said, but he will draw on contributions from his wider political circle.

Former aides like first-term speechwriter Jon Favreau, former national security spokesman Tommy Vietor, Obama's political guru David Axelrod and recently departed senior advisor Dan Pfeiffer augment the West Wing brain trust for the speech.

Professionals, including Stephen Colbert and the Weekend Update team from NBC's "Saturday Night Live," also often contribute.
</p>
       <p>But the four-week process of writing the speech often whittles an initial trove of 45 or so jokes to just a handful, as many are too risque for a president to say.

This year, aides hope to showcase the president's good spirits and political vigor as the administration hits the home stretch.

They point to Obama's climate deal with China, his executive action on immigration, a tentative nuclear deal with Iran and his opening to Cuba as evidence that his presidency still sets the agenda.

His mood is also lightened by evidence that people are beginning to see the economy as improving -- a factor
```

that helped to lift his approval rating to 48 percent in a recent CNN/ORC poll.

<h2>Starbucks stores reopen after computer glitch</h2>
<img src="tab2.jpg" style="position:relative; height:250px; width:400px;">
Starbucks is back in business early Saturday after a computer outage forced thousands of its stores to close early the night before.

The company said the outage was resolved Friday night after several hours. The glitch affected registers at 7,000 company-operated stores in the U.S. and 1,000 in Canada, and prompted some stores to give away drinks.

"All Starbucks stores in the U.S. and Canada are expected to open for business as usual on Saturday," the company said in a statement late Friday. "We apologize to our customers for this inconvenience."

Starbucks said the outage was caused by "a failure during a daily system refresh." Jim Olson, a company spokesman, stressed it was an internal issue and that no external breach was involved.
The problem began in the evening Friday on the East Coast, with workers posting hand-written "Cash Only" signs on windows and giving away free drinks and food because they were unable to ring up orders on registers. Starbucks initially said stores would remain open during the outage, then changed course and said it decided to close stores early.
At a Starbucks in Seattle, customers were told workers couldn't process orders and were offered coffee at no charge.

"I'm not going to complain about a free cup of coffee," said Suveer Sharma, who stopped in before heading on a trip to Idaho.

<h2>Sydney FC star and Italy legend Alessandro Del Piero sits down with Les Murray </h2>

<iframe width="700" height="500" src="https://www.youtube.com/embed/DlI4wqSFwbI" frameborder="0" allowfullscreen></iframe>

<h2>Affordable eye tracking is finally here</h2>

Making eye tracking available for everyone is the driving force behind everything we do. We believe that the true potential can only be reached once this technology has become widely available. Our small device represents a major breakthrough in eye tracking. It is the world's smallest eye tracker, the first to use USB 3.0.

<iframe width="700px" height="500px" src="https://www.youtube.com/embed/2q9DarPET0o" frameborder="0" allowfullscreen></iframe>

```
<script type="text/javascript" src="jquery-1.7.2.min.js"></script>

  <script>
    function resetTabs(){
       $("#content > div").hide(); //Hide all content
       $("#tabs a").attr("id",""); //Reset id's
    }

    var myUrl = window.location.href; //get URL
    var myUrlTab = myUrl.substring(myUrl.indexOf("#")); // For localhost/tabs.html#tab2, myUrlTab =
#tab2
    var myUrlTabName = myUrlTab.substring(0,4); // For the above example, myUrlTabName = #tab

    (function(){
       $("#content > div").hide(); // Initially hide all content
       $("#tabs li:first a").attr("id","current"); // Activate first tab
       $("#content > div:first").fadeIn(); // Show first tab content

       $("#tabs a").on("click",function(e) {
          e.preventDefault();
          if ($(this).attr("id") == "current"){ //detection for current tab
           return
          }
          else{
          resetTabs();
          $(this).attr("id","current"); // Activate this
          $($(this).attr('name')).fadeIn(); // Show content for current tab
          }
       });

       for (i = 1; i <= $("#tabs li").length; i++) {
         if (myUrlTab == myUrlTabName + i) {
            resetTabs();
            $("a[name='"+myUrlTab+"']").attr("id","current"); // Activate url tab
            $(myUrlTab).fadeIn(); // Show url tab content
         }
       }
    })()
  </script>
</body>
</html>
```

The code of Wizard layout

```
<!DOCTYPE html>
<html lang="en">
  <head>
  <title>Wizard Layout</title>

    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width, initial-scale=1">


    <!-- Favicons-->
    <link rel="shortcut icon" href="img/favicon.ico" type="image/x-icon"/>
    <link rel="apple-touch-icon" type="image/x-icon"
href="img/apple-touch-icon-57x57-precomposed.png">
    <link rel="apple-touch-icon" type="image/x-icon" sizes="72x72"
href="img/apple-touch-icon-72x72-precomposed.png">
```

```
   <link rel="apple-touch-icon" type="image/x-icon" sizes="114x114"
href="img/apple-touch-icon-114x114-precomposed.png">
   <link rel="apple-touch-icon" type="image/x-icon" sizes="144x144"
href="img/apple-touch-icon-144x144-precomposed.png">

   <!-- CSS -->
   <link href="css/bootstrap.min.css" rel="stylesheet">
   <link href="css/style.css" rel="stylesheet">
   <link href="fontello/css/fontello.css" rel="stylesheet">

   <!-- HTML5 Shim and Respond.js IE8 support of HTML5 elements and media queries -->
   <!-- WARNING: Respond.js doesn't work if you view the page via file:// -->
   <!--[if lt IE 9]>
     <script src="http://oss.maxcdn.com/html5shiv/3.7.2/html5shiv.min.js"></script>
     <script src="http://oss.maxcdn.com/respond/1.4.2/respond.min.js"></script>
   <![endif]-->

</head>
<body>

<h3><strong>Wizard Layout </strong></h3>
  <h4>_____</h4>



                                    <h3>I appreciate your rate</h3>
                                    <h3>
                                            Help me to improve my layouts design
                                    </h3>


                            <section class="container" id="main">
                            <!-- Start Review container -->
                            <div id="review_container">
                                    <div id="top-wizard">
                                            <strong>Progress <span id="location"></span></strong>
                                            <div id="progressbar"></div>
                                            <div class="shadow"></div>
                                    </div><!-- end top-wizard -->

                                    <form name="example-1" id="wrapped" method="POST">
                                            <div id="middle-wizard">

                                                    <div class="step">
                                                            <div class="row">
                                                                    <div class="col-md-3">
                                                                            <p class="visible-lg
visible-md">
                                                                                    <img
src="img/smileyface.jpg" width="90" height="90" alt="" data-retina="true">
                                                                            </p>
                                                                            <p class="lead">
                                                                             I appreciate you taking the
time to rate my design.
                                                                            </p>

                                                                    </div>

                                                                    <div class="col-md-4
col-md-offset-1">
```

```
                                                    <h4>Your personal info</h4>
                                                    <ul class="data-list">
                                                        <li>
                                                        <li><input
type="text" name="fullname" id="fullname" class="required form-control" placeholder="Your First name
*"></li>
                                                        <li><input
type="text" name="nickname" id="nickname" class="required form-control" placeholder="Your Nickname
*"></li>
                                                        <li><input
type="email" name="email" id="email" class="required form-control" placeholder="Your Email *"></li>
                                                        <li>
                                                        <div
class="styled-select" >
                                                            <select
class="form-control required" name="country" >

        <option value="" selected>Your Area</option>

        <option value="Europe" >British Columbia</option>

        <option value="Asia">Ontario</option>

        <option value="North America">Alberta</option>

        <option value="South America">Nova scotia</option>

        <option value="South America">Other</option>
                                                            </select>
                                                        </div>
                                                        </li>
                                                        <li><input
type="text" name="city" id="city" class="required form-control" placeholder="Your City *"></li>
                                                    </ul>
                                <input id="website" name="website" type="text" value=""><!-- Leave for security
protection, read docs for details -->
                                                </div>


                                            </div><!-- end row -->
                                        </div><!-- end step-->

