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Automatic wheelchair controller using Eye ball movement

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ABSTRACT: Each and every person in this world has a desire to live a normal and peaceful life but accidents, diseases, elder-ship make their desire life into disability. Moreover, there are lots of disabled persons and elders as well as the numbers are increasing day by day. They always need another person help and have to go under some physical therapies under the guidance of certain specialist to recuperate their problems in their day to day life. In this paper the proposed system helps them to move freely & safely and also takes the activities of a therapist without any third party help.

This system is a combination of different features and has the ability to detect the obstacle and provides few kinds of therapies also. A smart wheelchair is developed by using eye ball movement to control the movement of wheelchair and also with microcontroller interfaced system. Besides, an ultrasound system provides the facility of automate the wheelchair for obstacle detection. The aim of our research is to implement many facilities in a single wheelchair at low cost.

KEYWORDS: Eye ball movement, Physical exercise, Microcontroller, Wheel Chair.

I. INTRODUCTION

The idea of using eye ball sensing technology for controlling the motion of the wheelchair is to prove that it can be a unique concept that would stand apart from the rest of the average projects. The use of this new technology in conjunction with a mechanical system in order to simplify everyday life would spark interest in an ever growing modern society. Many people with disabilities do not have the dexterity necessary to control a joystick on an electrical wheelchair [20]. This can be a great for the person who is permanently unable to move any of the arms or legs. They can use their wheelchair easier only using an eye movement as commands. The aim of this study is to implement an interesting application using eye ball movement recognition system. The methodology adopted is based on grouping a microcontroller with a eye ball sensor kit for isolated input from user. The resulting design is used to control a wheelchair for a handicapped person based on the eye movement [9][10].

There are five options for basic motions of a wheelchair to be applied by the user. The five conditions of the wheelchair can be described as the following:

1) Moving forward from user
2) Moving backward from user
3) Turning to the right
4) Turning to the left
5) Static or stop condition

II.SYSTEM ANALYSIS

EXISTING SYSTEM

The breathing input diplomacy such as keyboard, mouse, and the other input strategy are used to interact with digital instrument. These input devices cannot be operated by disabled persons. In this paper, movement of human eyes is proposed for disabled person for wheelchair movement. These systems are classified into several types.

Bio-potential based method:

Bio-potential based system utilizes prospective energy from user's body behaviour which is acquired by using some special instrument, Such as Electrooculograph, Electromyography and

Electroencephalograph. Search coil can be used for measuring bio-potential. The search coil output can be used as sources of computer input for disabled person [7].

Voice Based method:

Voice Based method uses the user's voice as main input. This voice analysis is used to analyze the user's voice and convert into digital data. The main drawback of this system is vulnerable against noise. Other voices which come outside from user may affect the system [17].

Motion based method:

Motion based method utilizes other normal organ movements to operate the input system. Head and foot can be absorbed by accelerometer sensor and the observed input is used to control the input system [15].

Image Analysis method:

Image Analysis method utilizes camera to get input from user's desire and convert into digital data. Several image processing methods are used to analyze user's input data.

Search coil method:

Search coil method is used to induce voltage with coil including in contact lenses attached to user's eyes.

Drawbacks:

- Direct sensors attached to user's face cause some medical issues.
- These methods are relatively costly.
- It is in high cost and produce high error rate.
- The image analysis method does not insist any load to users and is realized with comparatively cheap cost.

PROPOSED SYSTEM

The proposed model uses an eye ball sensor to control wheelchair. Once the movement has been processed and it is given to the microcontroller. The microcontroller process depends upon the feed coding and the output is gives in to the driver circuit. Also, the obstacle detection sensors will be connected to give necessary feedback for proper operation of the robot. The wheelchair will be connected to driving circuit that will move to robot based on eye ball movement.

Advantages:

- Independent to move. We don't have to depend on someone else to move the chair.
- Minimal effort is needed to control the wheelchair.
- Adaptable for severity and disability.
- Easy to maintain with low power usage.
- Easy and convenient to all.

III.BLOCK DIAGRAM

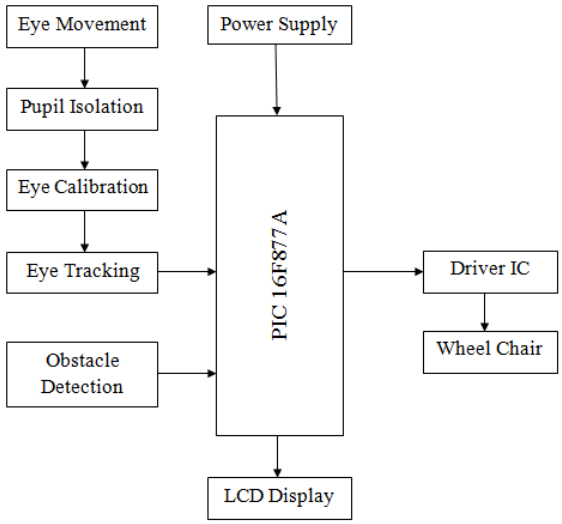

Figure 3.1: Block Diagram

Eye Movement:

Eye movement includes the controlled or uncontrolled movement of the eyes, serving in acquiring, fixating and tracking visual stimuli. Specific systems are used in maintaining passion, when reading and in music reading. A special type of eye movement, rapid eye movement, occurs during REM sleep.

