Design and Development of Assistive Device for Person with Disabilities

A thesis submitted in partial fulfillment of the

Requirements for the degree of

Bachelor of Technology

In

Industrial Design

By

Asutosh Sahoo (111ID0274)

Under the Supervision of

Prof. Bibhuti Bhusan Biswal

Department of Industrial Design

National Institute of Technology, Rourkela

Rourkela, Odisha – 769008

Declaration

I hereby declare that this thesis is my own work and effort. This work is being submitted for meeting the partial fulfillment for the Degree of Bachelor of Technology in Industrial Design at National Institute of Technology, Rourkela for the academic session 2011 – 2015.

Asutosh Sahoo (111ID0274)

NATIONAL INSTITUTE OF TECHNOLOGY

ROURKELA 769008, INDIA

Certificate of Approval

This is to certify that the thesis entitled "**Design and Development of Assistive Device for person with disabilities**" submitted to the National Institute of Technology, Rourkela by **ASUTOSH SAHOO, Roll No. 111ID0274** for the award of the Degree of Bachelor of Technology in Industrial Design Engineering is a record of original research work carried out by them under my supervision and guidance. The results presented in this thesis has not been, to the best of my knowledge, submitted to any other University or Institute for the award of any degree or diploma. The thesis, in my opinion, has reached the standards fulfilling the requirement for the award of the degree of Bachelor of technology in accordance with regulations of the Institute.

Dr. B.B. Biswal

Head of the Department

Department of Industrial Design

National Institute of Technology, Rourkela

Date:

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It is a pleasure to express gratitude to **Prof. Bibhuti Bhusan Biswal** sir for his invaluable guidance and assistance, without which the accomplishment of the task would have never been possible. I also thank him for giving this opportunity to explore into the real world and realize the interrelation of Law and Designing, without which a society can never progress. In our present project we have chosen the topic- "**Design and development of assistive device for person with disabilities"**. This report contains an over view of disabilities and how assistive devices are useful for disabled person and development of a voice operated wheel chair.

Asutosh Sahoo (111ID0274)

Abstract

Assistive technology advances more prominent autonomy by empowering individuals to perform tasks that they were once in the past not able to fulfill, or had extraordinary trouble finishing it, by giving upgrades to, or changing methods for interacting with the technology expected to finish such tasks. Our aim of this project is to design an assistive device for physically disabled persons. People with disabilities may utilize assistive device all alone or with the backing of other individuals. To design and develop a new assistive device, we need to know the sorts of disabilities and the current existing assistive devices. There are numerous sorts of assistive devices, all of which have a real part in enhancing individuals' lives, for example, wheelchairs, scooters, walkers, canes, crutches, prosthetic devices to upgrade their mobility. Our primary aim is to design assistive device with considerably more enhanced base. We have chosen to design and develop a motorized, voice-operated wheelchair. A standard wheelchair will be altered to meet our project's objectives. Finally, a working model will be submitted.

Keywords: Assistive device, Voice operated system, motorized wheelchair

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1. Introduction

Disabled folks need environs that is handy to them. They want a place where they can do all their stuffs without any complications either any problems. Persons with infirmities are entitled to use their every basic rights on an equal basis with others. Tactlessly, they are usually treated as a separate group, where the current environs becomes a hurdle for them. Scrutinizing the services needed by the immobilized person and the measures of spaces, assistive devices that should be provided to suit with their goings-on is crucial to endorse that all the amenities are handy especially to those who become incapacitated for the reason that of accident. Our paper studies the categories of infirmities and conveniences needed by disabled people in order to lead their daily life autonomously, together with training and recovery. This paper will guide the accurate use of assistive device and its design. An incapacitated individual always faces a lot of hitches in using a wheel chair in local surroundings. Patients with mobility disabilities face lots of problems as they cannot change the direction with their hands either legs. Therefore there is a need to develop voice operated wheel chair.

1.1 Origin of Work

The fundamental reason for this research is to study on the sorts of disabilities and assistive devices needed for crippled individuals. This research is the spine for the outline and advancement of assistive devices and their employments. The bodily environment has made obstruction to the handicap individuals which impacts their feeling and brain science. Along these lines, examine on assistive devices is key with a specific end aim to give spaces that can help them to procure aptitudes to get by all alone. The purposes of this research are to distinguish the issues confronted by the crippled individuals and to study the assistive devices required for them. Besides, this study will help to build public awareness and public acceptance with respect to individuals with handicaps. Also, the point is to start the thought of debilitate individuals to be dealt with and prepared in regions devoted to and intended for their needs and minimizes bodily and obsessive agony and trouble to them.

1.2 Problem Statement

Assistive Technology (AT) that refers to equipment and programming solutions for persons with bodily, cognitive either aural disabilities can help individuals to have a more beneficial or lovely lives. There are a few bodily handicaps/conditions which oblige the utilization of an assistive device including cerebrum harm, stroke, cracks, removal, pneumatic infection, neurological issue, musculature maladies/wounds and spinal string wounds. In such cases the utilization of assistive devices can bring an upgraded autonomy that will expand the client's personal satisfaction.

1.3 Objectives

This project aims to:

1) Study the types of disabilities.
2) Assistive devices
3) Assistive technology & considerations
4) Study about the voice operated wheel chair system
5) Design, integrate, program, interface and test a fully motorized, voice-operated wheelchair.

2. Disabilities

We can define disability as the interaction amid barriers and deterioration. The deterioration can be many types bodily, cerebral, psychic, aural, cognitive either developmental. A deterioration affects in body functionalities and shape; and makes it even more difficult in completion of a certain task. Thus, disability is a tangled term, casting back an interaction amid human body and its functions and with the physical environment.

2.1 Types of disabilities

1) Physical disabilities

Any deterioration which constrains the bodily capacity of appendages, bones is a bodily hindrance, not so much a bodily handicap. The communal mock-up of disability characterizes bodily incapacity as show while a debilitation comes in contact with an irregular plan either system, e.g. an individual who can't climb up with stairs may have a bodily hindrance of the knees when putting weight on them in a lifting co-ordinate. On the off chance that a lift was set, either a building had benefits on the first floor, this impedance would not turn into an inability. Other bodily handicaps incorporate weaknesses which restrain different features of everyday living.

Example: Partial either total paralysis, brain injury, stroke, muscular dystrophy, arthritis, amputation

2) Sensory disabilities

"Aural disabilities" can involve any of the five senses, but in general, it is the disability related to listening of voice, watching a view, either both. Aural disabilities have critical impact in audio-visual senses.

Autism: People having autism spectrum disease have aural sensitivity which affects in processing of a speech, seeing a ray of light either a smell.

Blindness/Low vision: Blindness is the condition of lacking perception due to physiological/neurological factors. Low vision refers to a limit of vision 20/70 either a smaller amount of than this level and we cannot change it by using spectacles. Low vision affects the performance of daily activities. Most visual deterioration are due to eye diseases such as cataract, macular degeneration and diabetes.

Hearing Loss: Damage to any part of outer area either middle area either inner area of ear causes hearing loss. Deterioration range from mild to severe.

3) Developmental disabilities

Constructive weakness is any disability which results from body construction. Constructive disability is a various gathering of serious incessant conditions that are because of cerebral and/either bodily disabilities. Constructive disabilities cause people living with them numerous troubles in specific zones of life, particularly in "language, versatility, learning, self-improvement, and autonomous living". Constructive handicaps can be distinguished at an early stage, and do hold on all through a singular's lifespan.

Ex: spina bifida, syndrome, Pervasive etc.

