



# Home Automation System

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## **Abstract:**

This project aims at making an automation switching device using a variable resistor, microphone, LEDs, HW battery, bulb holder, etc. This automation device is capable of automatically switching between different lighting conditions based on the sound intensity in the environment. The project uses a variable resistor to control the frequency at which the lights operate, microphone to detect the intensity of sound in the environment, LEDs to indicate the current state, HW battery to store energy, and a bulb holder to connect to the lighting conditions. Furthermore, it is programmed to take appropriate decisions such as to switch to a brighter/dimmer lighting condition, or turn off the lights depending on the sound intensity in the environment. The device runs on a microcontroller unit, which makes it highly flexible for a number of different applications.

An automated switching device is a piece of electronics that allows the user to control and automate the switching of electrical equipment or appliances. This device uses programmable logic controllers (PLCs) to execute a series of commands and change the state of circuits to turn them on or off. Automated switching devices are used in a wide range of applications such as production control, data networks, and industrial automation. This technology can increase efficiency by allowing for more consistent switching of electrical equipment and by allowing for faster response times than manual switching. Additionally, it offers increased safety to workers by reducing the amount of direct contact with electric current.

## **1. Introduction:**

Home automation refers to the use of technology to control and automate various functions in a residential or commercial building. This can include tasks such as adjusting the thermostat, turning lights on and off, controlling appliances, and managing security systems.

There are many benefits to using home automation systems. For one, they can save homeowners time and energy by automating tasks that would otherwise need to be done manually. They can also help to reduce energy consumption by allowing homeowners to control and monitor their energy usage more effectively. Additionally, home automation systems can increase the security and safety of a home by enabling homeowners to monitor and control access to their home remotely.

There are a wide range of home automation systems available, ranging from simple devices that control a single function to complex systems that can control and integrate multiple functions throughout a home.

Home automation systems can be controlled through a variety of methods, including smartphones, tablets, and voice assistants.

There are also a number of potential drawbacks to home automation systems. One concern is the cost, as some systems can be expensive to install and maintain. Another issue is the potential for security vulnerabilities, as home automation systems often rely on internet connectivity and can potentially be hacked. It is important for homeowners to carefully research and choose a reputable home automation system and to take steps to secure their system.

Overall, home automation can be a useful tool for increasing convenience, energy efficiency, and security in a home. However, it is important for homeowners to carefully consider their needs and do their research before investing in a home automation system.

## **2. Literature Survey:**

### **2.1 Zero PCB-Board**

For testing or for mounting your components you can either design and manufacture a custom PCB or else you can mount it on a zero PCB and accordingly make the connections. General Purpose PCB are perfect if you have not finalized the design or you are making the circuit just once like for a school or college project.

#### **2.1.1 Types of General Purpose PCB:**

1. Single Sided Paper Phenolic
2. Single Sided Glass Epoxy
3. Double Sided Glass Epoxy
4. Flexible PCB

### **2.2 4017-IC:**

Most of us are more comfortable with 1, 2, 3, 4... rather than 001, 010, 011, 100. We mean to say that we will need a decimal coded output in many cases rather than a raw binary output. We have many counter ICs available but most of them produce binary data as an output. We will again need to process that output by using decoders or any other circuitry to make it usable for our application in most cases.

The main features and specifications of IC 407 include the following.

1. The supply voltage of IC 4017 ranges from 3V to 15V, usually +5V
2. This IC is well-matched with Transistor-Transistor Logic or TTL.
3. The operational speed/CLK speed of this IC is 5 MHz.
4. It provides support to 10 outputs that are decoded.
5. It is available in different packages like 16-pin GDIP, PDIP & PDSO
6. Input high time 30 ns
7. Output current is 10 mA
8. Noise immunity is high typically 0.45 VDD
9. Operation is completely static
10. Low power like 10  $\mu$ W
11. Speed operation is medium like 5.0 MHz with 10V VDD
12. Input Voltage or  $V_{in}$  ranges from  $-0.5$  VDC to  $V_{DD} + 0.5$  VDC
13. TS or Storage Temperature ranges from  $-65^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
14. VDD or DC Supply Voltage ranges from  $-0.5$  VDC to  $+18$  VDC
15. PD or Power Dissipation is Dual-In-Line is 700 mW
16. TL or Lead Temperature is  $260^{\circ}\text{C}$

### 2.3 RELAY (9V):

A Relay is a simple electromechanical switch. While we use normal switches to close or open a circuit manually, a Relay is also a switch that connects or disconnects two circuits. But instead of a manual operation, a relay uses an electrical signal to control an electromagnet, which in turn connects or disconnects another circuit.

