ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 3, March 2017

ARM Based Wheelchair Controlled System

G. Vijaya Kumari[1], R.Shalini[2], S.Soundarya[3], T.Sharmila[4]

[1]Assistant Professor, Department of ECE, New Prince Shri Bhavani College of Engineering and Technology, Chennai, India

[234]UG Student, Department of ECE, New Prince Shri Bhavani College of Engineering and Technology, Chennai, India

ABSTRACT: A novel technique is implemented for the eye controlled based independent and cost effective system. The purpose of Eye movement based control electric wheelchair is to eliminate the necessity of the assistance required for the disabled person. And it provides great opportunity of the disabled to feel of independent accessible life. The implemented system will allow the disabled person to control the wheelchair without the assistance from other persons. In this system controlling of wheelchair carried out based on Eye blinking. The IR sensor is mounted in front of the user, to capture the image of any one of the Eye (either left or right) . According to the blinking of the eye, wheelchair motor will be directed to move left, right and forward. In addition to this, for the safety purpose ultrasonic sensor is mounted in front of wheelchair to detect the obstacles and automatically stop the wheelchair movement. To make system cost effective for monitoring, a ARM board allowed accessing the system without displaying unit.

KEYWORDS: Keil Compiler Embedded C, MEMS Accelerator, Ultrasonic Sensor, Heart Sensor, ARM LPC2148, Wheel Chair.

I.INTRODUCTION

The Wheelchair is used by the elder people or disabled persons in case of paralysis. Here in this system is introducing a method of controlling the wheelchair using eye movements. As per the development of the technologies there are several automated systems in the market such as joystick control system or by using the voice recognition. In case of the persons those who are totally paralytic they could not use the joystick control system, similarly dumb persons cannot handle the voice recognition system. Hence using the eye controlled system which can make the system more convenient. By this system can save the energy as well the man power assistant. Moreover, voice activated power wheelchair which works properly, when user speaks the command system works according to it like left, right, front, back, stop. But at a noisy environment it distracts the system, and system cannot respond properly. And other infrared reflection based eye pupil detection system providing accurate detection of the eye pupil center location, as well as system can track the eye movement. But the infrared radiations affected the eye and user may loss the eye visibility. Therefore, an effective camera captured image based eye pupil detection and tracking system is introduced [1]. This is efficient as well as cost effective system. Here real time video image capturing based on Face, Eye and Eye Pupil detection with minimum delay of time is used. A novel Eye tracking technique, which capture the image and detects the presents of human face. After detecting the face, it detects area of the eye location on the face detected image, and performs several operation of basic image processing like colour image to grey conversion, filtering, threshold, pattern matching, noise reduction and circle detection on it [2].

The ARM board is used to perform the control of the complete system operation. The ARM acquired the data and analyze it. ARM send the control signal to motor driving circuit based on the location of eye. This will decide to perform operation on motor like run the motor in clock vice direction, anti-clock vice direction and stop the motor. The Ultrasonic sensor is also mounted on the wheelchair for detection of any static or mobile obstacle. If sensor gets the obstacle very

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 3, March 2017

close to the wheelchair, it will indicate to the ARM and ARM LPC2148 sends the signal to motor driving circuit to stop the motor.

A heart rate monitor is a personal monitoring device which allows a system to measure the patient heart rate in real time or record their heart rate for later study. Early models consisted of a monitoring box with a set of electrode leads that attached to the chest. The heart rate of a healthy adult at rest is around 72 beats per minute (bpm) & Babies at around 120 bpm, while older children have heart rates at around 90 bpm. The heart rate rises gradually during exercises and returns slowly to the rest value after exercise [3].The rate at which the pulse returns to normal rate is an indication of the fitness of the person. Heart rate is simply measured by placing the thumb over the subject's arterial pulsation, and feeling, timing and counting the pulses usually in a 30 second period. Heart rate (bpm) of the subject is then found by multiplying the obtained number by2. This method although simple, is not accurate and can give errors when the rate is high. So this heart rate monitor with a temperature sensor is definitely a useful instrument in knowing the pulse and the temperature of the subject or the patient [3].

II.METHODOLOGY

In this method the wheelchair is operated by the eye movements. In the existing models the principle of this system is eye pupil detection and eye tracking based on computer vision technology. A new algorithm introduced for detecting the eye pupil location by Image processing. In this technique several stages used to find out the movement of eye, such as Face detection and Eye detection, color conversion, Edge detection, Hough Transformed, motion detection and object tracking [1].

