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Volume 08, Issue 03, Pages: 184–190.

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A PORTABLE WIRELESS HUMAN & DEVICE INTERFACE FOR PHYSICALLY CHALLENGED PEOPLE WITH VOICE ENABLE

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ABSTRACT

The main aim of this project is to design and construct a hand movement controlled device switching system for physically challenged. The user can wear this device to hand and with the simple hand movement's he/she can request the basic needs like water, food or medicine by using tilt sensor. User can also control the electrical devices like light, fan etc with the help of head movements. For example if the tilt is to the right side then the device will be "ON" for the first time then next time it will be "OFF". In the same way, if the tilt is to the left side then another device is going to be controlled. The tilt is in upwards or downward direction the related need will be announced. This device is very helpful for paralysis and physically challenged persons. This project makes use of a Relay for switching the devices and using android app voice commands are enabled for audio announcements and Micro controller, which is programmed, with the help of embedded assembly instructions. This microcontroller is capable of communicating with transmitter and receiver modules. The tilt sensor detects the hand angle movement and provides the information to the microcontroller (on board computer) and the controller judges whether the instruction is right movement or left movement instruction and controls the operation respectively.

1. INTRODUCTION

1.1 OVERVIEW

This project is to design and construct a head movement controlled device switching system for physically challenged. The user can wear this device to hand and with the simple hand movement's he can request the basic needs like water, food or medicine by using MEMS Sensor (tilt sensor). User can also control the electrical devices like light, fan etc with the help of hand movements. For example if the tilt is to the right side then the device will be "ON" for the first time then next time it will be "OFF". In the same way, if the tilt is to the left side then another device is going to be controlled. The tilt is in upwards or downward direction the related need will be announced. This device is very helpful for paralysis and physically challenged persons.This project makes use of a Relay for switching the devices and APR-33A3 voice chip for audio announcements and Micro controller, which is programmed, with the help of embedded

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assembly instructions. This microcontroller is capable of communicating with transmitter and receiver modules. The MEMS based sensor detects the movement of tilt sensor and provides the information to the microcontroller (on board computer) and the controller judges whether the instruction is right movement or left movement instruction and controls the operation respectively.

1.2 EXISTING SYSTEM

Previously the system doesn't consist for physically handicapped people. But certain system is developed for dumb persons to enable the voice while any obstacle is found in their path.

There after some developments are made to control the device wireless with the help of ir sensor. The ir sensor is wearable for heads, in practicable it is not much useful for the paralyzed persons. Also the system is developed with basic level microcontrollers.

1.3 PROPOSED SYSTEM

The proposed system is designed and developed for paralyzed persons. The proposed system is developed from the basic idea of author [1].

The system comprises of two sections named as Patient Wearable Section (PWS) and Control and Voice enable Section (CVS). The two sections uses ARDUINO UNO microcontroller to monitor and control the I/O signal from the sensors. Tilt sensor is used as input devices which can easily wearable for patient body. The tilt sensor is used to give data whenever a change occurs in its direction of angle.

The CVS section uses a ARDUINO UNO based ATmega328P microcontroller which control the different electrical loads and enable the voice commands. APR33A3 voice chip, Relay, loads are used .

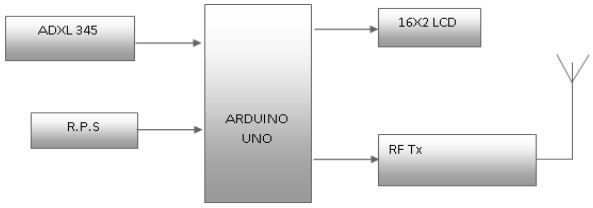

Fig.1.1 Block Diagram PWS (Patient Wearable Section)

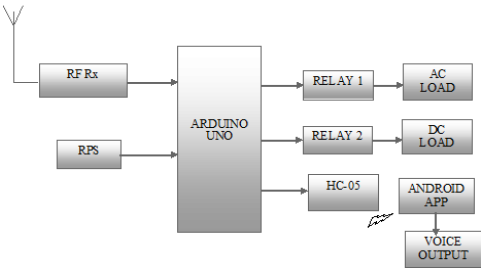

Fig.1.2 Block Diagram of CVS (Control & Voice enable Section)

2. LITERATURE SURVEY

Yu-Luen Chen This study describes the motivation and the design considerations of an economical head-operated computer mouse. In addition, it focuses on the invention of a head-operated computer mouse that employs two tilt sensors placed in the headset to determine head position and to function as simple head-operated computer mouse. One tilt sensor detects the lateral head-motion to drive the left/right displacement of the mouse. The other one detects the head's vertical motion to move up and down with respect to the displacement of the mouse. A touch switch device was designed to contact gently with operator's cheek. Operator may puff his cheek to trigger the device to perform single click, double clicks, and drag commands. This system was invented to assist people

with disabilities to live an independent professional life.

