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Wheel chair control using pupil tracking for handicapped and paralysed person.

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Abstract- *The main objective was to design and build an inexpensive, intuitive and practical powered wheelchair that did not interfere with the user's ability to communicate while operating the wheelchair. The wheelchair was designed for subjects who do not have voluntary muscle function in their head and neck. The control system tracked the position and rotation of the eye to control the direction of the wheelchair motion.`Here we are proposing a specialized Wheel chair which can be used by patients with different disabilities. EyeGesture based Wheel chair control using IR sensors for Patients who have paralysis from waist down. As per Eye gesture wheelchair will operate. And ultrasonic sensor is interfaced with controller which is used to detect obstacle.In this eye tracking based technology, three ProximityInfrared (IR) sensor modules are mounted on an eye frame to tracethe movement of the iris. Since, IR sensors detect only white objects;a unique sequence of digital bits is generated corresponding to eacheye movement. These signals are then processed via a microcontroller IC (LPC2148) to control the motors of the wheelchair.*

Keyword- *Intuitive, wheel chair, eye gesture, iris, infrared(IR), microcontroller.*

I INTRODUCTION

Wheelchair is mobility aided device for person with moderate/severe physical disabilities as well as the elderly. In order to take care for different disabilities, various kinds of interface have been developed for wheelchair control: such as joystick control, hands control. However, to steer own wheelchair through a conventional joystick is difficult for people experience total paralysis in all four limbs ,such as muscular dystrophy , spinal cord injury , amyotrophic lateral sclerosis,etc. The idea of eye controls of great use to not only the future of natural input but more importantly the handicapped and disabled. People who are unable to walk and are using wheel chairs exert great amounts of energy using physical strength to turn a steer the wheels. With eyesight Bering their guide, the disabled would save being their guide, the disabled would save energy and could use their hands and arms for other activates. The basic principle of this direction sensing is the colour of the eyes. There are two main color pigments in the human eyes. i.e., black and white. The colures show different wavelengths in the spectrum. The Infrared sensors are placed on either side of the eyes fixed in goggles. Both eyes are lit up by the energy from the Infrared Light-Emitting Diode (IRLED) sections.

II LITERTURE SURVEY

There are many persons suffering from various disabilities such as quadriplegia disease by considering there disabilities various work is being done on electric wheel chair to make them self dependent and rebuilt their self confidence and make them move to in desired direction. This information gave us idea for current work. The greatest work is done by Stephen Hawking for this. But it cost a lot; it is not possible for common person to buy this chair. In 1st method it is proposed to control wheel chair. It goes to the desired goal point and user is allowed to look around freely while navigation. In second method by using eye movements and gaze direction are used to control the wheelchair but user has to carry lots of weight always with him. By using such ideas which are listed in the survey we designed an electric wheel chair for paralyzed people based on Pupil detection technology.*A method is proposed to control monitering wheel chair using EOG .The

method allows user to look around freely while wheel chair navigates automatically.

SIMILER SYSTEMS- [1]Voice controlled wheel chair for physically disabled people, in this system we can control the DC motor corresponding to voice recogination.

[2]Automatic wheel chair using gesture recognition, in that using hand gesture wheel chair operate.

[3]Operation of wheel chair using joystick, in which one joystick is mounted on handle of wheel chair to decide the direction.

[4]Eye motion tracking wheel chair using image processing.

III PROPOSED SYSTEM

A.system overview-

In proposed system as wheel chair is operating on eye motion tracking & using sensor operation all the drawbacks of exisiting system get minimized as eye is the only organ that can be provide signal to sensors in paralysed person also, so we decided to do the project of sensor based wheel chair control using pupil motion tracking[1].

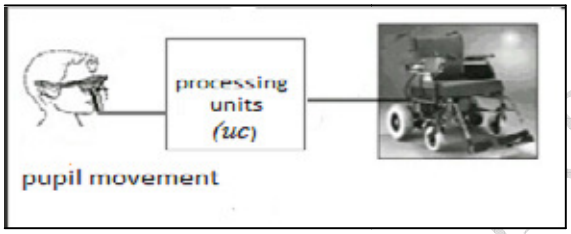


Fig 1. System setup

In this system model is prepared using goggle to monitor the direction of eye pupil using IR sensors. Also ultrasonic sensor is used to detect the obstracle in front of wheel chair and automatically stop the chair after detection[5]. One another facility is provided for monitoring the pulse rate of person sitting on chair in order to get the information about the health condition of paitient.

