Accident Prevention System and Security for Vehicles

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***Abstract* -- This Project focuses mainly on road accidents occurring due to poor indication of sign boards, drowsy state and drunken state of drivers in both two wheelers and four wheelers. The eye blink sensor detects the drowsy state and alarms the driver using buzzer .The alcohol sensor detects the alcohol from breath and stops the engine by micro controller immediately .The light sensor detects the intensity of the light and adjusts it accordingly. The zones are indicated by placing the transmitter modules at particular zones. Vehicle Theft is prevented by making use of Transmitter-Receiver module.**

***Keywords* -- Eye Blink Sensor, Alcohol Sensor, Light sensor, Dim Dip Controller; micro controller**

I. INTRODUCTION

The aim is to in preventing the accidents by providing receiver unit in vehicles along with transmitter unit at necessary places such as school zones, diversion zones, railway crossings and other accident prone zones to indicate about the respective places well in advance before reaching the spot by means of LCD message and as well as by a recorded voice. The accidents due to the drowsy state of the driver is prevented using eye blink sensor which detects the drowsy state and alarms the driver using buzzer and a LCD message. Similarly accidents due to the drunken state is prevented using alcohol sensor which detects the alcohol from breath and stops the engine by micro controller immediately and simultaneously giving an alertness through recorded voice and LCD message.

II. EYE BLINK

As noted by Grauman et al., the use of template matching is necessary for the desired accuracy in analyzing the user's blinking since it allows the user some freedom to move around slightly [11]. Though the primary purpose of such a system is to serve people with paralysis, it is a desirable 3 feature to allow for some slight movement by the user or the camera that would not be feasible if motion analysis were used alone. The normalized correlation coefficient, also implemented in the system proposed by Grauman et al., is used to accomplish the tracking [11].

This measure is computed at each frame using the following formula

$$\frac{\sum_{x,y}[f(x,y)-\bar{f}_{u,v}][t(x-u,y-v)-\bar{t}]}{\sqrt{\sum_{x,y}[f(x,y)-\bar{f}_{u,v}]^2\sum_{x,y}[t(x-u,y-v)-\bar{t}]^2}}$$

Since the candidate pairs are much smaller and start to fail the tests designed to pick out the likely components that represent the user's eyes. In all of the experiments in which the subjects were seated between 1 and 2 Where f(x, y) is the brightness of the video frame at the point (x, y), -f (u, v) is the average value of the video frame in the current search region, t(x, y) is the brightness of the template image at the point (x, y), and -t is the average value of the template image. The result of this computation is a correlation score between -1 and 1 that indicates the similarity between the open eye template and all points in the search region of the video frame. Scores closer to 0 indicate a low level of similarity, while scores closer to 1 indicate a probable match for the open eye template. A major benefit of using this similarity measure to perform the tracking is that it is insensitive to constant changes in ambient lighting conditions. The Results section shows that the eye tracking and blink detection works just as well in the presence of both very dark and bright lighting. Since this method requires an extensive amount of computation and is performed 30 times per second, the search region is restricted to a small area around the user's eye. This reduced search space allows the system to remain running smoothly in real time since drastically reduces the computation needed to perform the
Correlation search at each frame.

III. BLINK DETECTION

The detection of blinking and the analysis of blink duration are based solely on observation of the correlation scores generated by the tracking at the previous step using the online template of the user's eye. As the users eye closes during the process of a blink, its similarity to the open eye template decreases. Likewise, it regains its similarity to the template as the blink ends and the user's eye becomes fully open again. This decrease and increase similarity corresponds directly to the correlation scores returned by the template matching procedure The system proposed in this paper provides a binary switch input alternative for people with disabilities similar to the one presented by Grauman et al. [11]. However, some significant improvements and contributions were made over such predecessor systems.

The automatic initialization phase (involving the motion analysis work) is greatly simplified in this system, with no loss of accuracy in locating the user's eyes and choosing a suitable open eye template. Given the reasonable assumption that the user is positioned anywhere from about 1 to 2 feet away from the camera, the eyes are detected within moments. As the distance increases beyond this amount, the eyes can still be detected in some cases, but it may take a longer time to occur feet from the camera, it never took more than three involuntary blinks by the user before the eyes were located successfully. The Sample frames from sessions testing varying lighting conditions. The system still works accurately in exceedingly bright and dark environments. Another improvement is this system's compatibility with inexpensive USB cameras, as opposed to the high-resolution Sony EVI-D30 color video CCD camera used by Grauman et al. [11]. These Logitech USB cameras are more affordable and portable, and perhaps most importantly, support a higher real-time frame rate of 30 frames per second.

