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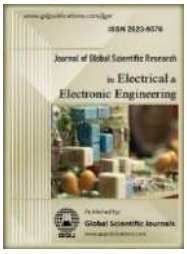

Voice Controlled System by Using Bluetooth and Wi-Fi Technique

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ABSTRACT

With the development of technology, automation is becoming more and more common in our daily life. The main goal of any automation system is to minimize human efforts. This paper presents an idea to control the doors of the house using a mechanical lock and password in addition to control the home appliances with two methods. The first method using Bluetooth and the second by using Wi-Fi technique. To prove the effectiveness and feasibility of this system, a simplified model was designed to connect devices such as lamp, fan, washing machine and air conditioner with the proposed home control system.

1. Introduction

Technology invention and digital systems become as the backbone for most modern innovations in different path ways of engineering.

Nowadays, smartphones are now becoming widely used with enhanced processors to be more powerful, very large storage capacities, richer enjoyment tasks and more telecommunications methods. Smartphone, which is a small pieces yet it is rapidly changing and becoming powerful device the classical ways of people interaction methods. Smartphone users have steadily turned into all portable devices and provided all people for their daily use [1]. HAS is quietly used to manage appliances that used in the home. Different types of appliances at home can be controlled depending on the HAS. All kinds of home devices like doors, washing machine, light, fan, electric heater, surveillance systems, and consumer electronics devices that widely used at home control rely on HAS[2].

The concept of home automation system (HAS) is designed to provide support and assistance to persons with disabilities and the elderly people. The automation process is fully controlled by the Bluetooth and Android OS. Everywhere now, people have a smartphone with an Android app. This phone is used to control the appliances with simple click and voice signals. Commands are passing through Bluetooth present in mobile. So you need not getup to switch on or off the devices. Speech commands are sent over Android's phone to the Bluetooth module and the graphing interface commands are transferred over Android phone to the Bluetooth module and the graphical

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user's interface commands will be transferred over the Android App to the Bluetooth module. We can send either a voice or GUI command to any command in the Bluetooth module at a time. This style is not compatible with regular switches. The electrical devices (on or off condition) can be operated without the need for traditional switches. This idea is thus economically viable, user-friendly and often lowers wiring costs. It also saves users time [3]. This project uses Bluetooth part that connects the hardware with a mobile device that try to find the solution to the troubles usually faced the elderly aged [4]:

1. The elderly people and the paralyzed are frequently require to control their home environment but they could not do anything because their circumstances and they cannot move to any place , this usually make them have bad impression.

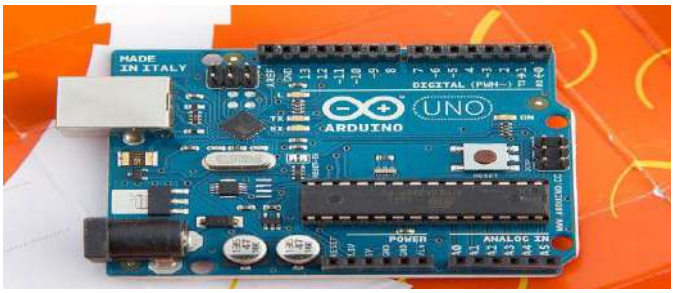
2. also, leave the comfort region to physically delay redundant home devices are frequently tasking after work a long day's or when someone is simply too lazy to get up.

3. For security and safety against electric fire accidents that happened in the home. The client can mechanically turn off all type of devices that may offer increase such risky situations. as a result, this devise making life easier for the disabled and the aged people.

2. System Design

Architecture of Arduino

Arduino is a progress board for unlocking microcontroller tools shown in Figure 1. The Uno board used in this article contains fourteen digital pins, six analog pins and one serial port [5]. The board works between 5 and 10 volts. Arduino 1.6.8 or advanced version is the programming software for this board. Programming is performed with the device that is connected to a board with a USB port by Arduino. The boards are commercially available in pre-assembled form.



Figure(1) Arduino UNO

Bluetooth Unit and Relay Board

We can wirelessly send and receive data through the Bluetooth Module. HC-05 is the Bluetooth module we use for the project. The module used is dependent upon Bluetooth V2.0 protocol and works within 10 meters range with a radio transceiver and baseband frequency of 2.4GHz, with a data rate exchange of 2,1 Mbps maximum. It has footprint with small dimension 12.7mm*27mm. Relay board that we are using provide with 4 relays that each of them handle a load up to 6A[6].

