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VOICE ENABLED GADGET ASSISTANCE SYSTEM WITH HUMAN AND DEVICE INTERFACE FOR PHYSICALLY CHALLENGED PEOPLE

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ABSTRACT: Information and communications technology and assistive technology offer new opportunities for everyone, but these opportunities are specifically more significant for Physically challenged people, who use assistive technology for their daily activities to a higher extent than people in general. Communication is a basic form of interaction between two individuals. This paper presents Voice Enabled Gadget Assistance System with human and device interface for Physically Challenged people. The main objectives of the system is design and construct a voice enabled device switching system to assist physically challenged and elderly people, and to provide a communication mechanism between the user and the predefined number through SMS messages via Bluetooth modem in case of emergencies. Arduino UNO micro controller, Bluetooth module, IR sensors, Relays and RS232 serial port to receive and transmit data from a mobile phone are used. User can also control the electrical devices with the help of voice commands.

KEYWORDS: Voice recognition, Physically challenged, NodeMcu.

I. INTRODUCTION

However, for a disabled person, he/she has difficulty in performing daily activities. People with disabilities are having difficulty coping with the fast-growing technology in our society and this is one of our major concerns. It has become essential for handicapped people to have access to communication technologies. Hence, they require assistance. Assistance can be provided either by humans or by machines. Assistance is provided either manually or automatically [1]. Before the invention of assistive devices, humans used to take care of disabled people. Assistive devices are invented later to overcome disadvantages in the traditional method of assistance. Assistive devices are used for different disabilities. Hearing aids for people who have a disability in hearing. Mobility aids which consist of wheelchairs, walkers, prosthetic devices [2]. Cognitive aids to help people who face challenges in thinking skills. Around 2.78% of our country's population cannot speak i.e., dumb. Dumb people generally use sign language to communicate, but finding it difficult to communicate with those who do not understand it. Communication between normal and dumb people using signlanguage is an expressive and natural process. So, we need a translator to communicate with them and understand what they say.

Our proposal was to implement a new smart communication device to help physically challenged people to communicate, allowing normal people and disabled people to have better communication. In our System we mainly focused on Voice Enabled Device Switching system. Therefore, in this project we are designing a prototype for communication between disabled people and normal people and also for operating

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electrical loads. Speech recognition is basically translation of spoken words into text, in computer science point of view [3]. The main two engines running speech recognition in Microsoft speech are automatic speech recognition (ASR) and Text To Speech (TTS). There are two types of speech recognition: 1- Speaker dependent 2- speaker independent. In the first type the system only responds well to the individual who trained the system and there is a wide range of words that can be detected. This type of recognition can be used for security systems and personal computers that work with voice recognition. The second type works based on the words detected and does not depend on the individual who gives the commands. Although in this type the number of words that can be recognized is less, it can still be as accurate as the speaker dependent systems. Speaker independent systems are mostly used in industrial requirements such as AT & T system in telephone system [4].

In this project, a hand assistive device is a fabric glove. This glove is used to assist the mute community in their daily life activities. This glove consists of flex sensors and an accelerometer to read the movement of the hand and thereby performing the operation based on the hand gesture. Appliance control in which the hand gestures of the glove can be used to wirelessly control home appliances like Television, AC, Lights, Fans, Heater, Mobile Charger, Motor. Environmental control can also be performed in which the state of the appliances is controlled using hand gestures. Phone calls can also be answered, rejected, connected and disconnected using hand gestures from the glove.

II. LITERATURE SURVEY

Zannatul Raiyan et. al. [5] proposed that the design of an Arduino based voice controlled automated wheelchair. The design is developed with a voice recognition system, which allows the physically disabled person to control the wheelchair by voice command who have issues in hand movement due to ageing or paralysis for joystick controlled wheelchairs. The design also provide some additional features such as obstacle detection for the safe movement and a GSM based navigation system for tracking and sending notifications to increase the usability of the automated wheelchair system.

V.Annie Varghese;S.Amrutha et. al. [6] presents Dual mode application of control system for people with several disabilities. Assistive Technology plays a vital role in the lives of people with severe disabilities. It helps them to lead an independent selfsupporting life. Disabled persons as a result of causes traumatic brain injuries and spinal cord injuries to stroke and cerebral palsy are find it difficult to carry out everyday tasks without continuous help. Already there exist a speech recognition system which provide support to the physically disabled people. But those people who cannot communicate through speech can use the tongue motion to control the environment.

V.Padmanabhan, M.Sornalatha et. al. [7] published a paper on Hand gesture recognition and voice conversion system for dumb people. Moreover, the device proposed by the author will be able to translate gestures that require more than one hand movement. Using device-based techniques means using some sort of glove-like framework that includes position trackers and flex sensors to track and measure the hand's position and movement. Devices employ PIC microcontrollers as controllers. There are two detectors in the glove: flex sensors and measuring devices.