4) Cognitive disabilities

There are two approaches to characterize psychological/cerebral disabilities: utilitarian disability either by analytic disability. Practical analyses of cerebral disabilities incorporate a cerebral imbalance, trisomy21, atrocious cerebrum harm and even insanity. Least focused subjective situations incorporate a lack of ability to concentrate consistently issue (ADD), dyslexia (trouble perusing), dyscalculia (trouble with math), and learning handicaps when all is said in done. Clinical conclusions may be valuable from a restorative point of view for treatment, however for the reasons of web openness, characterizing intellectual handicaps by disabilities in body functions is very useful. Handicaps overlook restorative either observable reasons for incapacity and rather give their focus on the subsequent capacities and difficulties. A portion of the fund cerebral classifications of cognitive disabilities incorporate shortages either challenges with:

1) Power of retention
2) Inquisitive
3) Intentness
4) Learning, phonetic, and rhetorical cognizance
5) Arithmetic cognizance
6) Ocular cognizance

Telling a designer that a very a smaller amount of number of individuals have a cerebral imbalance is extremely not important should the engineer distinguish what sort of boundaries he is dealing with for an example extreme introvert may confront on his or her site. Then again, telling a designer that a few individuals experience issues understanding math furnishes the engineer with a system for tending to the needs of this kind of gathering of people.

Also, clinical judgments are not totally unrelated as far as what troubles the individuals face. There is frequently significant cover of utilitarian handicaps inside clinical judgments. An individual with memory deficiencies might likewise experience issues with consideration either critical thinking, for instance. This sort of cover fits inside a restorative model, yet is not especially accommodating to web designers, who essentially need to comprehend what the individual can either can't do.

5) Body mobility & relocation

One cause of mobility deterioration (leading to active wheelchair use) are injuries to the spinal cord. This type of injuries may have variety of causes.

1) Spina bifida: Spina bifida (Latin: "splitting of spine") is a constructive natural disorder caused by not completely closing of embryonically cerebral tube. There are many vertebrae which are not fully formed, overlie on spinal cord which remain unopened and fused If there is a large opening then it creates the portion of spinal cord to expose and open. There are cases that spinal cord is filled or not filled with fluid sac.

Bodily signs of spinal bifida includes:

1-Leg weakness and paralysis

2-Orthopedic abnormalities
3-Abnormal eye movement

2) Atrocious (traumatic) Spinal cord injuries: It is because of the harm to the spinal cord. It results because of any direct or indirect injuries or diseases. A minor harm i.e. rheumatoid joint inflammation/osteoporosis can harm the spinal string. Chiefly it is brought about by wounds to spinal string, for example, assault, falls, industrial/engine vehicle accidents, sports wounds etc. Other portability weaknesses incorporate various sclerosis, lower appendage amputations, and euro-solid disabilities. The offer of dynamic wheel seat clients with various sclerosis either other neuro-solid hindrances may be littler then the patients with spinal string wounds and spina bifida.

3) Body configuration and design: In this part we have discussed about natural body part shortage and developed amputations. The separation of natural body part shortage and developed amputations is made due to the different etiologies of the two. Natural body part shortage is the natural absence of a body part and transverse upper body part reduction shortage is the traversal natural absence of an upper body part. The person with such disorders undergo amputations. Person with natural body part shortage do not experience specter body part pain but experience greater sensitivity compared to non-affected body part.

3. Assistive Devices

Assistive devices can feasibly adjust for failures and build liberty and individual satisfaction. Assistive devices can be considered as mechanical apparatuses predominantly planned to help personages with failures to accomplish what they oblige and what they need to do. Assistive devices can be elementary either multifaceted banking on on the needs of damaged person. Assistive gadgets help adjust for the accompanying hindrances either conditions.

A) Decrease balance
B) Decrease strength
C) Amputations
D) Decrease co-ordination
E) Pain in weight bearing
F) Fracture

Generally assistive devices are utilized to enhance functions. As per a review around 71% of every assistive gadget are utilized by ageing folks. Assistive implements keep up either heighten day by day utilities, reduces apprehension related grievances, eases amalgamation into society, and above all adjusts natural surroundings rather than singular.

3.1 Types of assistive devices:

Assistive devices are classified into two types on the basis of their costs and the technology used.

A) Simple either Low technology based assistive devices:

Examples: Walker, cane, crutches (mobility device), aids for bathing either toileting, hearing aid, simple wheel chair, bathing devices.

B) Sophisticated either High technology based assistive devices:

Examples: Computer applications, sensors, smart phone system, programmed pill containers, robotic aids, digital muscle stimulator, vice activated system etc. Also we can classify the assistive devices in terms of their functionalities.

1. Architectural Elements:

Example: Intelligent Mechanism for opening/closing doors based on speech and light beam technology, Modification of utilities i.e. bath room, stairs, inclination to comfort the elderly etc.

2. Aural Elements:

Examples: Vision aids,Heptics system, Image magnifiers, representing human eyes for estimating exact areas, alphabet to sound, Amplify environmental sounds, cutting unwanted noise, Flash light replacing door knocking, Word caption telephone, Keyboard with group keys assigned colors and location, special buttons for launching desired application, Text-to-audio-software, Augmentative Communication Aids, Voice Generator with Text-to-Speech function, Combining augmented image data to support human visual system etc.

3. Computers:

Examples: Hardware and Software, Head Mouse on top of monitor, mapping the eye motion to positions of pointers on screen, Braille Character Keyboard, Voice actuators

4. Controls:

Examples: Devices helping elderly having strain in moving to perform some tasks, Sip/Puff switch by closing lips with pressure, exhale air through mouth, Voice Command, Software connecting all facility to a computer ,joysticks etc.

5. Independent Living:

Examples: Voice operated wheel chair, systems using sensors etc.

6. Mobility:

Examples: Motion/Mobile Facilitator, Walking Aids, Manual, Electric Mobile Chairs, Supporting Bars etc.

7. Orthotics/Prosthetics:

Examples: Bionic hand controlled by nerve signal, Variable Damp Artificial Leg etc.

8. Recreation/Leisure/Sports:

Examples: Enhancing ability in performing recreation activities as normal life, Special Prosthetics for exercising, Software for synthesizing sounds for music performance etc.

9. Modified Furniture/Furnishings:

Examples: Adjustable level bed, easing get in and out, standing supporter etc.

10. Services:

Examples: Public Rest Room, Crossroad, Telephone Access etc.

Examples of most common assistive devices for mobility purpose:

Standard Stroller: Utmost steady assistive mobility device. No systematic out from under the patient.

We can add more weight UN weighting legs. It moves with a very slow walking speed

Fig.1 Standard Walker

Rolling Walker: It moves with a very high speed and very easy to move. No need to pick up its back legs while walking. Glides on back legs help for easier sliding.

Fig.2 Rolling Walker

Rollators: Fastest walking speed, Seats for resting, brakes on handles, basket for carrying goods, Good balance without leaning.

Fig.3 Rollator

Quad Cane: Ability to stand, larger base support, Allows for more weight to be put through hand

Fig.4 Quad Cane

Simple Cane: Light weight, unstable assistive device for walking.

Fig.5 Simple Cane

Wheel Chairs: The work of a wheelchair is to provide the independence of moving amid locations. Wheelchairs are used for rather long duration of time. Most stable assistive device for mobility. Now a days automated wheel chairs are preferred over manually operated wheel chairs.