B. block diagram-

Discription:

System development is start with the design architecture of the proposed design. Transparent block diagram has been used to outline the proposed design as shown in Figure 1. 3 IR sensors are used to left, right, and front direction of eye and according to the signal generated from the respective sensor microcontroller turned the DC motor drive ON and rotated the DC motors to turn wheel chair in left, right and front direction respectively.

LCD is used to display the direction of wheel chair, along with that 12v power supply is used to operate DC motor as well as microcontroller[4]. As shown in block diagram 2 DC motors are using for avoiding the skidding effect due to improper balance of wheelchair so 4 wheels are used in wheel chair for balancing purpose.

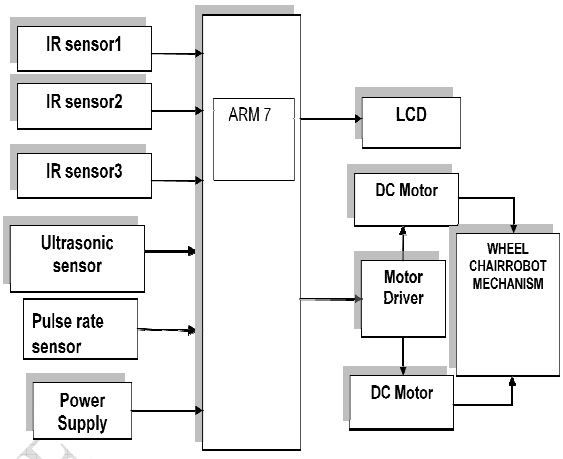


Fig 2. Block diagram

IV HARDWARE SPECIFICATION

A.IR SENSOR:

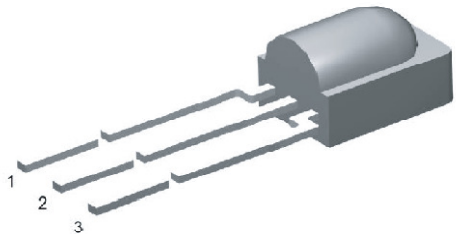


Fig 3. IR sensor[7]

The Infrared sensors are placed on either side of the eyes fixed in goggles. The whole circuitry is fitted inside a table which is connected to the spectacles through a long flexible cable which performs the analysis, processing and of the signals derived from the sensor's eye movements. Both eyes are lit up by the energy from the Infrared Emitting Diode (IRLED) sections. The silicon phototransistors and the IR sources are mounted in front of the eyes so that the obstruction of the field of view is minimized

and the capability to accurately monitor the position of the eye is maintained The Eye ball position is detected to sense the position of the Eye ball[6]. The Tx , Rx sensors are positioned in such a way to sense the position of Iris Up/Down,left/right.

B. ULTRASONIC SENSOR:

Ultrasonic sensor are basically used to measure the distances between the obstacle / object and the sensor. The ultrasonic sensor works on Doppler effect[2].

It consist of a ultrasonic transmitter and a receiver. The transmitter transmit the signal in one direction. This transmitted signal is then reflected back by the obstacle and received by the receiver. So the total time taken by the signal to get transmitted and to received back will be used to calculate the distance between the ultrasonic sensor and the obstacle.

C. PULSE RATE SENSOR:

Fig 4. Pulse rate sensor[3]

the device consists of an infrared transmitter LED and an infrared sensor photo-transistor. The transmitter-sensor pair is clipped on one of the fingers of the subject (see Figure 2). The LED emits infrared light to the finger of the subject. The photo-transistor detects this light beam and measures the change of blood volume through the finger artery. This signal, which is in the form of pulses is then amplified and filtered suitably and is fed to a low-cost microcontroller[1] for analysis and display. The microcontroller counts the number of pulses over a fixed time interval and thus obtains the heart rate of the subject. Several such readings are obtained over a known period of time and the results are averaged to give a more accurate reading of the heart rate. The calculated heart rate is displayed on an LCD in beats-per-minute in the following format:

Rate = nnn bpm

Where nnn is an integer between 1 and 999.