The reliability of the system has been shown with the high accuracy results reported in the previous section. In addition to the extensive testing that was conducted to retrieve these results, additional considerations and circumstances that are important for such a system were tested that were not treated experimentally by Grauman et al. [11]

One such consideration is the performance of the system under different lighting conditions. The experiments indicate that the system performs equally well in extreme lighting conditions (i.e. with all lights turned off, leaving the computer monitor as the only light source, and with a lamp aimed directly. The accuracy percentages in these cases were approximately the same as those that were retrieved in normal lighting conditions. Another important consideration is the placement and orientation of the camera with respect to the user. This was tested carefully to determine how much freedom is available when setting up the camera, a potentially crucial point when considering a clinical environment, especially an Intensive Care Unit, which is a prime setting that would benefit from this system [18].

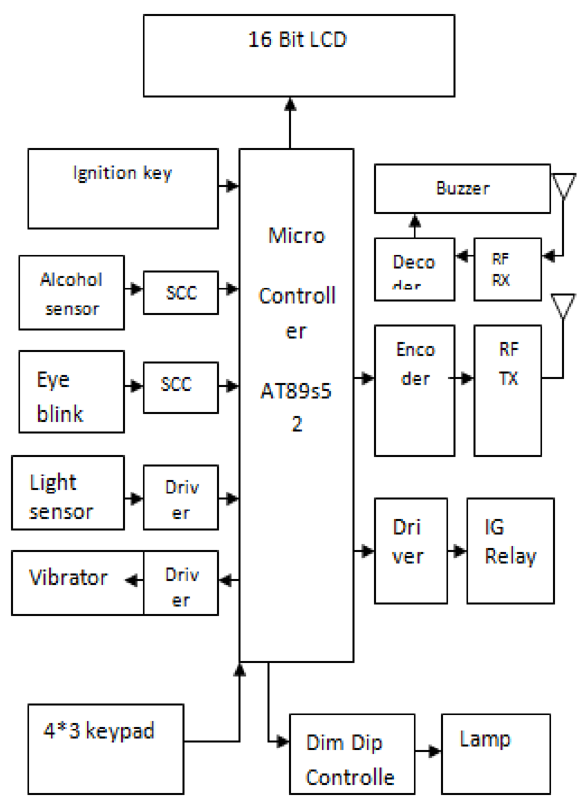
IV. IR SENSOR

Aside from horizontal offset and orientation of the camera, another issue of concern is the vertical offset of the camera in relation to the user's eyes. The experiments showed that placing the camera below the user's head resulted in desirable functioning of the system. However, if the camera is placed too high above the user's head, in such a way that it is aiming down at the user at a significant angle, the blink detection is no longer as accurate.

This is caused by the very small amount of variation in correlation scores as the user blinks, since nearly all that is visible to the camera is the eyelid of the user. Thus, when positioning the camera, it is beneficial to the detection accuracy to maximize the degree of variation between the open and closed eye images of the user. Finally, with respect to the clinical environment, this system provides an unobtrusive alternative to the one tested by Miglietta et al., which required the user to wear a set of eyeglass frames for blink detection [18].

This is an important point, considering the additional discomfort that such an apparatus may bring to the patients. Some tests were also conducted with users wearing Glasses which exposed somewhat of a limitation with the system. In some situations, glare from the computer monitor prevented the eyes from being located in the motion analysis phase. Users were sometimes able to manoeuvrer their heads and position their eyes in such a way that the glare was minimized, resulting in successful location of the eyes, but this is not a reasonable expectation for severely disabled people that may be operating with the system. With the rapid advancement of technology and hardware in use by modern computers, the proposed system could potentially be utilized not just by handicapped people, but by the general population as an additional binary input

