# www.SeminarsTopics.com

**Welcome To www.SeminarsTopics.com For Download Latest Seminar Topics.**

**We are adding More Research Seminar Topics Please keep visiting www.SeminarsTopics.com for Regular Updates**


**www.SeminarsTopics.com**

**SeminarsTopics.com is now a true collaboration of the best minds in education, with more than 1000 students/ Professors, subject experts and editors contributing to it every day.**

**Students/Professors are most welcome to contribute here by Uploading Seminar**

# Thanks

# ABSTRACT

This seminar topic delivers a new method to guide and control the wheelchair for disabled people based on their eyeball movement. In this method use sensor based eyeball tracking system to control powered wheelchair. Eyeball sensor will generate distinct range of values for each position of eyeball (i.e. left, right, straight). This concept can be used for multiple applications, but this paper focuses the application to mobile and communication aid for paralytic people. The system involves two stages; first eyeball tracking and second sending of control signals to the arduino controlled wheelchair.

# Chapter 1

# INTRODUCTION

Transportation is of vital importance in this advanced world. The world is changing towards automation. The aim of this seminar topic is to introduce automation in transportation for the paralytic people. This seminar proposes advanced model of existing system .This existing system can operate using joysticks in hand or using head movement detection sensor. But this proposed system operates in eyeball movement detection.

Inside house paralytic people reaching a desired destination is little bit difficult. So, paralytic people can't move freely inside their house they depend on others for their motion. Here with the help of eyeball movement detection system, the new idea of providing a cost effective, less hardware complex embedded system that helps the paralytic people to move freely inside their house.

# Chapter 2

# DIFFERENT EYE TRACKING MECHANISMS

There are three eye tracking mechanisms to compute the position of pupil.

## 2.1 Electro-Oculogram (EOG) Method:

The Electro-Oculogram method obtains the gaze direction by sensing the electro-oculographic potential. This is done by measuring the potential using electrodes placed on face where human eye is an electric dipole with a negative pole at the fundus and positive pole at the cornea. One electrode is placed to the side of the left eye and another to the side of the right eye. This pair shall detect horizontal eye movements. One electrode is placed above the left eye and another below the left eye. This pair shall detect vertical eye movements. A fifth electrode is attached by the ear to provide reference voltage. These electrodes send the electrical signals to two EOG circuits of similar design to detect the horizontal and vertical movement of the pupil. This information is sent for computation. The big advantage of this method is the ability to detect eye movements even when they are closed.

## 2.2 Lens Tracking Systems

In this method a non slipping contact lens fits over corneal bulge. The tracking of the pupil is recorded by affixing a magnetic coil or mirror to the lens. The integrated mirror in the contact lens allows measuring reflected light; alternatively, the integrated coil in the contact lens allows detecting the coil's orientation in magnetic field. The big advantage of this method is high accuracy and nearly unlimited resolution in time. Both methods explained so far are obtrusive and are not suited well for interaction by gaze. The third and preferred method for eye-gaze interaction is using video camera.

## 2.3 Head Mounted Camera System

The most common mechanical setup involves use of desktop computer with integrated eye tracker camera. The desktop computer is loaded with software package for analyzing the eye gaze data. This setup require head fixation and hence restricts the head movements. An alternative method uses a head mounted eye tracking.

## 2.4 Proposed System

In this seminar topic proposals importance is to serve all types of paralytic people to move freely to smaller distances inside their residence. This system uses only eyeball detection using eyeball IR sensor. The sensor consists of two parts infrared transmitter and receiver.

Infrared transmitters and receivers are housed into a single unit and fixed in front of the goggles. Necessary wirings are takes through the goggles to the sensor processing. The person should wear the goggles for the sensor to work. Since the sensor is shielded it can be isolated from the external light, thus external light illumination will not affect the sensor output values.

