

Microcontroller Based EOG Wheelchair

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ABSTRACT: Inspired by the advancement in sensor technology and learning behind working of wheelchair, in this paper we developed an automated system to control the motor rotation of wheel chair based on EOG for physically challenged people who cannot walk due to physiological or physical illness, injury or any other disability. The proposed system is an Electrooculography (EOG) controlled wheel chair. It is a special kind of wheel chair, which will move in the desired direction based on the eye movement and also with the help of the joystick, the wheelchair will move according to the joystick movement, it is helpful for the physiological or physical illness, injury or any other disability people. EOG is a new technology which senses the eye signals for eye movements using electrodes. This sense data is then given to the control unit to move the wheel chair at desired direction. This signals may also use for controlling the wheel chair. Signals received from both the units processed simultaneously by performing operations such as amplification, noise filtering, and then it is given to micro controller which drives the motors attached with the wheel chair for desired movements.

KEYWORDS: Electrooculography, Microcontroller, Motors, Wheelchair

I. INTRODUCTION

The quantity of individuals moving around the world with the help of artificial methods because of the illness or accident is expanding at a disturbing rate. The proposed method enables physically challenged people like paralytic patients or physically handicapped patients or patients having intense sicknesses like Parkinson's illness. This proposed method is valuable for the patients where they can move their wheelchair in their very own ways, without any external help or backing. In this method, there will be a wheelchair demonstrate as a ROBOT show, which will contain an in-assembled MICRO CONTROLLER and Electrooculography (EOG) framework, which will do the capacities like right, left, forward and backward tasks. The wheelchair is planned so that it can move freely. Through this feature, the patients can enable movements of their wheelchair as per their desire.

II. RELATED WORK

Manuel Merino, Octavio Rivera, Isabel Gómez, Alberto Molina, Enrique Dorrnozoro (2010) built up a framework to recognize eye development dependent on the EOG flag. They utilized Ag/AgCl sensors and BCI2000 and the enhancer USB amp for EOG procurement. Since EOG flag data is predominantly contained in low frequencies, a band pass channel with a range somewhere in the range of 0.1 and 30Hz and an example rate of 128 was utilized. A clamor was additionally expelled by an averaging channel. Created calculation for EOG orderrelies

upon subsidiary and sufficiency dimension of EOG flag. A subsidiary of the EOG flag was utilized to distinguish the edges of the flag. This calculation discovered the underlying edge, last edge, an area between edges.

For an up movement and flicker, the underlying edge is certain and the last edge is negative. A clock determined the width of the area between edges. A pulse was classified as blink if the width of this area was smaller than 250ms.

Patterson CasimirD'Mello, Sandra D'Souza (2012) built up a Lab VIEW based EOG arrangement framework. Ag/AgCl terminals were utilized for EOG flag obtaining. To beat the poor conductivity of the skin, they utilized an electrolytic gel dependent on Sodium Chloride. EOG signals were then intensified and separated by utilizing a high pass channel of 0.5Hz and low pass channel of 30Hz [1]-[3]. M Series USB-6221 was utilized as an information procurement interface. They utilized adequacy based EOG grouping calculation. They utilized the way that the adequacy of the flicker flag is higher than another eye development. They contrasted the pinnacle abundancy and an edge esteem and in the event that the plentifulness was more prominent than a limit, at that point it was considered as a flicker.

P. P. Chitee, S. B. Khemnar, A. A. Kanawade, S. B. Wakale(2016) built up an "A hand motion based wheelchair for a physically impaired individual with a crisis ready framework". The framework includes two noteworthy units. The principal unit is a straightforward client of two hand signal unit [4]-[6]. The second unit is the wheelchair unit. The main motion unit comprises of ARM7 controller which screens the movements of fingers and transmits the comparing control flag to the wheelchair unit. The wheelchair unit additionally comprises of ARM7 controller for controlling the development of a wheelchair. The second motion unit comprises of ARM7 controller the controller can identify the sound declaration.

III. PROPOSED SYSTEM

This method operated with the eye movement as an input signal to control the motion of the wheelchair in any direction. i.e., Right, Left, Forward and Reverse direction. In this strategy, the EOG sensor is utilized, which is a system for estimating the cornea-retina standing potential that exists between the front and back of the human eye. The resulting signal is called the electrooculogram [7]-[10].