                                        <div class="step">
                                            <div class="row">

                                                <div class="col-md-3">
                                <p class="visible-lg visible-md">
                                                    <img
src="img/smileyface.jpg" width="90" height="90" alt="" data-retina="true">
                                                    </p>
                                                    <p class="lead">
                                                        I appreciate you
taking the time to rate my design.
                                                    </p>

                                                </div>

                                                <div class="col-md-8
col-md-offset-1">
                                                    <div class="rating_wp
```

```
clearfix">
                                                                    <label
class="rating_type">Visibility of the layout status</label>
                                                                    <span
class="rating">
                                                                    <input type="radio"
class="required rating-input" id="rating-input-1-5" name="rating-input-1" value="5 Stars"><label
for="rating-input-1-5" class="rating-star"></label>
                                                                    <input type="radio"
class="required rating-input" id="rating-input-1-4" name="rating-input-1" value="4 Stars"><label
for="rating-input-1-4" class="rating-star"></label>
                                                                    <input type="radio"
class="required rating-input" id="rating-input-1-3" name="rating-input-1" value="3 Stars"><label
for="rating-input-1-3" class="rating-star"></label>
                                                                    <input type="radio"
class="required rating-input" id="rating-input-1-2" name="rating-input-1" value="2 Stars"><label
for="rating-input-1-2" class="rating-star"></label>
                                                                    <input type="radio"
class="required rating-input" id="rating-input-1-1" name="rating-input-1" value="1 Star"><label
for="rating-input-1-1" class="rating-star"></label>
                                                                    </span>
                                                                </div>
                                                                <div class="rating_wp
clearfix">
                                                                    <label
class="rating_type">Consistency and standards</label>
                                                                    <span
class="rating">
                                                                    <input type="radio"
class="required rating-input" id="rating-input-2-5" name="rating-input-2" value="5 Stars"><label
for="rating-input-2-5" class="rating-star"></label>
                                                                    <input type="radio"
class="required rating-input" id="rating-input-2-4" name="rating-input-2" value="4 Stars"><label
for="rating-input-2-4" class="rating-star"></label>
                                                                    <input type="radio"
class="required rating-input" id="rating-input-2-3" name="rating-input-2" value="3 Stars"><label
for="rating-input-2-3" class="rating-star"></label>
                                                                    <input type="radio"
class="required rating-input" id="rating-input-2-2" name="rating-input-2" value="2 Stars"><label
for="rating-input-2-2" class="rating-star"></label>
                                                                    <input type="radio"
class="required rating-input" id="rating-input-2-1" name="rating-input-2" value="1 Star"><label
for="rating-input-2-1" class="rating-star"></label>
                                                                    </span>
                                                                </div>
                                                                <div class="rating_wp
clearfix">
                                                                    <label
class="rating_type">Flexibility and efficiency of use</label>
                                                                    <span
class="rating">
                                                                    <input type="radio"
class="required rating-input" id="rating-input-3-5" name="rating-input-3" value="5 Stars"><label
for="rating-input-3-5" class="rating-star"></label>
                                                                    <input type="radio"
class="required rating-input" id="rating-input-3-4" name="rating-input-3" value="4 Stars"><label
for="rating-input-3-4" class="rating-star"></label>
                                                                    <input type="radio"
class="required rating-input" id="rating-input-3-3" name="rating-input-3" value="3 Stars"><label
for="rating-input-3-3" class="rating-star"></label>
```

```
                                                    <input type="radio"
class="required rating-input" id="rating-input-3-2" name="rating-input-3" value="2 Stars"><label
for="rating-input-3-2" class="rating-star"></label>
                                                    <input type="radio"
class="required rating-input" id="rating-input-3-1" name="rating-input-3" value="1 Star"><label
for="rating-input-3-1" class="rating-star"></label>
                                                    </span>
                                                </div>
                                                <div class="rating_wp
clearfix">
                                                    <label
class="rating_type">Aesthetic and minimalist design</label>
                                                    <span
class="rating">
                                                    <input type="radio"
class="required rating-input" id="rating-input-4-5" name="rating-input-4" value="5 Stars"><label
for="rating-input-4-5" class="rating-star"></label>
                                                    <input type="radio"
class="required rating-input" id="rating-input-4-4" name="rating-input-4" value="4 Stars"><label
for="rating-input-4-4" class="rating-star"></label>
                                                    <input type="radio"
class="required rating-input" id="rating-input-4-3" name="rating-input-4" value="3 Stars"><label
for="rating-input-4-3" class="rating-star"></label>
                                                    <input type="radio"
class="required rating-input" id="rating-input-4-2" name="rating-input-4" value="2 Stars"><label
for="rating-input-4-2" class="rating-star"></label>
                                                    <input type="radio"
class="required rating-input" id="rating-input-4-1" name="rating-input-4" value="1 Star"><label
for="rating-input-4-1" class="rating-star"></label>
                                                    </span>
                                                </div>
                                            </div>
                                        </div><!-- end row -->
                                    </div><!-- end step-->

                                    <div class="step">
                                        <div class="row">
                                            <div class="col-md-3">
                        <p class="visible-lg visible-md">
                                                    <img
src="img/smileyface.jpg" width="90" height="90" alt="" data-retina="true">
                                                </p>
                                                <p class="lead">
                                                    I appreciate you
taking the time to rate my design.
                                                </p>

                                            </div>
                                            <div class="col-md-8
col-md-offset-1">
                                                <h3>Your review</h3>
                                                <div
style="position:relative">
                                                    <textarea
name="review" id="review" class="form-control required" style="height:250px; width:600px;"
placeholder="Some words..."></textarea>
                                                </div>
                                            </div>
                                        </div><!-- end row -->
                                    </div><!-- end step-->
```

```
                                                <div class="submit step" id="complete">
                                                <img src="img/Happy-small.png" width="150"
height="150" alt="" data-retina="true">


                                                        <h3>Review complete! Thank you for you
time.</h3>
                                                        <button type="submit" name="process"
class="submit">Submit Your Review</button>
                                                </div><!-- end submit step -->

                                        </div><!-- end middle-wizard -->

                                        <div id="bottom-wizard">
                                                <button type="button" name="backward"
class="backward">&#x276e;  Backward </button>
                                                <button type="button" name="forward"
class="forward">Forward  &#10095; </button>
                                        </div><!-- end bottom-wizard -->

                                </form>
                        </div><!-- end Review container -->
                        <div class="bt_more"><a href="#anchor_1" class="animated flash"><i
class="icon-angle-double-down"></i></a></div>
                        </section><!-- end section main container -->


</div><!-- End background image -->


   <!-- Scroll to top -->
        <div id="toTop"><i class="icon-up-open"></i></div>

   <!-- Jquery -->
   <script src="js/jquery-1.10.2.min.js"></script>
   <script src="js/jquery-ui-1.8.22.min.js"></script>
   <script src="js/jquery.anystretch.min.js"></script>

   <!-- OTHER JS -->
   <script src="js/jquery.wizard.js"></script>
   <script src="js/jquery.validate.js"></script>
   <script src="js/jquery.placeholder.js"></script>
   <script src="js/jquery.tweet.min.js"></script>
        <script src="js/jquery.bxslider.min.js"></script>
   <script src="js/bootstrap.min.js"></script>
   <script src="js/retina-replace.min.js"></script>
   <script src="js/owl.carousel.min.js"></script>
   <script src="js/functions.js"></script>
  </body>
</html>

/* CSS code */


body {

        font:20px Arial;
        color: black;
  background-image:
```

```
url(
AAAINhG4nudroGJBRsYcxKAA7);
  background-color: #ade0f4;
font-family: Arial;
}
}
h1,
h2,
h3,
h3,
h4,
h5,
h6 {

 font-family: inherit;
 font-weight: bold;
 line-height: 20px;
 color: inherit;
 text-rendering: optimizelegibility;
 -webkit-font-smoothing: antialiased !important;
}
h2,
h3,
h4{
        color:black;
}
h1 {
        font-weight:900;
        text-align:center;
        font-family: Arial;
}
h2 {
        font-weight:700;
        text-align:center;
        font-family: Arial;
}
.main-title {

        color:black;
}
.main-title h1{
        font-size:42px;
        line-height:40px;


