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Human-Computer Interface for Handicapped People

Mohan Kumar[1], Shyam Chendekar[2], Rohit Bhoye[3], Kunal Churi[4]
[1]*Associate Professor,* [2, 3, 4]*U.G. Student, Department of Electronics and Telecommunication, Atharva College Of Engineering, Mumbai, Maharashtra, India*

An economical head operated mouse for individuals with disabilities. It focuses on the top operated mouse that employs one tilt sensing element placed within the telephone receiver to work out head position and to operate as straightforward headoperated computer mouse. The system uses measuring system based mostly tilt sensing element to detect the user's head tilt so as to direct the mouse movement on the computer screen. Clicking of mouse is activated by the user's eye brow movement through a sensing element. The keyboard operate is meant to permit the user to scroll letters with head tilt and with eye brow movement because the choice mechanism. Voice recognition section is additionally gift within the head section to identify the little letters that area unit pronounced by the unfit user.

Keywords: Computer mouse, head operated, people with disabilities, tilt sensor.

I. INTRODUCTION

Owing to the shortage of acceptable input devices, individuals with disabilities usually encounter many obstacles once using computers. Currently, keyboard and mouse are unit the foremost common input devices. Because of the increasing quality of the Microsoft Windows interface, i.e., Windows ninety eight and NT, electronic device has become even intercalary vital. Therefore, it's necessary to create a straightforward mouse system for individuals with disabilities to control their computers. People with funiculus injuries (SCIs) and United Nations agency area unit unfit have progressively applied electronic helpful devices to boost their ability to perform sure essential functions. Equipment, that has been changed to learn People with disabilities embody communication and daily activity devices, and battery-powered wheelchairs. From our literature analysis there are unit several pc input devices area unit out there. Finger mounted device mistreatment pressure sensors, but no Hardware has been realised up to now and it wants physical quite interaction with system. a good vary of interfaces area unit out there between the user and device and therefore the interfaces are often enlarged keyboards or a fancy system that Allows the user management} or control a movement with the help of a mouth stick, However, for several individuals the mouth stick methodology isn't correct and cozy to use. an eye fixed imaged input system, Electrooculograpy (EOG) signals ,electromyogram (EMG) signals, encephalogram (EEG) signals area unit capable of providing solely a number of controlled Movements have slow interval for signal process and need substantial motor coordination. In infrared or ultrasound-controlled mouse system (origin instruments' head mouse and prentke romish's head master), etc. There are unit 2 primary determinants that area unit of concern to the user. the primary one being whether or not the transmitter is intended to aim at a good varyor not with relevancy receiver, the opposite one being whether or not the pointer of electronic device will move along with his head or not. These concerns increase the load for individuals with disabilities. Thus, various systems that utilize commercially out there natural philosophy to perform tasks with straightforward operation and simple interface management area unit painfully needed. the flexibility to control a electronic device has become additional vital to individuals with disabilities particularly because the advancement of technology permits a lot of and more functions to be controlled by pc. There are unit several reasons for individuals with disabilities to control a pc. As an example, they have to amass new data and communicate with the surface world through the web. Additionally, they have to figure reception, get pleasure from leisure activities, and manage several different things, like home searching and net banking. This analysis focuses on a tilt sensing element controlled electronic device. The lean sensors or inclinometers notice the angle between a sensing axis and a reference vector like gravity or the earth's field of force. Within the space of drugs science, tilt sensors are used principally in activity medication analysis. As an example, application of tilt sensors in gait analysis is presently being 2 investigated. Andrews et al. used tilt sensors connected to a floor reaction sort gliding joint foot orthosis as a training program supply via AN electrocutaneous show to boost bodily property management throughout useful electrical stimulation (FES) standing. Bowker and Heath counseled employing a tilt sensing element to synchronize leg bone nerve stimulation to the gait cycle of hemiplegics by watching angular rate. Basically, tilt sensors have potential applications of rising the talents for persons with different disabilities. The system uses MEMS accelerometers to notice

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the user's head tilt so as to direct mouse movement on the pc screen. Clicking of the mouse is activated by the user's eye-brow movement through a sensing element. The keyboard operate is intended to permit the user to scroll letters with head tilt and with eye brow movement because the choice mechanism. Voice recognition section is additionally gift within the head section to spot the tiny letters that area unit pronounced by the unfit user. the lean sensors will sense the operator's head motion up, down, left, and right, etc. consequently, the pointer direction are often determined.