Md.R.Ahsan, Muhammad I.Ibrahimy, Othman O.Khalifa With the ever increasing role of computerized machines in society, Human Computer Interaction (HCI) system has become an increasingly important part of our daily lives. HCI determines the effective utilization of the available information flow of the computing, communication, and display technologies. In recent years, there has been a tremendous interest in introducing intuitive interfaces that can recognize the user's body movements and translate them into machine commands. For the neural linkage with computers, various biomedical signals (biosignals) can be used, which can be acquired from a specialized tissue, organ, or cell system like the nervous system. Examples include Electro-Encephalogram (EEG), Electrooculogram (EOG), and Electromyogram (EMG). Such approaches are extremely valuable to physically disabled persons. Many attempts have been made to use EMG signal from gesture for developing HCI. EMG signal processing and controller work is currently proceeding in various direction including the development of continuous EMG signal classification for graphical controller, that enables the physically disabled to use word processing programs and other personal computer software, internet. It also enable manipulation of robotic devices, prosthesis limb, I/O for virtual reality games, physical exercise equipments etc. Most of the developmental area is based on pattern recognition using neural networks. The EMG controller can be programmed to perform gesture recognition based on signal analysis of groups of muscles action potential. This review paper is to discuss the various methodologies and algorithms used for EMG signal classification for the purpose of interpreting the EMG signal into computer command.

Jose Sellek,Wunnava Subbarao, Hussein Khorram The authors present several sensing mechanisms and associated electronics developed to sense and monitor eye blinking and head nodding. The muscular vibrations around the eye are sensed by a piezoelectric crystal, a mechanical eye-blink sensor that provides the same information about eye-blinking as the optical sensor. An eight-plate metallic castle with a rotating metallic ball is the basis for the head movement or nodding sensor. The relative position of the ball within the castle provides information about the head movement. Sixteen head positions can be configured, providing very valuable information about the rate of head movement and pattern of head movement.

W. J. Perkins and B. F. Stenning For those severely physically disabled persons who are unable to use keyboards, the computer has to be adapted to operate from the limited signals that can be obtained from controlled movements. These movements need to be identified and appropriate devices provided which can produce suitable signals to operate a computer. To minimize programming effort, it is also necessary to standardize on a particular form of input signal-in our case, one or two on/off contacts-for which the programs are developed. It is desirable for user input devices to be linked to the

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computer through an Interface Control Unit, which can also be operated from a remote infra-red unit mounted on a wheelchair. Such units are described.

3 SOFTWARE IMPLEMENTATION

3.1 ARDUINO SOFTWARE IDE USER'S GUIDE

Arduino is an open-source project, enabling hobbyists to easily take advantage of the powerful Atmega chips. The Arduino IDE is the software where you can write code and upload it to the Atmega chip. The code is then executed on the chip. Most 3D-printer electronics are Arduino-compatible, they use the Atmega chip and enable the user to upload their code using Arduino. This includes Megatronics, Minitronics and RAMPS. Before you can start using the electronics you need software 'firmware', that translates machine instructions (gcode) into actual movements. There are a few options here, including Marlin and Sprinter and Repetier. The actual firmware is not discussed in this document. You can use Arduino to upload this firmware onto your electronics. This document will guide you in the steps you need to take.

To upload a firmware, you must first open the files using File → Open. Select the .ino file from the directory containing the firmware. Arduino will open several tabs with files. Next step is to select the correct electronics board. From the Tools menu, locate the Board item. This item should include a few sub items, including Megatronics, Minitronics, Arduino mega 2560 (RAMPS with mega 2560) and Arduino Mega 1280 (RAMPS with mega1280). Select the board that fits your electronics. Also we need to select the serial port the electronics is connected to. In the Tools menu, locate the Serial port item. This should include at least one item if the board is connected and the drivers are installed properly. If there are multiple items here, you need to find out which is the correct one by unplugging the board and checking which port was removed. Once you have set the board and serial port, you can upload the firmware by pressing File → Upload. Arduino will try to compile the firmware, if any errors occur the process will stop and you will need to fix the errors before trying again. Once compilation is complete, the actual upload will start. This may take a minute for a large sketch.