}
.main-title h1 span{
        color: black;
}
.main-title p {
        font-size:29px;
        font-weight:400;

        text-align:center;
        font-weight:300;
        font-family: Arial;
}
h3 {                /*progess + thank you*/
 font-size:30px;
 text-align:center;
```

```
  line-height:32px;

}

.box h3 {
        font-size:18px;
        margin-bottom:5px;
}



h4 {
  font-size: 30px;
  ine-height:22px;
  text-align:center;
}
h5 {
  font-size: 14px;
  line-height:14px;
}

h6 {
  font-size: 13px;
}

p {
  margin: 0 0 20px 0;
}

/** Lists **/
ul,
ol {
  padding: 0;
  margin: 0 0 30px 0;
  list-style:none;
  background-color: white;          /***************** small container around fill in forms
**********************/
}
ul ul,
ul ol,
ol ol,
ol ul {
  margin-bottom: 0;
}
li {
  line-height: 20px;
}
hr {
  margin: 80px 0;
  border: 0;
  border-top: 1px solid #dfdfdf;
}


a:hover,
a:focus {
  color: #333;
  text-decoration: none;
}
```

```
/** Wizard Buttons **/
.backward, .forward {
	border:none;
	color:white;
	padding:100px 0;
	width:250px;
	height:90px;
	text-align:center;
	text-decoration:none;
	transition: background .5s ease;
	-moz-transition: background .5s ease;
	-webkit-transition: background .5s ease;
	-o-transition: background .5s ease;
	display:inline-block;
	cursor:pointer;
	font-weight:600;
	outline:none;
	font-family: Arial;
	background:black;
	position:relative;
	-webkit-border-radius: 3px;
	-moz-border-radius: 3px;
	border-radius: 3px;
	-webkit-font-smoothing: antialiased !important;
  }

.backward {padding:7px 20px 7px 30px;}

 button[disabled].backward, button[disabled].forward {   /* when you can't go back */
	border:none;
	background:#ccc;
	outline:none;
}

.backward:before {

   font-family: Arial;
   text-decoration: inherit;
   position: absolute;
	font-weight:normal;
   top: 8px;
   left: 20px;
	text-transform:none;
  }

.forward {padding:20px 25px 20px 20px;}
  .forward:before {

   font-family: Arial;
   text-decoration: inherit;
   position: absolute;
	font-weight:normal;
   top: 8px;
   right: 20px;
	text-transform:none;
  }

.backward:hover, .forward:hover {background:#7D9DFF; color:white;}
```

```
.bt_more a{ font-size:45px; color:#fff; margin-top:20px; display:block; text-align:center;
margin-bottom:30px;}



#status {
	width:121px;
	height:70px;
	position:absolute;
	left:50%; /* centers the loading animation horizontally one the screen */
	top:50%; /* centers the loading animation vertically one the screen */
	background-image: url(../img/preload.gif); /* path to your loading animation */
	background-repeat:no-repeat;
	background-position:center bottom;
	margin:-35px 0 0 -60px; /* is width and height divided by two */
	text-align:center;
}
#status img{
	position:absolute;
	top:0;
	 left:0
}
/** Header ==================== **/
.stretchMe{background-color:#FFFF00;}

#top-nav ul{ float:right; margin:0; padding:0;  font-weight:700; text-transform:uppercase; font-size:12px;}
#top-nav ul a { color:#fff; text-decoration:none;}
#top-nav ul a:hover, #top-nav ul a#active{ color: #FFFF00;}
#top-nav ul li {float:left; padding-left:10px; margin-right:10px }
#top-nav ul li:first-child{ background:none;}
#top-nav ul li a#purchase { color: #FFFF00;}
#top-nav ul li a#purchase:hover { color:#323232;}

/* Button Responsive Menu*/
.btn-responsive-menu{display: none;float: right;cursor:pointer;margin:  0px 15px 0 0;color:
#fff;text-shadow: 0 -1px 0 rgba(0, 0, 0, 0.25);}
.bar {display: block; width:18px;height:2px; margin:5px; background:#fff; -webkit-border-radius:
1px;-moz-border-radius: 1px;border-radius: 1px;}



/*=============================================================================
==================*/
/* 2.  CONTENT */
/*=============================================================================
==================*/

/** Form area ============================== **/
#top-wizard {
	text-align:center;
	padding:15px 120px;
	background-color:Black;
	border-bottom:1px solid #e7e7e7;
	position:relative;
	color:white;
	text-transform:uppercase;
	font-size:18px;
}
.shadow {
```

```
		width:100%;
		height:6px;
		position:absolute;
		left:0;
		bottom:-6px;
		background:url(../img/shadow_top_form.png) no-repeat center top;
}
.ui-widget { }
.ui-widget input, .ui-widget select, .ui-widget textarea, .ui-widget button {}
.ui-widget-content { background: #fff; color: black; }
.ui-widget-content a { color: #222222; }
.ui-widget-header {background: #66FF99; }
.ui-widget-header a { color: black; }
.ui-progressbar { height:2em; text-align: left; }
.ui-progressbar .ui-progressbar-value {margin: -1px; height:100%; }

#review_container {
		background-color: white;
		 box-shadow: 0 0 px rgba(0, 0, 0, 0.3);
		 -webkit-border-radius: 5px;
		-moz-border-radius: 5px;
		border-radius: 5px;
		overflow:hidden;
		 z-index:9;
		 position:relative;
		 width:1000px;
		 margin-left:75px;
}
.ie8 #review_container {
		background-color:#fff;
		border:1px solid #ddd;
		 margin-top:-300px;
		 margin-bottom:60px;
		 z-index:9;
		 position:relative;
}
#middle-wizard {
		padding:30px 30px 0 30px;
		text-align:left;
}
#bottom-wizard {
		text-align:center;
		padding:15px 120px;
		border-top:1px solid #e7e7e7;
}
#complete{
		text-align:center;
		padding: 0 45px 35px 45px;
}
#complete h3{
		text-align:center;
		margin-bottom:40px;
		font-size:22px;
}
#complete i {
		color:#cacaca;
		margin: 0 0 10px 0;
		font-size:160px;
		padding:0;
}
```

```
#complete button{
	-webkit-border-radius: 3px;
	-moz-border-radius: 3px;
	border-radius: 3px;
	font-size:18px;
	border:2px solid  black;
	color:black;
	padding:40px 35px;
	text-decoration:none;
	transition: background .5s ease;
	-moz-transition: background .5s ease;
	-webkit-transition: background .5s ease;
	-o-transition: background .5s ease;
	display:inline-block;
	cursor:pointer;
	font-weight:600;

	outline:none;
	background: white;
	-webkit-font-smoothing: antialiased !important;
}
#complete button:hover{background:#7D9DFF; color:white; border:2px solid  #7D9DFF;}

.rating_wp{
	-webkit-border-radius: 3px;
	-moz-border-radius: 3px;
	border-radius: 3px;
	border:1px solid #ededed;
	margin-bottom:18px;
	padding:15px 3px 3px 5px;
}
.rating {
   display: inline-block;
   font-size: 20px;
	float:right;
	position:relative;
}
.rating_type {
	float:left;
	font-size:25px;
	color:black;
	margin-top:8px;
	font-weight:normal;
}
.rating-input {
   float: right;
   padding: 0;
   margin: 0 0 0 0;
   opacity: 0;
}
.rating:hover .rating-star:hover,
.rating:hover .rating-star:hover ~ .rating-star,
.rating-input:checked ~ .rating-star {
   background-position: 0 0;
}
.rating-star,
.rating:hover .rating-star {
	cursor:pointer;
   float: right;
   display: block;
```

```
    width: 74px;
    height: 72px;
    background: url(../img/star.png) 0 -74px;
}



