VOICE RECOGNITION BASED SMART DEVICE FOR PHYSICALLY CHALLENGED PERSONS

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Abstract - *This scheme proposes a method to help peoples who are physically challenged or have not the strength to hold a mobile device and physically ill. A physically challenged person is defined as a person who has a locomotor disability and neurological origin that constitutes a restriction in one or more of daily living activities such as using home appliances. Hence this system provides a voice which is understandable by both disabled people as well as normal people. The people with disabilities are mostly struggled to use home appliances, they always needs someone to help out. This system will allow the person to use the home appliances such as fan, light and etc., with the help of voice recognition system. People who are physically challenged struggle every day in performing their actions. This idea presents new system for control of household appliances using voice module, control of their wheelchair and an panic switch in case of emergency and helps in guiding the physically challenged people to run their day to day life with the help of hand held devices. They can turn on and off the household appliances with the use of the voice module. They can also control their wheelchair with the help of switches provided for the wheelchair motion. The system is also provided with the panic switch for emergency alert.*

***Key Words*: Voice Recognition, Arduino IDE, Locomotor, Dc Motor, Motor Driver**

1. INTRODUCTION

The home computerization systems are gaining popularity day by day due to their ease of use and extensive action capabilities. Incorporating voice recognition expertise to home automation systems make the system more users responsive and easy to function. Some require home automation system to satisfy their needs and comfort while for physically challenged people it can provide great assistance. There are several researches and developments on the home automation systems. The voice recognition based home automation system for paralysed people uses the speech recognition module to recognize the voice commands. This proposed a home automation system uses the voice recognition module v3 for the voice recognition function, a microcontroller and relay.

1.1 LITERATURE REVIEW

There have been several researches and developments on the home automation systems. The voice recognition based home automation system [1] uses the Microsoft speech API running on PC to recognize the voice commands. The RF transreceiver is used to send these commands to the controller to control the various electrical devices. The use of computer makes this system more expensive and difficult to handle. Intelligent home navigation system for disabled and elderly person [2] proposed a system which uses voice recognition module SR-07 for the speech recognition process, an Arduino controller, a wheel chair and a navigation module. The Arduino receives the command from the voice recognition module and move the wheel chair accordingly thus eliminating the need of any third person's assistance.

The voice recognition based home automation system [3] uses Lab VIEW to perform speech recognition and Zigbee module with a controller is used to control the devices wirelessly. The Limitation of the system [1] [3] is the use of the computer which makes system more expensive.

[5] Proposed a home automation system for elderly and physically challenged people which can control the home appliances by two methods by voice commands or by using mobile as remote controller. The voice recognition is done by the android application and thus given to the controller to control the devices.

The home automation system [6] proposed two ways to control home appliances that are by using timer or by using the voice commands. The software environment is developed on Virtual Basics 6.0 on PC and devices are controlled using PC parallel ports.

[7] Proposed a Bluetooth based home automation system which comprises of a remote controller interfaced with microcontroller which is additionally interfaced with the Bluetooth module to provide wireless control of the appliances. When key on the remote controller is pressed the controller sends the command via Bluetooth module to the receiver and corresponding action on the receiver side is taken.

[8] Proposed system which uses PC to convert the voice commands to text and send this converted text to the cellular network via mobile phone, on receiver side the text is received by another mobile phone and this command is read by the microcontroller and corresponding control action is taken.

[9] Proposed a system which can control devices from the large distance. The user voice commands are converted into the symbols and they are sent to server PC over WI-FI network. The PC contains the voice recognition application developed on Microsoft VisualBasic.net. When the given command is recognized this information is transferred to the control circuit through PC parallel port and the corresponding device is turned on or off.
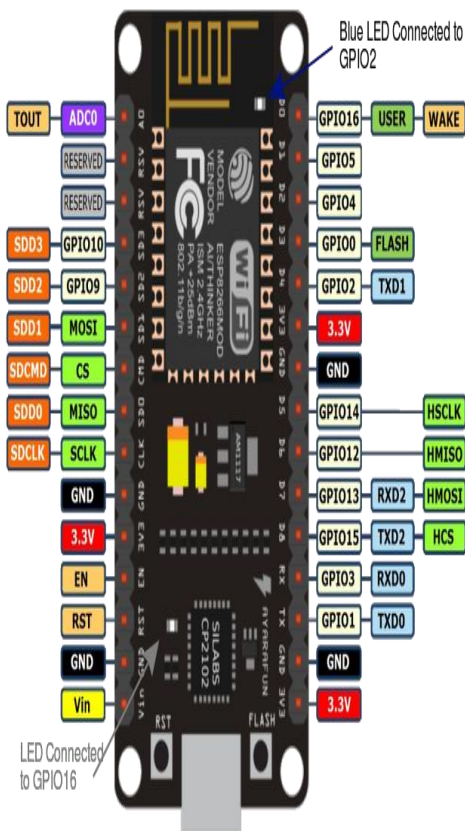
2. HARDWARE COMPONENTS

Fig -1: ESP8266

Borrowing a page from the successful playbooks of Arduino or a Raspberry Pi, the NodeMCU project aims to simplify ESP8266 development. It has two key components.