Fig.6 Wheel Chair

4. Assistive Technology

Assistive technology can be characterized as any element, piece of apparatus either element framework, whether manufactured in an industry either customized, that is utilized to intensification, sustain either enhance practical abilities of people with disabilities. It likewise incorporates the administration that straightforwardly aids a person with an inability in the determination, securing either utilization of an assistive innovation gadget. It is an adaptable, shared choice making process in which groups of families, experts, and companions more than once overhaul their choices and achieve agreement about the constantly evolving capacities, needs, and desires of the individual with an inability. Assistive technology is not only for individuals with bodily disabilities – it can advantage numerous individuals with a wide range of access issues. It can be exceptionally basic either perplexing as it relies on upon the needs of a crippled person. Many times, preparing, support and different administrations are important to guarantee that the technology meets expectations for a handicapped individual.

4.1 Important Considerations:

A) The appropriate assistive device and its proper utilization are important both for safety and security in the environment, as well as conserving energy.

B) It should be selected and fitted by the professionals.

C) In assistive technology service therapist must consider the person's skills and abilities, functional limitations, comfort with technology, training needs.

D) Task is the second crucial component to adequately execute technology. Therapist must distinguish the task to be finished, and afterward separate that task into its sub parts. As technology can't finish a task for an individual – they will probably need to interface with the innovation somehow. The assignment in assistive technology is long haul arrangement that can keep on serving the individual as their handicap advances either as their employment undertakings extend. Therapist must make the task a smaller amount of demanding, conceivable and more productive task completion. The therapist must be aware in providing safety for the client through proper guarding and instructions during activities.

E) The therapist must prepare the client bodily and cerebrally fit for the activities.

F) The effect of environment should be considered in assistive technology.

Example: We can use speech input device for a student who cannot write. But it may disturb other students. So digital tape recorder for that student is preferred.

H) Assistive technology work aesthetically and preferentially according to requirement.

I) Above all, the therapist must make the device worth of using. A device is used, that does not imply that it is worth using, as the user may not have alternatives.

5. Development of Voice Operated Wheel Chair

5.1 Block diagram

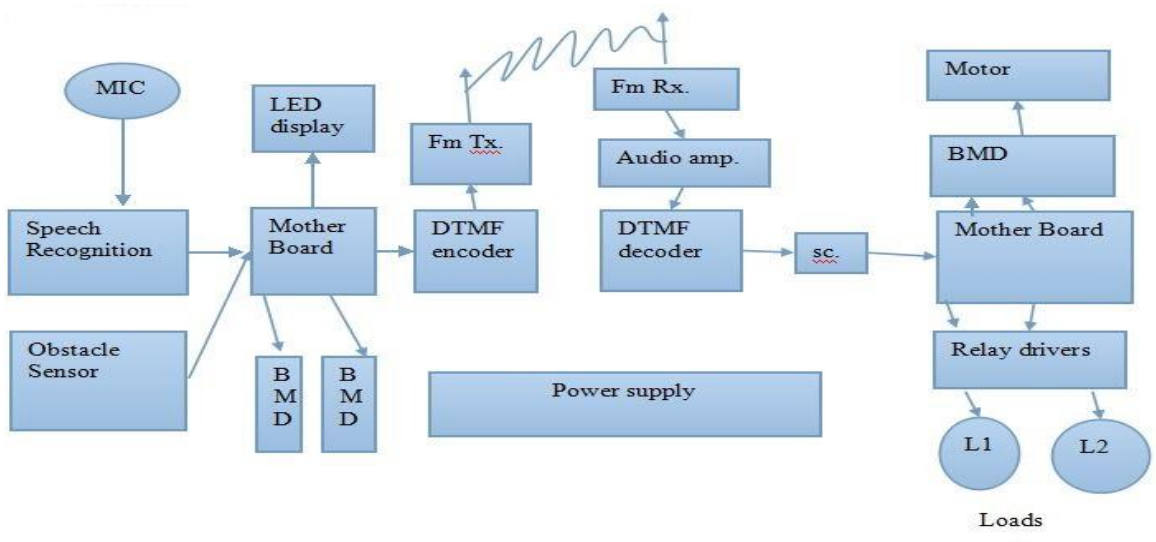

Fig.7 Block Diagram of the system

5.2 Working:

In this application two distinctive equipment sheets are accessible. One is put in the wheelchair (beneficiary side/robot side) and second one is put at the client side (transmitter side). Wheelchair side voice command operated framework is interfaced to the Micro controller. In view of the voice guidelines voice command operated framework is giving the direction to the controller. In light of those guidelines wheelchair (robot) will move (forward, in reverse, right, and left and stop). This left and right operation will work just wheel seat is in stop condition. These inputs are originating from the client side equipment board (transmitter side) with the assistance of remote correspondence. With a specific end goal to work voice command operated framework in light of the client prerequisite he needs to prepare the particular words. Same words he needs to use in the application. The different directions of motions possible are:

1) Advancing**:** For forward motion both motors should move in forward direction.
2) Regressive**:** For backward motion both motors should move in opposite direction.
3) Leftward**:** Left side motor should move in forward direction and right side motor should move in backward direction.
4) Right side movement: Right motor should move in backward direction, Left motor should move in the forward direction.

Wheel Chair Motion

Direction	Right motor	Left motor
Forward	ON(CW)	ON(CW)
Backward	ON(CCW)	ON(CCW)
Right	Off	ON(CW)
Left	ON(CW)	Off

Table.1 Wheel Chair motion

For motion in forward direction both motors should rotate in clockwise direction. For motion in backward direction both motors should rotate in counter clockwise direction. For right side movement right motor should be off and left motor should be in clockwise direction. For left side movement left motor should be off and right motor should be in clockwise direction. After the vocal sound command is set, the wheelchair moves in that route. These commands are transferred to the wheelchair by electrical indications which are used the drive the left either right motor of the wheelchair. We have connected two motors at the left and right side of the wheelchair wheels. Through communication ports electric signals are transferred. Basic predefined pins of this parallel port accepts the commands in form of electric signals.

5.3 Design Principle

The design of the project Voice operated wheel chair is basically consisting of four sections. The sections are as follows:

1) Input section
2) RF transmitter and receiver
3) Encoder and decoder
4) Output Section

5.3.1 Input Section

The system accepts voice commands which controls the motors of the wheel chair. The voice active system adjusts to any linguistic. Even if someone has strain in stating words, the wheelchair will adjust to distinguish distinct sounds. The wheelchair can be driven with only 5 sounds. The commands are combined to match the activities of a joystick. The Discourse Triggered Wheelchair Controller project was designed to develop a feasible model for stimulating a wheelchair using a low-cost voice understanding functioned system. A micro controller was automated to offer user switch over each command, as well as to avoid speech instructions from being issued unintentionally. The input section consists of a speech distinguished sensor, a micro controller, a motor driver and two DC motors.

5.3.2 RF Transmitter and Receiver

The RF module operates radio frequency. In this project we have used wireless transmitter which operates with 434 MHZ receiver. They can be attached easily to a bread board and can work well with micro-controllers to generate a very modest wireless data link. It merely works communicating data in one path, two pairs (of different frequencies) are needed to act as a transmitter/receiver pair. Broadcast through RF is improved than IR. RF sign can travel even while there is an obstacle amid transmitter and receiver. An RF transmitter receives serial data and transmits it wirelessly through radio frequency through its antenna. The transmitter data is established by an RF receiver operating at the same frequency as that of the transmitter. In the RF module the digital data is characterized as difference in the amplitude of the carrier wave. This sort of modulation is branded as Amplitude Shift Keying (ASK).

In This project we have used ST-TX-01-ASK transmitter. It is cost a smaller amount of, small in size, pretentious in utilization for designing.