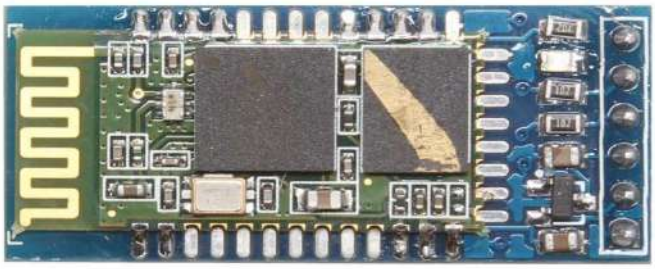


Figure (2) HC-05 Bluetooth Module

Hardware's connection have been done as the following approach:

1. In Arduino IDE, the Bluetooth device is installed with the aid of the bread boards and Bluetooth control code is printed.
2. Relay board will install in the Arduino through bread board and operates in the same way as a switch do for controlling the devices.
3. Android application is designed to communicate with the device to control household appliances using smartphones.
4. Home devices can be remotely controlled.
5. HAS is useful for disabled persons.
6. Internet connection isn't necessary.

Wi-Fi (ESP8266)

Wi-Fi type ESP-12E is developed by Ai-thinker Team. Processor core of ESP8266 unit is smaller in sizes of the module encapsulates Ten silica types (L106) integrates industry-leading ultra little power. 32-bit MCU micro, with the 16 bit short mode, Speed clock support 80 MHz, 160 MHz, supports the RTOS. ESP8266 module is a self-contained SOC with TCP/IP protocol stack which provide any microcontroller access to your Wi-Fi network [7]. ESP8266 is capable of either insert an application or delete all functions of Wi-Fi networking from another application processor. Each ESP8266 element preprogrammed with an AT lead firmware set. ESP8266 module board is relatively cost effective and huge. Figure (3) below presents aarchitecture Esp8266 [8].

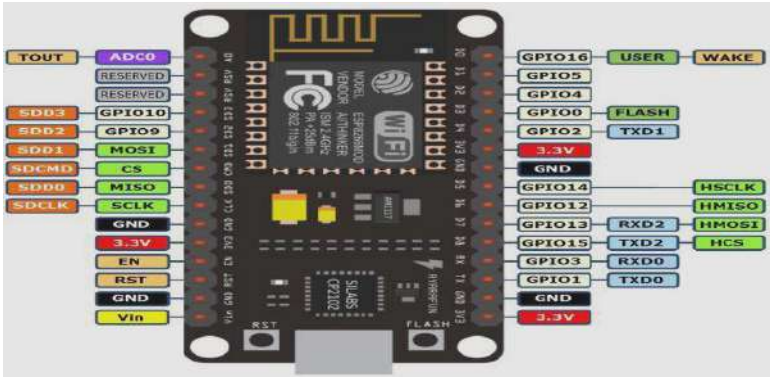


Figure (3):Architecture of Wi-Fi ESP8266

Relay board

A relay is an electrical device that used to control high voltages using little voltage as an Input. It composed of a wrapped coil around a column and a two metal flaps(nodes) very small that are used to control the circuit to close it. One of the node is stable and other is capable of being moved. Any system at home that works in the supply of A.C voltage could be connected directly with this interface circuit. By applying +12V to the common relay terminal, a buzzer can also be joined. Relays that remain on the board can also be configured

like this with the microcontroller [4]. A relay board is shown below.

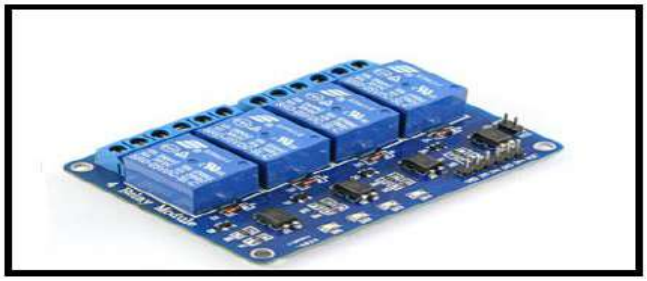


Figure (4) relay board

e. Solenoid Characterization

Solenoids are mainly electromagnets. they are set of a big coil of with an armature (a slug of metal) in the heart. The slug is pulled to the center of the coil when the coil is energised. Solenoid allows you to pull the electromagnetically inductive coil around the plunger. A permanent magnet (PM) used as a plunge for producing a higher actuation force instead of using metal rods. There are imposed more than one form of solenoid forces. One is the electric force within the solenoid, where the magnetic field encourages when a current passes through wound spools. A constant magnet plunger also induced magnet force. A constant magnet plunger also induced magnet force. It's basically an electronic lock used to ensure that factory doors, buildings, etc are closed.

The solenoid lock is usually active to prevent you from opening the door while the slug is in progress. In this state it needs no control. When 9-12V DC is used the tight sprocket pulls in so the door can no longer stretch and open, but we can open and turn it around with the two Phillips-head bolts. It rotates about (90/180 or 270) degrees to conform to the door with which we want to use it. Figure (6) shows the lock of the key [9].

