

## Automation of Home Appliances Using Bluetooth

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### ABSTRACT:

This paper presents the overall design of Home Automation System (HAS) with low cost and wireless remote control. This system is designed to assist and provide support in order to fulfill the needs of elderly and disabled in home. Also, the smart home concept in the system improves the standard living at home. The main control system implements wireless Bluetooth technology to provide remote access from PC/laptop or smart phone. The design remains the existing electrical switches and provides more safety control on the switches with low voltage activating method. The switches status is synchronized in all the control system whereby every user interface indicates the real time existing switches status. The system intended to control electrical appliances and devices in house with relatively low cost design, user-friendly interface and ease of installation. We propose additional security feature to this system.

**KEYWORDS:** Bluetooth, Microcontroller, Cell Phone.

### I.INTRODUCTION:

The home automation increases the quality of the control of the home equipment. Main purpose of home automation is "SAVE ELECTRICITY". Everyone can control the home equipment or office equipment automatically. Home automation system saves time, man workforce, money even electricity. Secured, flexible, reliable, user friendly and affordable this are the specification of home automation system. The main objective of this project is to enable user remotely control their home appliances using cell phone via Bluetooth. To control devices first user will check Bluetooth connectivity on his cell phone, then it will ensure to pair its Bluetooth to the Bluetooth connected to microcontroller. Now we will use an application made in MIT app inventor. Through that application we will select options to switch on/off home appliances. Microcontroller will act according to the information provided by the commands given by the user. This is how devices will be controlled. To give this project an additional security feature, we have added a security camera which will capture the image of a visitor outside our home through virtual wifi.

### II.COMPONENTS USED:

#### 1.MICROC PRO for PIC MICROCONTROLLER:

The MicroC PRO for PIC is a powerful, feature-rich development tool for PIC microcontrollers. It is designed to provide the programmer with the easiest possible solution for developing applications for embedded systems, without compromising performance or control. It allows to quickly develop and deploy complex applications

- Write your C source code using the built-in Code Editor (Code and Parameter Assistants, Code Folding, Syntax Highlighting, Auto Correct, Code Templates, and more.)
- Use included microC PRO for PIC libraries to dramatically speed up the development: data acquisition, memory, displays, conversions, communication etc.
- Monitor your program structure, variables, and functions in the Code Explorer.
- Generate commented, human-readable assembly, and standard HEX compatible with all programmers.

- Use the integrated micro ICD (In-Circuit Debugger) Real-Time debugging tool to monitor program execution on the hardware level.
- Inspect program flow and debug executable logic with the integrated Software Simulator.
- Get detailed reports and graphs: RAM and ROM map, code statistics, assembly listing, calling tree, and more.
- microC PRO for PIC provides plenty of examples to expand, develop, and use as building bricks in your projects. Copy them entirely if you deem fit – that’s why we included them with the compiler.

## 2. MICROCONTROLLER PIC 16F 877A:

Microcontroller is a control device which incorporates microprocessor. PIC Microcontrollers are the family of specialized microcontroller chips produced by Microchip Technology in Chandler, Arizona. The acronym PIC stands for “Peripheral interface controller”, although that term is used rarely nowadays. It has these following features in it:-

- It consists of two 8 bit and one 16 bit timer.
- It has serial ports, parallel ports and 5 I/O ports.
- It has 368 bytes RAM
- 256 bytes EEPROM data memory.

## 3. MIT APPLICATION INVENTOR:

This is an open source web application for android provided by google and now maintained by MIT. It uses a graphical interface. It transforms the complex language of text based coding to visual, drag and drop building blocks.

## III. PRINCIPLE:

In the present project a microcontroller is used as a control unit which gets inputs (instructions, commands) from a mobile connected. To make the connection more secure, consumer authentication along with secure, on/off any appliance positioned within Bluetooth range. After pairing the Bluetooth of our cell phone with the Bluetooth connected to the microcontroller, we will send command to microcontroller through application in our smart phone to operate appliances. Then microcontroller sends those commands to the relays. Thus, when the relay drive is activated by the microcontroller, the device either gets ON or is switched OFF as per the requirement. Our project makes use of security camera outside home that will capture the image of a visitor and send it to our smart phone using virtual wifi.

## IV. FUNCTIONAL REQUIREMENT:

1. The microcontroller within the control unit will issue its command to the electrical appliances through a simple control circuit.
2. Bluetooth is used to connect the smart phone to the microcontroller which will relay the command to appliances.
3. The control unit will control the electrical appliances and detect the status of the appliances to be relay back to the microcontroller.
4. Once Bluetooth of the two communicating medium is paired up, command is send by the user to the microcontroller using application made in MIT app inventor.
5. Then microcontroller will act according to the user’s command and operate the devices by activating or deactivating the relays.
6. Security camera added for security purpose will capture the image of a visitor outside the main door and send it to the smart phone through virtual wifi.

**V. TECHNOLOGY CONSIDERATION:**

1. **Wireless Networks:** The easily available networks are mostly based on Bluetooth. This network provides a considerable area of coverage and can be utilized more cost-effectively for this project.
2. **Communication protocols:** The available communication protocol is virtual wifi communication.
3. **I/O interfaces between micro - controller and devices:** Serial or parallel I/O will be considered as options for connection between the user and the microcontroller. Using the microcontroller, a control circuit will be implemented to control the electrical appliances.

**VI. TECHNICAL APPROACH:**

Assuming that the control unit is powered and operating properly, the process of controlling a home device will proceed through this process. The remote user will pair Bluetooth of its cell phone with the Bluetooth connected to the microcontroller. Then user will send command to the microcontroller using application. Thus microcontroller issues commands to the appliance.

**VII. SOFTWARE USED:**

In this project, we have used MIT application inventor for designing the application for android provided by google and now maintained by MIT. It uses a graphical interface. It transforms the complex language of text based coding to visual, drag and drop building blocks. We have used Android Studio for developing the android application for smart phone to control the appliances and take the commands from the user. Then we have used MicroC PRO for PIC to set the program for the microcontroller device and attach the pins accordingly in the embedded systems. It is done in c language. On the other hand we have also used PROTEUS design suit for designing the microcontroller.

**VIII. APPLICATION AND ADVANTAGES:**

1. Effective control of home appliances using mobile phone.
2. Increases power efficiency and the lifetime of the appliances.
3. Power wastage is reduced.
4. Virtual wifi has increased the safety of the user and it is easily affordable as it needs no internet connection.
5. We can use this application for some more leisure activities like dropping and removing of curtains.
6. This has made the system secure by camera feature.

**IX. CONCLUSIONS:**

This experiment was designed keeping in mind the interest of the common people with the belief that the ultimate outcome of this project will be of much help to them, making their lives simpler. It was done using the wireless system and it is extremely fast and efficient. It has combined android client, network transmission, and wireless switch, home information centre to form a complete system. Also by enabling the camera feature it has added to the security in the system that is much reliable and efficient.

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