Electric smart board using mobile bluetooth to control home appliance

Dr. Navneet kumar
Mr. Abhishek kumar
Mr. Aditya kumar singh
Mr. Mahesh Kumar Dubay
Mr. Saurabh Kumar
Mr. Udit Bisht

Rajkiya Engineering College bijnor, India
Electrical Engineering

Abstract

In this paper, the design of an Electric smartboard using mobile Bluetooth to control home appliances is presented. Bluetooth Based Home Automation System Using Android and Arduino is designed and implemented. In this research work, a part of smart home technology that uses Bluetooth in a mobile device is used, so it will be cheap and efficient to use. This paper describes a home automation system that would be used to enable home lighting, garage door motor, water pumping motor, and smoke detection using a smartphone application with Bluetooth wireless technology. The system included three main components: an Arduino microcontroller for connecting the appliances, a Bluetooth module for signal transfer, and a smartphone with the Android application to control home appliances. By using smartphone applications we can control household appliances and provide security to decrepit people. The idea of the paper is to control home appliances to avoid the danger of electric shock and convenience of decrepit and physically disabled people, who can easily access and control the home appliances by staying at a particular place and access them remotely without the help of other people. By using this system, our home automation works smartly by providing increased quality of life and comforts to users.

Keyword: - Arduino Uno, Home automation, Bluetooth Module, Smart phone.

I. Introduction

Nowadays everyone has a smartphone and wants to control everything from the smartphone. Everyone knows how to control mobile phones so it is easy to use and understand. Lights, fans, switches, refrigerators are controlled through a Bluetooth-based remote using Arduino. The design of home automation is going to become simpler and more popular because most people use smartphones nowadays. A smartphone usually supports one or more short-range wireless technologies such as Bluetooth and infrared, making it possible to transfer data via these wireless connections. Smartphones can provide computer mobility, ubiquitous data access, and pervasive intelligence for almost every aspect of business processes and people’s daily lives [1]. One of the smartphone applications that have been developed is smart homes technology [2]. The
fundamentals of building an automation system for an office or home are increasing day-by-day with numerous benefits.

II. Methodology

Home automation describes a system of networked, controllable devices that work together to make your home more comfortable, customized, efficient and secure. In this device there are five main parts: Arduino, Bluetooth module, Relay drivers, android application and step down transformer. Firstly we provide power to the step down transformer, it steps down the input voltage and is given to the arduino with a VIN pin. The Bluetooth module is also connected with an arduino to Rx and Tx pin that provides the information to the microcontroller. Microcontroller reads the information and sends it to the relay drivers which work as switches. In Arduino we upload the program as per requirement then it performs some mathematical and logical operation to control the relay drivers.

III. Literature Review

In recent years, smart home automation systems have become very common technology and especially with fast development in internet WebPages. Various smart home systems with improved technologies have been implemented. Most of the technologies are based on controlling home automation systems in android applications which gives user interface for monitoring and controlling their home electronic appliances from local network or internet.

3.1. Arduino Board

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on LED, publishing something online. We use the Arduino programming language and the Arduino Software (IDE) by sending a set of instructions to the microcontroller on the board to control the Processing. Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers such as students, hobbyists, artists, programmers, and professionals has gathered around this open source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike. Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming.

3.2. Arduino UNO

The Arduino UNO is the best board to get started with electronics and coding. The UNO is the most used and documented board of the whole Arduino family. Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform [3].
3.3. Bluetooth Module (HC-05)

HC-05 Bluetooth Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication which makes an easy way to interface with a controller or PC. HC-06 Bluetooth module provides switching mode between master and slave mode which means it is able to use neither receiving nor transmitting data. The Bluetooth module HC-06 is a MASTER/SLAVE module. By default the factory setting is SLAVE. The Role of the module (Master or Slave) can be configured only by AT COMMANDS. The slave modules cannot initiate a connection to another Bluetooth device, but can accept connections. Master module can initiate a connection to other devices.