.caption {background: #f8fafb;}
.transit-to-top {
        height: 60px;
        overflow: hidden;
        width: 100%;
        cursor:pointer;
}
.transit-to-top h4 {
        text-align:center;
        moz-transition: all 0.3s ease-in-out;
        o-transition: all 0.3s ease-in-out;
        transition: all 0.3s ease-in-out;
        -webkit-transition: all 0.3s ease-in-out;
        margin:20px 0 0 0;
        padding:0;
}
.thumbnail:hover h4{margin-top: -40px;}
.p-title {
        display: block;
        height: 40px;
        }
.widget_nav_menu {
        min-height:100%;
        height:100%;
        text-align:center;
}
.project-item-image-container {
        border: none;
        cursor: pointer;
        height: 100%;
        position: relative;
        width: 100%;
}
.project-item-image-container:hover, .project-item :hover .project-item-image-container {
        filter: alpha(opacity=100);
        -moz-transition: background-color 0.2s ease-out, color 0.1s ease-out;
        -ms-filter: "progid:DXImageTransform.Microsoft.Alpha(Opacity=100)";
        opacity: 1;
        -o-transition: background-color 0.2s ease-out, color 0.1s ease-out;
        transition: background-color 0.2s ease-out, color 0.1s ease-out;
        -webkit-transition: background-color 0.2s ease-out, color 0.1s ease-out;
}
.project-item-image-container > img {width: 100%!important;}
.phone-info {
        display: inline-block;
        margin: 5px 0px 0 0;
        width: 100%;
        text-align:center;
}
ul.social_team {
        list-style:none;
        padding:0;
        margin:5px 0 5px 0;
```

```
		font-size:16px;
}
ul.social_team li{
		display:inline-block;
		width:30px;
		height:30px;
		line-height:30px;
		text-align:center;
}
.review_strip{
		background:#f8fafb;
		-webkit-border-radius: 5px;
		-moz-border-radius: 5px;
		border-radius: 5px;
		position:relative;
		padding:15px 15px 10px 15px;
		margin-top:20px;
		margin-bottom:40px;
}
.review_strip img{
		top:-15px;
		position:absolute;
		left:15px;
}
.review_strip h4{
		font-size:18px;
		margin:0 0 25px 75px;
		padding:0;
}
.review_strip h6{
		margin-bottom:3px;
}
.review_strip p{
		font-style:italic;
		margin-bottom:10px;
}
.rating_2{
   color: #FC0;
		margin-top:0;
		font-size:18px;
		margin-left:-5px;
		margin-bottom:5px;
}
.rating_3{
   color: #FC0;
		margin-top:0;
		font-size:18px;
		margin-left:-5px;
		margin-bottom:8px;
}
.avatar_strip{
		background-color:#fff;
		-webkit-border-radius: 5px;
		-moz-border-radius: 5px;
		border-radius: 5px;
}
.date{
		font-size:12px;
		font-weight:600;
		margin-top:-23px;
```

```
		color:#999;
}
.date_2{
		font-size:12px;
		font-weight:600;
		color:#999;
		margin-bottom:15px;
}
.details{
		border-left: 1px solid #ddd;
}

#counters{
		text-align:center;
		font-size:26px;
}
#counters h3{
		opacity:0.4;
		font-size:20px;
		line-height:22px;
		margin-bottom:40px;
		text-transform:none;
		font-weight:600;
}
.count{
		font-size: 36px;
		font-weight:800;
		margin-top:45px;
		display:inline-block;
}
.border_count{
		background:url(../img/border_counter.png) no-repeat center right;
}

.review_summary_wp{
		background:#8dc63f url(../img/light.png) no-repeat center -20px;
		color:#fff;
		padding:40px 30px 35px 30px;
		width:100%;
		display:table;
		position:relative;
		text-shadow: 0 1px 1px rgba(0, 0, 0, 0.25);
}
.review_summary_wp:before{
		content: "";
  position: absolute;
  top: 45px;
  right: -15px;
  width: 0;
		height: 0;
		border-top: 15px solid transparent;
		border-bottom: 15px solid transparent;
		border-left: 15px solid #8dc63f;
}
.review_summary{
		display: table-cell;
    vertical-align: middle;
		text-align:center;
}
.review_summary i{
```

```
		font-size:20px;
}
.review_summary h3{
		margin:0;
		text-transform:none;
		font-size:18px;
		color:#fff799;
		font-weight:400;
}
.review_summary h3 span{
		font-size: 70px;
		font-weight:800;
		color:#fff;
}
.review_summary h3 span small{
		font-size:35px;
		color:#FFF;
		font-weight:800;
}
.review_desc{
		background:#f8fafb;
		padding:30px;
		position: relative;
		overflow: hidden;
}
.review_desc:before{
		content: "";
  position: absolute;
  top: 0;
  right: 0;
  border-width: 0 16px 16px 0;
  border-style: solid;
  border-color: #fff #fff #ebedee #ebedee;
  background: #ebedee;
  -webkit-box-shadow: 0 1px 1px rgba(0,0,0,0.2), -1px 1px 1px rgba(0,0,0,0.1);
  -moz-box-shadow: 0 1px 1px rgba(0,0,0,0.2), -1px 1px 1px rgba(0,0,0,0.1);
  box-shadow: 0 1px 1px rgba(0,0,0,0.2), -1px 1px 1px rgba(0,0,0,0.1);
  /* Firefox 3.0 damage limitation */
  display: block; width: 0;
}
.review_desc blockquote{
		border:0;
		padding:0;
		margin:0;
		font-size:14px;
		font-style:italic;
		margin:20px 0 0 0;
}
.review_desc .media-body h4{
		margin:10px 0 0 0;
}
.review_desc .media img{
		background-color:#fff;
		-webkit-border-radius: 5px;
		-moz-border-radius: 5px;
		border-radius: 5px;
}
.date_posted{
		font-size:12px;
}
```

```
.review_details {
	border-left: 1px solid #ddd;
	padding-left:20px;
}
.review_details span {
	display:inline-block;
	margin-bottom:15px;
}
.review_details span.last {
	margin-bottom:0;
}
.review_details span h6{
	margin-bottom:5px;
	margin-left:5px;
	font-size:14px;
}
.review_details span i{
	color:#FC0;
	font-size:18px;
}

/*=============================================================================
==================*/
/* fill in forms */
/*=============================================================================
==================*/
input#website {display: none; }

.form-control::-moz-placeholder { color: #999; opacity:1;}
.form-control::-webkit-input-placeholder {color: #999;}

input.form-control, select.form-control, textarea.form-control {
	background:none;
	background-color:white;
	border:1px solid black;
	border-radius: 1px;
	 -webkit-appearance: none;
	-webkit-border-radius: 1px;
	-moz-border-radius: 1px;
	-webkit-box-shadow: none;
   box-shadow: none;
   -webkit-transition: none;
	color: #999;
	height:70px;
	font-size:25px;
	font-weight:500;
	width:350px;
	margin-bottom:13px;
	line-height: 2;
	padding: 16px 20px;
	-webkit-font-smoothing: antialiased !important;
	-webkit-border-radius: 3px;
	-moz-border-radius: 3px;
	border-radius: 3px;
}
input.form-control:focus, select.form-control:focus, textarea.form-control:focus  {
 border-color:none;
 outline: 0;
 -webkit-box-shadow: none;
 box-shadow: none;
```

```
 color:black;
 background-color: #D6EBFF;

}

/** Drop down select:  Area select ========== **/
.styled-select select {
   background: transparent;
   width:150%;
   padding: 5px;
   padding-left:15px;
   border: 0;
   border-radius: 0;
   height: 75px;
          font-weight:400;
          -moz-appearance: window;
    -webkit-appearance: none;
    cursor: pointer;
          font-weight:600;
   }
.styled-select {
   width: 150%;
     overflow:hidden;
   height: 75px;
   background: white url(../img/arrow.png) no-repeat  95% center ;
          border:1px solid black;
          margin-bottom:13px;
          -webkit-border-radius: 5px;
          -moz-border-radius: 5px;
          border-radius: 5px;
   }
 .styled-select select::-ms-expand, .styled-select-2 select::-ms-expand {
    display: none;
}

ul.data-list li {position:relative; margin:30px; margin-top:10px;}



/** Errors validation styles and position ========== **/

/** Common style**/
label.error{
          font-size:14px;
          position: absolute;
          top:-28px;
          right:-15px;
          z-index:99;
          height:25px;
          line-height:25px;
          background-color:#e34f4f;
          color:#fff;
          font-weight:normal;
          padding:0 6px;
   }
  label.error:after {
          content: '';
          position: absolute;
          border-style: solid;
          border-width: 0 6px 6px 0;
```

