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Intelligent System for Disabled Persons using GSM/GPS

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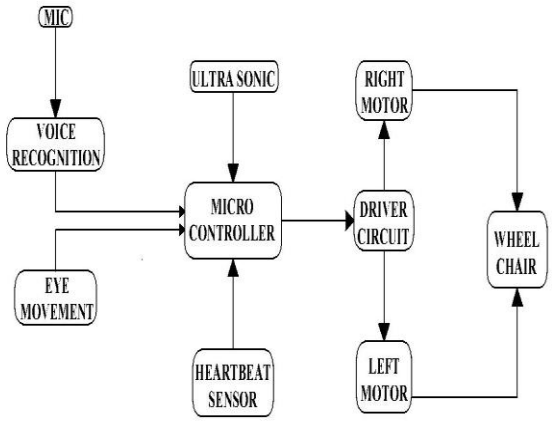
ABSTRACT
This paper mainly focusing on control and guiding the wheel chair for physically disabled/Challenged or chronic diseases or elderly on eye based movements. Various methods has been developed to control wheel chair: joystick control, sip-puff control and controlling by head movement. Many disability people don't have control the wheel chair using the above mentioned interfaces. This proposed model have an alternative, we use optical eye tracking (EOG) method and Daugman's Algorithm for finding center of the pupil with use of eyeball sensor to control the wheel chair. Also we are using heart rate sensor and object position by the use of GPS. GSM to provide necessary Feedback for proper operation of the wheelchair system.
Keywords:- EOG, GSM, GPS

I. INTRODUCTION

Most of the physically disabled and paralyzed or elderly people they can't use their leg or hand to control wheel chair and they dependent on other people assistance, due to loss of self-mobility.

Accidents and Diseases injuring the nervous system failure and they may not able to move their voluntary muscles. To overcome this issue and people drive a wheelchair safely and easily we are going for eye based wheel chair controller.

The modern generation having various interface available and developed especially for eye movement, In our interface EOG(Electro-Oculogrphy) and Voice recognition techniques has been proposed with Daugman's algorithm based wheel chair controller, In addition we are using heart beat sensor to sense the patience heart beat rate, if the value exceed the threshold limit alert message will be sent to individual also this sensor is used GPS tracking system to track the wheel chair location for security identification. Polar beat application is act as GSM Module to send warning message to family members for certain emergency period. Ultrasonic sensor used for avoid anti-collision and obstacles detection.



Block Diagram

II. ELECTROOCULOGRAPHY (EOG)

An Electrooculography is record electrical activity which changed in occurrence with actions of the eye in the head. It was initially believed that these potentials reflected the action potentials in the muscles that are responsible for moving the eyes in the circle.

It is now commonly agreed that these electrical potentials are generated by the permanent potential difference which existing between the cornea and the ocular fundus (cornea-retinal potential, 10-30mV: the cornea being positive).

This potential difference sets up an electrical field in the tissues surrounding the eye.

As the eye rotates, the field vector rotates correspondingly. Therefore, eye movements can be detected by placing electrodes on the skin in the area of the head around the eyes. Vertical movements of the eyes are best measured by placing the electrodes on the lids, while horizontal eye movements can be best measured by placing the electrodes on the external canthi (the bone on the side of the eye).

Daugman's algorithm:

The term biometrics refers to technologies that analyze and measure human body characteristics for the authentication purposes. These characteristics include fingerprints, DNA, voice patterns, irises, hand measurements and facial patterns. In this modern era, when internet has reached its peak and forms the basis for all modern banking and business systems, the accurate verification for accessing accounts is also becoming a necessity. A demand for a superior technology compared to passwords, secret questions and other access protecting technologies led to the increased research and development of biometrics. The biometric feature that is used in this thesis is an iris.

The iris biometric deals with identifying a human being by his/her iris pattern extracted from the images of his/her eye. The human eye consists of 3 major parts: pupil (the inner most black part), iris (the colored part) and sclera (the white part). The iris and pupil as said to be non-concentric. The radius of inner border of the iris i.e. it's border with the pupil is also not constant since the size of pupil increases and decreases depending on the amount of light incident to the pupil. Every individual has a unique pattern of iris .This pattern can be extracted from the image of the eye and encoded. The code can be compared to the codes obtained from the images of other eyes or the same eye. The result of comparison can represent the amount of difference between the compared codes. In that way it can be concluded if the compared eye patterns belong to the same or different eye.

