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Wireless EOG Based Interface For Controlling Application

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Abstract

This paper portrays an eye-development technique in view of electrooculography (EOG) to build up a framework for helping crippled individuals. Its most critical elements are versatile, conviviality, measured quality which making it versatile to the specific needs of every client as per the sort of impediment included. A human-machine interfaces (HMI) is a framework that gives a yield channel to the mind and does not rely on upon fringe muscles and nerves. We are centering the fundamentally on EOG signals for the human–machine interface for controlling a wheelchair, where the control is really affected by eye developments. This gadget incorporates remote EOG signal procurement segments, cathodes and an EOG signal order calculation. The EOG arrangement calculation depends on extricating highlights from the electrical signals relating to four headings of eye development (up, down, left, right) .This control strategy could be helpful in different applications, for example, portability and correspondence help for an impaired person.

KEY TERMS—HUMAN-MACHINE INTERFACES; ELECTROOCULOGRAPHY; EYE MOVEMENTS; ELECTRODES.

I. INTRODUCTION

A human-machine interface (HMI) now and then called a direct neural interface or a brain–machine interface (BMI) is a straight correspondence between the human mind and an electronic or electromechanical outside gadget. An HMI framework is controlled straightforwardly by the mind, it needs a dependable technique to recognize the eye development. Eye developments can be utilized assigns, for example, EOG (Electro-OculoGraphy) which are exchanging data from clients to HMI frameworks EOG (Electro-OculoGraphy) is the electric capability of the retina in the human eye. Electric possibilities show up all over the place strong exercises are included. The strong exercises actuate or deactivate particles whose spread creates streams. Cathodes can recognize particle streams or electro-potential advantageously.

A standout amongst the most possibly valuable applications for expanding the portability of crippled and/or elderly persons is wheelchair usage. A standard mechanized wheelchair helps the portability of impaired individuals who can't walk. This would make control of the wheelchair, especially troublesome. In such cases it is important to grow more unpredictable human-wheelchair interfaces adjusted to the inability of the client, subsequently permitting them to information development summons in the sheltered and basic way. Our proposed EOG control sign can be used in numerous different uses of human machine interfaces, for example, wheelchair, PC console and home mechanization.

II. ELECTROOCULOGRAPHIC PHYSIOLOGY

The electrooculography (EOG) - based HMI framework is a standout amongst the most valuable frameworks for detecting so as to give data about human eye movement changes in eye position.EOG sign is created by the potential contrast in the middle of cornea and retina. Distinctive eye developments produces different EOG wave designs. Frequently combines of the cathodes are put around the eye. Normally EOG amplitudes range between 0.05and 3 mg and a recurrence band from DC to 50 Hz. The EOG signal has a point of interest of linearity and wide potential territory. An EOG-based framework can

be utilized to control TV, wheelchair or a console. Such a framework gives both comfort and correspondence to crippled clients, especially when there is some physical limitation that keeps them from utilizing other HCI frameworks. A few strategies have been proposed to interpret the EOG signals coming about because of eye developments. It's useful inside of the investigation of eye development.

III. SYSTEM ARCHITECTURE

This proposed system implements a human-machine interface based on electrooculography (EOG) that permits interaction with a machine using eye movement as shown in fig.(1). The EOG stores the movement of the eye by measuring activity, through electrodes. This system architecture is classified into three major parts: [1] EOG signal collection [2] transceiver [3] wheelchair command generation. In the EOG signal collection, consist of electrodes, preamplifier and A-D Converter. Due to small and noisy biopotential signals, the analog EOG signal is amplified and filtered to extract the horizontal eye-gaze direction. In this system, wireless transceiver is used which work either transmit or receive signals. It provides mobility to the system. Wheelchair command generation consists of a microcontroller which define the position of wheelchair and H-BRIDGE are used for motor drive to move the wheel.

