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INTEGRATED EOG BASED INTERFACETO CONTROL WIRELESS ROBOT

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Abstract— ***A novel approach using Electrooculography (EOG) signals to control human–computer interface (HCI) systems, if properly classified. The ability to measure and process these signals may help users to overcome many of the physical limitations and inconveniences in daily life. Here, describe a method used in a wireless EOG-based robot control detects eye movements in eight directions. This device includes wireless EOG signal acquisition components, wet electrodes and a display section. Controlling a robot wirelessly by eye movements and to receive a person from outside .Robotic movement is controlled by five eye movements. The rest of the four movements are used to control odor and to display messages. Another technology used in my project is the embedded system. Embedded systems are systems which perform a specific or a pre-defined task. It is the combinations of hardware and software. It is nothing but a computer inside a product. It is a programmable hardware design nothing but an electronic chip. A general-purpose definition of embedded systems is that they are devices used to control, monitor or assist the operation of equipment, machinery or plant. Additionally, it may be applied to study eye functions in real-life conditions in the near future. More modifications can also be implemented by making use of different combinations of eye movements. Further modifications in, this will surely make some rapid growth in the field of robotics.***

Keywords—EOG, Human ComputerInterface, Embeded Systems

I. INTRODUCTION

The main objective of this project is to make it possible for a person in a paralyzed condition to communicate with the outside world. This goal is achieved by controlling a robot by eye movements and to receive a person from outside.

In the existing system they are using EOG signals. EOG signals are signals which are potential difference produced due to the different eye movements. By using that signals just moving a red dot on the screen towards eight different positions. But this controls the display section by a wired connection.

Several studies have shown that both children and adults benefit substantially from access to a means of independent mobility. While the needs of many individuals with disabilities can be satisfied with traditional manual or powered wheelchairs, a segment of the disabled community finds it difficult or impossible to use wheelchairs independently.

To accommodate this population, researchers have used technologies originally developed for mobile robots. Assistive robotics can improve the quality of life for disable people. Nowadays, there are many help systems to control and guide autonomous mobile robots In the last years, the applications for developing help systems to people with several disabilities are increased, and therefore the traditional systems are not valid. In this new systems, we can see: videooculography systems (VOG) or infrared oculography (IROG) based on detect the eye position using a camera [2]; there are several techniques based in voice recognition for detecting basic commands to control some instruments or robots; the joystick (sometimes tactil screen) is the most popular technique used to control different applications by fine control that the person may be have difficulty to accomplish people with limited upper body mobility but it requires. In this project another technology is using named electrooculography signals (EOG).

There are several methods to sense eye movement. In this work, the goal is to sense the electrooculographic potential (EOG). My project is based on the record the polarization potential or corneal-retinal potential (CRP) [5]. The higher metabolic rate at retina maintains a voltage of +0.40 to +1.0. This cornea-retinal potential is measured by surface electrodes placed on the skin around the eyes. The actual recorded potentials are smaller, in the range of 15 to 200 micro volts, and are usually amplified before processing event this potential is commonly known as an electrooculogram. The EOG ranges from 0.05 to 3.5 mV in humans and is linearly proportional to eye displacement. The human eye is an

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electrical dipole with a negative pole at the funds and a positive pole at the cornea.

Another technology used in the project is the embedded system. Embedded systems are systems which perform a specific or a pre-defined task. It is the combinations of hardware and software. It is nothing but a computer inside a product. It is a programmable hardware design nothing but an electronic chip. A general-purpose definition of embedded systems is that they are devices used to control, monitor or assist the operation of equipment, machinery or plant.

"Embedded" reflects the fact that they are an integral part of the system. In many cases their embeddedness may be such that their presence is far from obvious to the casual observer and even the equipment for some time before being able to conclude that an embedded control system was involved in its functioning.

In this work, the goal is to sense the electrooculographic potential (EOG). Our project is based on the record the polarization potential or corneal-retinal potential (CRP) This potential is commonly known as an electrooculogram. The EOG ranges from 0.05 to 3.5 mV in humans and is linearly proportional to eye displacement. The human eye is an electrical dipole with a negative pole at the funds and a positive pole at the cornea. This system may be used for increasing communication and/or control. The analog signal from the oculographic measurements has been turned into signals suitable for control purposes.

