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IoT Based Automated Smart Home

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Abstract—This paper deals with the design of home automation controlling of home appliances using wireless remote control. This is achieved using a Bluetooth module and an android application. This low-cost system can be accessed remotely using a laptop or smartphone with a software or an application installed in it. Even the elderly or disabled at home can be able to access it, making their work easy and simple. The design is very simple using some low-cost electrical apparatus, with ease of installation and smart home system also provides more safety control over the electrical switches with some power saving methods. Smart home or home automation provides a better standard of living at home with low-cost design and a user friendly interface.

Keywords—Home automation, Arduino Uno, Bluetooth, Smart home, IoT, GSM module.

I. INTRODUCTION

The concept of "Internet of things" has existed for many. But it is not widely not used everywhere. Few terms like smart-home has been used and are introduced in the concept of network connectivity of appliances and the house wirelessly. Basically, IoT is an interconnection of physical devices also called as smart devices and other embedded systems. Internet of Things allows devices to connect to each other and exchange data or information through wi-fi or Bluetooth wirelessly. IoT is becoming popular nowadays and is entering quickly in the emerging market. Since IoT is not easy to implement and due to its cost, it is not accepted by everyone.

Implementing the of "HOME AUTOMATION" with IoT makes a smart home, where each home appliance is connected to a smart device which can control any connected device from anywhere in the house. Home automation also referred to as "domotics" makes devices to react automatically based on some condition.

Home automation has been there for many years for simple controlling of appliances and due to the advancement of technology the idea is to interconnect all the devices. Allowing full control of the home appliances in your hand from anywhere. In home automation, an individual can dictate how a device should react, what time it should react and for what. HVAC (Heating, ventilation and air conditioning) systems also uses this concept of home automation.

This paper reviews about the HOME AUTOMATION using Bluetooth and Arduino board, which is controlled using a simple android app through a smartphone. With this, electrical appliance can be controlled with just a click. Since Bluetooth is very easy to implement and is of low cost, anyone can afford it and use it as a daily driver. Bluetooth is available is everywhere, in most of the current devices like laptop/notebook, smart phones and they all come with built-in Bluetooth adapter, which automatically reduces the cost of the system.

II. DESCRIPTION

Home automation is a technique in which all the components which absorbs the voltage can be controlled from faraway places using either wi-fi module or Bluetooth module. The technology that can be implemented using internet. The components that are generally used here is as follows:

1. Arduino UNO module.
2. Bluetooth HC-05 module.
3. Relay modules.
4. Electricity consumable devices.

The description of the devices is given below.

III. COMPONENTS REQUIRED

Arduino UNO:

Arduino UNO is a microcontroller board. It is based on the ATmega328 which is a datasheet. There are several pins in the board, such as:

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- 14 digital input/output pins (of which 6 are PWM pins).
- 6 analog inputs.

Apart from these pins they contain a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. The pin number 13 of the analog inputs contains the internal resistance.

Fig.01 Arduino UNO

Bluetooth HC-05 module:

It is a hardware component that is used to establish a wireless connection between any device and the interfacing circuit. Here, in our project, this module establishes a link between the android smartphone and the Arduino board.

Fig 02. Bluetooth HC-05 Module

Relay module:

Relay modules are the devices which are generally used to switch or operate any device over a network. There are several channels of these modules, such as a single channel relay module can control only one device, a two-channel relay module can control two devices. A diagram of a two-channel relay module is shown below.

Fig 03. Relay Module (2 channel)

Devices:

These are the general power consuming devices such as bulbs, fans, TV, ACs, etc.

IV. CONNECTION FLOWCHART

The following diagram shows how the circuit is connected. The main component used here is the Arduino board. All the devices connected here are connected to the Arduino board. The input is given in the form of analog signals. The entire module is being controlled by some set of instructions. These instructions help the Arduino board to fetch the Bluetooth signals and turn off or turn on or perform some other operations on the entire home circuit. The outputs are given to the LCD module, lights, fans and other devices. Since the devices are very high voltage consuming devices, they are connected using the relay modules. For the functioning of the Arduino board, we first upload a specific code to the module.

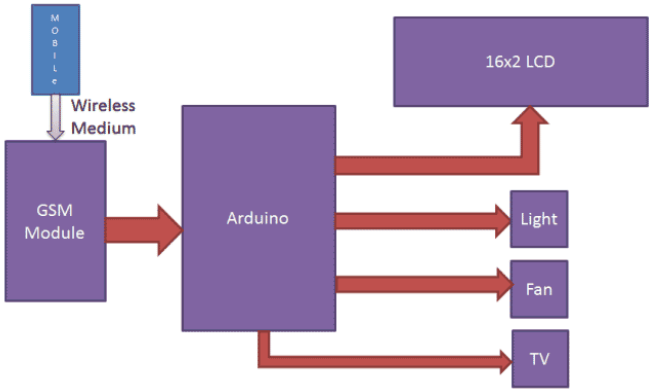

Fig 04. Hardware Flowchart

The Bluetooth module basically contains the ability to control the entire operations of the home automation using a single software. This software has to be uploaded to the programmable Arduino (UNO as we have used) board. The code of the software that has to be uploaded is shown in the next section.