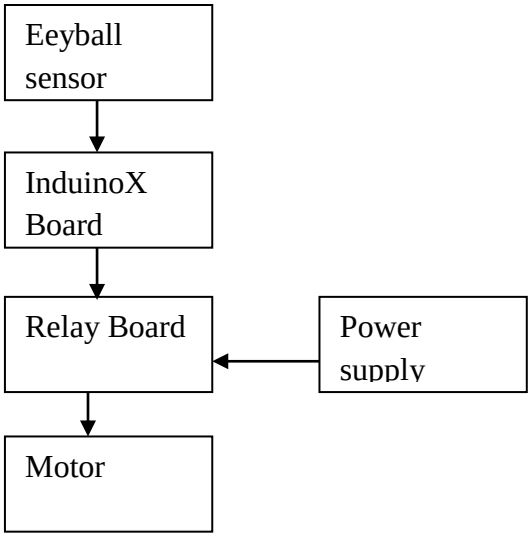


Figure 2.4: Flow of the proposed system.

The flow of our proposed system starts with the detection of the eyeball position. In order to detect the position of the eyeball we use the eyeball IR sensor. The values generated by the sensor depending on the position of the eyeball are routed to the arduino kit. Next the values in the arduino kit are processed and sent to the relay as the enable signals to switch on the relays and as the final step when the relays are made to switch on the motors fitted to the wheels of the wheelchair will start to rotate and thus the wheelchair will be locomoted.

## 2.5 InduinoX

The Induino board consists of an 8-bit Atmel AVR micro-controller with complementary components to facilitate programming and incorporation into other circuits. An important aspect is the standard way that connectors are exposed, allowing the CPU board to be connected to any external devices and a variety of interchangeable add-on modules (known as shields). Also, the on-board components on Induino-X can be connected/disconnected to/from the i/o pins by using jumpers.

The Induino can be connected to a computer and programmed using a standard USB. A FTDI FT232 is used for USB to serial conversion. In-spite of an internal oscillator in the micro-controller, the boot-loader is configured such that it works with a 16MHz external clock oscillator.

**Shields**

Shields are the add-on circuits which are mounted on the Induino board, which gives extended functionality from the available functionality of the board.

## 2.6 Relay Board

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another

circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor.Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protective relays".

## 2.7 Arduino

The Arduino is what is known as a Physical or Embedded Computing platform, which means that it is an interactive system, that through the use of hardware and software can interact with it's environment.

For example, a simple use of the Arduino would be to turn a light on for a set period of time, let's say 30 seconds, after a button has been pressed. In this example, the Arduino would have a lamp connected to it as well as a button. The Arduino would sit patiently waiting for the button to be pressed. When you press the button it would then turn the lamp on and start counting. Once it had counted 30 seconds it would then turn the lamp off and then carry on sitting there waiting for another button press. You could use this set-up to control a lamp in an under-stairs cupboard for example. You could extend this example to sense when the cupboard door was opened and automatically turn the light on, turning it off after a set period of time.

# Chapter 3

# EYE BALL SENSOR WORKING

The eyeball sensor is based on the concept that “white color region of the eye will scatter the light and black color region of the eye will absorb the light”. The sensor consists of IR transmitter and receiver circuitry (LDR). The IR transmitter will transmit the light. The iris of the eye which is in black color will absorb all the light and it won’t reflect where as the white part will reflect the light.

At the receiver side there will be LDR or Light Dependent Resistor these LDRs are used at the dark/light sensing area. Thus when the eyeball of the patient is illuminated by the light in the transmitter side, partial of the illuminated light will be absorbed by the black region of the eye and part of the light will be reflected by the white region of the eye as mentioned above. Thus by receiving the analog light pulses the Light Dependent Resistors at the receiver side which has ohmic resistance about 100000 will absorb the light, on absorbing the light pulses the ohmic values of the sensor will decrease or increase depending on the intensity of the light which in turn sends digital values as the output to the arduino kit.

Fig 3.1: Eyeball sensor.

## 3.1 Pupil detection

The pupil is a hole located in the center of the iris of the eye that allows light to enter the retina. It appears black because light rays entering the pupil are either absorbed by the tissues inside the eye directly, or absorbed after diffuse reflections within the eye that mostly miss exiting the narrow pupil. Pupil - the opening in the center of the iris- it changes size as the amount of light changes (the more light, the smaller the hole).