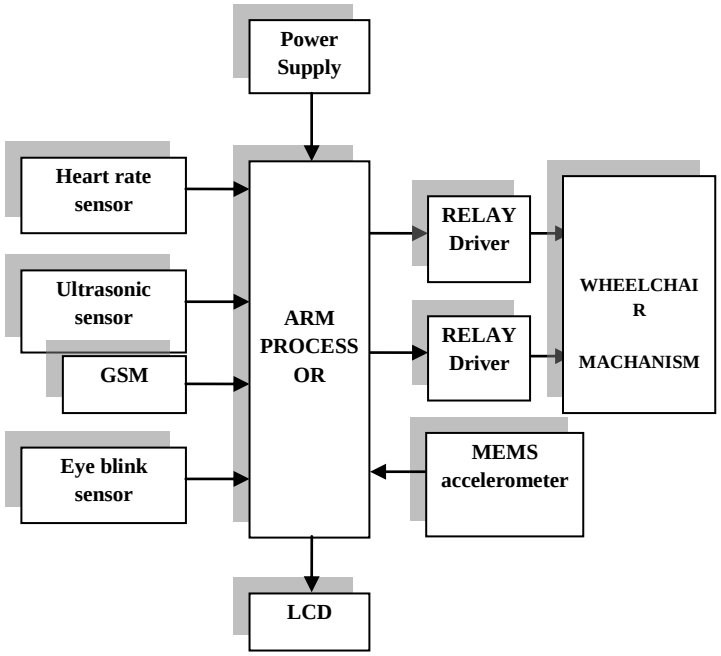

Fig.1: System Architecture

In this proposed method different types of sensors are used such as heart rate sensor and ultrasonic sensor. The patients can be monitored regularly. GSM is being fixed as the precautionary measures such that if a patient is abnormal or

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 3, March 2017

in case of emergencies the information has been sent to the concern persons automatically. The basic architecture of the proposed system is as follows.

A) ARM LPC2148: The LPC2148 microcontrollers are based on a 32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support. That combines the microcontroller with embedded high-speed flash memory ranging from 32 kb to 512 kb. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. Embedded ICE RT and Embedded Trace interfaces offer real-time debugging with the on-chip Real Monitor software and high-speed tracing of instruction execution. This board is build with LPC2148 as a microcontroller unit. The input supply to the board is fed from dc source. The serial communication can be done by means of UART. It uses a crystal oscillator for generating frequency. This board is specially designed for connecting digital sensors and analog sensors which has input voltage range 5VDC as well as it can be interfaced with serial communication devices, relay boards etc. The output can be monitored in LCD as well as pc.

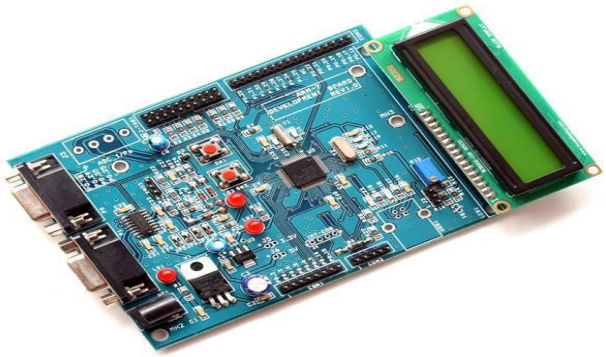

Fig.2: ARM board

B) EYE BLINK SENSOR: The eye is illuminated by an IR led, which is powered by the +5v power supply and the reflected light is recorded by an IR photo diode. This eye blink sensor is IR based; the variation across the eye will vary as per eye blink. The exact functionality depends greatly on the positioning and aiming of the emitter and detector with respect to the eye. If the eye is closed means the output is high otherwise output is low. This to know the eye is closing or opening position Connect regulated DC power supply of 5 Volts. Black wire is Ground, Next middle wire is Brown which is output and Red wire is positive supply. These wires are also marked on PCB. To test sensor you only need power the sensor by connect two wires +5V and GND. You can leave the output wire as it is. When Eye closed, LED is off & the output is at 0V.Put Eye blink sensor glass on the face within 15mm distance, and you can view the LED blinking on each Eye blink. The output is active high for Eye close and can be given directly to microcontroller for interfacing applications.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 3, March 2017

Fig.3: sensor placed in the specs

C) HEART RATE SENSOR: Heart beat is sensed by using a high intensity type LED and LDR. The finger is placed between the LED and LDR. As sensors photo diode or a photo transistor can be used. The skin may be illuminated with visible (red) using transmitted or reflected light for detection. The new signal processing approach presented here combines analog and digital signal processing in a way that both parts can be kept simple but in combination are very effective in suppressing disturbance signals. The setup described here uses a red LED for transmitted light illumination and a LDR as detector. if any abnormal condition occurs it will generate an interrupt to the controller.