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V. FLOWCHART

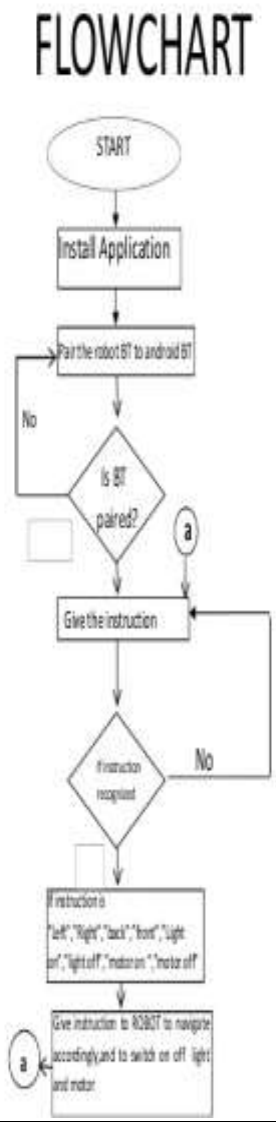

Fig 05. Software Flowchart

VI. CIRCUIT DIAGRAMS

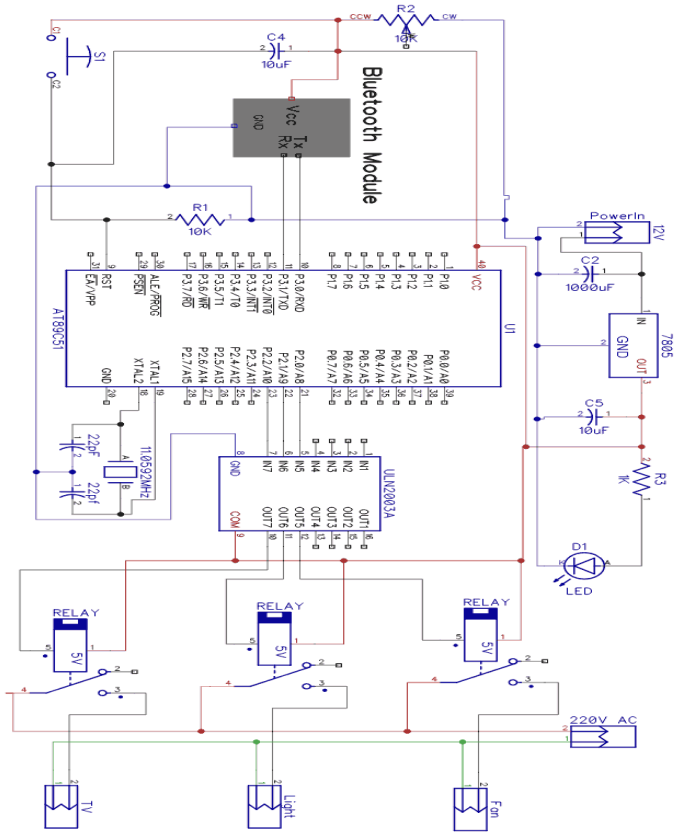

Fig 06. Pin Diagram

VII. FUTURE APPLICATION

1. **Voice controlled Home Automation**

   We have seen how to control our home circuit system using a simple smartphone using Bluetooth. Another way to achieve this is using our voice in it. We can implement this using any voice recognizing application on our android smart phones. In a simple voice recognizing application this system works by saying a simple '1' for turning off the entire system or any particular device of the system. On the other hand, saying anything except '1' is generally considered as input '0', which in turn turns the entire system or any particular device of the system ON.

2. **IR (remote sensing) Home Automation**

   The task of controlling he entire home circuit becomes lot more easy if we do it without using the internet or by some other technology, which can provide the necessary signals to the Arduino. This job can be easily done using remote sensors. The remote sensors provide appropriate signals to control the Arduino and get the proper output.

VIII. CONCLUSION

Hence, this is to conclude that this system can have a complete access to all the devices of our home from any remote location. This is rather a cheaper way of managing the home equipment. Here in this system all the equipment work in a synchronous manner. The entire circuit can be controlled by

just adding an Arduino board and a Bluetooth system. The Bluetooth system will help controlling the system in a very efficient manner. We can even improvise this concept using a voice controller and an IR circuit which may help us to control the circuit in a very different manner. Using voice control, we can control the entire system using our voice controlled apps such as A.I. apps like Cortana, Siri, Google A.I. etc. The IR's can be applied by adding a circuit at the doors. At doors, we can add sensors which can control the home equipment using the basic algorithm of counts. All these future applications are just add-ons to the existing system using Bluetooth module. These might turn out to be very cheap as well as efficient.

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