```
        border-color: transparent #e34f4f;
        display: block;
        width: 0;
        z-index: 1;
        bottom: -6px;
        left: 20%;
  }

.styled-select label.error{overflow:visible;}

ul.data-list-2 li label.error {
                font-size:11px;
                position: absolute;
                top:-15px;
                left:-10px;
                margin:0;
                z-index:99;
                height:25px;
                line-height:25px;
                background-color:#e34f4f;
                color:#fff;
                font-weight:normal;
                padding:0 6px;
  }


/* carousel */
.item blockquote {
        border:none;
        padding-left:0;
        line-height:24px;

}
#quote-carousel {
  padding: 0 10px 30px 10px;
  margin-top: 30px 0px 0px;
  font-weight:600;
}
#testimonials {
        background: #325b88 url(../img/users_bg.jpg) repeat 0 0;
        padding:60px 0 20px 0;
        color:#fff;
        margin-top:30px;
        text-align:center;
}
#quote-carousel small{
        color:#fff;
        font-style:italic;
                margin-bottom:20px;
}

/* Control buttons  */
#quote-carousel .carousel-control {
  background: none;
  color: #222;
  font-size: 3em;
  text-shadow: none;
  margin-top: 30px;
}
/* Previous button  */
```

```
#quote-carousel .carousel-control.left {
  left: -12px;
}
/* Next button  */
#quote-carousel .carousel-control.right {
  right: -12px !important;
}
/* Changes the position of the indicators */
#quote-carousel .carousel-indicators {
  right: 50%;
  top: auto;
  bottom: 0px;
  margin-right: -19px;
}
/* Changes the color of the indicators */
#quote-carousel .carousel-indicators li {
  background: #fff;
  border:none;
}
#quote-carousel .carousel-indicators .active {
  background: #1c1c1c;
}
```

Appendix B

Laurentian University Research Ethics Board approval

APPROVAL FOR CONDUCTING RESEARCH INVOLVING HUMAN SUBJECTS
Research Ethics Board – Laurentian University

This letter confirms that the research project identified below has successfully passed the ethics review by the Laurentian University Research Ethics Board (REB). Your ethics approval date, other milestone dates, and any special conditions for your project are indicated below.

TYPE OF APPROVAL / New **X** / Modifications to project / Time extension

Name of Principal Investigator and school/department	Nasser Jeary, supervisor, Dr. Ratvinder Singh Grewal, Computer Science
Title of Project	Testing the Speed and Accuracy of Navigating Layout Of Web Page Elements Using Eye Tracking And Speech Recognition Mechanisms.
