

**Title:** Home Automation System

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**Title:**

Embedded systems and Iot

Embedded systems refer to computer systems designed to perform specific functions within a larger device or system. They are typically composed of microcontrollers or microprocessors that are embedded into hardware and operate with limited resources. These systems are dedicated to performing a specific task, such as controlling machinery, monitoring sensors, or managing communication protocols.

## **Heading1 : COMPONENTS Required**

Arduino UNO

Single Channel Relay Module

Bluetooth Module HC-05

LED Bulb

Power Supply (USB)

Bread Board

Push Button Jumper Wires

5V Battery

Resistors (220ohm, 10kohm)

## **Heading2 : Components Description**

Arduino UNO :

- Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software.
- It consists of a circuit board, which can be programed (referred to as a microcontroller) and a ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board.
- Arduino provides a standard form factor that breaks the functions of the micro-controller into a more accessible package.

1 Channel Relay : The 1 Channel 5V Relay Module provides a single relay that can be controlled by any 5V digital output from your microcontroller. The relay is accessible using screw terminals and can handle up to 2A of current. A handy LED indicates the status of the relay.

HC 05 Bluetooth Module :

- 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 controller or PC.
- Designed to replace cable connections HC-05 uses serial communication to communicate with the electronics. Usually, it is used to connect small devices like mobile phones using a short-range wireless connection to exchange files.

### **Heading3: Working Principle**

HC 05/06 works on serial communication. Here the android app is designed to send serial data to the Bluetooth module when a certain button is pressed. The Bluetooth module at the other end receives the data and sends it to Arduino through the TX pin of the Bluetooth module(RX pin of Arduino). The Code fed to Arduino checks the received data and compares it based on which the relay works to perform the required task(on or off a signal). Simultaneously push button works depending on the condition of LED to change it

### **Heading 4: Data Sheets**

Arduino UNO :

- Microcontroller ATmega328 • Operating Voltage 5V • Input Voltage (recommended) 7-12V • Input Voltage (limits) 6-20V • Digital I/O Pins 14 (of which 6 provide PWM output) • Analog Input Pins 6 • DC Current per I/O Pin 40 mA DC • Current for 3.3V Pin 50 mA • Flash Memory 32 KB of which 0.5 KB used by bootloader • SRAM 2 KB • EEPROM 1 KB • Clock Speed 16 MHz

Bluetooth Module :

- Length: 28 mm (1 in) • Width: 15 mm (0.6 in) • Height: 2.35 mm (0.1 in) • Supply voltage: 3.3V to 6.0V • Operating voltages: 3.3V (all other pins, except VCC) • Working current: 30mA • Operating range: max. 10m (33 ft) • Default password: 0000 or 1234 (depends on model/manufacture)

LED :

- Input Voltage Range: 100-277 Vac Nom. (90-305 V Min/Max) • Frequency: 50/60 Hz Nom. (47-63 Hz Min/Max) • Power Factor:>0.90 @ full load, 100V through 277V 3 • Input Current:0.25 Amps max at 120 Vac • Efficiency:85% typical at max load • Maximum Power:20W • Leakage Current:300 µA Typical • Hold Up Time: Half Cycle • Output Protection: Over-Voltage, Over-Current, and Short Circuit Protection with Auto Recovery • Minimum Starting Temp: -30°C • Storage Temperature: -40°C to +85°C • Maximum Case Temp.90°C • Humidity:5% to 95% • Cooling: Convection • Sound Rating: Class A • Vibration Frequency:5 to 55 Hz/2g, 30 minutes • Weight:5.8 oz (165 grams) typical

Push Button :

• Mode of Operation: Tactile feedback • Power Rating: MAX 50mA 24V DC • Insulation Resistance: 100Mohm at 100v • Operating Force:  $2.55 \pm 0.69$  N • Contact Resistance: MAX 100mOhm • Operating Temperature Range: -20 to +70 °C • Storage Temperature Range: -20 to +70 °C

1 Channel Relay :

Contact current 10A and 250V AC or 30V DC. • Each channel has indication LED. • Coil voltage 12V per channel. 3 • Kit operating voltage 5-12 V • Input signal 3-5 V for each channel. • Three pins for normally open and closed for each channel.

## **Heading 5: Challenges Faced**

Had to know about different functions and data sheets of respective components. Hence we searched about them in internet and used ChatGpt for better understanding .

## **Heading 6: Conclusion**

With the help of Raspberry Pi we can do Iot, Home automation, Robotics, Security system etc. IoT is deployed for Smart homes, Wearables (watches and bracelets), Smart Cars, Smart farming, Smart Retail, Smart Grids, Smart city, and smart healthcare. With such a broad spectrum of applications, the future of IoT looks more promising than ever before.

## **References:**

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