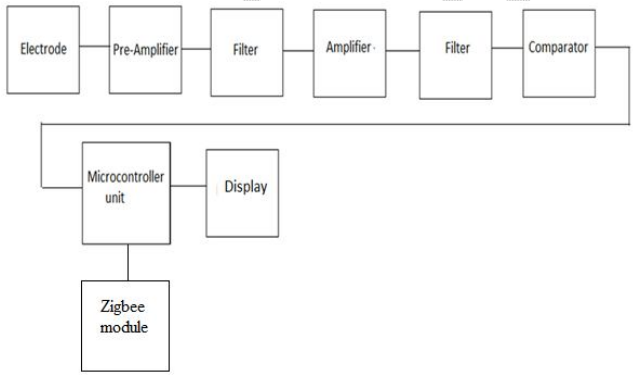

Fig 1 : Block Diagram

1.1 Block Diagram Description

Electrooculagraphy signals are retrieved by placing electrodes on respective positions of head.EOG signals are analog and very small in magnitude. Analog signals from the electrodes are amplified by a preamplifier. After amplifying the signal may contain noises to avoid that signals are passed through filter sections. Rectified signals are again amplified and given to comparator section. Comparator compares the various signals and gives the input to microcontroller unit. On the basis of the signal. received the program which is pre-burned analyzes the signals and gives corresponding outputs to the LCD. Zigbee module sends the signals to wireless robot. On the basis of these signals wireless robot will move and door operation is also controlled by this signals.

TABLE I -LCD displays output

Eye Position	Output
Up	UP
Down	DOWN
Left	LEFT
Right	RIGHT
Up Left	UP LEFT
Up Right	UP RIGHT
Down Left	DOWN LEFT
Down Right	DOWN RIGHT

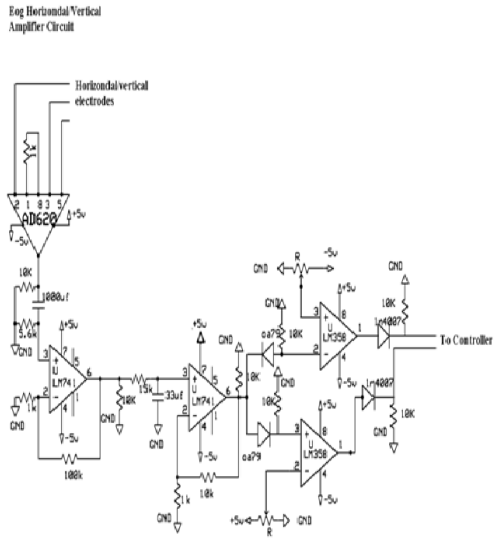

Fig 2 : Input Section

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1.2 Processing and Display Section

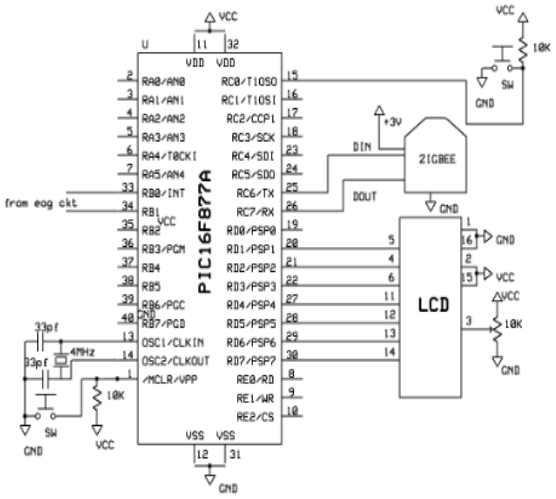

Fig 3 : Processing and Display

II. SOFTWARE DESCRIPTION

2.1 MPLAB IDE

The MPLAB X IDE is the new graphical, integrated debugging tool set for all of Microchip's more than 800 8-bit, 16-bit and 32-bit MCUs and digital signal controllers, and memory devices. It includes a feature-rich editor, source-level debugger, project manager, software simulator, and supports Microchip's popular hardware tools, such as the MPLAB ICD 3 in-circuit debugger, PICkit™ 3, and MPLAB PM3 programmer. Based on the open-source Net Beans platform, MPLAB X runs on Windows® OS, MAC® OS and Linux, supports many third-party tools, and is compatible with many Net Beans plug-ins. MPLAB® X IDE is a software program that is used to develop applications for Microchip microcontrollers and digital signal controllers. This development tool is called an Integrated Development Environment, or IDE. Because it provides a single integrated "environment" to develop code for embedded microcontrollers.

2.2 PIC Kit Programmer

It is software used to dump the hex file into PIC microcontroller. This is having a USB interface to communicate with PC.