Frequency Range: 315-433.92 MHZ

Source Voltage: 3-12V (5V is used)

Yield Power: 4-16 DBM (decibel mill watt)

PIN Diagram:

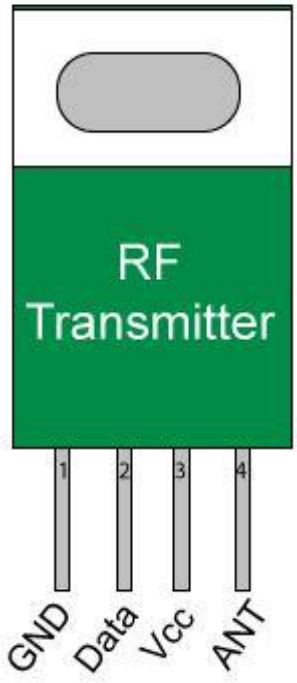

Fig.8 RF Transmitter

PIN Description:

Pin No of RF Transmitter	Function of the Pin	Name of the Pin
1	Ground(0V)	Ground
2	Serial Data Input Pin	Data
3	Supply Voltage: 5V	Vcc
4	Antenna Output Pin	ANT

Table.2 PIN Description of RF Transmitter

In this project we have used ST-TX-02-ASK receiver. Because of its low cost.

Frequency Range: 315-433.92 MHZ

Distinctive Sensitivity: -105DBM

Source current: 3.5 mA

Action Voltage: 5V

Process Temperature range: -20C to +70C

PIN Diagram:

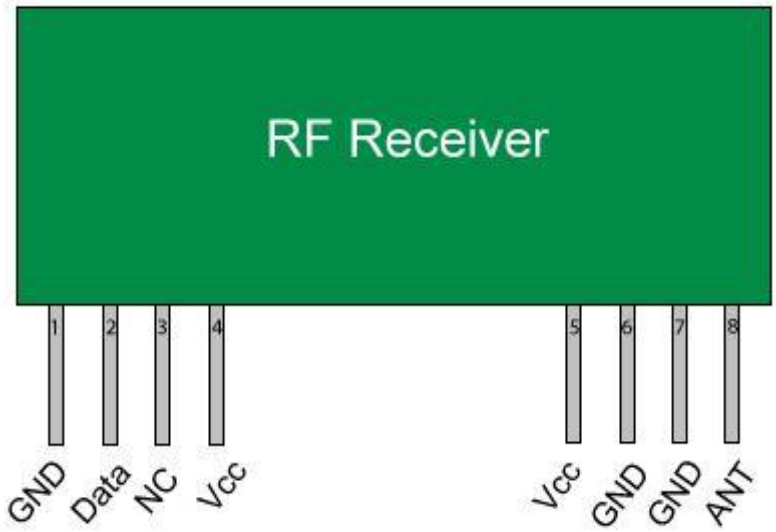

Fig.9 RF receiver

PIN Description:

Pin No of RF receiver	Functions of the Pins	Name of the Pins
1	Ground(0V)	Ground
2	Serial Data Output pin	Data
3	Linear Output pin(not connected)	NC
4	Supply voltage:5V	Vcc
5	Supply voltage:5V	Vcc
6	Ground(0V)	Ground
7	Ground(0V)	Ground
8	Antenna Input pin	ANT

Table 3. PIN description of RF receiver

5.3.3 Encoder and Decoder

We have used the RF module along with a pair of transmitter and receiver. Encrypt is utilized for encrypting parallel data for broadcast feed, while the operation is decrypted by a decrypt. In this project we have utilized HT12E for encoding and HT12D for decoding.

HT12E Encoder:

It is used for encoding. It is mostly utilized as a part of interfacing the RF. Basically, it changes over the parallel inputs into serial harvest. It encrypts the 12 bit parallel information into serial for broadcast through a RF transmitter. These 12 bits are segregated into 8 separate location bits and 4 data bits. It has a broadcast authorize pin which is lively low. At the point when a trigger sign is gotten on TE stick, the modified locations/data are transmitted organized with the header bits by means of a RF either an infrared broadcast medium. It twitches a 4-word broadcast endless supply of a broadcast authorize. This cycle is rehashed the length of TE is kept low. When TE comes back to high, the encrypt finishes its last cycle and afterward it stops.

Functioning Voltage: -2.4V-12V

Low standby current: 0.1mA at VDD =5V

Negligible peripheral mechanisms.

PIN Diagram:

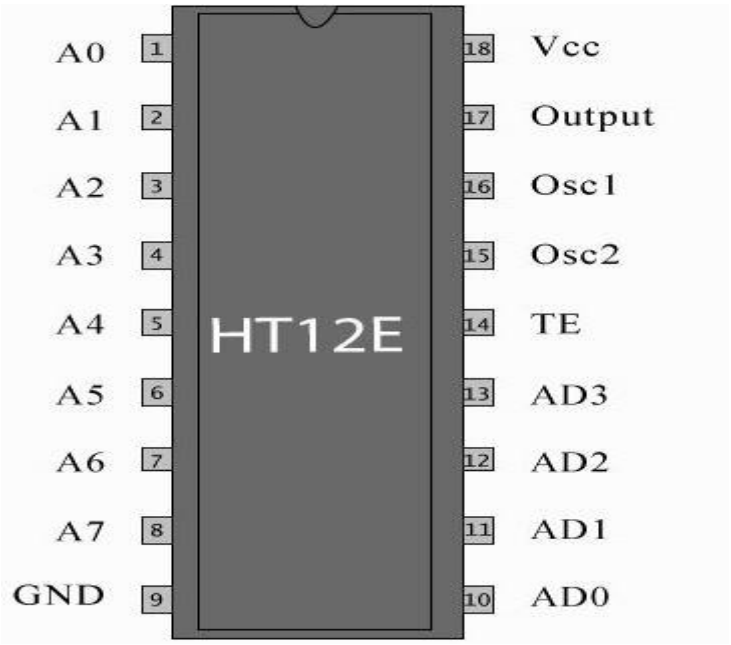

Fig.10 HT12E encoder

PIN Description:

Pin No of HT12E encoder	Functions of Pin	Name of Pin
1	8 bit Address pins for input	A0
2		A1
3		A2
4		A3
5		A4
6		A5
7		A6
8		A7
9	Ground(0V)	Ground
10	4 bit data address pins for input	AD0
11	4 bit data/address pins for input	AD1
12		AD2
13		AD3
14	Termination enable active low	TE
15	Oscillator input	OSC2
16	Oscillator output	OSC1
17	Serial data output	Output
18	Supply voltage: 5V	Vcc

Table.4 PIN description of HT12E encoder

HT12D decoder:

It is the decrypt circuit. This preparation of decrypts are vitally utilized for remote control solicitations. It changes over the serial data into parallel output. It becomes estranged the serial sites and data got by RF collector into parallel data and sends them to yield data pins. The serial data is compared and the residential areas times reliably. The data code is decrypted while no blunder either unparalleled codes are found. An authentic broadcast in established by a high flag at VT pin. HT12D is fortified for translating 12 bits, of which 8 are location bits and 4 are data bits. The statistics on 4 bit hook sort yield pins stay inviolate until fresh is gotten.