HC-05 Bluetooth specifications:

- Bluetooth protocol: Bluetooth Specification v2.0+EDR
- Frequency: 2.4GHz ISM band
- Modulation: GFSK (Gaussian Frequency Shift Keying)
- Emission power: \( \leq 4 \text{dBm}, \text{Class 2} \)
- Sensitivity: \( \leq -84 \text{dBm} \) at 0.1% BER
- Speed: Asynchronous: 2.1Mbps(Max) / 160 kbps, Synchronous: 1Mbps/1Mbps
- Security: Authentication and encryption
- Profiles: Bluetooth serial port
3.4. Relay Drivers

Relay is an electromagnetic switch which is used to defer two circuits electrically and connect magnetically. When the Arduino transmits the signal then the relay driver receives the signal and starts its work. They are frequently used to interface an electronic circuit (working at low voltage) to an electrical circuit which works at extremely high voltage. For instance, a hand-off can make a 5V DC battery circuit to switch 230V AC mains circuits. In this way a little sensor circuit can drive, say, a fan or an electric knob. A transfer switch can be separated into two sections: information and yield. The info area has a loop which creates an attractive field when a little voltage from an electronic circuit is connected to it. This voltage is known as the working voltage. Generally utilized transfers are accessible in various arrangements of working voltages like 6V, 9V, 12V, 24V and so on. In a basic hand-off there are three contactors: ordinarily shut (NC), regularly open (NO) and normal (COM). At no info express, the COM is associated with NC. At the point when the working voltage is connected the transfer curl gets charged and the COM changes contact to NO. Diverse transfer setups are accessible like SPDT and DPDT which have a distinctive number of changeover contacts. By utilizing a legitimate blend of contactors, the electrical circuit can be turned on and off.
IV. Architecture of the Device

This venture centres around the robotization of machines with the assistance of an android application. In this day and age, enhancement is the primary thought process. Any framework created goes for streamlining the human endeavours to a negligible and our framework goes for doing likewise. The architecture of this device as shown in figure 3(a). The user will communicate to the Android application through the Arduino Uno via Bluetooth module. This model is very resilient and gageable, maximum efficiency, safety and securely added smart home appliances with least amount of human effort. The Bluetooth signal has the most efficient energy to connect any signal without loss of information with least harmonics. Home automation system main part consists of Arduino with microcontroller. The people must have a mobile application with proper connection. It should be used as multi appliances work together. The Arduino board is configured for each home appliance using coding in the microcontroller. With the help of Microcontroller, we can control the electromagnetic relay which works as a switch to receive a signal from the Arduino through the Bluetooth module HC-05. When the signal is transmitted from the transmitter as a datasheet to relay then the relay works as a switch and controls many appliances of smart home (multitasking). There are three main parts of this home automation which is given below.

1. Arduino Uno
2. Bluetooth HC-05
3. Relay Drivers

VI. Future works

Though overall the project is completed successfully, further study could be conducted to consider increasing the range of the signal to discover a method to amplify its range from the Bluetooth module. Furthermore, rather than using optocouplers and connecting them to the breadboard, further study could consider the use of a relay module to connect the modules.
V. Conclusion

This project is indeed a low-cost and efficient project for home application. This project is also a cost-effective project with a simple and easy to use interface for decrepit and physically disable peoples. By using this method, home appliances can be controlled to avoid the danger of electric shock and convenience for users. This project can also promote wireless cameras, in order to incorporate other security features of Smart Home Automation System. In terms of upgrading security in the home, doors and windows are also mounted by setting alarms in case of any kind of thief or sabotage.

The approach discussed in the paper is novel and has achieved the target to control home appliances remotely using the WiFi technology to connect system parts, satisfying user needs and requirements. WiFi technology capable solution has proved to be controlled remotely, provide home security and is cost-effective as compared to the previously existing systems. Hence we can conclude that the required goals and objectives of the home automation system have been achieved. The system design and architecture were discussed, and the prototype presents the basic level of home appliance control and remote monitoring has been implemented. Finally, the proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems.

References