REB file number	2015-09-03
Date of original approval of project	November 4, 2015
Date of approval of project modifications or extension *(if applicable)*	
Final/Interim report due on: *(You may request an extension)*	November, 2016
Conditions placed on project	

During the course of your research, no deviations from, or changes to, the protocol, recruitment or consent forms may be initiated without prior written approval from the REB. If you wish to modify your research project, please refer to the Research Ethics website to complete the appropriate REB form.

All projects must submit a report to REB at least once per year. If involvement with human participants continues for longer than one year (e.g. you have not completed the objectives of the study and have not yet terminated contact with the participants, except for feedback of final results to participants), you must request an extension using the appropriate LU REB form. In all cases, please ensure that your research complies with Tri-Council Policy Statement (TCPS). Also please quote your REB file number on all future correspondence with the REB office.

Congratulations and best wishes in conducting your research.

Rosanna Langer, PHD, Chair, *Laurentian University Research Ethics Board*

Appendix C

The experiment's consent

Informed Consent

Testing the Speed and Accuracy of Navigating Layout Of web Page Elements

Investigator	Nasser Jeary	nalzahrani@laurentian.ca Phone No:+17059887703
Supervisor	Dr. Ratvinder Singh Grewal	rsgrewal@cs.laurentian.ca
Department: Computer Science		
Research Ethics Officer, , Laurentian University Research Office, telephone: 705-675-1151 ext 2436 or toll free at 1-800-461-4030 or email: ethics@laurentian.ca.		

Through The Use of An Eye Tracking And Speech Recognition Mechanisms.

Purpose of the Research

This research project will investigate the speed and accuracy of navigating the basic layout of web page elements through the use of an eye tracking device and speech recognition software. Nine layouts were designed for this experiment and they are as follow: grid of equals, module tabs,wizard, movable panel, center stage, accordion, radio button & check-box, titled sections and collapsible panel. These layouts were designed in a particular way so it can be navigated through the use of the eye tracker and speech recognition software. The predicative models of human computer interaction will be used as the one of the measures in my test.

Experimental Conditions