The microcontroller takes decisions based on the inputs provided and controls the wheelchair. The decisions made by microcontrollers are

1. If the eye moves in the left, the wheel chair moves left.
2. If the eye moves in the right, the wheel chair moves right.
3. If the eye moves in the upper direction, the wheel chair mover forward.
4. If the eye moves in the lower direction, the wheel chair moves reverse.

At first, the joystick is swung to the careful centre position. Till the joystick is kept in the centre position the engine will be halted. At the point when the joystick is moved the potentiometer encodes simple voltage esteems and exchanges it to the Arduino board through the simple information stick. The Arduino takes these simple qualities and sends it to an ADC (Analog to advanced converter). The ADC changes over the simple incentive to an advanced flag. The computerized flag is sent to the engine driver through advanced information yield stick. It contains two inbuilt H-connect driver circuits. In its normal method of activity, two DC engines can be driven at the same time, both in forward or turn around and right or left bearing.

IV. BLOCKDIAGRAM

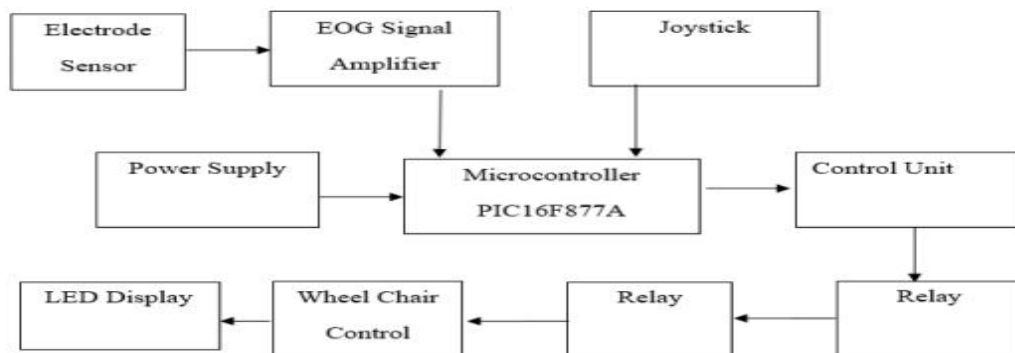


Fig 4.1: Block Diagram

The block diagram Fig 4.1 shows that how the wheelchair moves.

1. A wheelchair incorporates terminal sensor as detecting component, CC2500 handset module for transmitting and accepting RF flag, a microcontroller unit a basic leadership gadget and engines to explore the wheelchair in four ways only together with a joystick movement or eye movement.
2. You just need to put on a small transmitting tool on your hand which encompass a joystick or wear electrode behind the eye.
3. This may transmit the suitable command to the wheelchair so that it can flow into the favoured path they want. Ordinary wheelchairs have a couple of confinements in setting to adaptability, cumbersomeness and controlled capacities.
4. Our machine lets in the users to apply button movement or eye movement for movement and synchronize them with the movement of the Wheelchair with a view to use it with comfort.

V. RESULT AND DISCUSSION

The wheelchair thus developed will move in the focused direction based on the eye movement. The wheelchair is appended with two engines for the development of a wheelchair for various conditions. At the point when the eye is engaged up, one engine turns the left wheel in reverse and another engine pivots the correct wheel forward so the wheelchair moves towards the left and the other way around for right development with the assistance of the EOG sensor and furthermore with the assistance of the Joystick. At the point when the eye is centred right, the two engines running forward and push the two wheels ahead with the goal that the wheelchair pushes ahead also when the eye is centred left the wheelchair will be ceased. The conditions might be modified inside the IC programming with regards to the individual's decision.

VI. CONCLUSION

Thus finally, we proposed a microcontroller based wheelchair using EOG & accelerometer signals and also with the help of the joystick are successfully implemented and demonstrated it is shown in Fig 6.2. The final application of this wheelchair is it can be used in a medical application for paralyzed and handicapped people. Also by using this signal, we can control any real time machine like a computer system, robot, vehicle, wheelchair etc.



Fig 6.2: Output model of the electric wheelchair

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