Figure(5) Solenoid Door Lock

3. Experimental work

The main objective of this paper is to formulate and implement a low-cost open-source home automation system which can control and automate most household appliances. For users to run Home Automation System, this app is a simple and manageable web interface. Two scenarios involve this paper:

- **Scenario 1:**

Devices in home are controlled remotely using phone and voice calling. Merged technologies such as Android with Bluetooth to design home automation system, we designed user interfaces using Android because Android operating systems are capturing most of the mobile market. It has technical advantages of scalability, flexibility, availability, safely and facility for users.

The goal is to use Android as a platform, as people are familiar with so many Android applications. The interactive graphical user interface of Android makes it easy for users to operate an application. We have used fans, bulbs etc. that have been graphically depicted in this application to better understand users. Users can use the mobile app to switch ON/OFF devices like a fan, tube lights etc. Even if they are not home, they can also check the status of devices. This app is adjustable for adding or removing devices as required by the user.

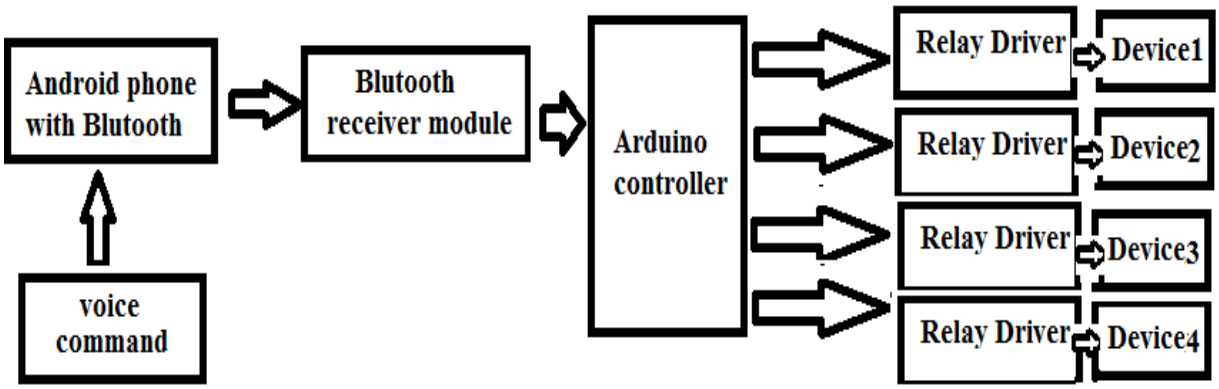


Figure (6) Block representation of the proposed system

The block representation of the automation system proposed is shown in Fig. 6. You can use Android App to enter a voice command on your mobile phone. The command received is transferred on to the mobile phone using the Bluetooth. The command (in a coverage zone of about 30 feet), is obtained and transferred to the Arduino controller, by Bluetooth module HC-05. Controller reads a serial port instruction. Arduino Controller compares the android telephone order. The respective output pin shall be high if the command is matched. The relay control is signaled by the controller and the corresponding appliance is turned on (load). Figure(7a) represent the mobile app and (7b) connection device.