V. BLOCK DIAGRAM AND ITS DESCRIPTION



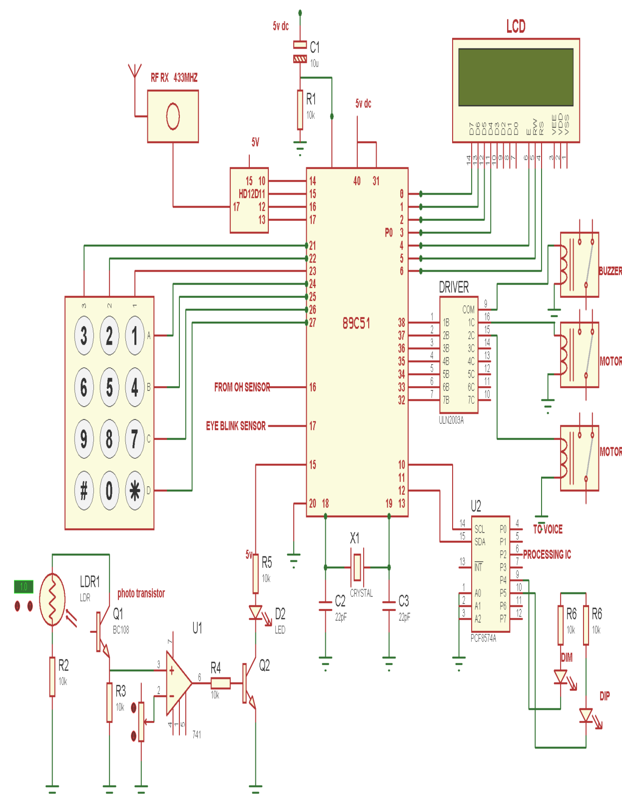
Here the Sensing device used to acquire the necessary signals to compute the glucose concentration is given in the Electrode Unit. The Sensed signals from the electrode unit are of low voltage, so they are amplified in the Amplifier Unit. The buffer is used to make the signals suitable for further processing. The Signal conditioner is used here to convert the input signals to a signal suitable for Microcontroller computation. [2]. the power supply circuit consists of filters, rectifiers, and then voltage regulators. Starting with an AC voltage, a steady DC voltage is obtained by rectifying the AC voltage, then filtering to a DC level, and finally, regulating to obtain a desired fixed DC voltage. The regulation is usually obtained from an IC voltage regulator Unit.

Which takes a DC voltage and provides a somewhat lower DC voltage, which remains the same even if the input DC voltage varies, or the output Load connected to the DC voltage changes. The sensor eliminates ambient IR noise by using high frequency, pulsed IR illumination, much like a carrier wave in an amplitude-modulated radio (Fig. 3). Because the illuminating LED is pulsed at a high frequency (62.5 kHz), changes in reflectivity of the eye during a blink cause modulation of the amplitude of the reflected IR carrier wave. The modulated output of the photodiode is amplified to a usable level and then run through a product detector circuit.

This produces a signal containing the desired demodulated information, as well as undesirable high frequency content around the carrier frequency and also higher harmonics of the carrier. The phase synchronization normally needed with product detector circuits is inherent in the design since the frequency of switching is derived directly from the same oscillator as the LED drive pulses, and hence is perfectly in

Phase with the LED pulses. The signal is then filtered to remove the higher frequency content, completing demodulation, and is scaled and adjusted for offset as desired by the user. Comparing the output of the modulated IR eye blink detector with the simultaneous signal from the Hall-effect lever system revealed that during eyelid closure, the IR signal exhibited a consistent time lead of 5–10 ms (Fig. 7). The delay in the mechanical recording during eyelid closure is most likely related to initial inertial forces causing a deformation of the eyelid-thread-lever mechanical link. In Fig. 7, also note that the IR signal does not shown inertial artifact (lever bounce, seen as double peak of the eye blink in the mechanical recording). Following the end of the US, during eyelid opening, the mechanical signal also typically lagged behind the IR signal. It is not clear to what extent this lag reflected the true kinematics of the upper eyelid. Differences in the IR and mechanical signal during eye opening could possibly result from friction-related artifacts that occur during the return of the lever to the initial position. Comparing the modulated IR signal with the analysis of simultaneously conducted high-speed video recording revealed a striking resemblance to the reconstructed distance between the upper and lower eyelids.

VI. CIRCUIT DIAGRAM AND ITS DESCRIPTION



The P/S is the Parallel/Slave Port used to transmit data bits. The RST block is used to reset the microcontroller as well as other devices. The RTC (Real Time Clock) gives the clock signal to all the peripherals used in the circuit. The ADC (Analog to Digital Converter) is used to convert the input analog signals from various components to digital signal and supply to the Microcontroller. [5].

VII. WORKING PRINCIPLE

This project involves a simple principle of displaying the sensed signal from the electrodes on the LCD Screen through a microcontroller. The sensed signal will be in milli voltage, so it can’t be used directly by the other components. So the signal is amplified to an extent that can be processed by other components. The amplified signal is conditioned for the microcontroller by the signal conditioner. The microcontroller, the signal conditioner and other components are powered by a separate power supply circuit which converts 230V AC to 5V & 12V. The microcontroller is programmed to convert the input signal in volts to the respective glucose value. The computed value is then displayed in the 16x2 LCD screen. [6]

VIII. CONCLUSION

It has been daily trend for us to read lot of accident in newspaper happened mainly because of over speeding of vehicle i.e. rash driving, not following sign board and fatigue states of driver like drowsy, drunken state. In order to prevent this problem a device was designed for preventing accidents. This project is gift for the society to prevent accidents in this crowded environment. Hope this project is of no doubt to save precious life

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