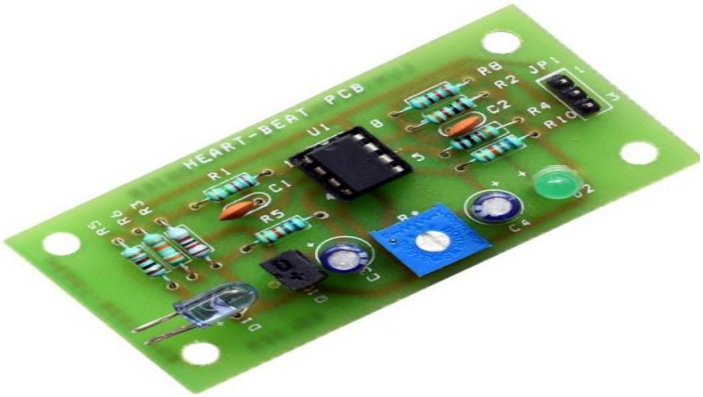

Fig.4: Heart Sensor

D) Ultrasonic sensor: Ultrasonic sensors (also known as transceiver when they both send and receive) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 3, March 2017

Fig.5: Ultrasonic sensor

E) LCD: A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and data. LCD is used here just to intimate the status of the system.

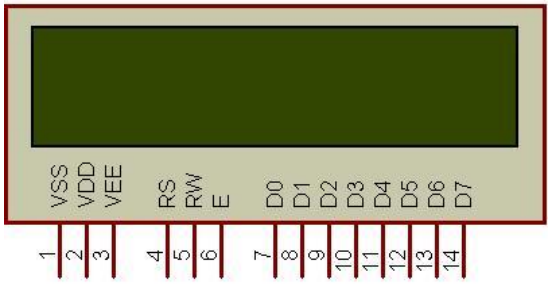

Fig.6: LCD Display

III.PERFORMANCE ANALYSIS

The wheel chair is been placed in particular directional axis. In case of MEMS performance the sensor is to be placed in any one axis(namely x or y or z).If suppose the wheel chair falls or the direction of the sensor is varied to any

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 3, March 2017

other direction then the LCD displays as fall detected and if the sensor is placed in proper position then LCD displays the corresponding angle at which the chair moves.

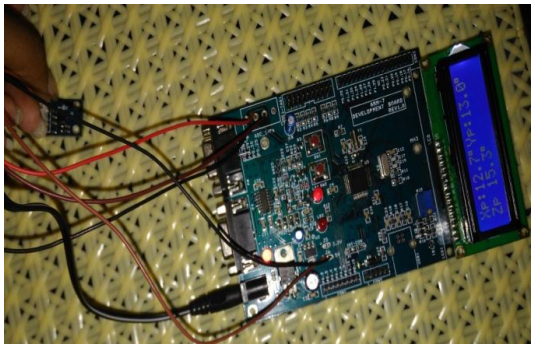

Fig.7: Sensor placed in proper direction

Similarly sensors fixed in the ARM board. The wheel chair is fixed with the motor such that by using eye blink sensor the direction of the wheelchair changes as per the program performed. The ultrasonic sensor senses the obstacles and if it sense the wheel chair stops automatically. The heart rate sensor senses the patient heart rate in the real time basis in case of any abnormalities occur the message will be passed through GSM.

Fig.8: sensor is not stable

IV. CONCLUSION

This project is entirely for the patients who are completely paralyzed and it does not need the assistance or man power .The usage of ARM is because it is cost effective and crystal oscillator in the ARM is in range of 1 MHz to 25 MHz. Since the frequency is more the delay time decreases. Similarly the ARM is itself meant for advanced RISC machine. It is advanced processor in the current technology.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 3, March 2017

REFERENCES

[1] Autonomous Camera based Eye Controlled Wheelchair system using Raspberry-Pi IEEE 2015
[2] Lee W. O, Lee H. C, Cho C. W, Gwon S. Y, Park K. R, Lee H, Cha J (2012) Auto-focusing Method for Remote Gaze Tracking Camera. Optical Engineering. 51: 063204-1-063204-15.
[3] Heart rate monitoring system using finger tip through aurdino and processing software, International Journal of Science, Engineering and Technology Research (IJSETR), Volume 5, Issue 1, January 2016
[4] Eye Controlled Wheel Chair Using EOG, Alex Dev, Horizon C Chacko and Roshan Varghese, International Conference on Computing and Control Engineering (ICCCE 2012), 12 & 13 April, 2012.