Functioning Voltage: 2.4V-12V

Low Power and high invulnerability

Frequency Array: 434MHZ

Source Voltage: 5V

PIN Diagram:

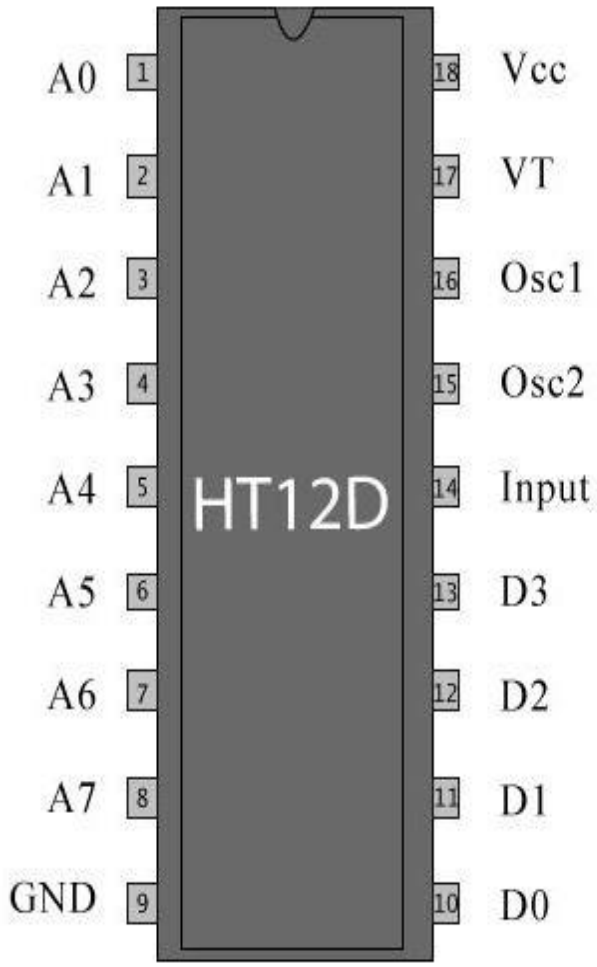

Fig.11 HT12D decoder

PIN Description:

Pin No.	Function			Name
1	8 bit input/output ports (P1 pins)			P1.0
2				P1.1
3				P1.2
4				P1.3
5				P1.4
6				P1.5
7				P1.6
8				P1.7
9	Reset Pins: Active High			Reset
10	Input (receiver) for serial communication	RxD	8bit input/output ports (P3 pins)	P3.0
11	Output (Transmitter) for parallel communication	TxD		P3.1
12	External interrupt1	Int 0		P3.2
13	External interrupt2	Int 1		P3.3
14	Timer1:External input	T0		P3.4
15	Timer2:External input	T1		P3.5
16	Write to external data memory	Write		P3.6
17	Read from external data memory	Read		P3.7
18				Crystal2

Table 5. PIN description for HT12D decoder

BLOCK Diagram of RF Transmission:

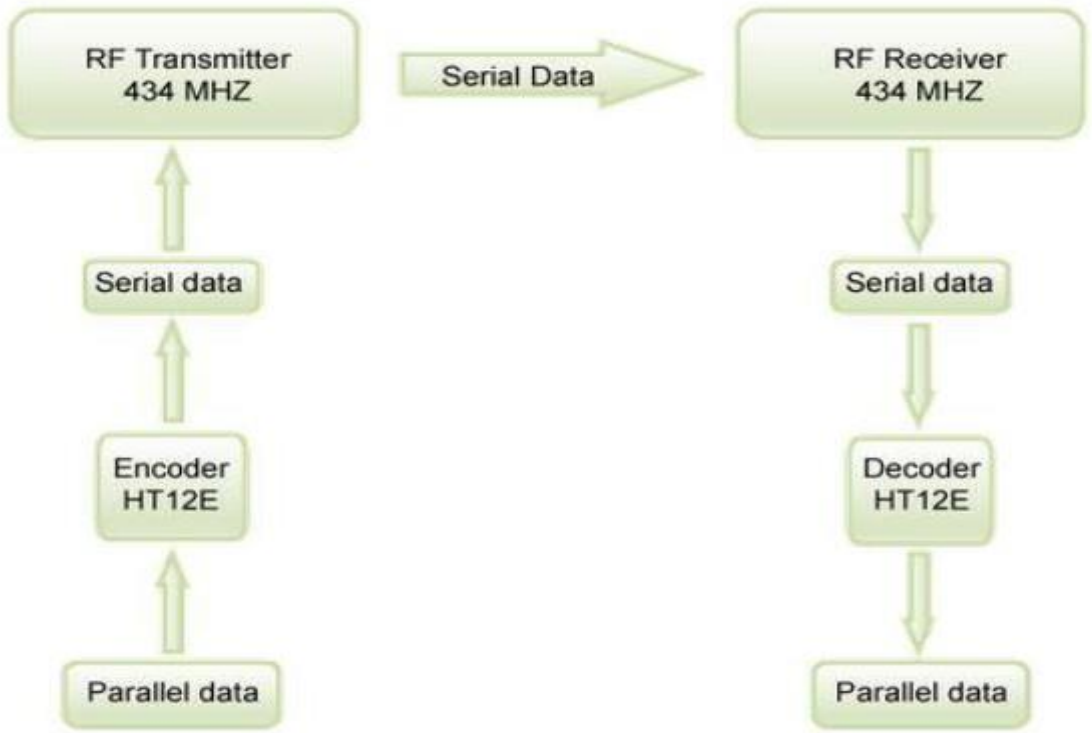

Fig.12 Block diagram of RF Transmission

Description:

This radio frequency (RF) broadcast system utilizes Amplitude Shift Keying (ASK) using transmitter/receiver (TX/Rx) pair employed at 434 MHz The spreader module takes serial data and spreads these signs through RF. The transferred cyphers are acquired by the receiver module put far from the source of broadcast. The framework permits one route communication amid two hubs, namely, broadcast and gathering. The RF module has been utilized as a part of combination with a planning of four channel encrypt/decrypt ICs. Here HT12E & HT12D are employed as encrypt and decrypt individually. The encrypt changes over the parallel feedbacks (from the remote switches) into serial arrangement of cyphers. These signs are serially exchanged through RF to the gathering point. The decrypt is utilized after the RF recipient to decipher the serial configuration and recover the first flags as yields. These yields can be understood on linking LEDs. Encrypt IC (HT12E) which gets parallel data as site bits and regulator bits. The regulator signals from remote switches together with 8 location bits establish a preparation of 12 parallel cyphers. The encrypt HT12E encrypts these parallel signs into serial bits. Broadcast is authorized by giving ground to pin14 which is

dynamic low. The controller signals are set at pins 10-13 of HT12E. The serial data is bolstered to the RF transmitter through pin17 of HT12E. Spreader, after accepting serial information from encrypt IC (HT12E), transmits it remotely to the RF collector. The collector, after getting these signs, sends them to the decrypt IC (HT12D) through pin2. The serial statistics is gotten at the data pin (DIN, pin14) of HT12D. The decrypt then recuperates the first parallel organization from the got serial data. At the point when no sign is gotten at information pin of HT12D, it breaks in standby mode and devours a smaller amount current (lower than 1μA) for a voltage of 5V. At the point when signal is gotten by recipient, it is set to DIN pin (pin14) of HT12D. On collecting of sign, oscillator of HT12D is endorsed. IC HT12D then deciphers the serial data and makes checking of the location bits three times. In the result that these bits match with the residential area (1-8) of HT12D, then it puts the information bits on its data (sticks 10-13) and makes the VT stick high. A LED is connected with VT pin (pin17) of the decrypt. The relating yield is hence formed at the info pins of decrypt IC. A sign is directed by transporting down any either all the pins 10-13 of HT12E and relating sign is gotten at collector's end (at HT12D). Address bits are arranged by operating initial 8 pins of both encrypt and decrypt ICs. To send an explicit sign, discourse bits must be same at encrypt and decrypt ICs. By designing the location bits appropriately, a solitary RF spreader can likewise be utilized to control an assortment of RF collectors of same repetition. To outline, on every broadcast, 12 bits of information is transmitted comprising of 8 location bits and 4 information bits. The sign is gotten at collector's end which is then sustained into decrypt IC. On the off chance that address bits get synchronized, decrypt proselytes it into parallel information and the relating data bits get brought down which could be then used to drive the LEDs. The yields from this framework can either be utilized as a part of negative rationale either NOT entryways (like 74LS04) can be consolidated at information pins.