Program Structure:

All Arduino programs have two functions, setup() and loop(). The instructions you place in the startup() function are executed once when the program begins and are used to initialize. Use it to set directions of pins or to initialize variables. The instructions placed in loop are executed repeatedly and form the main tasks of the program. Therefore every program has this structure

```
void setup()

{ // commands to initialize go here

}

void loop()

{ // commands to run your machine go here

}
```

The absolute, bare-minimum, do-nothing program that you can compile and run is void setup() {} void loop() {} The program performs no function, but is useful for

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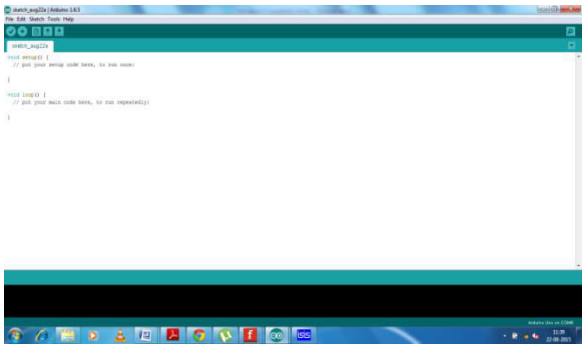
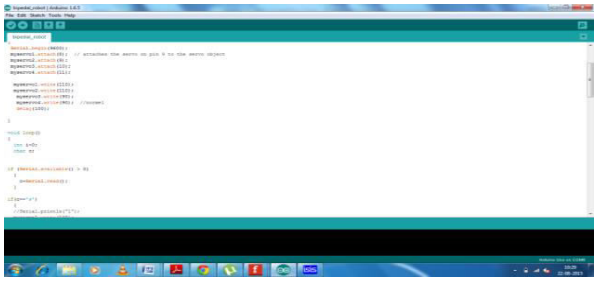
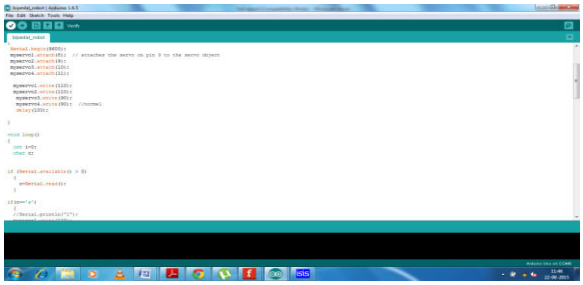
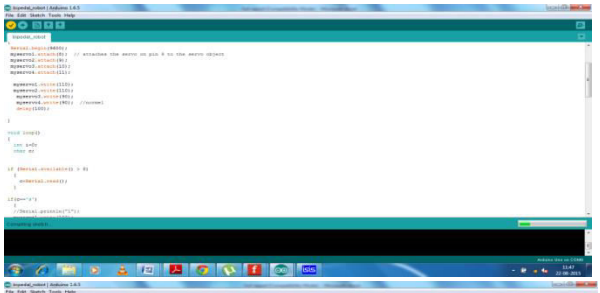
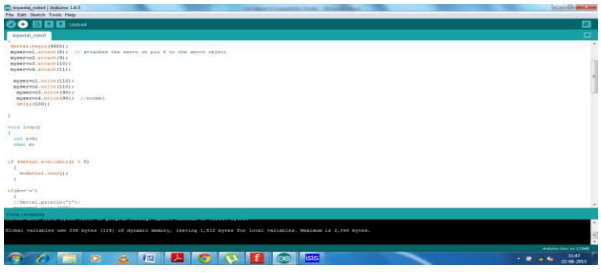
clearing out any old program. Note that the compiler does not care about line returns, which is why this program works if typed all on one line.