Voice Recognition:

Voice identification is the process of converting a reverberation signal, captured by micro- phone (MIC) or a telephone, to a recognized command or word. There two important part of in Voice Identification - i) Recognize the continuous sound and ii) Identify the word from the sound. This identification methods depends also on many parameters – Speaking-Mode, Style, Size of the Vocabulary, Language Model. There are two types of Speak Mode for Voice identification system - one word at a time (isolated-word Voice) and continuous Voice. Depending on the speaker enrolment, the Voice identification system can also divide - Speaker dependent and Speaker independent system. In Speaker dependent systems user need to be train the systems before using them, on the other hand Speaker independent system can identify any speaker's Voice. Vocabulary size and the language model also important factors in a Voice identification system. Language model or artificial grammars are used to confine word combination in a series of word or sound. The size of the vocabulary also should be in a suitable number.

Voice Command	Condition
START	To start the vehicle
FORWARD	Move forward/Straight
LEFT	Turn left side direction
RIGHT	Turn right side direction
STOP	To stop the vehicle

Speech Commands

Heart Rate sensing:

Continuous cardiac monitoring is an important tool in the clinical assessment of patients with a variety of conditions. It allows the detection of changes in heart rate, rhythm and conduction, and is essential in the detection of life threatening arrhythmias. This is achieved using a cardiac

monitor, connected to a cable lead and skin electrodes, which captures the electrical activity predominantly through a single view.

Ultrasonic Sensor:

In this system ultrasonic is used to find out obstacles in the path of wheelchair. Any obstacle is detected microcontroller is become zero and buzzer is ON and activated. Calculate the distance through the time interval between sending signal and receiving signal. The HC-SR04 Ultrasonic Sensor is a very accurate proximity/distance sensor that has been used commonly for object avoidance in various wheelchair projects.

The Ultrasonic Sensor sends out a high-frequency sound pulse and then times how long it takes for the echo of the sound to reflect back. The sensor has 2 openings on its front. One opening transmits ultrasonic waves, (like a tiny speaker), the other receives them, (like a tiny microphone).The speed of sound is approximately 341 meters (1100 feet) per second in air. The ultrasonic sensor uses this information along with the time difference between sending and receiving the sound pulse to determine the distance to an object.

GSM:

The GSM system was designed as a second generation cellular phone technology. One of the basic aims was to provide a system that would enable greater capacity to be achieved than the previous first generation analogue systems. GSM achieved this by using a digital TDMA (time division multiple access approach). By adopting this technique more users could be accommodated within the available bandwidth. In addition to this, ciphering of the digitally encoded speech was adopted to retain privacy. Using the earlier analogue cellular technologies it was possible for anyone with a scanner receiver to listen to calls and a number of famous personalities had been "eavesdropped" with embarrassing consequences.

GPS (Global Positioning System):

"The Global Positioning System (GPS) is a space-based radio navigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis --freely available to all. For anyone with a GPS receiver the system will provide location and time GPS receiver, the system will provide location and time. GPS provides accurate location and time information for an unlimited number of people in all weather, day and night, anywhere in the world." anywhere in the world.

III. MICROCONTROLLER

The signal received from the serial port is the processed by the micro-controller and corresponding control signals are sent to the wheelchair controller. This program embedded into the micro-controller will move the motor in either clockwise or anti-clockwise direction.

Forward Motion

The wheelchair moves in the forward direction if the status of the output port is '0110'.

Right Motion

The wheelchair moves in the right direction if the status of the output port is '0011'.

Left Motion

The wheelchair moves in the left direction if the status of the output port is '1100'.

IV. CONCLUSION

By the proposed system the patient will feel secure and safe. The patient and doctor interaction will be very quick in case of emergencies will help to avoid pathetic conditions. The proposed system is cost effective with consideration of features added to provide better assistance and safety for the people who have lost their mobility due to accidents or medical disorders or from the origin.

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