5.3.4 Output Section

The output section consists of a motherboard having a micro-controller (AT89C51) and different drivers for different relays. The motherboard is intended on a printed circuit board, compatible for the micro-controller. The micro controller reads the code from the decrypt. And recognizes the speech command by the user. The micro controller is programmed to switch ON/OFF the device using drivers on first press a toggle at the next press of the same key.

AT89C51 Micro controller

It is an 8-bit microcontroller. It consists of 4KB of Flash programmable erasable read only memory (PEROM) as well as 128 bytes of RAM. It can be detached and project to a maximum thrilling of 1000 times. In 40 pin AT89C51, there are four ports allocated as P1, P2, P3 and P0. Every lone one of these ports are 8-bit bi-directional ports, i.e., they can be utilized as both data as well as output ports. On the other hand P0 which requires outward draw ups, rest of the ports have inside force ups. At the point when 1s are self-possessed to these port pins, they are dragged high by the inner draw ups and can be utilized as feedbacks. These ports are furthermore bit addressable thus their bits can as well be gotten too exclusively. Port P0 and P2 are the same used to give low byte and high byte addresses, discretely, when connected with an exterior memory. Port 3 has multiplexed pins for astonishing aptitudes like serial communication, tools impedes with, clock inputs and read/unite operation from

outer memory. AT89C51 has an ingrained UART for serial correspondence. It can be modified to operate at diverse baud rates. Counting two timers & hardware interferes, it has a summative of six interferes. This kind of small scale controller has 3-general sorts of memory. To program this type of smaller scale controller it is essential to have an indispensable conception of the memory types.

The three kinds of memory are:

1-External Code Memory
2-On chip Memory
3-External RAM
Exterior code memory is the code (program) memory that lives off chip. It is in the custom of EPROM.
On chip memory states to any memory (code, RAM, other) that bodily exists in the micro-controller.
External RAM is the RAM memory that lives off chip. This is often in the form of standard fixed RAM.

Code Memory:

It is the memory that authorities the real 8051 project that is to be run. This memory is controlled to 64K and comes in abundant shapes and sizes: Code memory may be originate on-chip, either burned into the Micro controller as ROM either EPROM. Code might as well be put away utterly off-chip in a freestanding ROM either, all the more routinely, an outer EPROM. Glimmer RAM is likewise another mainstream strategy for putting away a project. Different amalgams of these memory sorts might as well be utilized -that is to say, it is credible to have 4K of code memory on-chip and 64k of code memory off chip in an EPROM. At the point when the system is put away on-chip the 64K most extreme is frequently diminished to 4k, 8k, and either 16k. This fluctuates be dependent on the discrepancy of the chip that is being utilized. Every interpretation offers actual aptitudes and one of the spotting components from chip to chip is the amount ROM/EPROM space the chip has. On the other hand, code memory is most typically actualized as off-chip EPROM. Programming Tip: Since code memory is restricted to 64K, 89C51 projects are restricted to 64K. A few assembling agents and compilers offer approaches to get around this farthermost point when utilized with exceptionally wired apparatus. On the other hand, without such exceptional compilers and equipment, projects are constrained to 64K.

External RAM:

As a palpable opposite of Internal RAM, the 89C51 also supports what is called Exterior RAM. As the name suggests, External RAM is any random access memory which is found off-chip. Since the memory is off-chip it is not as malleable in terms of accessing, and is also slower. What Outward RAM fails in speed and flexibility it gains in quantity? While Internal RAM is restricted to 128 bytes (256 bytes with an 8052), the 8051 supports External RAM up to 64K.

Programming Tip: The 8051 may perhaps only address 64k of RAM. To inflate RAM afar this limit requires indoctrination and hardware tricks. We have to do this "by hand" since many compilers and assemblers, while providing support for programs in surplus of 64k, do

not support more than 64k of RAM

On chip Memory:

The 89C51 integrates a convinced measure of on-chip memory. On-chip memory is truly one of two sorts: Interior RAM and Special Function Register (SFR) memory. The 8051 has a panel of 128 bytes of Interior RAM. This Interior RAM is set up on-chip on the 8051 so it is the hastiest RAM available, and it is moreover the most easy-going as far as perusing, written work, and adjusting its element. Internal RAM is unsteady, so when the 8051 is retuned this memory is cleared. The 128 bytes of inside ram is subdivided as indicated on the memory map. The preliminary 8 bytes (00h - 07h) are "register bank 0". By controlling certain SFRs, a system may resolve to utilize register banks 1, 2, either 3. These option register banks are situated in inner RAM in addresses 08h through 1Fh. The 80 bytes staying of Internal RAM, from locations 30h through 7Fh, may be utilized by client variables that need to be gotten to habitually either at rapid. This array is as well used by the Micro controller as a hoarding region for the working stack. This earnestly controls the 8051's stack since, as represented in the memory delineate, range saved for the stack is just 80 bytes- -and typically it is a smaller amount of since this 80 bytes must be conveyed amid the stack and client variables.

SFR Descriptions

There are special function registers (SFR) self-possessed privileged the 89C51 less important scale regulator. In this miniaturized scale controller all the info, yield ports, clocks hinders are controlled by the SFRs. The SFR functionaries are as per the following. P0 (Port 0, Address 80h, and Bit-Addressable): This is statistics/harvest port 0. Every single bit of this SFR associates to one of the pins on the Micro controller. Case in point, bit 0 of port 0 is pin P0.0, bit 7 is pin P0.7. Constituting an appraisal of 1 to a touch of this SFR will send an anomalous state on the relating I/O pin though an estimation of 0 will convey it to a low level. Programming Tip: Although the 8051 has four I/O port (P0, P1, P2, and P3), if our apparatus operates outside RAM either outer code memory (i.e., your system is put away in a separate ROM either EPROM chip either in the event that you are utilizing outer RAM chips) you may not utilize P0 either P2. This is on the grounds that the 8051 uses ports P0 and P2 to address the external memory. Consequently in the event that we can apply outer RAM either code memory you might just utilize ports P1 or P3 for our own utilization.

Features:

1) Companionable with MCS-51 program.
2) Full motionless procedure 0HZ-24HZ.
3) 128*8 bit interior RAM
4) 40 pins
5) 6 intrude sources
6) Programmed serial network
7) Low power idle and power down methods.