### 2.4 VARIABLE RESISTORS (1K):

A variable resistor is a resistor of which the electric resistance value can be adjusted. A variable resistor is in essence an electro-mechanical transducer and normally works by sliding a contact (wiper) over a resistive element. When a variable resistor is used as a potential divider by using 3 terminals it is called a potentiometer. When only two terminals are used, it functions as a variable resistance and is called a rheostat. Electronically controlled variable resistors exist, which can be controlled electronically instead of by mechanical action. These resistors are called digital potentiometers.

1. **Fixed resistors:** These resistors have a specific value and these values cannot be changed.
2. **Variable resistors:** These resistors do not have a specific value and the values can be changed with the help of dial, knob, and screw.

### 2.5 LED:

A light-emitting diode (LED) is a semiconductor device that emits light when an electric current flows through it. When current passes through an LED, the electrons recombine with holes emitting light in the process. LEDs allow the current to flow in the forward direction and blocks the current in the reverse direction.

### 3. HARDWARE REQUIRED:

1. Zero PCB- Board
2. 4017-IC
3. Relay (9V)
4. Variable resistors (1K)
5. Microphone
6. Resistor (10K&1K)
7. BC547
8. LEDs
9. HW Battery
10. Battery Connector
11. Bulb Holder

### 4. CIRCUIT DIAGRAM:

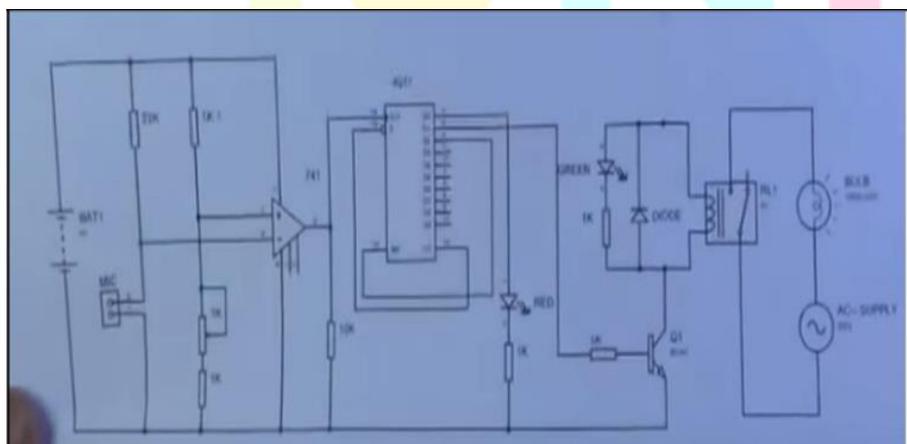


FIG 1: Time relay home automation system circuit diagram

## 5. **SUMMARY & CONCLUSION:**

The system as the name indicates, 'Home automation' makes the system more flexible and provides attractive user interface compared to other home automation systems. In this system we integrate mobile devices into home automation systems. A novel architecture for a home automation system is proposed using the relatively new communication technologies. The system consists of mainly three components is a BLUETOOTH module, PCB microcontroller and relay circuits. WIFI is used as the communication channel between android phone and the PCB microcontroller. We hide the complexity of the notions involved in the home automation system by including them into a simple, but comprehensive set of related concepts. This simplification is needed to fit as much of the functionality on the limited space offered by a mobile device's display. The approach discussed in the paper is novel and has achieved the target to control home appliances remotely using the WiFi technology to connects system parts, satisfying user needs and requirements 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 home automation system have been achieved. The system design and architecture were discussed, and 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.

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