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Bluetooth Based Home Automation for Physically Challenged.

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ABSTRACT

Technological progressions in the past have provided various solutions for so many problems. Although the advancement of mobile phones has both horns and thrones in its evolution, the best service of it is used, to provide a remedial measure for the problem of physically challenged. The physically impaired person needs the help of another fellow men / women to fulfil their basic requirements such as ON / OFF of the electrical appliances. With the advancement in embedded technology, this paper has focussed on providing a solution to exterminate the manly assistance for such physically impaired individuals. This is made feasible by interfacing the mobile gadget of the person with a microcontroller so that the person can use his /her mobile keypad to turn ON / OFF the electrical appliances. Thus this paper aimed at finding a solution for the basic needs of impaired persons by designing an embedded system using Arduino UNO, Bluetooth and mobile app and also came out with successful outcomes.

Keywords: - Bluetooth, Microcontroller, Keypad, Home Automation.

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INTRODUCTION

Activating the home appliances without conventional switch but by using a smart phone is known as home automation. This is an advanced technology in the home automation, so houses are getting smarter [1-6]. Usually conventional wall switches are located in different parts of the house and often require persons for their operations and, thus, manual pressing turn them ON and OFF. It becomes very difficult for the elderly or physically handicapped people to operate them. The main aim of this project is to control the home applications remotely by using Android OS smart phones with an Arduino board applicable especially for the physically disabled persons. This system is enhanced to control the home applications through an Android application of smart/ tablet phones by entering the selected number for corresponding load/appliances. A Bluetooth is interfaced to the microcontroller using serial communication pins [7], [8]. The electrical loads can be controlled either by the semiconductor devices like TRIAC and Opto-isolator or through relay coils [9].

If the user connect the Android application device to a Microcontroller through Bluetooth then user can send the control signals through the Bluetooth attached to the Microcontroller. He/she can enter the selected option in the Android application on the GUI for corresponding appliance and that data is sent to the Microcontroller. The received data is compared with the stored data in the controller and, if it matches, then the microcontroller will perform the desired operation of turning the home appliances on/off.

Overall Block Diagram of the proposed system is shown below in figure 1.

Hardware details

Microcontroller

This paper uses Arduino ATMEGA328 microcontroller as controlling element. It is an 8 bit Microcontroller pre programmed with a boot loader that aids in uploading of object files directly into microcontrollers flash memory. Apart from this Arduino has lot of other features like readily available Bluetooth shields/modules that can be directly interfaced using on board serial communication facility of Arduino, undemanding accessibility of I/O ports, regulator IC on Board, etc... The Figure 2 below Shows Arduino Microcontroller board which is employed in this paper.

Bluetooth

In this work, HC05 Bluetooth module is used. It transmits the 8 bit data at the rate of 3Mbps modulation with complete 2.4GHz radio transceiver and baseband. It supports the baudrates of 9600,19200,38400,57600,115200,230400,460800. It operates at low power of 1.8V.

The Transmitter pin [Tx] of Arduino should be connected to the receiver pin [RxD] of Bluetooth shield HC-05 and the receiver pin [Rx] of Arduino is to be connected to the transmitter [Tx] pin of HC-05. The basic connection diagram is shown below in figure 5.

Android Mobile

The Person who needs automation has to give the commands for controlling the room appliances through an android tablet/mobile/laptop which is shown below in figure. By installing the application in their mobile device, the person can enter the commands by just touching the numbers in their HMI panel of mobile and control the appliance.

Peripherals

In this proposed work three output peripherals have been considered. The Fan is controlled by Arduino using a driver IC [L293DE]. The LED Light in room is controlled using a relay circuit. A buzzer alarm is used for indicating emergency needs to their care takers.

Software Requirements

The proposed idea requires use of Arduino IDE for Editing and Compiling our Sketch and uploading the program into flash memory. Apart from that any mobile phone which has Android OS can be used. Blue term application file has to be installed in the handheld device of the aged/disabled persons.

Results and Discussion

The proposed system was developed for controlling three home appliances, Table 1 lists the same.

The developed hardware module has been shown in figure 6.