PIN Diagram:

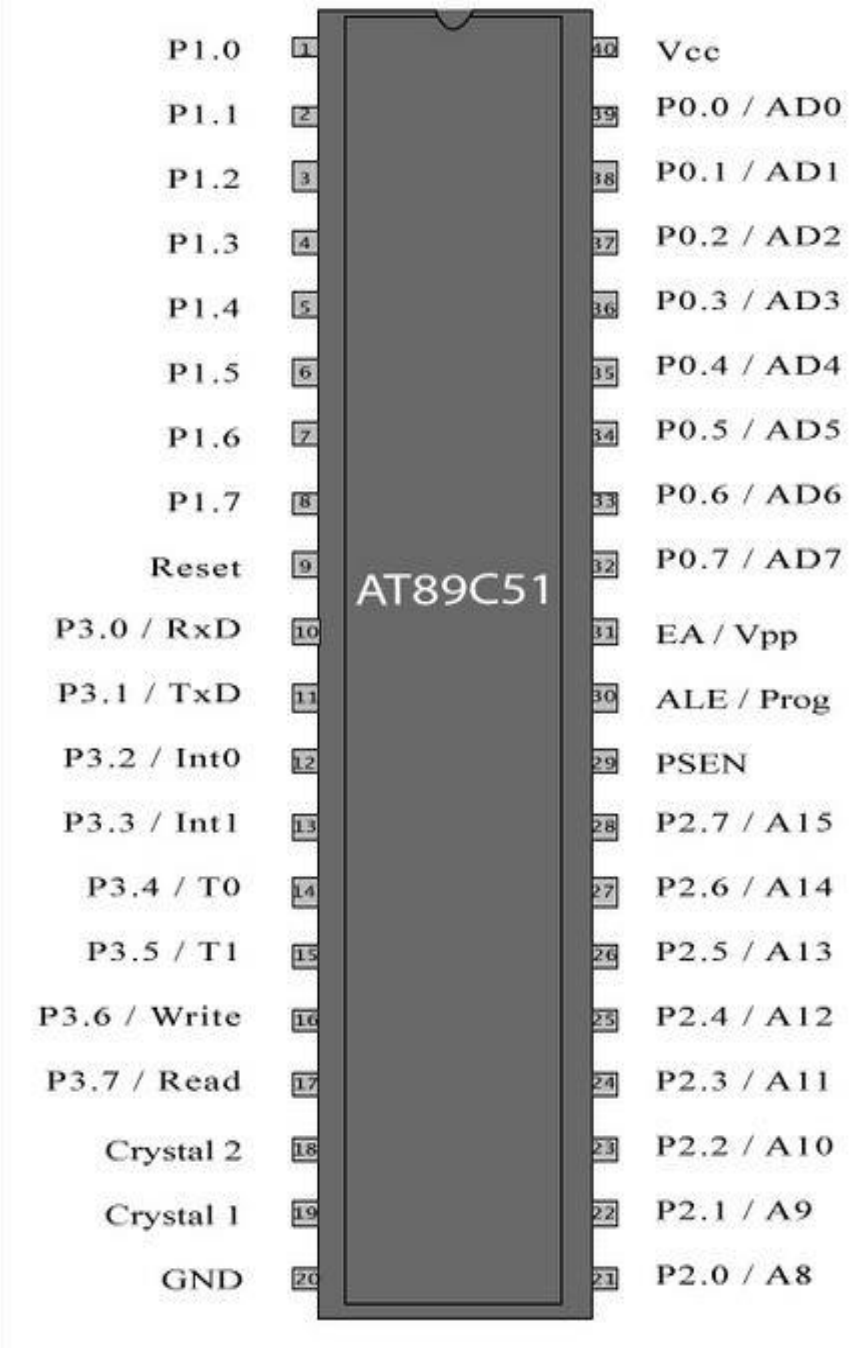

Fig.13 AT89C51 micro-controller

PIN Description:

Pin No.	Function			Name
1	8 bit input/output ports (P1 pins)			P1.0
2				P1.1
3				P1.2
4				P1.3
5				P1.4
6				P1.5
7				P1.6
8				P1.7
9	Reset Pins: Active High			Reset
10	Input (receiver) for serial communication	RxD	8bit input/output ports (P3 pins)	P3.0
11	Output (Transmitter) for parallel communication	TxD		P3.1
12	External interrupt1	Int 0		P3.2
13	External interrupt2	Int 1		P3.3
14	Timer1:External input	T0		P3.4
15	Timer2:External input	T1		P3.5
16	Write to external data memory	Write		P3.6
17	Read from external data memory	Read		P3.7
18				Crystal2

19	Quartz crystal oscillator	Crystal1
20	Ground (0V)	Ground
21	8 bit input/output ports (P2 Pins) High order address bits when addressing with external memory	P2.0/A8
22		P2.1/A9
23		P2.2/A10
24		P2.3/A11
25		P2.4/A12
26		P2.5/A13
27		P2.6/A14
28		P2.7/A15
29	Program store enable: Read from external program memory	PSEN
30	Address latch enable	ALE
	Program pulse input during flash programming	Prog.
31	External Access enable: Vcc for internal program execution	EA
	Programming enable voltage:12V(during flash programming)	Vpp
32	8 bit input/output pins(P0 pins) Low order address bits when interfacing with external memory	P0.7/AD7
33		P0.6/AD6
34		P0.5/AD5
35		P0.4/AD4
36		P0.3/AD3
37		P0.2/AD2
38		P0.1/AD1

39		P0.0/AD0
40	Supply Voltage 5V	Vcc

Table.6 PIN description for AT89C51 micro-controller

6. Voice Recognition

Vocal sound appreciation is the proficiency by which sounds, words either phrases spoken by us are altered into electrical signals or then these signals are altered into coding patterns to which sense has been allocated. While the idea could more in general be called "sound recognition", but the motivation is on the humanoid vocal sound as we most often and most certainly use our dialogue to link our ideas to others in our instant environments. In the background of a virtual environment, the user would apparently expansion the greatest feeling of entanglement, either being part of the simulation, if they could use their most common form of communiqué, the vocal sound. The strain in using vocal sound as an input to a computer imitation lies in the fundamental alterations amid humanoid communication and the more old-fashioned forms of computer input. While computer programs are commonly planned to generate a particular and all around branded reaction after accepting the best likely data, the humanoid vocal sound and talked verses are definitely not strict. Every humanoid vocal sound is various, and vague words can have characteristic allegations if talked with characteristic enunciation either in various settings. A few approaches have been endeavored, with fluctuating degrees of execution, to conquest these defies. In this project we have utilized the HM2007IC voice recognition kit.

6.1 Speech Acquisition

Amid discourse attainment, speech trials are developed from the speaker continuously and put away in remembrance for preprocessing. Speech attaining indulges an amplifier attached with a simple to-advanced converter (ADC) that has the truthful augmentation to get the vocal sound sign, example it, and proselyte it into computerized discourse. The framework directs the simple discourse by a transducer, augments it, and sends it by an ADC. The resulting tests are put away into memory on a RAM. We can without much of a stretch actualize discourse securing with the HM2007 IC. The amplified data port with the sound codes gets the sign, intensifies it, and sends it into 8-bit PCM computer at an inspecting rate of 3.57MHZ. The HM 2007 IC indulges foundation design either preparing of words, which is performed utilizing a programming panel. In the training process client prepares the IC by speaking words into the amplifier and doling out a precise value for that word. For instance a world "hi" can be apportioned an esteem 02or 05. This can then be later related with a small scale controller for further tasks.

6.2 Speech Pre processing

The communication signal contains of the spoken numeral along with a silence period and back ground clatter. Preprocessing diminishes the extent of handling required in later stages. In general, preprocessing comprises enchanting the dialogue trials as input, stalling the trials into frames, and returning an exclusive outline for each trial, as pronounced in the succeeding steps.

1) System must categorize beneficial either substantial trials from communication signal system which splits the communication trials into overlay frames.
2) System checks the frames for vocal sound action by means of end point detection and energy threshold scheming.
3) Communication trials are delivered over a pre-emphasis filter.

6.3 HM2007IC

In this venture we have operated HM2007IC meant for vocal sound appreciation. The HM2007 is a CMOS vocal sound appreciation LSI (Large Integration) circuit. The chip comprises a simple front end, vocal sound examination, guideline, and outline regulator capacities. The chip is employed as a part of a stand-alone either CPU linked. The voice command activated package is a wide-ranging simple to create programmed vocal sound command operated circuit. Programmable, as we can formulate the words (either verbal pronunciations) we need the circuit to identify. This package certificates us to discover dissimilar paths concerning several features of vocal sound command activated innovation.