Pupil Isolation:

The pupil is a hole situated in the middle of the iris of the eye that allows illumination to hit the retina. It appears black because illumination rays towards the inside the pupil are either absorbed by the tissues inside the eye directly, or absorbed after scatter reflections within the eye that mostly miss exiting the narrow pupil. In human the pupil is in a circle, but previous kind, such as several cats, have perpendicular slit pupils, goats have parallel oriented pupils, and several catfish have annular types.

Eye Calibration:

Calibration in quantity knowledge and metrology is the assessment of measurement standards delivered by a device under test with those of a calibration standard of well-known exactness. Such a standard could be another measurement device of well-known exactness, a gadget generating the quantity to be considered such as a voltage, or a physical artefact.

Eye Tracking:

Eye tracking is the progression of measuring either the tip of observe (where one is looking) or the movement of an eye family constituent to the head. An eye tracker is a device for measuring eye positions and eye organization. Gaze at trackers be used in inspect intended the visual system, in psychology, in psycholinguistics, advertising, as an key in device for human-computer communication, and in result design.

Obstacle Sensors:

Each vehicle characteristics an obstacle detection system, currently based upon a LIDAR laser scanner sensor, to detect obstacles of 7+ centimetres wide within a reach of 40-100 meters. A failsafe detection algorithm is used that scans the area in front of the vehicles 'empty'. The obstacle detection directly plugs-in to the low level motion controllers and can interrupt the navigation task. The obstacle detection algorithms are able to differentiate true obstacles from 'ghost' substance such as rain, snow or leaves falling from the trees.

Driver IC:

In electronics a driver IC is an electrical conduit or additional electronic constituent used to manage an additional path or constituent, such as a towering power transistor, LCD and numerous others. They are regularly used to regulate current flowing through a path or to control other factor such as additional components several diplomacy in the circuit.

Wheel Chair:

Stimulating wheelchair is a wheelchair that is propelled by means of an electric coast rather than physical power. Motorized wheelchairs are helpful for those incapable to push a physical wheelchair. They may also be used not immediately by people with established mobility impairments, but also by citizens with cardiovascular and fatigue-based situation.

IV.RESULTS AND DISCUSSION

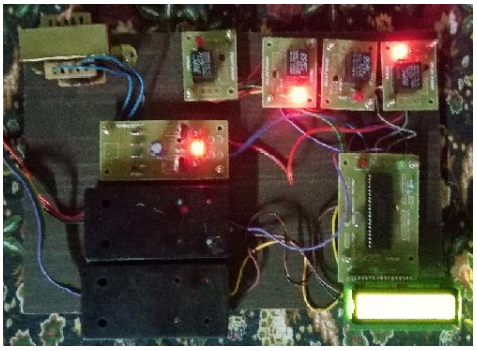

Figure 4.1: Forward Direction

When pupil is moved upwards the controller makes the first and third relay on and moves the wheelchair in forward direction.

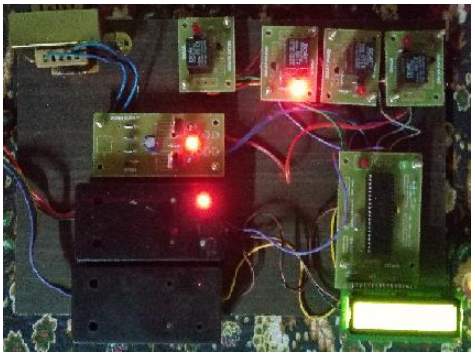

Figure 4.2: Left Direction

When pupil is moved left the controller makes the third relay on and moves the wheelchair in left direction.

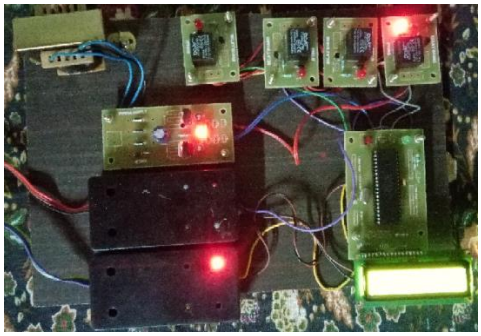

Figure 4.3: Right Direction

When pupil is moved right the controller makes the first relay on and moves the wheelchair in right direction.

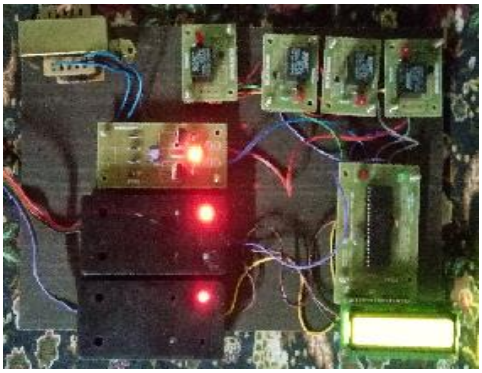

Figure 4.4: Stop Operation

When eye is closed the controller makes all relay off and stops the operation of wheelchair temporarily.

V.CONCLUSION

This wheel chair is more efficient and cost effective compared to other methods of control. Different types of therapy facility create a new revolution with this automated system. This system is very useful for a developing country like Bangladesh where most of the peoples are unable to effort the costly therapies from specialists of doctors. With the help of Government this system can be improved and implemented to a higher scale so that the poor and middle class family members can aim such type of system for their welfare and treatment.

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