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Sensors that measure bending are referred to as flex sensors. Coach mode and word formations are controlled by these sensors. The digital ports of the controller can be connected to this in order to enclose the digital information. When an explicit gesture is created, the PIC microcontroller processes it. Coaching and operational modes are available on the controller.

Baker J., Reddy R. and Huang X. et. al. [8] presents Historical Perspective of Speech Recognition. Although a lot of advancements are achieved, there is still a lot more that can be done in this area. Many systems have been developed through years, that use voice recognition such as voice enabled wheelchairs, which focuses on implementing smooth control for computerized systems through humming. Peixoto N., Ghaffari Nik H. and Charkhkar H. et.al. [9] focuses on device switching by voice commands, which is a great help to those with disabilities and elderly people. This system will give them an opportunity to live as autonomously as possible in their surroundings. They will have the ability to alert by voice commands and send Short Message Service (SMS) messages in case there is an emergency, to predefined numbers.

Ratnajit Mukherjee,Soumyajit Dey,Sumit Das, Anupambasu, et. al. [10] proposed "An iconic and keyboard based communication tool for people with multiple disabilities. An Augmentative and Alternative Communication (AAC) tool developed in India which caters to Indian multilingual needs. The communication tool is based on an iconic query-response interface. The system is currently available in English, Bengali and Hindi versions. It is used in a range of Indian institutions serving children with speech and motor impairments.

III. VOICE ENABLED GADGET ASSISTANCE SYSTEM

The block diagram of Voice Enabled Gadget Assistance System with human and device interface forPhysically Challenged people is represented in below Fig. 1. whenever the voice or speech commands are detected by the module then it analyzes the commends according to that sensors are activated. for example if speech command as switch on light, then automatically IR sensors at blub will detects the commands and blub will glow. The load may be the switching on TV, pressing Alarms, fan, light etc. whenever the emergency is happened then alerting message is send to mobile phone through WiFi module.

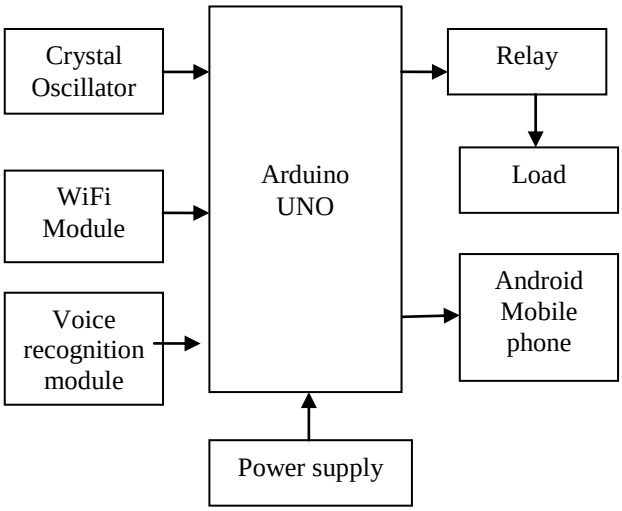

Fig. 1: BLOCK DIAGRAM OF VOICE ENABLED GADGET ASSISTANCE SYSTEM

The Microcontroller Arduino Mega board is responsible to control the devices which are connected with sensors and actuators. The microcontroller is a main head of system that may control and performs all operations of system.

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Fig. 2: ARDUINO UNO MODULE

The Arduino Uno is a microcontroller board that works based on ATMega328. It contains an ICSP (In- Circuit Serial Programming) header, a 16 MHz ceramic resonator, 6 analog inputs, a USB (Universal Synchronous Bus) connection, 14 digital input/output pins, a power jack and reset button.

The relay module may let the microcontroller as an Arduino for controlling the digital outputs which have high loads for instance DC or AC motors, solenoid, light-bulb, etc. This module is designed with 2 relays integration. Thus, it is capable for controlling these 2 relays. This relay module detail features are: 5V 2-channel relay interface board in which everyone requires 15-20 mA driver current; equipped with higher-current relay: DC 30V-10A and AC 250V-10A; a standard interface which is directly controlled through a microcontroller.

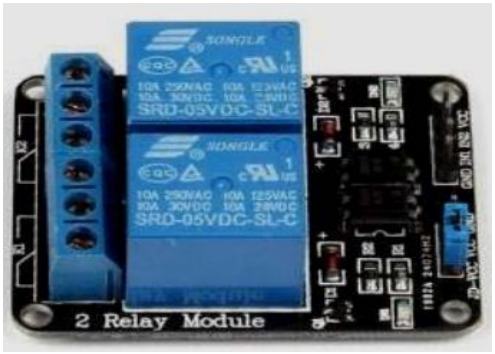

Fig. 3: 2-CHANNEL RELAY MODULE

The power supply is a circuit that provides the required DC voltage for running the other circuits. The voltage obtained from a main line is 230V AC (Alternating Current) but the circuit components need 5V DC (Direct Current). Therefore the step-down transformer is utilized for obtaining a 12V AC that is further transformed as 12 V DC by the rectifier.