III. RESULT AND DISCUSSION

3.1 Output Waveforms

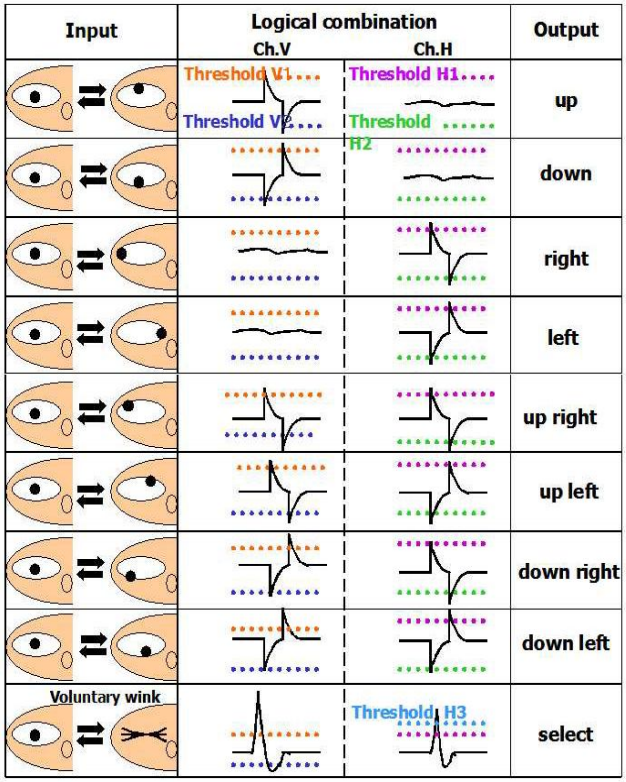

Fig 4 : Output Waveforms

According to the experimental results for eye movement, the EOG acquisition device can successfully measure EOG signals from five wet electrodes.We tested eight different types of EOG signals, as shown . Each of the EOG signals was divided into vertical and horizontal signals. The experimental results demonstrate that the action of looking up or down corresponds to vertical movement; therefore, the vertical signals for these actions are more pronounced than the horizontal signals.

The negative peak corresponds to the eye returning to the center of the screen.The action of looking down initially generates a negative peak which is then accompanied by a positive peak.; therefore, the horizontal signals for these actions are more obvious than the vertical signals. The actions of looking left and right displayed similar results as did looking up and down, in terms of peak values.signals for these oblique movements had both positive and negative peaks in the horizontal and vertical directions. The highest level of accuracy obtained was 86.25%

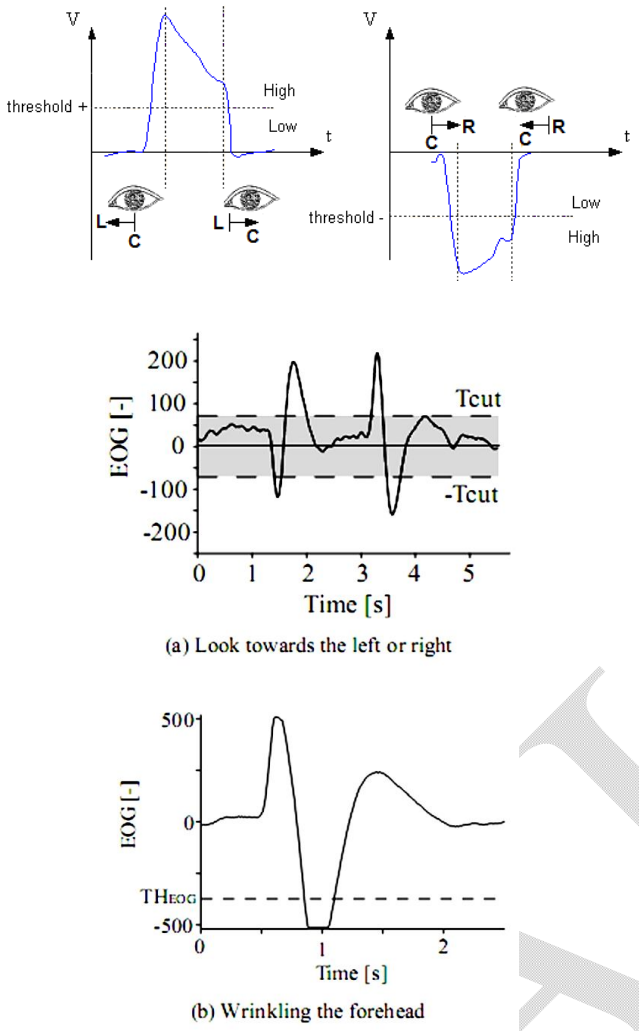

Fig 5: EOG Waveforms

IV. CONCLUSION

This project actually trying to realize a robotic servant for a paralyzed person. And the most important thing for person with disabilities is to live like a normal man. To certain extend it can be accomplished by this project. More modifications can also be implemented by make use of different combinations of eye movements. Then it is possible to make the robots to do some more operations .This project also helps handicapped soldiers to work even in war field. Truly a soldier's ambition is to do for their country till last breath but in current situation they can't if they are wounded. Further modifications in this will surely make some rapid growth in the field of robotics.

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