II. LITERATURE SURVEY

Human Computer Interaction is concerned with the way humans interact with technology. It deals with how humans work with computers and how computer systems can be designed to best facilitate the users in achieving their goals. There is a gap to be bridged, with computer technology on the one side, and the human operator on the other side. In these times we see rapid technological advancements, in terms of computer performance, ever-increasing telecommunication possibilities and new and improved interface devices such as lightweight LCD displays and magnetic and optical tracking devices. With the progression of technology over the years we have also seen improvements in the interface through which the user interacts with a computer system: the User Interface (UI). The first of what can be called the modern computers, such as the ENIAC required users to program the computer by connecting cables on a patch board. Later, a less cumbersome UI was possible in the shape of punch tapes or cards that were used as in- and output. The development of computer screens with the possibility of displaying text opened the way for more diversity in the UI, allowing the user to interact with the computer using a command driven or menu driven interface. As long as there have been user interfaces, there have been special software systems and tools to help design and implement the user interface software. These tools have demonstrated significant productivity gains for programmers, and have become important commercial products. Others have proven less successful at supporting the kinds of user interfaces people want to build. Design in Human Computer Interface is more complex than in many other fields. It is inherently interdisciplinary, drawing and influencing diverse areas such as computer graphics, software engineering and human factors. The developers task of making a complex system simple and sensible to the user is in itself a very difficult, complex task.

III. BLOCK DIAGRAM AND DESCRIPTION

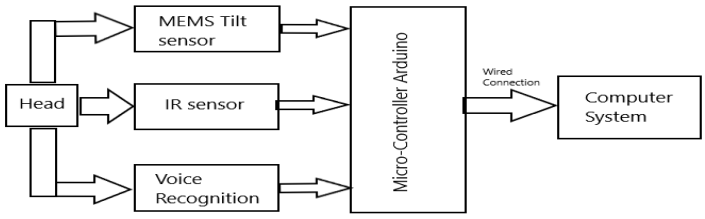


Fig. 1. Block Diagram

A. MPU 6050 (MEMS Tilt sensor)

We are using MPU6050 to trace the movement of the head. MPU6050 typically consists of 2 or more components. Listing them by priority, they are : accelerometer, gyroscope and magnetometer. The MPU6050 could be a 6 DOF (Degrees of Freedom) or a six axis detector, which means that it provides six values as output. 3 values from the accelerometer and 3 from the gyroscope. The MPU 6050 could be a detector based on MEMS (Micro Electro Mechanical Systems) technology. Both the accelerometer and the gyroscope is embedded within one chip. This chip uses I2C (Inter Integrated Circuit) protocol for communication. Accelerometer works on the principle of piezo electrical impact. Here, imagine a three-dimensional box, having atiny low ball within it. The walls of this box area unit created with piezo electrical crystals. Whenever you tilt , the ball is forced to maneuver within the direction of the inclination, due to gravity. The wall with that the ball collides, creates small piezo electric currents. There area unit whole, 3 pairs of opposite walls in an exceedingly cuboid. Each try corresponds to AN axis in 3D space: X, Y and Z axes. Depending on the present made from the piezo electrical walls, we are able to confirm the direction of inclination and its magnitude. Gyroscopes work on the principle of Coriolis acceleration. Imagine that there is a fork like structure, that is in constant back and forth motion. It is held in place using piezo electric crystals. Whenever, you try to tilt this arrangement, the crystals experience a force in the direction of inclination. This is caused as a result of the inertia of the moving fork. The crystals thus produce a current in consensus with the piezo electric effect and this current is amplified. The values are then refined by the microcontroller.

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B. IR Sensor (Eye-Brow Sensor)

The eye brow sensor contains an IR LED at 900 nm. It shines invisible IR light on the user's eye and this light does not cause any harm to the user's eye. An IR 900 nm sensor is use to detect the reflected IR light when the user blinks his eye. This signal is given to the signal conditioning section then to the microcontroller for further processing.

C. Voice-Recognition Module

This Voice Recognition Module is a compact and easy-control speaking recognition board.This product is a speaker-dependent voice recognition module. It supports up to 80 voice commands in all. Max 7 voice commands could work at the same time. Any sound could be trained as command. Users need to train the module first before let it recognizing any voice command. This board has 2 controlling ways: Serial Port (full function), General Input Pins (part of function). General Output Pins on the board could generate several kinds of waves while corresponding voice command was recognized.

D. Micro-Controller (Arduino Leonardo)

The Arduino Leonardo is a microcontroller based on the ATmega32u4 . It has twenty digital input/output pins (of which seven can be used as PWM outputs and twelve as analog inputs), a 16 MHz crystal oscillator, a micro USB connection, a power jack, an ICSP header, and a reset button. It contains everything required to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Leonardo differs from preceding Arduino boards in that the user-programmable ATmega32U4 AVR microcontroller has built-in USB functionality, eliminating the need for a secondary processor. This makes the Leonardo more versatile: in addition to supporting a virtual serial/COM port interface, it can appear to a connected computer as a mouse and keyboard.