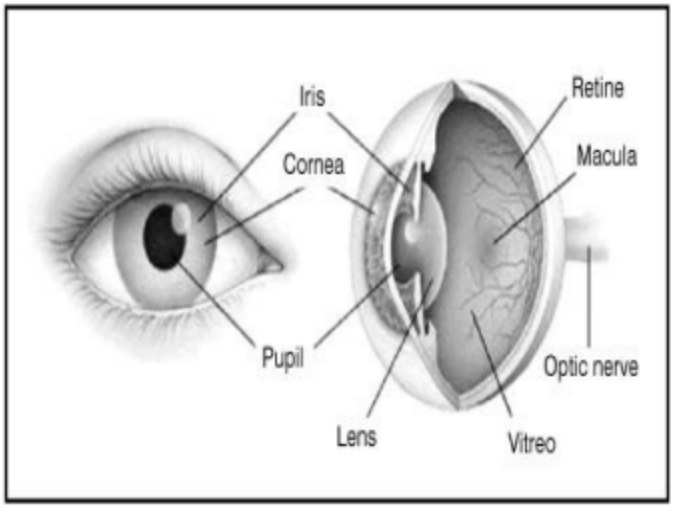


Figure 3.2 : Eye anatomy

## 3.2 Light Dependent Resistor or a Photo Resistor

A **Light Dependent Resistor** (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells.

**Working Principle of LDR**

A **light dependent** resistor works on the principle of photo conductivity. Photo conductivity is an optical phenomenon in which the materials conductivity (Hence resistivity) reduces when light is absorbed by the material.

When light falls i.e. when the photons fall on the device, the electrons in the valence band of the semiconductor material are excited to the conduction band. These photons in the incident light should have energy greater than the band gap of the semi conductor material to make the electrons jump from the valence band to the conduction band. Hence when light having enough energy is incident on the device more & more electrons are excited to the conduction band which results in large number of charge carriers. The result of this process is more and more current starts flowing and hence it is said that the resistance of the device has decreased. This is the most common **working principle of LDR.**

**Characteristics of LDR**

LDR's are light dependent devices whose resistance decreases when light falls on them and increases in the dark. When a **light dependent** resistor is kept in dark, its resistance is very high. This resistance is called as dark resistance. It can be as high as 1012 Ω. And if the device is allowed to absorb light its resistance will decrease drastically. If a constantvoltage is applied to it and intensity of light is increased the current starts increasing.

## 3.3 Micro- Controller

The signals from the eyeball sensor are sent to the micro-controller. Based on the signals received by the micro-controller, it sends the control signal to enable the relay circuit. The relay circuit in turn supplies power to the motors, thus the motors start to rotate and the wheelchair is locomoted.

## 3.4 Sprocket

A **s**procket is a profiled wheel with teeth, cogs, or even sprockets that mesh with a chain, track, or other perforated or indented material. The name 'sprocket' applies generally to any wheel upon which are radial projections that engage a chain passing over it. It is distinguished from a gear in that sprockets are never meshed together directly, and differs from a pulley in that sprockets have teeth and pulleys are smooth.

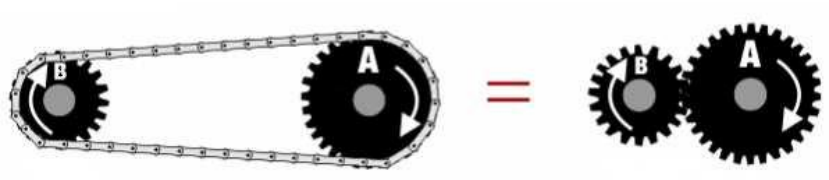


Figure 3.4: Sprocket wheel arrangement.