An open source ESP8266 firmware that is built on top of the chip manufacturer's proprietary SDK. The firmware provides a simple programming environment based on eLua (embedded Lua), which is a very simple and fast scripting language with an established developer community. For new comers, the Lua scripting language is easy to learn.

A DEVKIT Board that incorporates the ESP8266 chip on a standard circuit board. The board has a built-in USB port that is already wired up with the chip, a hardware reset button, wifi antenna, LED lights, and standard-sized GPIO (General Purpose Input Output) pins that can plug into a bread board. Figure 1 shows the DEVKIT board, and Figure 2 shows the schema of its pins.

The NodeMCU DEVKIT board that comes preloaded with the firmware can be purchased for $8 USD a piece, which makes it a very economical device for prototyping and even for production use.

But, what about Arduino, you ask? The Arduino project creates an open source hardware design and software SDK for a versatile IoT controller. Similar to NodeMCU, the Arduino hardware is a microcontroller board with a ready USB connector, LED lights, and standard data pins. It also defines standard interfaces to interact with sensors or other boards. But unlike NodeMCU, the Arduino board can have different types of CPU chips (typically an ARM or Intel x86 chip) with memory chips, and a variety of programming environments.

In fact, there is an Arduino reference design for the ESP8266 chip as well. However, the flexibility of Arduino also means significant variations across different vendors. For example, most Arduino boards do not have wifi capabilities and some even have a serial data port instead of a USB port. I feel that Node MCU provides a more consistent and accessible experience for IoT developers.

2.1 DC MOTOR:

The direct current motor is represented by the circle in the center, on which is mounted the brushes, where we connect the external terminals, from where supply voltage is given. On the mechanical terminal we have a shaft coming out of the Motor, and connected to the armature, and the armature-shaft is coupled to the mechanical load. On the supply terminals we represent the armature resistance Ra in series. Now, let the input voltage E, is applied across the brushes. Electric current which flows through the rotor armature via brushes, in presence of the magnetic field, produces a torque Tg. Due to this torque Tg the dc motor armature rotates. As the armature conductors are carrying currents and the armature rotates inside the stator magnetic field, it also produces an emfEb in the manner very similar to that of a generator. The generated EmfEb is directed opposite to the supplied voltage and is known as the back Emf, as it counters the forward voltage.

2.2 VOICE RECOGNITION MODULE

Voice Recognition Module is a compact easy-control speaking recognition board. It is a speaker-dependent module and supports up to 80 voice commands. Any sound

could be trained as command. Users need to train the module first before recognizing any voice command. Voice commands are stored in one large group like a library. Any 7 voice commands in the library could be imported into recognizer. It means 7 commands are effective at the same time.

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.

Specifications of Voice recognition module
•Voltage: 4.5-5.5V
•Current: <40mA
•Digital Interface: 5V TTL level UART interface
•Analog Interface: 3.5mm mono-channel microphone connector + microphone pin interface
•Recognition accuracy: 99% (under ideal environment)
•Support maximum 80 voice commands, with each voice 1500ms
•Maximum 7 voice commands effective at same time
•Easy Control: UART/GPIO
•User-control General Pin Output

Dimensions:

• Size: 30mm x 47.5mm

Fig -2: Voice Recognition Module

2.3 ARDUINO IDE

In this chapter, we will learn about the different components on the Arduino board. We will study the Arduino UNO board because it is the most popular board in the Arduino board family. In addition, it is the best board to get started with electronics and coding. Some boards look a bit different from the one given below, but most Arduino have majority of these components in common.

Various kinds of Arduino boards are available depending on different microcontrollers used. However, all Arduino boards have one thing in common: they are programed through the Arduino IDE. The differences are based on the number of inputs and outputs (the number of sensors, LEDs, and buttons you can use on a single board), speed, operating voltage, form factor etc. Some boards are designed to be embedded and have no programming interface (hardware), which you would need to buy separately. Some can run directly from a 3.7V battery, others need at least 5V.

Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programed (referred to as a microcontroller) and ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board. The key features are –

Arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.

You can control your board functions by sending a set of instructions to the microcontroller on the board via Arduino IDE (referred to as uploading software).

Unlike most previous programmable circuit boards, Arduino does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board. You can simply use a USB cable.

Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program.

Finally, Arduino provides a standard form factor that breaks the functions of the micro-controller into a more accessible package.

In this chapter, we will study in depth, the Arduino program structure and we will learn more new terminologies used in the Arduino world. The Arduino software is open-source. The source code for the Java environment is released under the GPL and the C/C++ microcontroller libraries are under the LGPL.

Sketch – The first new terminology is the Arduino program called "sketch". Structure

Arduino programs can be divided in three main parts: Structure, Values (variables and constants), and Functions. In this tutorial, we will learn about the Arduino software program, step by step, and how we can write the program without any syntax or compilation error.

Let us start with the Structure. Software structure consist of two main functions –

- Setup( ) function
- Loop( ) function

3. METHODOLOGY

This project was implemented concentrating to design a power wheelchair which has both control systems for the disabled having just lower limb or both lower limb and upper limb injury as well as provide some therapy facilities to support them to gain their stain back. So the whole system is divided into two portions. First one is controlling portion whereas the other is panic portion and voice control portion for the controlling of home appliance and the motor control using the input switch
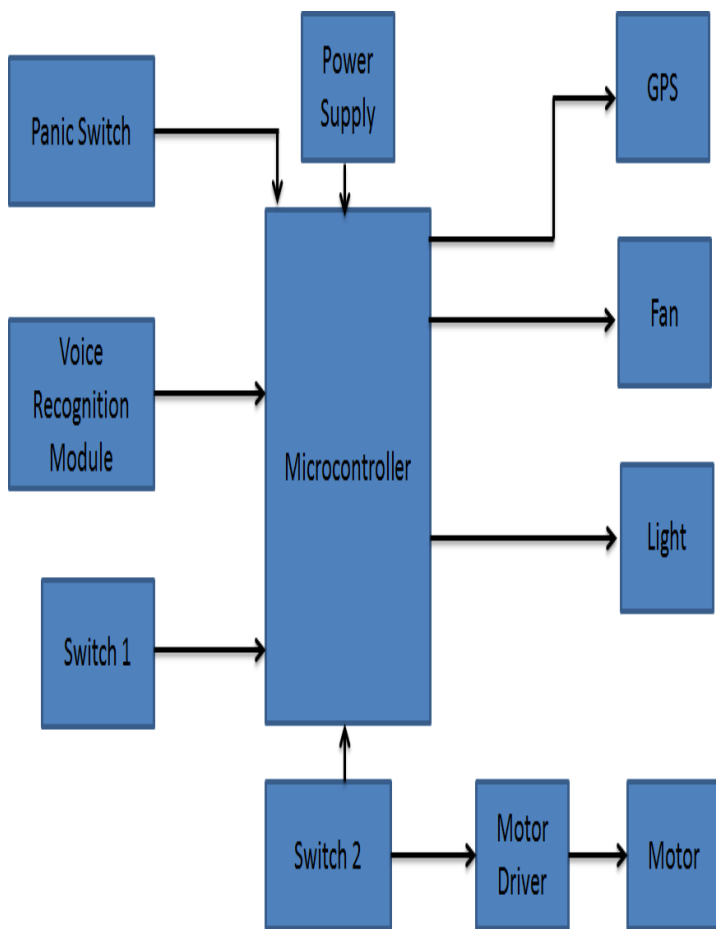
4. PROPOSED SYSTEM

Fig -3: Proposed System

The proposed system mainly focuses on helping physically challenged person to control the household appliances with voice recognition module