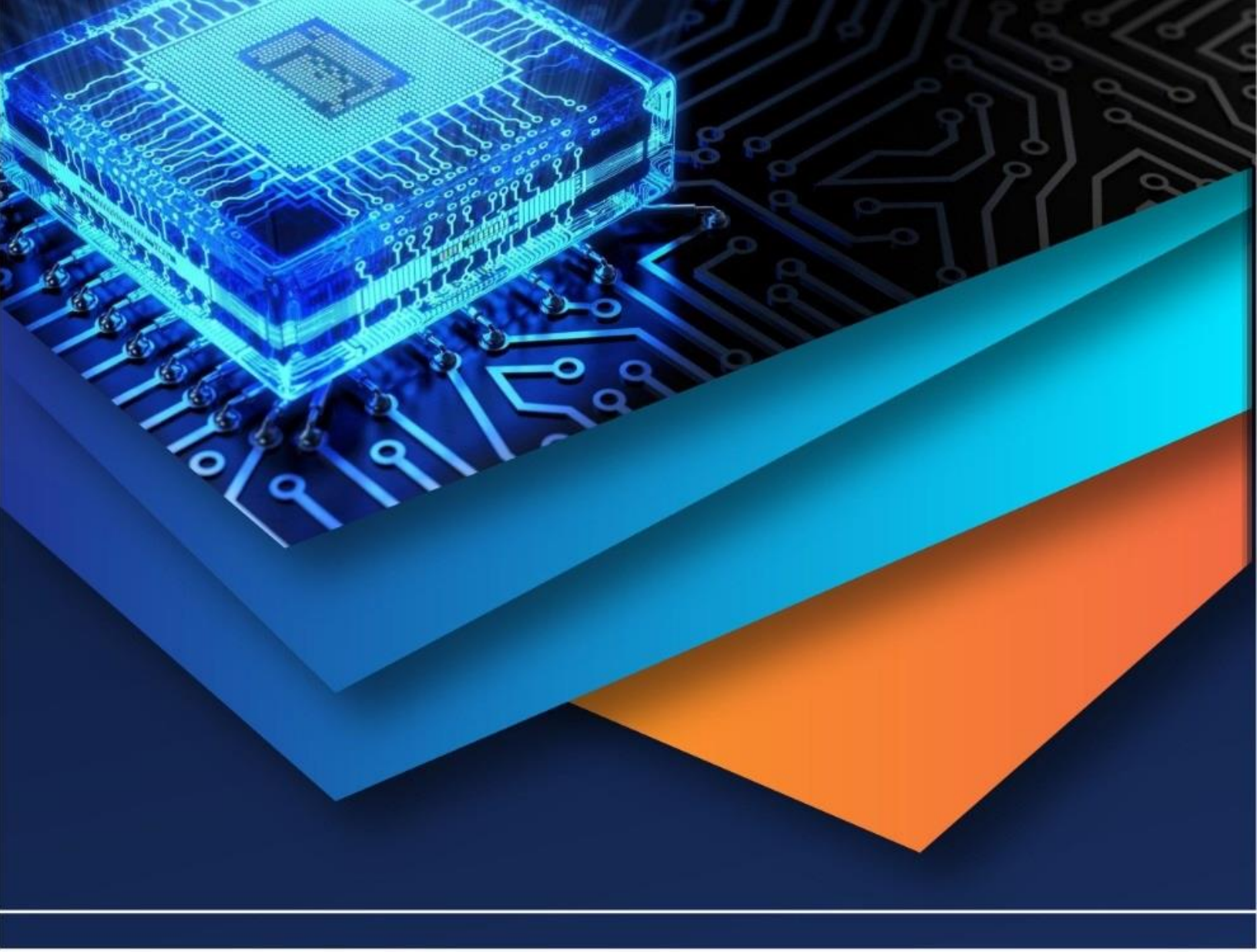
IV. CONCLUSION

The main advantage of this project is to eliminate the disability for the handicapped people so that they can enjoy this world as a normal human being are enjoying. Those people can control or operate all the computer application by the gesture of their eye movement and the interactive application are done by their tooth click and also gaming, swapping, page scrolling, etc. are also done using their head movement by placing a MEMS (Micro-Electro Mechanical System). The complete replacement of wired communication It finds the solution to the disabled person to operate the computer fully with the enabled mode. The HCI (Human Computer Interface) is an evolving area of research interest nowadays. This project aims to be a convenient process for helping out the disabled to operate computers. These systems can also be used in other application like robotics efforts, in process to make the device cost effective and more complex thereby reducing the size. Thus we have developed a real hand free mouse. This project will be very effective and accurate using of both MEMS and eye blink sensors as a wireless mouse for future.

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