I'm going to be conducting an experiment where you are going to navigate nine layouts of web page elements through the use of an eye tracking device and speech recognition software. During the navigation you will be asked to perform the following tasks:

- Navigate down a web page and click button or link to let me be able to measure the consumed time from a starting position of the pointer to the target button or link.
- Complete a form of wizard, which let me know how long they take to complete a form.
- Drag a particular element and drop it at certain position within the web page.
- Open or close collapsible panels
- Interact with radio buttons & check-boxes

Benefits from Participating

- You will learn how to interact with the eye tracker and speech recognition application
- You will learn how to use both techniques in navigating the web.
- You will gain some information about the properties of the best affordable eye tracker and speech recognition software in the market.
- By the end of the research you will know whether eye tracking or speech recognition mechanism is the more reliable method to navigate the basic layouts of page elements.
- **Risks of Participating**

There are no risks associated with this experiment.

Required Time for the Experiment

The estimate of the required time is from 30 to 45 minutes. The participant will take as much or as little time as he/she is comfortable with.

Withdrawing from the Experiment

You have the right to withdraw from the experiment at any time and for any reason or even before starting the study when you get nervous or frustrated.

Confidentiality of data

In this experiment, BlueBerry Flashback Express software will be working in the background to record your performance and measure the duration of the experiment to collect data but it will not record your face or your identity. All the information will be stored on the computer of the researcher, and will be password protected. No information that will identify you personally will be kept. All paper records will be shredded, and all electronic raw data files will be deleted at the end of the project using deletion software, so that the data cannot be recovered. All information will be presented anonymously. None of the participants will be identified.

- You may contact research ethics officer, regarding possible ethical issues or complaints about the research itself.
  Laurentian University Research Office, telephone: 705-675-1151 ext 2436 or toll free at 1-800-461-4030 or email ethics@laurentian.ca.