The proposed system also guides the When this physically challenged person gets into an emergency period a panic switch is provided by pressing this switch their location will be sent to the concerned person as an mobile notification. This proposed system consists of a microcontroller which is nothing but an Arduino nano controller. Devices such as GPS, light, voice recognition model, and motor drivers, motor are adopted to help the physically disabled person. It has two switches which are used to move the wheelchair front and back respectively. And another additional switch is incorporated which will be used as panic switch.
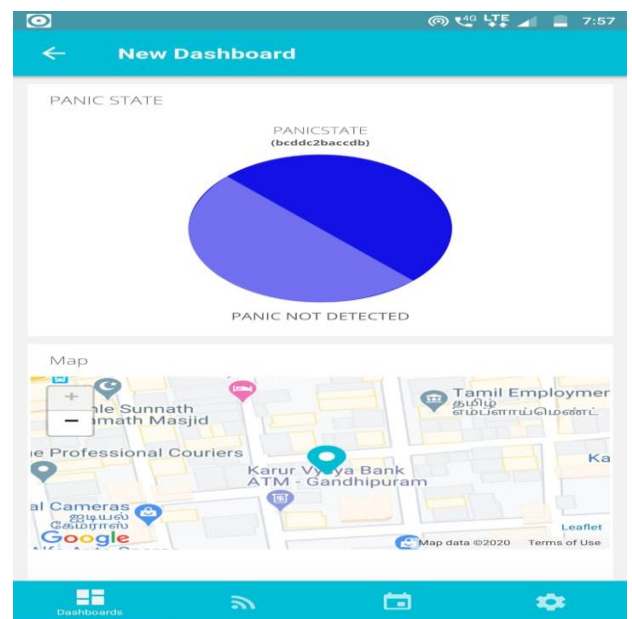
5. RESULTS AND DISCUSSION

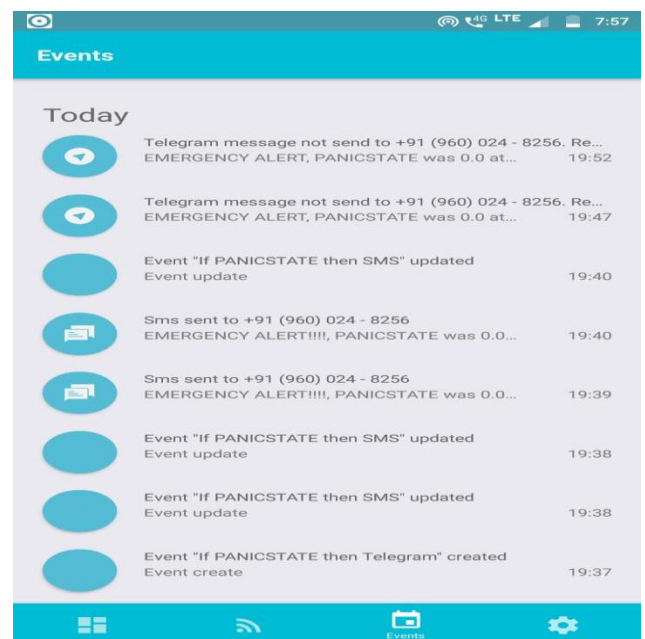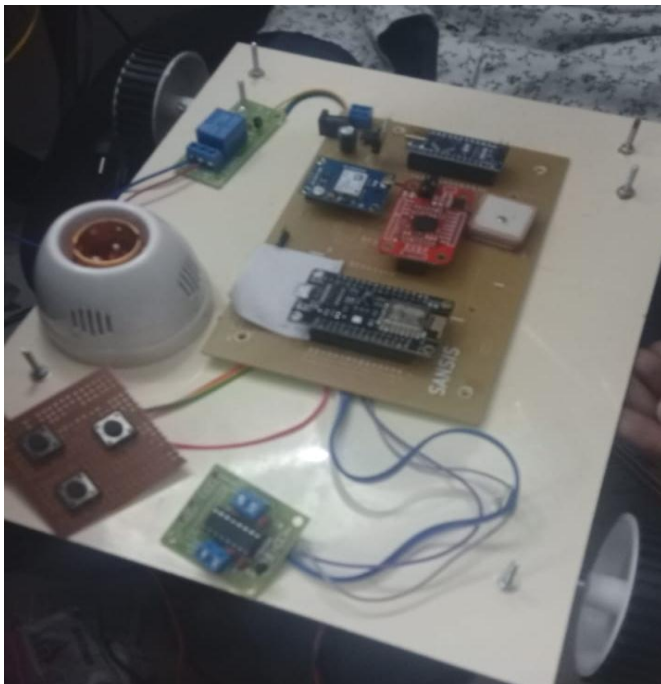**Fig -4:** Output image for Detected system

Fig -5: Output for the Emergency Information

Fig -5: Working Model

After the implementation of the modules in our proposed system, it has to undergo the phase of experimentation and testing. The modules were tested for a basic electrical appliance (incandescent light bulb) and the appropriate results were obtained. The following section includes the analysis of the obtained test results and its descriptions.

6. CONCLUSION

This Scheme presents the smart home assistance and alerting system for physically disabled people. The proposed system has GPS and panic switch for alerting and identifying the person from various places. This system will be efficient for those who are all live alone with physical disabilities. By using the system, the users can turn on and off electronics equipment's without others intervention.

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