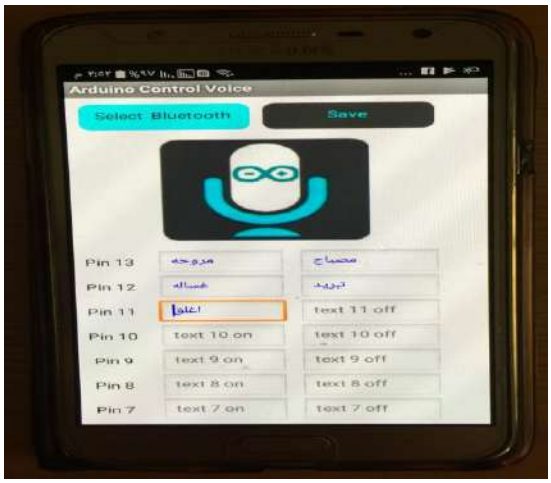


Figure (7a) Mobile Android Application

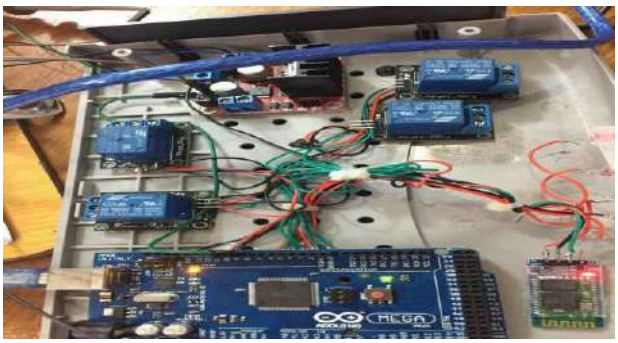


Figure (7b) connection system

- **Scenario 2:** Another approach is design and implementation of new smart home system that uses Wi-Fi type ESP8266 to a Windows based PC through cable. The ESP8266 runs on 3.3V, Wi-Fi is programmed using user name and password of the home or organization, connect ESP8266 to the pins 2 to 9 of the Arduino and then Wi-Fi (D5, D6, D7, D8) connect to four relays. then relay connect to the devices to control and turn (ON- OFF) . there is especial password used to connect Wi-Fi. If the password is right, the correct performance (verification) we heard tone . if password is wrong tone of the failed action will be heard. connect the ground of the ESP8266 with the ground of the Arduino. Lastly, For testing purpose we are using four LED's connect to relays. Figure below (8) represent Proposed wireless HAS architecture .

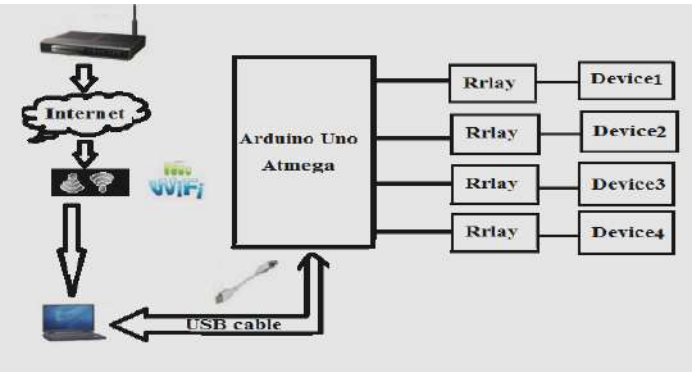


Figure (8) architecture wireless HAS.

Figure (9) illustrate first screen that will be shown to the client to set up relation with Wi-Fi network to control devices and Figure (10) show final screen of Wi-Fi connection.

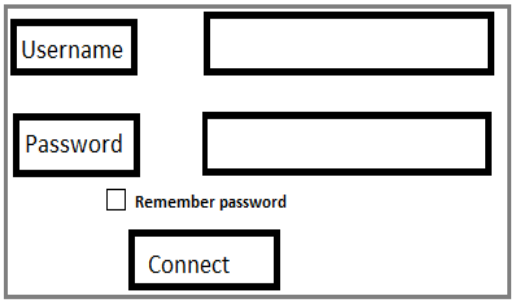


Figure (9) Login Screen

Figure (10) final screen of Wi-Fi connection .

- **Scenario 3:** Another approach is to control the opening and closing of the doors in the house or even the secret used in banks. Using a secret code that can be easily changed as desired by the user and any device he wishes. It is a generic, easy-to-use security lock and control panel with a control panel and secret numbers. After all successful connection we will output as lock/unlock. For this project you will need some equipments used in this system that show in the figure (11):

1- Arduino Uno circuit as data processing center
2- solenoid door open and close circuit as system output (12V DC)
3- key pad
4- Led as indicator
5- Relay circuit as switch

Figure (11) component of the second approach

Here we use an Arduino to control a solenoid door lock that can be opened with the correct key combination. it will be possible to control (Lock/Unlock) solenoid door lock (worked by 12V) by entering password on key pad. When the keys are compressed they are correspond with the keys already stocked. If the keys that are pressed match the initial password stored which is ('****'), then the lock will open up and after 10 sec the lock will close. First connect the (4X4) keypad to the Arduino After that, we linked Arduino with solenoid that connect to relay and relay connect to Arduino. Also use Led connect from pin12 of Arduino if password . We fixed all the problems

during the design and testing of the system. lastly, we successfully achieve our goals.

Figure (12) keypad used that connect with other component

Figure (13) connection between Arduino, relay and solenoid.

it's possible to apply a similar circuit to control different devices or motors that need more current than the Arduino can supply directly from its output pins.

4. Conclusion

There are two scenarios in this paper firstly; this work uses a design model of HAS focused on the wireless Bluetooth technology. Bluetooth home network is set up to track and manage various types of devices that are linked to a home environment over a Bluetooth network. The built home network system Bluetooth includes each computer simulation programs and a home server. A HAS with Bluetooth, Android and Arduino was created for the proposed work. This is an effective low-maintenance and user-friendly system for the elderly and people in a different way. The main motive of this paper is that the systems are controlled by an Android phone with a central control system. It also saves customers time for running equipment. More wires are needed for connecting load in traditional switches. But the need for wire is significantly decreased in the proposed method.

The devices in the home can be monitored and their status (On or OFF) controlled remotely. The concept suggested in this article is also available for manufacturing, malls and hospitals to be automated.

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