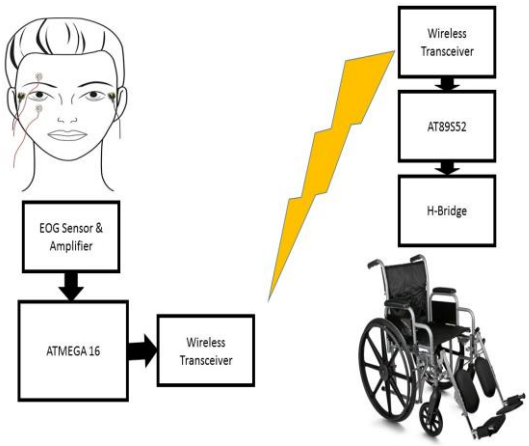

Figure 1: Block diagram of proposed system

IV. EYE GESTURE RECOGNITION

Eye developments can be recorded in three routes: with attractive curls, utilizing video handling or utilizing EOG. EOG are most utilized methods. EOG tends to deliver more exact yields as far as velocity and blunder. In the EOG approach, a basic minimal effort gadget can utilize two sets of terminals to quantify the resting capability of the retina reflecting to the eye develops. Eye motion acknowledgment is to recognize a wide range of eye developments, for example, flicker, even flag, vertical sign. The principle objective in framework is for identification of electric sign close eye territory and the utilizing terminals framework will attempt to distinguish the adjustments in electric heartbeat keeping in mind the end goal to finish up the movement to be taken. The location of sequential saccades in flat and vertical heading is a key stride of eye signal acknowledgment. The identified saccades are mapped to eye developments in essential bearings. These essential headings are left, right, here and there. At that point they are encoded into the fundamental summons for controlling the wheelchair.

V. EOG BASED HUMAN-WHEELCHAIR INTERFACE

In this paper, the electrooculography (EOG) sign is utilized to create the driving summon of wheelchairs. The EOG is an exceptionally average way to deal with measure eye developments, and it is measured taking into account the relentless corneal-retinal potential. EOG plentifulness and stage regarding the heading of eyeball development. The cornea side is assigned as positive while the retina side is negative. This shows potential distinction. One terminal is connected to the positive info of a comparator and the other one is the negative data. No potential contrast is measured when the eyeballs are adjusted to the inside Eyeballs pivot to one side and a positive heartbeat is recognized (center in Fig. 1). In the same way, a negative heartbeat is measured when the eyeballs move to one side. Expendable Ag/AgCl terminals were utilized for EOG estimation and one set comprised of three

anodes. An instrumentation enhancer is a kind of differential speaker that has been equipped with data cushion, which dispose of the requirement for info impedance coordinating.

We are utilizing Atmega16 Microcontroller. It can be termed as a solitary on chip memory which incorporates a number of peripherals such as RAM, EEPROM, Timers ADC, etc., required to perform some predefined undertaking. It is less complex and speedier in operation. For exact and improve control ATMEGA microcontroller is picked. The procured EOG signal utilizing the dispensable anodes is level moved and afterward sent to the microcontroller. From microcontroller the yields are associated with the DC engines connected in the wheelchair by means of an engine driving circuit. They opened up simple EOG sign is sustained to a level shifter circuit. Level moving is key on the grounds that EOG signal adequacy can be negative yet microcontroller can't work with negative voltage. The label moved sign is given to the 16 bit ATMEGA microcontroller (ATMEGA16). The client can move his/her eyeballs deliberately, e.g. if there should be an occurrence of perusing or general perception. These eye developments which are not proposed as control summons can bring about undesirable movement of the engines. To forestall such issue, there is a condition for instating on or off the control framework which is specified as the START/STOP condition.

VI. CONCLUSION

Human-Machine interface(HMI) systems based on EOG signals can serve as an efficient communication tool for paralyzed persons. EOG patterns corresponding to 4 types of different eye movements have been successfully employed to control a wheelchair. This work is developing to provide solutions for the particular needs of an important group of disabled and/or elderly by trying to give improvement to assistance to people who cannot securely operate conventional services.

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