D.DC MOTOR DRIVER:

DC motors are used to physically drive the application as per the requirement provided in software. The dc motor works on 12v.To drive a dc motor, we need a dc motor driver called L293D[5]. This dc motor driver is capable of driving 2 dc motors at a time. In order to protect the dc motor from a back EMF generated by the dc motor while changing the direction of rotation, the dc motor driver have an internal protection suit. We can also provide the back EMF protection suit by connecting 4 diode configurations across each dc motor[4][5].

V. FLOW CHART

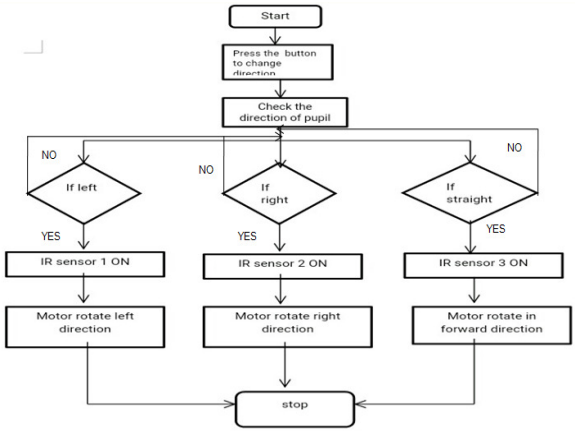


Fig 5. Flow chart of system

A.WORKING:

Based on the position of eye wheelchair will move left, right and forward. By using eye tracking sensor detect the position of eye[2]. Eye tracking sensor will recognize colour differences. the eye focus on three parts of the eye that will respond to incoming light rays in a different manner: 1) left position of pupil 2) right position of pupil 3) straight position pupil, based on these white and black portions eye tracking sensor will give the signals to microcontroller. It decides movement of wheelchair as left, right or straight respectively, by rotating the dc motor in the respective direction.

Note that IR light is not visible light, but it resides after red light and opposite blue/ultraviolet light. It is known that a large percentage of IR light is transmitted through the skin (another type of soft tissue). Before starting the wheelchair the patient have to press the switches while looking at left, right and straight and while closing the eyes. The values for all directions are stored into the buffer Now values generated by the sensor are fed into the microcontroller. Now the microcontroller matches it

with the values that are stored in the buffer. If the values generated by the sensor matches with the values of left in the buffer, then the microcontroller will automate the driver connected to the right motor. Thus the right motor will start to rotate in the forward direction. As a result the wheelchair will turn left. During this time the left wheel is stopped.viceversa is for right direction[6].

VI. RESULT

A.PROTOTYPE MODEL

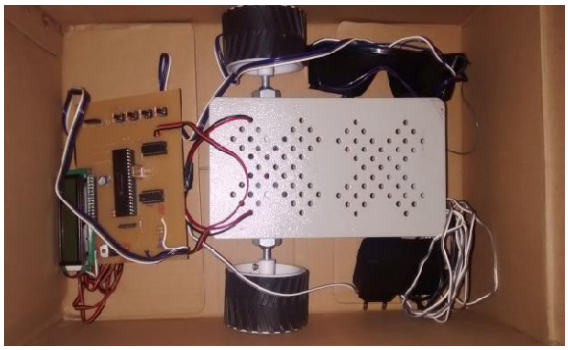


Fig 6. Prototype model[2]

B. OBTAINED RESULT:

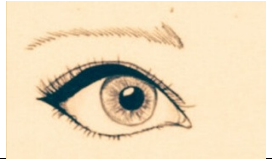
POSITION OF PUPIL	WHEELCHAIR MOVEMENT
1] LEFT 	Changes the direction to left
2] RIGHT 	Changes direction to right
3]STRAIGHT 	continues in straight direction

Table 1. various result obtained

VII. CONCLUSION

In the real time application we can use long range ultrasonic for the sensing of obstacles in a little far distance and always monitor the position of wheelchair like as it bend front or back or right or left. Thus this project enables to help the physically challenged persons to move freely with their own control of the wheel chair and that is the sensor based automated wheelchair.

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