Sprockets are used in bicycles, motorcycles, cars, tracked vehicles and other machinery either to transmit rotary motion between two shafts where gears are unsuitable or to impart linear motion to a track, tape etc. Perhaps the commonest form of sprocket is found in the bicycle, in which the pedal shaft carries a large sprocket-wheel (driver) which drives a chain which in turn drives a small sprocket (driven) on the axle of the rear wheel. Early automobiles were also largely driven by sprocket and chain mechanism, a practice largely copied from bicycles. In order to reduce the speed of the powered wheel chair sprocket arrangement is used but in a reverse arrangement that is the small sprocket (13 teeth) is used as a driver i.e. it is connected to the motor shaft and the larger sprocket (26 teeth) is connected to the wheel shaft and it is driven. Thus as a result we obtained speed reduction of the powered wheelchair.

## 3.5 Working Process

The eyeball sensor which is focused to the eyeball of the patient generates three different ranges of values depending upon the position of the eyeball.

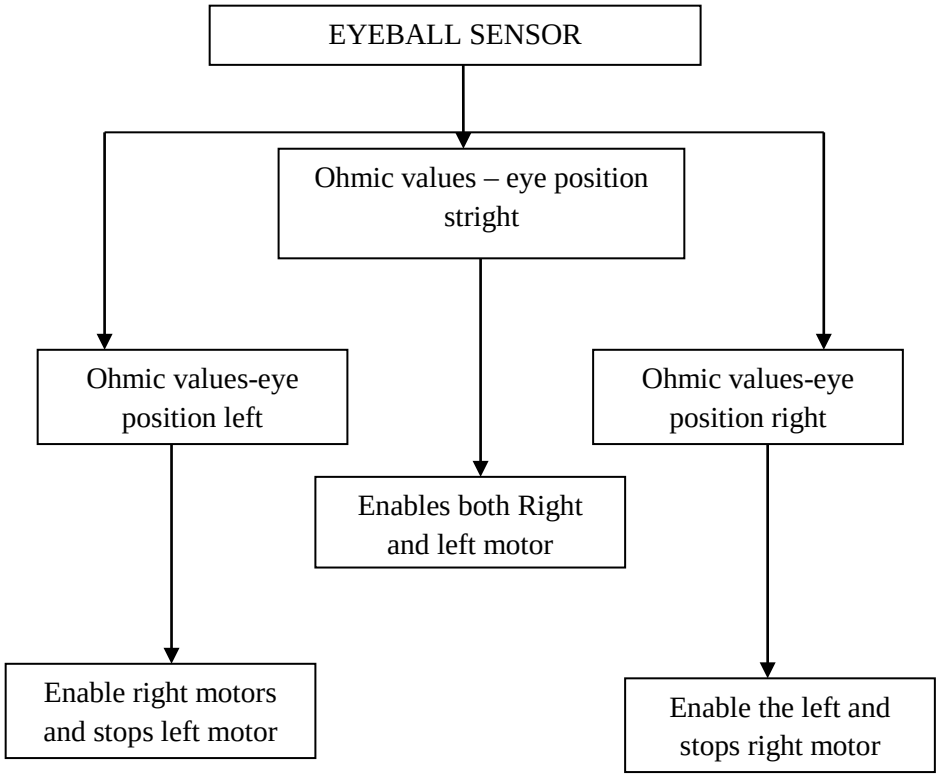


Figure 5.3: Flow of controls from sensor.

As shown in the above flowchart, values generated by the sensor is fed into the arduino kit. Now the arduino kit matches it with the values that is written in the coding.

## 3.6 Left Motion

If the values generated by the sensor matches with the values of left in the coding, then the arduino will automate the relay 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.

## 3.7 Right Motion

If the values generated by the sensor matches with the values of right in the coding, then the arduino will automate the relay connected to the left motor. Thus the left motor will start to rotate in the forward direction. As a result the wheelchair will turn right. During this time the right wheel is stopped.

## 3.8 Straight Motion

If the values generated by the sensor matches with the values of straight in the coding, then the arduino will automate the relay connected to the right motor and also the left motor. Thus the right and left motors will start to rotate in the forward direction. As a result the wheelchair will move straight.

