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Mini Project

TITLE :

IoT Based AC REMOTE CONTROL USING NODE MCU

➢ CONTENTS :

➢ INTRODUCTION :

- IoT (Internet of Things) is a rapidly growing technology that has transformed the way we interact with devices and appliances in our daily lives.

- One of the most popular IoT applications is the remote control of household appliances, such as air conditioners. An IoT-based AC controller using NodeMCU is a system that enables remote control of an AC unit through a web application.

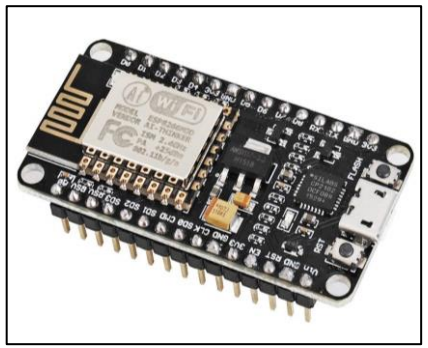
- By using the NodeMCU board and an IR sensor, the user can send commands to the AC unit remotely through the internet, such as turning the unit on/off, adjusting the temperature. The system is cost-effective, easy to install and use, and scalable to handle multiple AC units.

- This technology has brought about a new level of convenience and flexibility to our daily lives and has the potential to revolutionize the way we interact with our appliances.

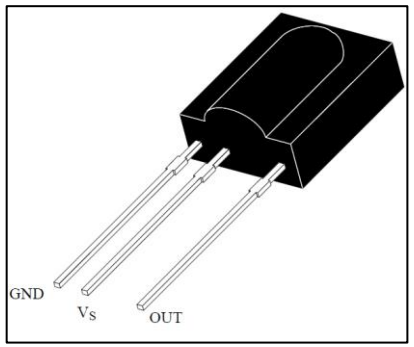
➢ PROBLEM STATEMENT :

- Air conditioning is a common appliance used in many homes and offices. However, controlling the AC unit remotely can be a challenge, especially when the user is not in the same room as the AC unit.
- The traditional way of controlling the AC unit through a remote controller has limitations, such as the need to be within a certain range and the possibility of losing or misplacing the remote controller.
- To overcome these limitations, an IoT-based AC controller using NodeMCU can be developed. This solution will enable the user to control the AC unit remotely from anywhere, as long as they have internet access.

➢ Hardware Requirements:

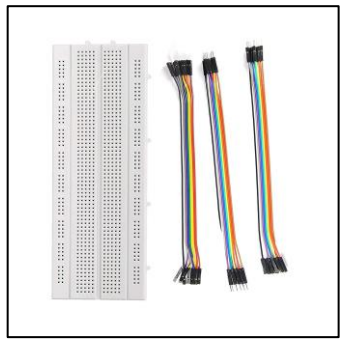


NodeMCU board

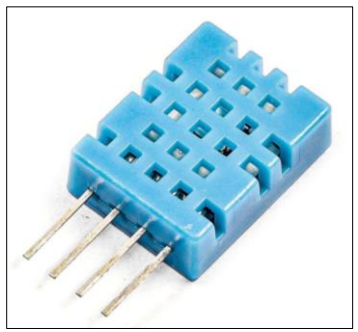


TSOP 1738

IR LED



Jumper Wires and Bread Board



DHT 11

➢ Hardware Requirements:

NodeMCU board: This is a small microcontroller board that contains an ESP8266 Wi-Fi chip, making it easy to connect to the internet wirelessly.

IR sensor (TSOP1738): This is an IR receiver module that is used to capture and decode IR signals sent by the remote control.

IR LED : An IR LED (Infrared Light Emitting Diode) is commonly used in an IoT-based AC controller using NodeMCU. The IR LED is used to transmit IR signals to the AC unit, allowing remote control of the AC unit through the internet.

Breadboard: A breadboard is used to create a prototype of the circuit and to make the connections between the components.

DHT 11: The DHT11 sensor measures temperature and humidity.