Features:

1) Solo chip voice acknowledgement CMOS LSI
2) Speaker needy
3) Exterior RAM provision

4) Maximum 40 word acknowledgement (.96 second)
5) Maximum word interval 1.92 seconds (20 word)
6) Microphone provision
7) Manual and CPU modes accessible
8) Self-sufficient stand-alone vocal sound command activated circuit
9) User programmable
10) 40 either 20 word terminology
11) Multi-lingual
12) Non-volatile memory back up
13) Effortlessly interfaced to regulate exterior circuits & uses

PIN Diagram:

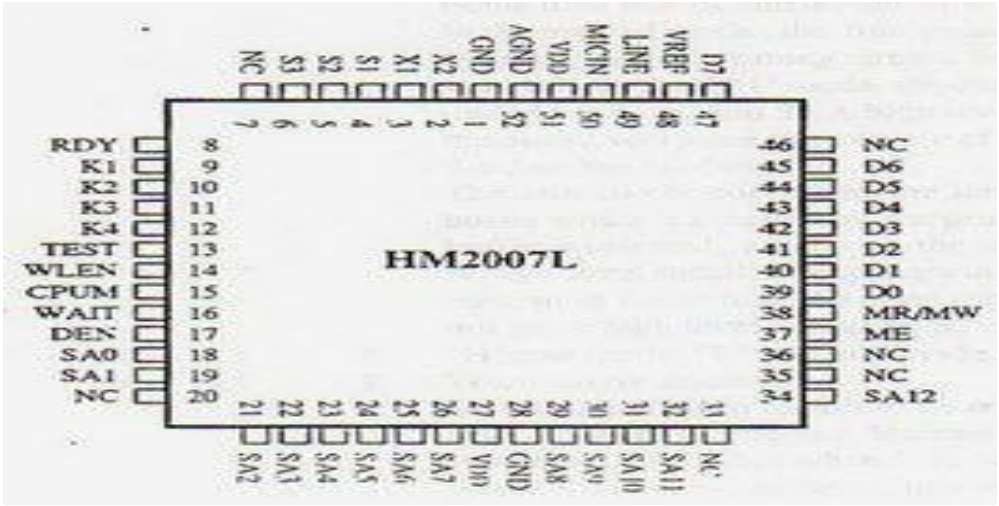

Fig.14 HM2007L IC

Involvement Voltage - 9 to 15 V DC, Uses a normally obtainable 12V 500ma DC Connecter

Yield Data - 8 bits at 5V Logic Level

Interface - Any microcontroller like 8051, PIC either AVR can be connected to data port to understand and Implement dedicated applications

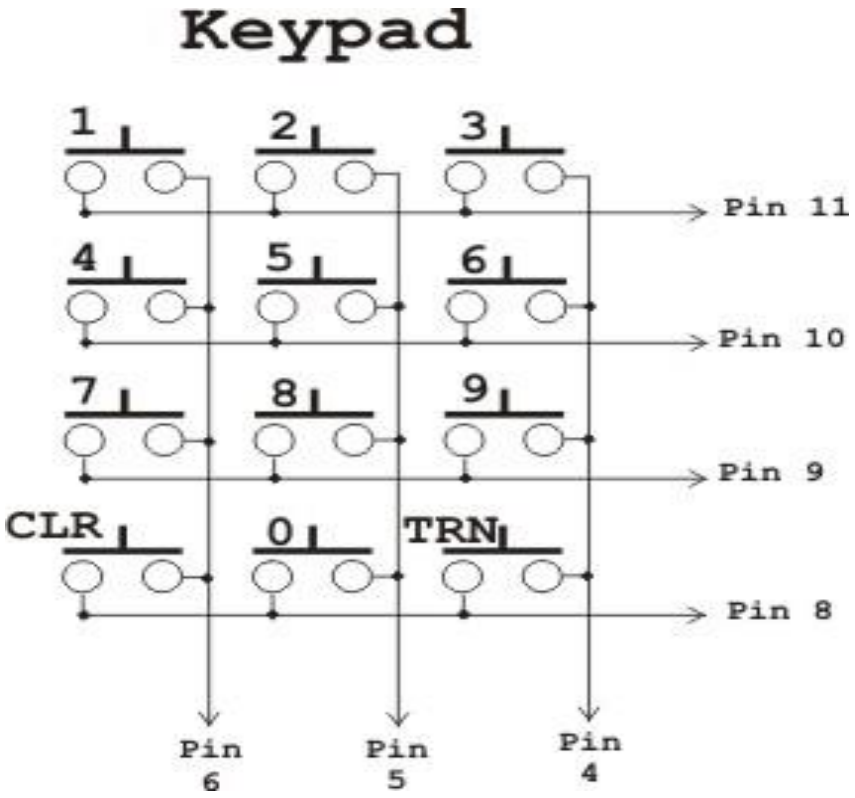

Fig.15 Keypad of HM2007IC

The keypad and digital display are utilized to express with and program the HM2007 chip. The keypad is embraced with 12 commonly open momentary communication buttons. At the point when the circuit is turned on, "00" is on the display, the red LED (READY) is ignited and the circuit sits tight for a charge. Press "1" (display case will exhibit "01") on the keypad, then press the TRAIN key (the LED will turn on) to place circuit in formulating mode, for word one. Say the objective word into the on board receiver (close LED) apparently. The circuit signals acknowledgment of the vocal sound is entered by flaming the LED off then on. The word (either pronunciation) is presently eminent as the "01" word. On the off chance that the LED did not spark, begin once again by pressing "1" and next "Prepare" key. Press "2" then TRN to formulate the second word etcetera. The circuit will accept and identify up to 20 words (numbers 1 through 20). It is not vital to formulate all word spaces.

6.3.2 Testing Recognition

At the outset reprise a trained word into the microphone. The numeral of the word should be exhibited on the digital display. For illustration, if the word "hell" was trained as word number 20, uttering the word "hell" into the microphone will root the figure 20 to be displayed.

6.3.3 Error Codes

The chip delivers the succeeding error codes.

55 = word is too elongated

66 = word is too undersized

77 = no match

6.3.4 Clearing Memory

To delete all the words stored in memory press “99” and after that “CLR”. The figures will swiftly roll by on the digital display as the memory is wiped away.

6.3.5 Changing & Erasing Words

Equipped words can undeniably be altered by overwriting the first word. For incidences take up word six was "accelerative" and we need to change it to "converse". Ultimately reinstruct the word space by pressing "6" after that the TRAIN key and saying "converse" into the amplifier. In the occurrence that one desires to remove the word without succeeding it with alternative word press the word number (for this circumstances six) after that press the CLR key. Word six is right now removed.

7. Conclusion

Our project introduces a voice operated wheel chair for bodily disabled persons for their independent movement. It will be able to navigate in indoor and outdoor environment. So, this is an extremely useful system for users having restricted body part movements. We can use this wheelchair for every person whose only one sense is working that is their mind and their body does not respond to any machine. We have made a prototype based on our study.

Future work and Development:

After studying and working on this project we have found that there are many things which can be developed in the voice operated wheel chair.

1. Improvement in extra noise cancellation can be made for better speech operated system. A developed quality microphone with noise cancellation facility can be used in this project.
2. Emergency stop and braking system can be developed.
3. Wheel chair can be made fold able.
4. GPS system can be installed in the wheel chair.
5. Overall solar charging battery can be used for power supply instead of a transformer.

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Extra Pictures of the prototype