Results

If you are interested to see the result of the study, a summary of the results of this research will be available in the main lab of computer science department at the end of this research.

I have received the Letter of Information, have had the nature of the study explained to me and I agree to participate. All questions have been answered to my satisfaction.

Date: _____

Name of Participant (please print): _____

Signature of Participant: _____

Appendix D

The HCI Lab questionnaire

LaurentianUniversity
UniversitéLaurentienne

Lab Questionnaire

Thank you for taking the time to fill out this questionnaire.

General participant Information

Gender: ☐ Male ☐ Female

Age range: ☐ 18-22 ☐ 23-27 ☐ 28-32

☐ 32-36 ☐ 36-40 ☐ 40 +

Are you a computer science student ?

☐ Yes ☐ No

On average, how often do you browse the web ?

☐ More than 9 times/day ☐ 5 to 8 times/day ☐ 1 to 4 times/day ☐ A few times a week

☐ Once a week ☐ Once a month

Have you ever interacted with an eye tracker?

☐ Yes ☐ No

Have you ever used speech recognition software to control your computer?

☐ Yes ☐ No

Please indicate whether you agree or disagree with the following statements:

In future, I probably consider buying a laptop or screen with built-in eye tracker.

☐ Strongly agree ☐ Somewhat agree ☐ Neither agree nor disagree

☐ Somewhat disagree ☐ Strongly disagree

I probably consider using speech recognition software to navigate the web .

☐ Strongly agree ☐ Somewhat agree ☐ Neither agree nor disagree

☐ Somewhat disagree ☐ Strongly disagree

How did you find navigating the layouts through the use of the eye tracker?

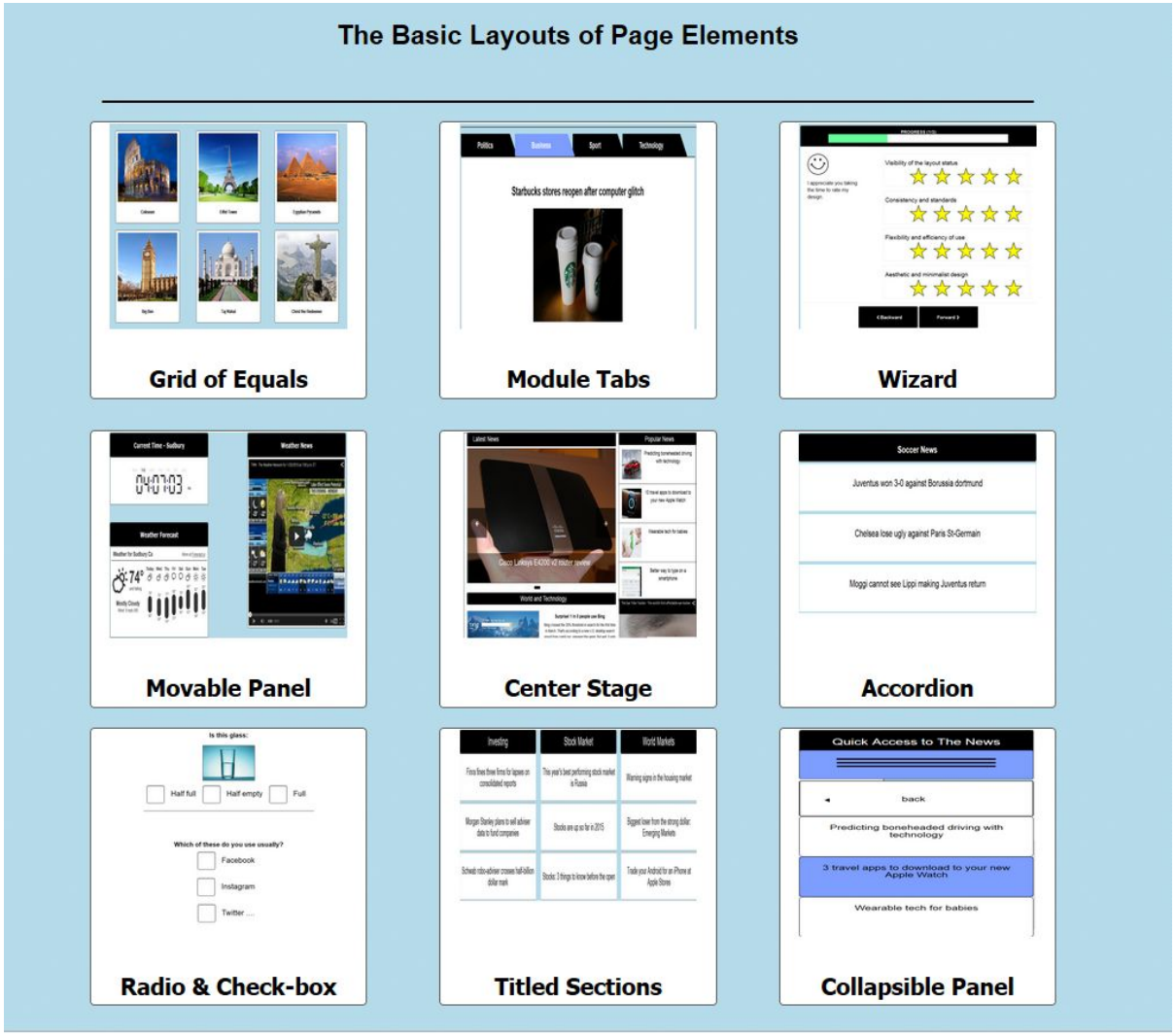
☐ Enjoyable ☐ Motivating ☐ Challenging ☐ Boring ☐ Frustrating

How did you find navigating the layouts through the use of the speech recognition software?

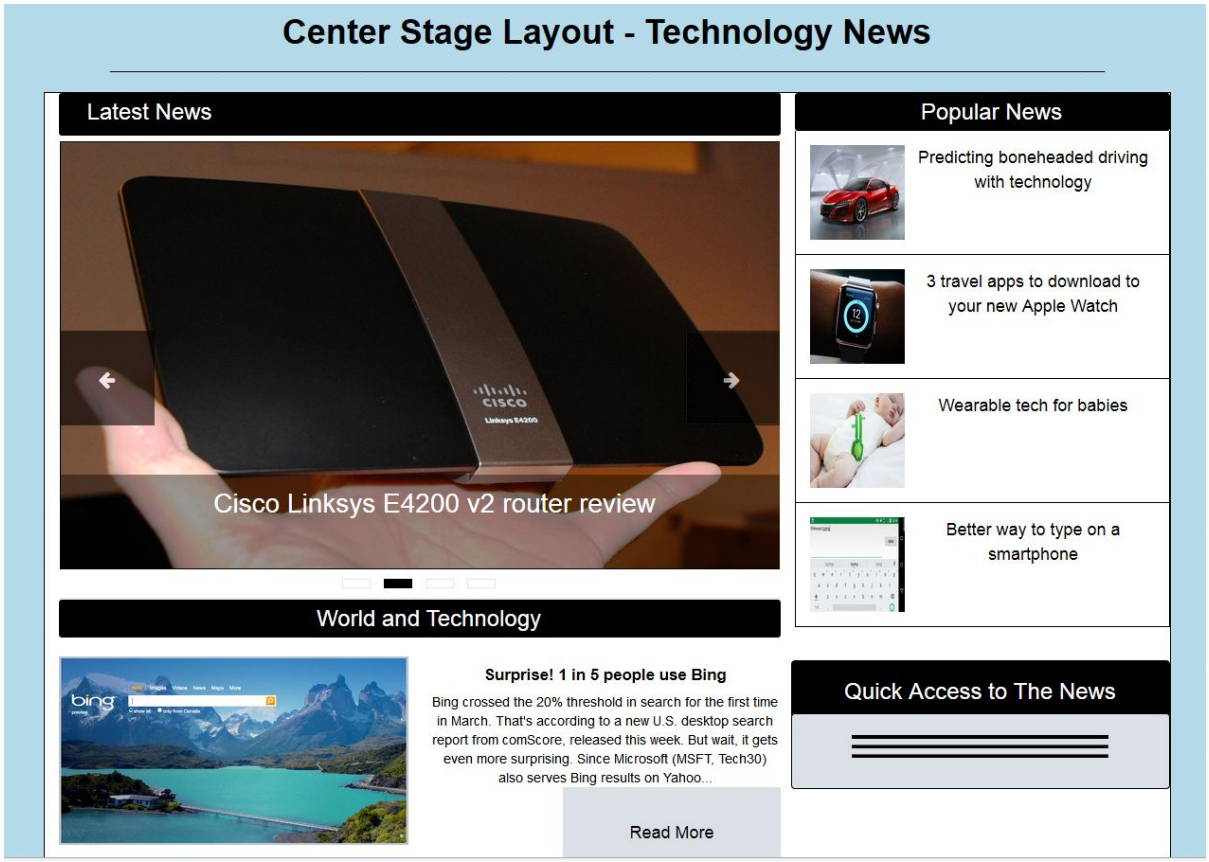
☐ Enjoyable ☐ Motivating ☐ Challenging ☐ Boring ☐ Frustrating

Appendix E

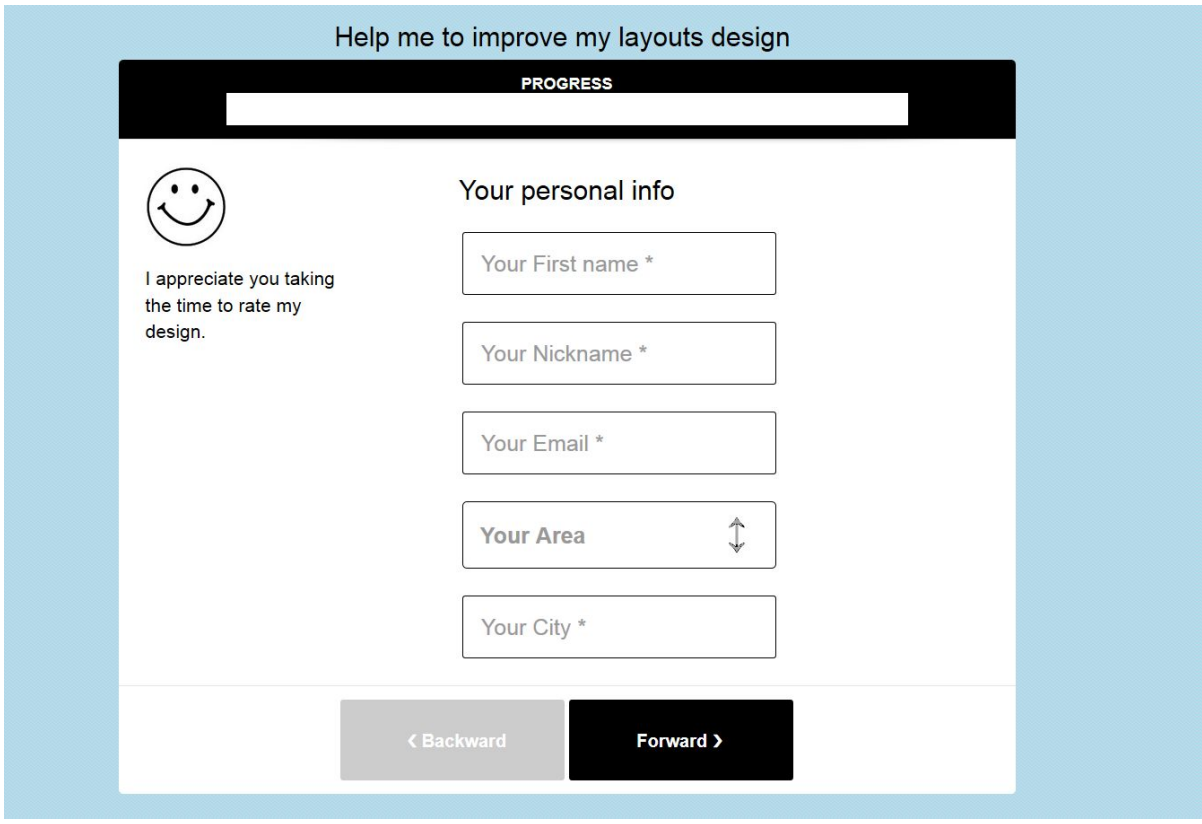
A screenshot of the homepage of the website

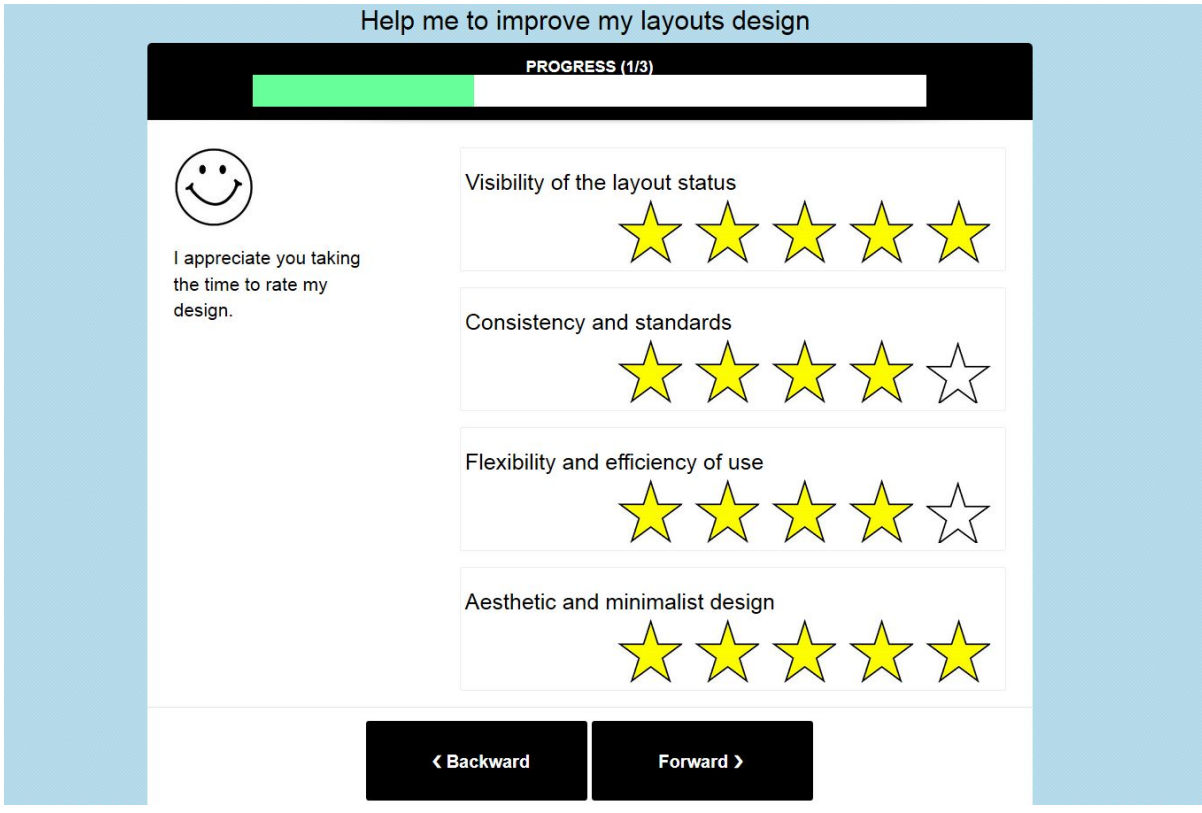


A screenshot of Task 1

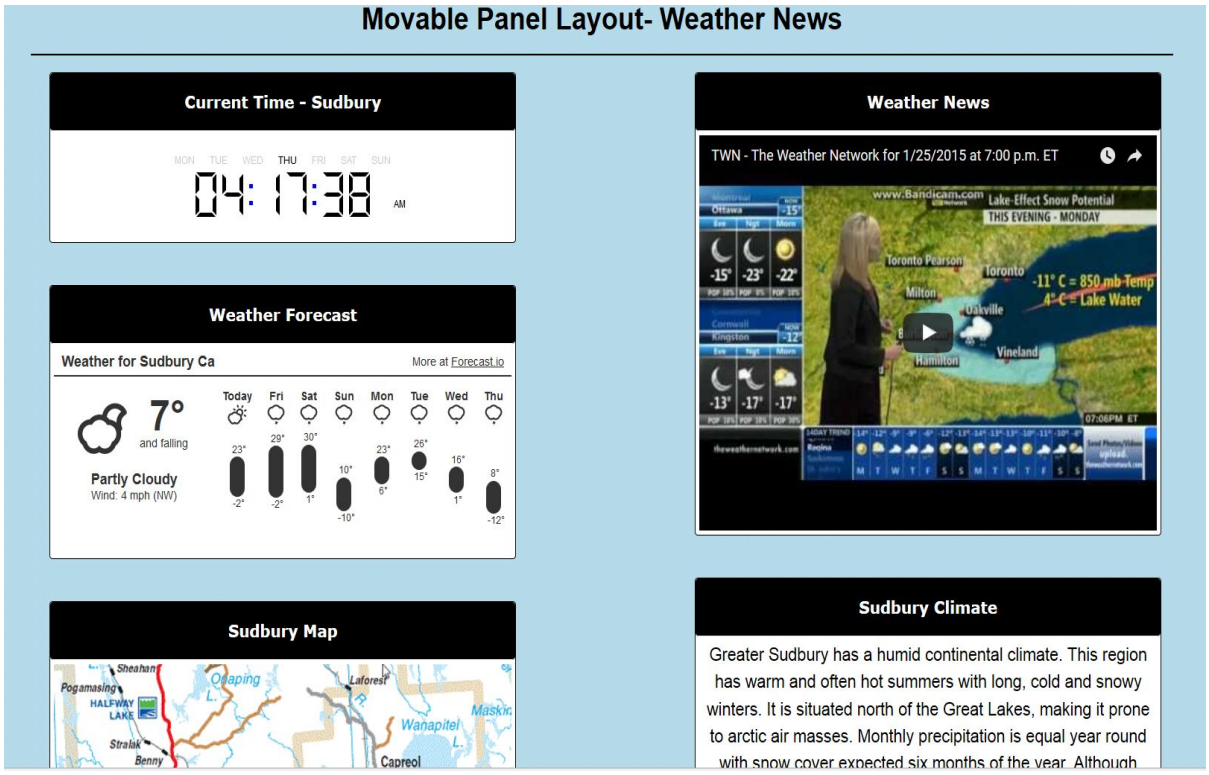


A screenshot of Task2

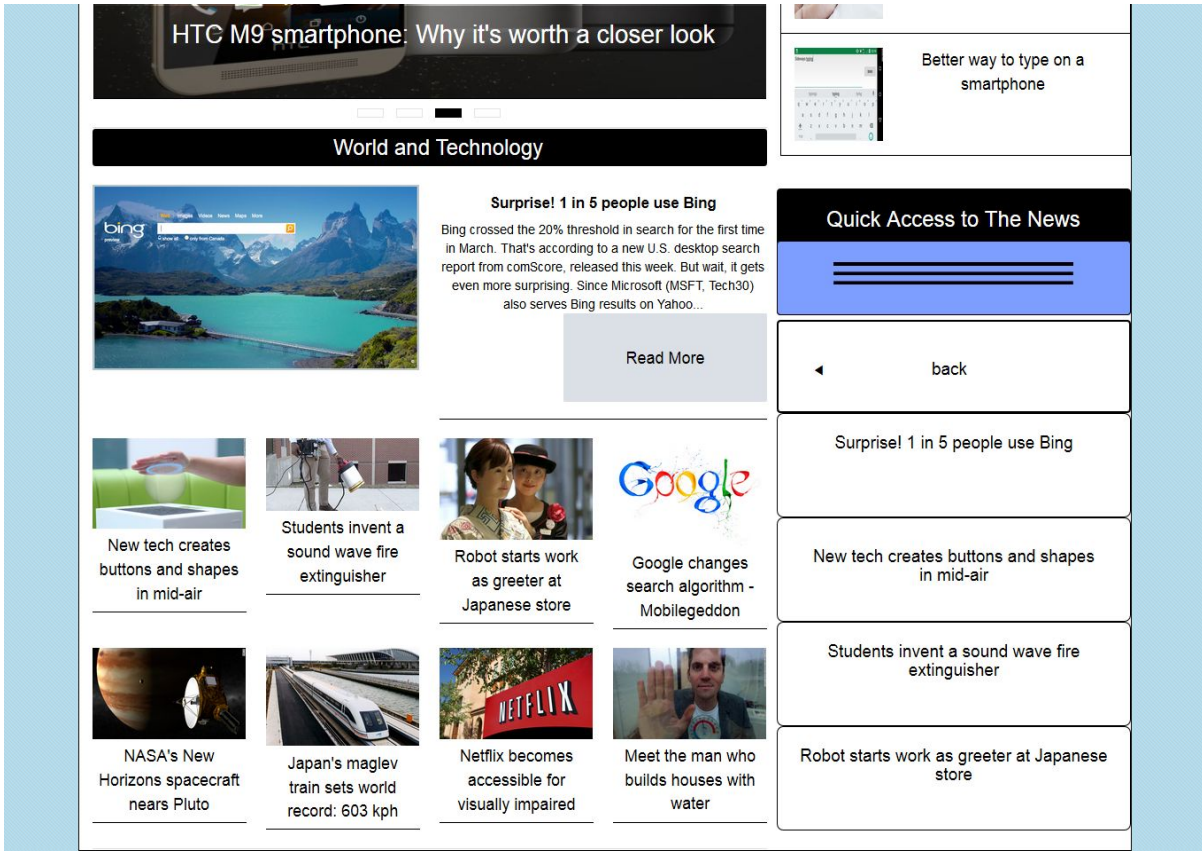




A screenshot of Task 3



A screenshot of Task 4



A screenshot of Task 5

Which do you prefer,

☐ Cats ☐ Dogs

Is this glass:

☐ Half full ☐ Half empty ☐ Full

Which of these do you use usually?

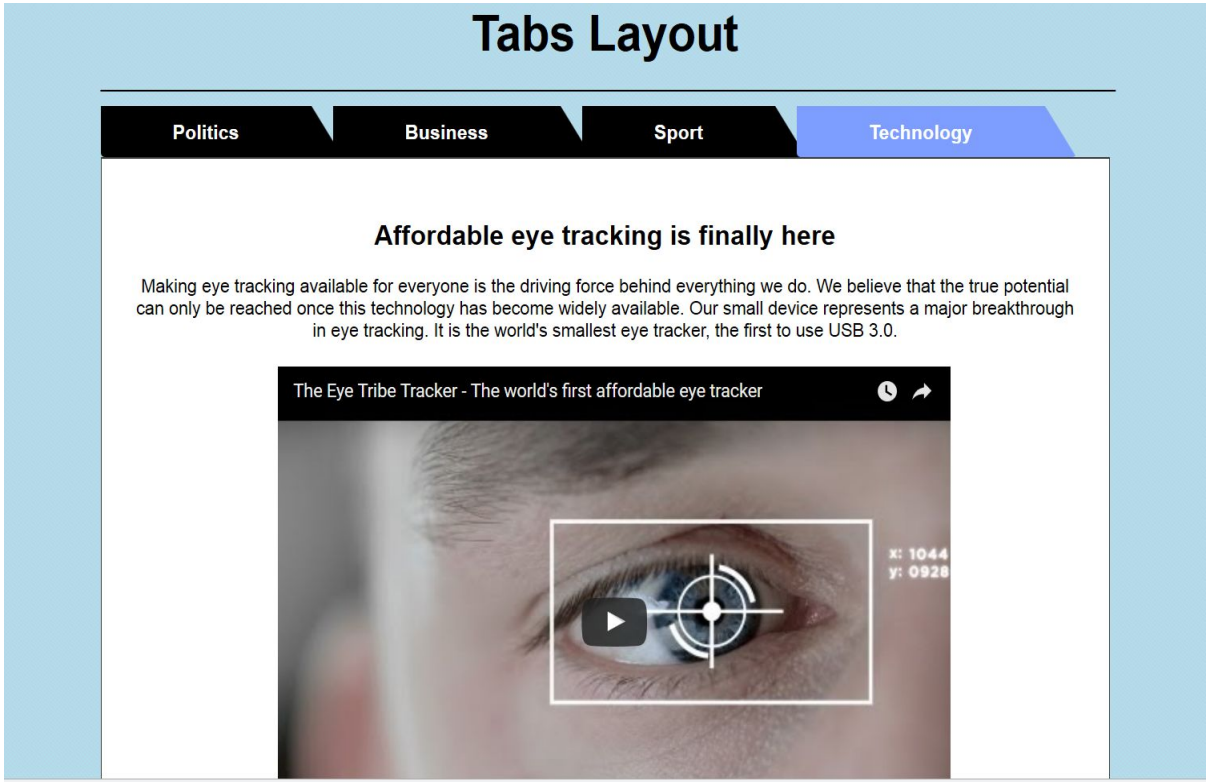
☐ Facebook

☐ Instagram

☐ Twitter ....

Submit

A screenshot of Task 6



A screenshot of Task 7