Home Automation for Differently Abled

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Abstract— **Home Automation enables the control of various home appliances from a single touch or click, thus playing an important role in our daily life. This project deals with automating home appliances remotely over an android device for the convenience of the differently abled (mainly the blind, deaf and dumb). The System contains an ATMega328p microcontroller on an Arduino UNO development board, a HC-05 Bluetooth module, a Relay module, LCD display. For the visually impaired voice controlled automation is provided, while for the deaf and the dumb keypad control through the android device is arranged. With the help of 'AMR Voice' App and 'Blynk' app installed on an android phone, the connection is established with the HC-05 Bluetooth module, through which the voice commands/ keypad commands are sent over to the microcontroller. Based on the received command relevant action is taken upon the home appliance and the status of the appliance is reported on the lcd display and sounded by the buzzer.**

Keywords—Home Automation, Arduino UNO, HC-05 module, relay module, lcd display, buzzer, AMR Voice App, Blynk App.

I. INTRODUCTION

Home Automation is the process of automating a Smart Home. A Home Automation system can control lighting, climate, entertainment systems and appliances. A home automation system typically connects controlled devices to a central hub or "gateway". The user interface for control of the system uses either wall-mounted terminals, tablet or desktop computers, a mobile phone application, or a Web interface, that may also be accessible off-site through the Internet. In order to enable the use of the automated home functions for the disabled, Voice controlled automation for the visually impaired and the touchpad/ keypad enabled automation for the deaf and the dumb is proposed in this project.

Using an android device with the necessary apps installed in it, AMR Voice app and the Blynk App, and establishing connection between the android device and the HC-05 Bluetooth module, commands can be sent over from the android device to the microcontroller which takes a relevant action upon the connected home appliances.

Being able to control home appliances remotely will create at the touch of a button or a voice command enables the differently abled to access these devices at any time and from anywhere, within the limited area range as provided by the communication module. Here we are using a HC-05 Bluetooth module which usually covers an area of up to 9 meters or 30 feet.

Using other communication modules can naturally increase the range of area being covered by the system.

II. LITERATURE SURVEY

i. Here we have reviwed few papars to understand the gap which exists in the general area of home automation.

ii. Mrs. Paul Jasmin Rani, et, al., [1] presented that the primary objective of their project is to construct a fully functional voice based Home automation system that uses Internet of Things, Artificial Intelligence and Natural Language Processing (NLP) to provide a cost-effective, efficient way to work together with home appliances. There are many smart home solutions in the market that aim to automate the basic operations of these home appliances using various technologies such as GSM (Global System for Mobile), NFC (Near-Field Communication) etc. However, most of these systems focus on mimicking the basic operation of the electrical switch. Their project aims at providing a fully automated voice based solution that our users can rely on, to perform more than just switching on/off the appliances. The user sends a command through speech to the mobile device, which interprets the message and sends the appropriate command to the specific appliance.

iii. Kumar Mandula, et, al., [2] discussed the availability of high speed mobile networks like 3G and Long Term Evolution (LTE) coupled with cheaper and accessible smart phones, mobile industries impact on growth in terms of providing various services and applications at the finger tips to the citizens. Internet of Things (IoT) is one of the promising technologies which can be used for connecting, controlling and managing intelligent objects which are connected to Internet through an IP address. Applications ranging from smart governance, smart education, smart agriculture, smart health care, smart homes, etc. can use IoT tor effective delivery of services without manual intervention in a more effective manner. This paper discusses about IoT and how it can be used for realizing smart home automation using a micro-controller based Arduino board and Android mobile app. In this paper, two prototypes namely home automation using Bluetooth in an indoor environment and home automation using Ethernet in an outdoor environment are presented.

iv. Ming Wang, et, al., [3] discussed with the development of the social economy, more and more appliances have been presented in a house. It comes out a problem that how to manage and control these increasing various appliances efficiently and conveniently to achieve more comfortable, security and healthy space at home. In this paper, a smart control system based on the technologies of internet of things has been proposed to solve the above problem. The smart home control system uses a smart central controller to set up a radio frequency 433 MHz wireless sensor and actuator network (WSAN). A series of control modules, such as switch modules, radio frequency control modules,

have been developed in the WSAN to control directly all kinds of home appliances. Application servers, client computers, tablets or smart phones can communicate with the smart central controller through a wireless router via a Wi-Fi interface. Since it has WSAN as the lower control layer, an appliance can be added into or withdrawn from the control system very easily. The smart control system embraces the functions of appliance monitor, control and management, home security, energy statistics and analysis.

v. Norhafizah bt Aripin, et, al., [4] present the development of home appliances based on voice command using Android. This system has been designed to assist and provide the support to elderly and disabled people at home. Google application has been used as voice recognition and process the voice input from the smart phone. In this paper, the voice input has been captured by the android and will be sent to the Arduino Uno. Bluetooth module in Arduino Uno received the signal and processed the input signal to control the light and fan. The proposed system intended to control electrical appliances with relatively user-friendly interface and ease of installation. We have demonstrated up to 20 meter of range to control the home appliances via Bluetooth.

vi. Thoraya Obaid, et, al., [5] in their paper a voice controlled wireless smart home system has been presented for elderly and disabled people. The proposed system has two main components namely (a) voice recognition system, and (b) wireless system. Lab View software has been used to implement the voice recognition system. On the other hand, ZigBee wireless modules have been used to implement the wireless system. The main goal of this system is to control home appliances by using voice commands. The proposed system can recognize the voice commands, convert them into the required data format, and send the data through the wireless transmitter. Based on the received data at the wireless receiver associated with the appliances desired switching operations are performed. The proposed system is a low cost and low power system because ZigBee is used. Additionally, the proposed system needs to be trained of voice command only once. Then the system can recognize the voice commands independent of vocabulary size, noise, and speaker characteristics (i.e., accent).