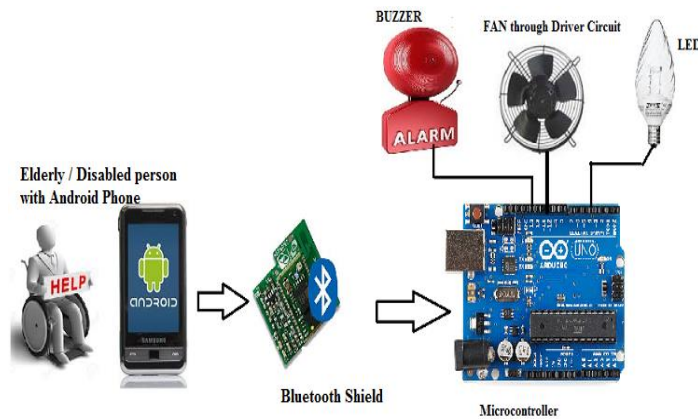


Figure 1 Overall Block diagram of the proposed idea

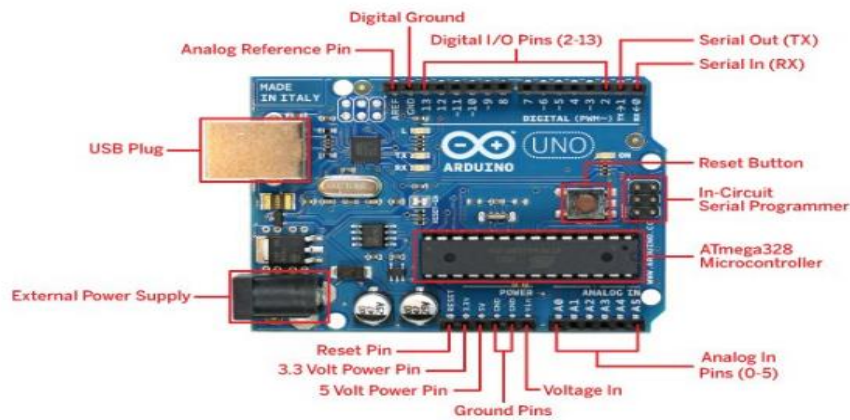


Figure 2 Arduino Microcontroller

HC-05

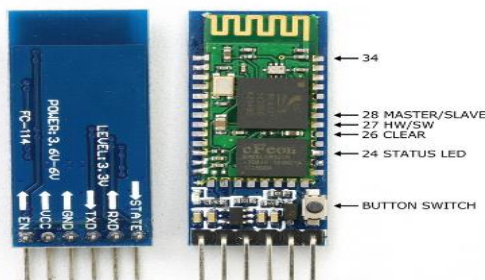


Figure 3 Bluetooth Shield, HC - 05

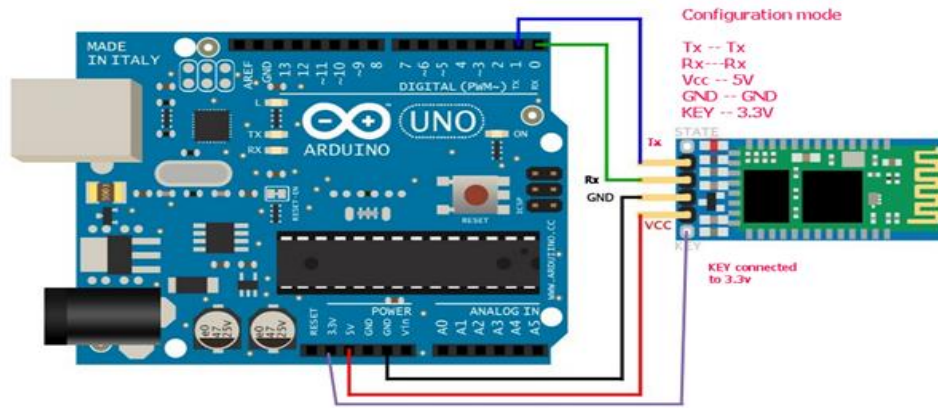


Figure 4 Basic Connection of Arduino with Bluetooth Shield



Figure 5 Android handheld device



Figure 6 Hardware Module Developed

Table 1. Commands Reference for Controlling Appliances using Blue term

S.No	Commands /Numbers Pressed in Blue term	Purpose
1	ON Press 1	LED Lights ON
	ON Press 2	LED Lights Off
2	ON Press 3	Fan ON
	ON Press 4	Fan OFF
3	ON Press 5	Buzzer ON
	ON Press 6	Buzzer OFF

Conclusion and Future Work

Though development of science and technology plays its own game of advancing and automating in every day to day action, elderly and aged people are still facing the problem of expecting for the assistance. This work is used for guiding such people by simply investing the available electronic resources like arduino microcontroller, Bluetooth device, Android OS, Peripherals.

Even though the idea has been implemented for three room appliances, it can be further enhanced to automate 13 home appliances. The same circuit can also be improved by adding a voice controller IC and by implementing the same.

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