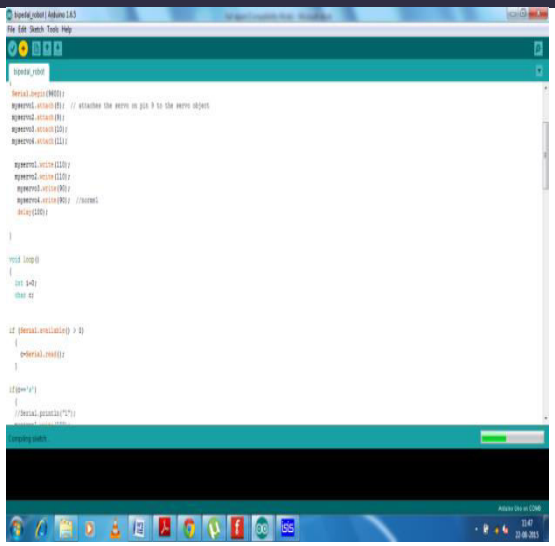






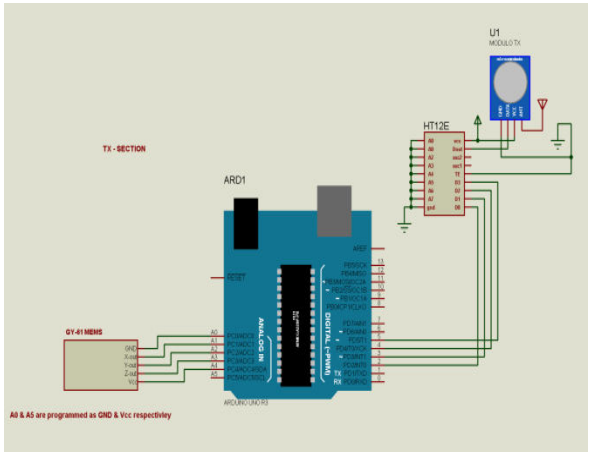




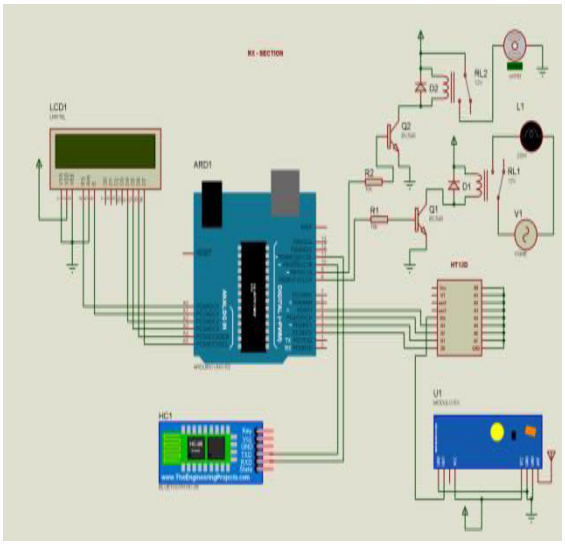


4 SCHEMATIC DIAGRAM

4.1 SCHEMATIC DIAGRAMS



TX- SECTION



RX SECTION

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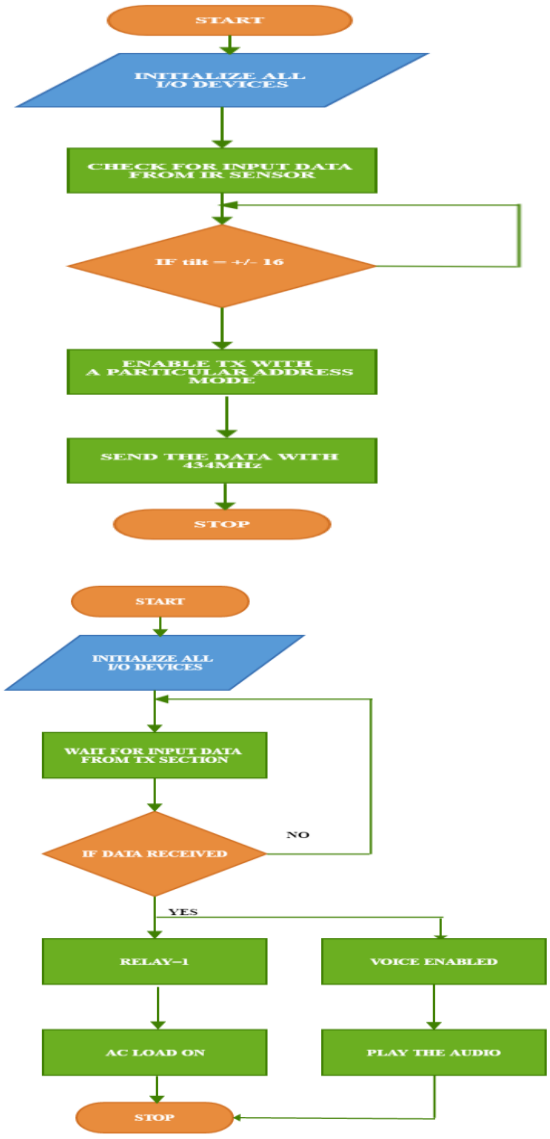
5.2. FLOW CHART

PWS SECTION



CONCLUSION

In this paper, we proposed a controlling of electrical loads and voice enable for basic needs by the movement of head using IR sensors for physically challenged persons and electrical devices is controlled by using different types of twilts of head and the basic needs of food ,water and some other basic needs are designed by the apr voice circuit with the help of voice ic. This microcontroller is capable of communicating with transmitter and receiver modules. . Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented.

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