III. BLOCK DIAGRAM

The block diagram of the proposed system is as follows:
The connection of the devices is done as shown in the above block diagram.

i. The **Arduino UNO** is an open-source microcontroller based on the microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.[1] The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE(Integrated development Environment) via a type B USB cable.[4] It can be powered by a USB

cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform. The ATmega328 on the Arduino Uno comes preprogrammed with a boot loader that allows uploading new code to it without the use of an external hardware programmer.
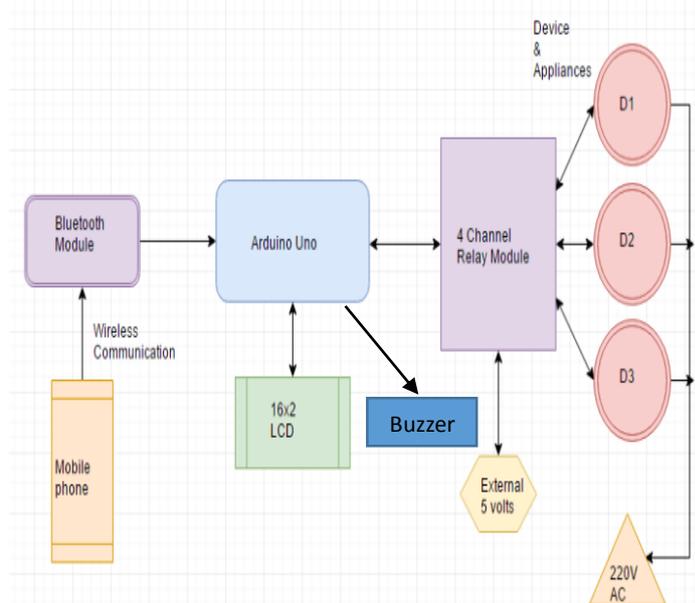

Fig: Block Diagram of proposed system

ii. The **HC-05 Bluetooth module** is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. Bluetooth modules are designed for wireless data transmission between small distances it considered as wireless personal area network technology (WPAN) it works at ultra-high frequencies (UHF). It considers as the cheapest method for data transmission, easiest and more flexible compared to other methods. It even can transmit files reach to 25 Mb/s. This technique depends on frequency hopping spread spectrum technique (FHSS) it uses this technique to avoid interference with other devices and it a full duplex transmission which mean it can transmit and receive at same time.

iii. The **Relay Module** used here is of 5volt operability. It is a relay interface board, it can be controlled directly by a wide range of microcontrollers such as Arduino, AVR, PIC, ARM and so on. It uses a low level triggered control signal (3.3-5VDC) to control the relay. Triggering the relay operates the normally open or normally closed contacts. It is frequently used in an automatic control circuit. To put it simply, it is an automatic switch to control a high-current circuit with a low-current signal.5V relay signal input voltage range, 0-5V. VCC power to the

system. JD-VCC relay in the power supply. JD-VCC and VCC can be a shorted.

iv. The **LCD Display** is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in DIYs and circuits. The 16×2 translates display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7 pixel matrix.

The future scopes of the system is vast as home automation is now taking the leads for the comforted living and the proposed system can be upgraded with many sensors and security lock for homes, enhancing the experience of the user. Also using a better range advanced communication module can automatically increase the range of area over which the command can be issued as the one used here is a simple serial communication Bluetooth module with range limited to only 9 meters or 30 feet.

IV. METHODOLOGY

The proposed system uses the following components:

- Arduino UNO (with ATMega328p microcontroller)
- HC-05 Bluetooth Module
- Relay Module
- LCD Display
- Buzzer
- Jumper wires for connection

The Bluetooth module, the relay module, LCD display and the buzzer are interfaced with the Arduino UNO. The AMR Voice app is installed in the android device from Google play store and the connection is established between the Bluetooth module and the robot. It uses android mobiles internal voice recognition to pass voice commands to your robot and pairs with Bluetooth Serial Modules and sends in the recognized voice as a string. This string is recognized by the microcontroller by comparing it with the available commands preprogrammed and the relevant action is taken upon the intended home appliance. For example, the command "Light on" spoken into the android device is sent to the microcontroller and the dedicated relay module channel is operated to 'on state'. The similar is seen for other commands too. At the change in the status of the home appliance, its status is displayed on the 16x2 LCD display and the buzzer is sounded. This is the operation of the proposed system for the visually impaired. For the deaf and dumb, the system connection remains the same and the dedicated app is created using the 'Blynk' app. A project as per the need of the system is created using the Blynk app on the android device and this project can be later converted into an app itself and be shared among the destined users. This App establishes connection among the HC-05 and the android device and the Commands sent in the form of the touch from the touchpad are used to automate the appliances. The Security of the proposed system solely depend on the connection of the Bluetooth module and for a secure operation the Bluetooth module's password is set to desired one rather than the default "1234" or "0000" and is to shared only with the destined users and none other.

V. RESULTS AND CONCLUSION

The designed system is able to automate the home appliances remotely, provided the android device provides commands in the range operated by the communication module and provides ease of living for the differently abled. Also the LCD display and the buzzer sounding provides a relief for the user indicating the completion of the task/ command received.

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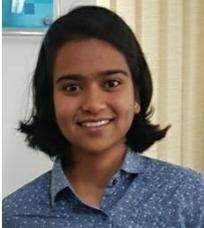
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