A Crystal oscillator is an electronic oscillator circuit where piezoelectric crystal is used as frequency selective element. Often the frequency of oscillator is utilized for keep tracking the time in quartz wristwatches, for providing the stable clock signals to digital ICs (Integrated Circuits) and for stabilizing the frequencies of radio transmitter and receiver. The quartz crystal is one of the more basic kinds of piezoelectric resonator, thus it is employed in oscillator circuits and it is known as crystal oscillator.

Android is a Linux-based mobile phone operating system developed by Google. It is a software stack for mobile devices that includes an operating system, middleware and key applications. The Android SDK provides the tools necessary to begin developing applications on the Android platform using Java programming language.

ESP-12E Wi-Fi module is developed by Ai-thinker Team. ESP8266EX is among the most integrated Wi-Fi chip in the industry. It integrates the antenna switches, RF balun, power amplifier, low noise receive amplifier, filters, power management modules. It requires minimal external circuitry, and the entire solution, including front-end module, is designed to occupy minimal PCB area.

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Fig. 4: WI-FI MODULE

Voice Recognition Module is a compact and easy to use speech recognition board that can be easily interface easily with Arduino. 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.

Fig. 5: VOICE RECOGNITION MODULE

IV. RESULT ANALYSIS

Arduino Installation:

After learning about the main parts of the Arduino UNO board, we are ready to learn how to set up the Arduino IDE. Once we learn this, we will be ready to upload our program on the Arduino board. In this section, we will learnin easy steps, how to set up the Arduino IDE on our computer and prepare the board to receive the program via USB cable.

Step 1: Choose arduino board and USB Cable
Step 2: Download Arduino IDE Software
Step 3: Power up your board
Step 4: Launch Arduino IDE
Step 5: Open your first project
Step 6: Select your Arduino board
Step 7: Select your serial port:
Step 8: Upload the program to your board

The microcontroller is programmed using Arduino IDE software in this system. C and C++ languages are used to program the Arduino. Using the Arduino editor, the value readings of the IR sensors are checked against the values recorded on the Arduino IDE. The output will be sent to the wifi device and seen in the text message is smart mobile and voice commands inspeaker.

The outputs are generated with respect to the voice command given to the Android phone with a relatively high accuracy. The WiFi module sends SMS to the provided numbers in case of emergency commands.

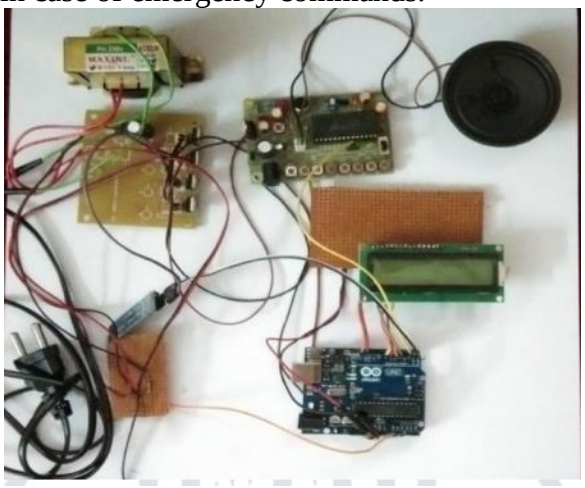

Fig. 6: HARDWARE CONFIGURATION

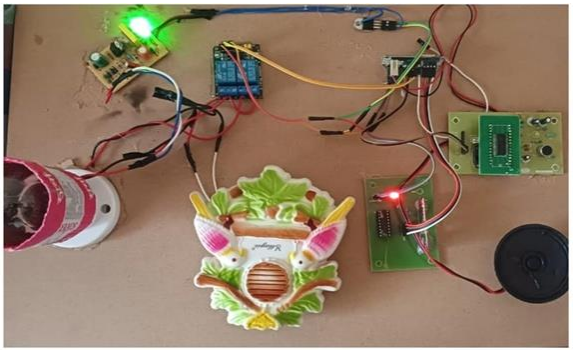

Fig. 7: ACTIVATED THE ALARM SITUATION

V. CONCLUSION

In this paper, Voice Enabled Gadget Assistance System with human and device

interface forPhysically Challenged people is developed. Hand gesture recognition and voice conversion system can help the speech impaired people to communicate with normal people in the real world. Arduino is main control unit for this project. Programmed the system to control the loads using any device that is allowed Android phones are improvising the system in much better way. Voice enabled device switching system was designed and satisfactory results and outputs were achieved.

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