## 3.9 Braking System

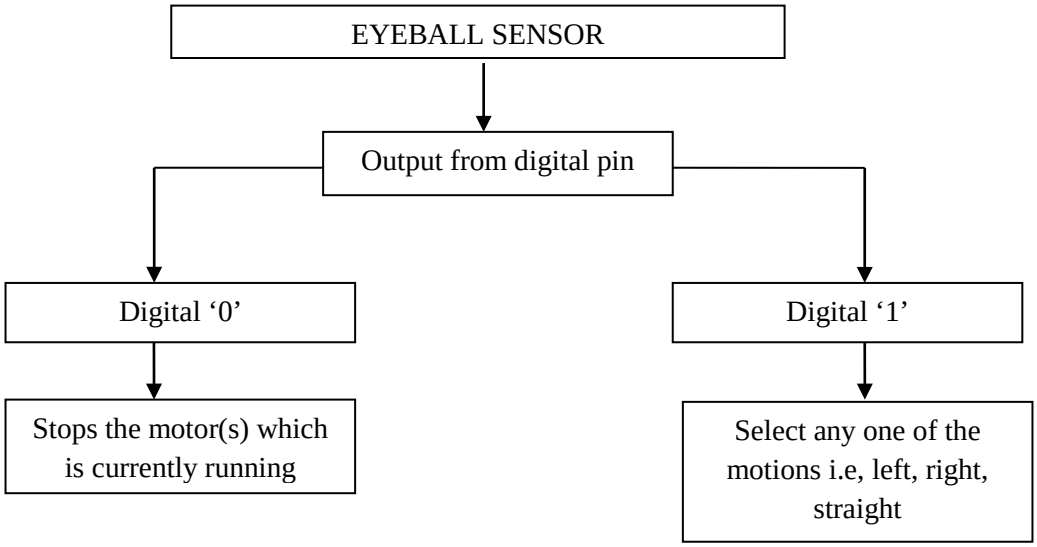


Figure 3.9: Flow of controls from sensor for braking the system.

The system doesn't have any manual braking**.** Eyeball sensor will also produce two binary values '1' and '0'. The value '1' is produced when the patients eye is opened and one of the above three motions will be selected and the wheel chair will be moved accordingly. The value '0' is produced when the patient eye is closed and this value is passed into the arduino kit, which in turn will switch off the relay(s) which are enabled at that time.

**Modelled wheelchair**

## Chapter 4

# ADVANTAGES

- The existing eye tracking methods for locomating the powered wheel chair are based on image processing techniques thus it is tedious to work with images. But our system uses only eyeball sensor which tracks the position of the eye by using a simple components light dependent resistor, comparator, IR led.
- Calculating the threshold values of position of the image processing techniques are complex but using the eyeball sensor we can easily calculate the threshold values.
- Using the eyeball sensors instead of the CCD camera will also reduce the cost of the total system dramatically.

# APPLICATION

- Application to mobile and communication aid for paralytic people.
- Medical Field.

# CONCLUSION

This system consists of eyeball sensor, microcontroller and wheelchair. The above mentioned hardware along with the software proved to be the great tool which makes the life of the paralytic people independent. This system can also be extended to locomotion of the wheelchair in reverse also. We can also implement obstacle sensors in this system which will be very helpful to the paralytic people in dodging the obstacles. The system can be extended to control the equipments around such fans, lights, etc.

# REFERENCE

[1] “OpenEyes: a low-cost head-mounted eye-tracking solution” [Li, Babcock, Parkhurst 2006]

[2] Raj kamal , Microcontrollers: Architecture, Programming, Interfacing and System Design, Prentice Hall.

[3] Schilling, K., Roth, H., Lieb, R. and Stützle, H.: Sensors to improve the safety for wheelchairusers, in: I. Placencia Porrero and E. Ballabio (eds), Improving the Quality for the European Citizen, IOS Press, 1998.

[4] D.P. Kothari &I.J Nagarath, electrical machines, third edition, Tata McGraw Hill, New Delhi, 2004.

**BIBLIOGRAPHY :**