➢ Hardware Requirements:

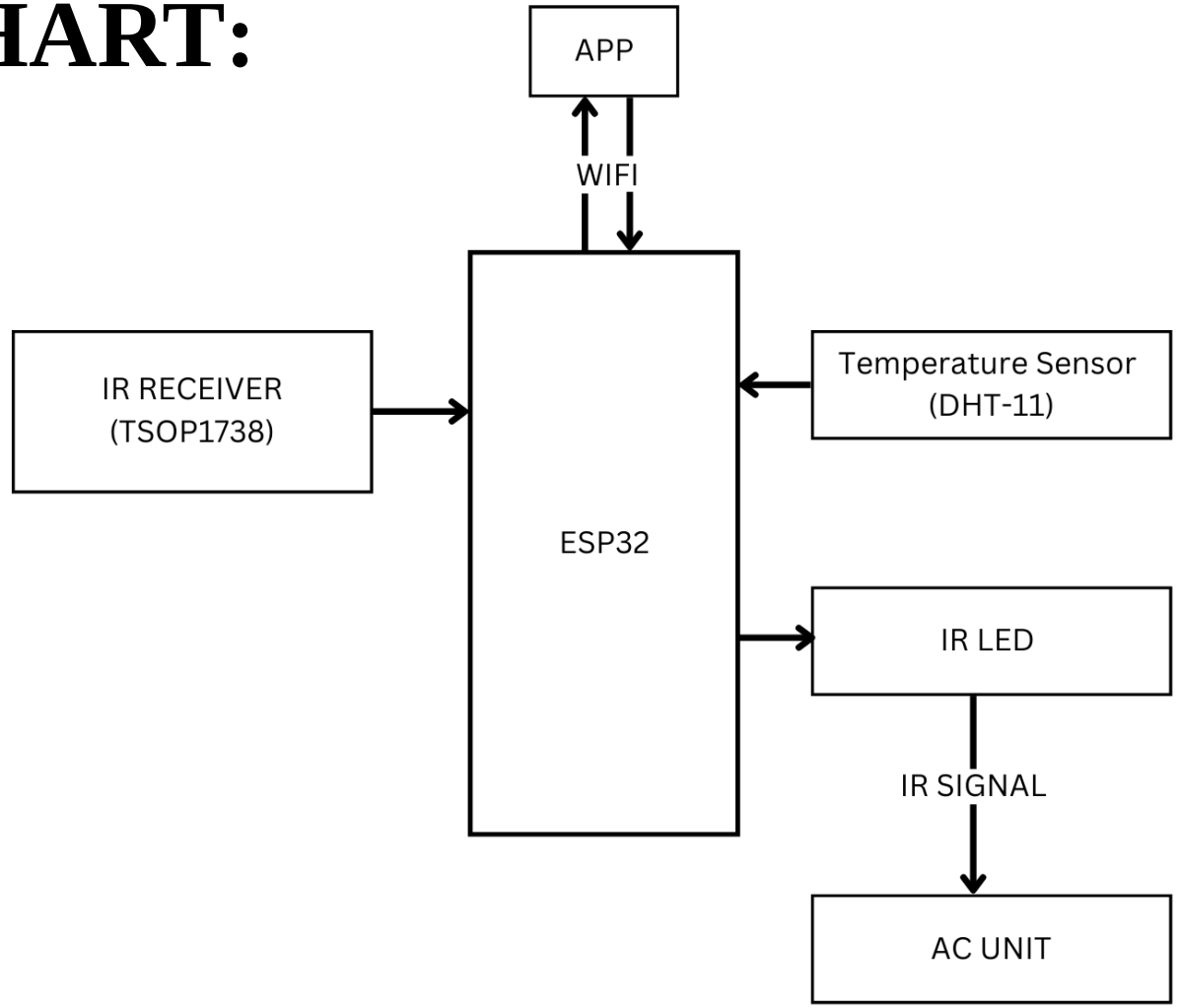
Jumper wires: Jumper wires are used to make the connections between the components on the breadboard.

AC unit: The AC unit to be controlled by the IoT-based AC controller.

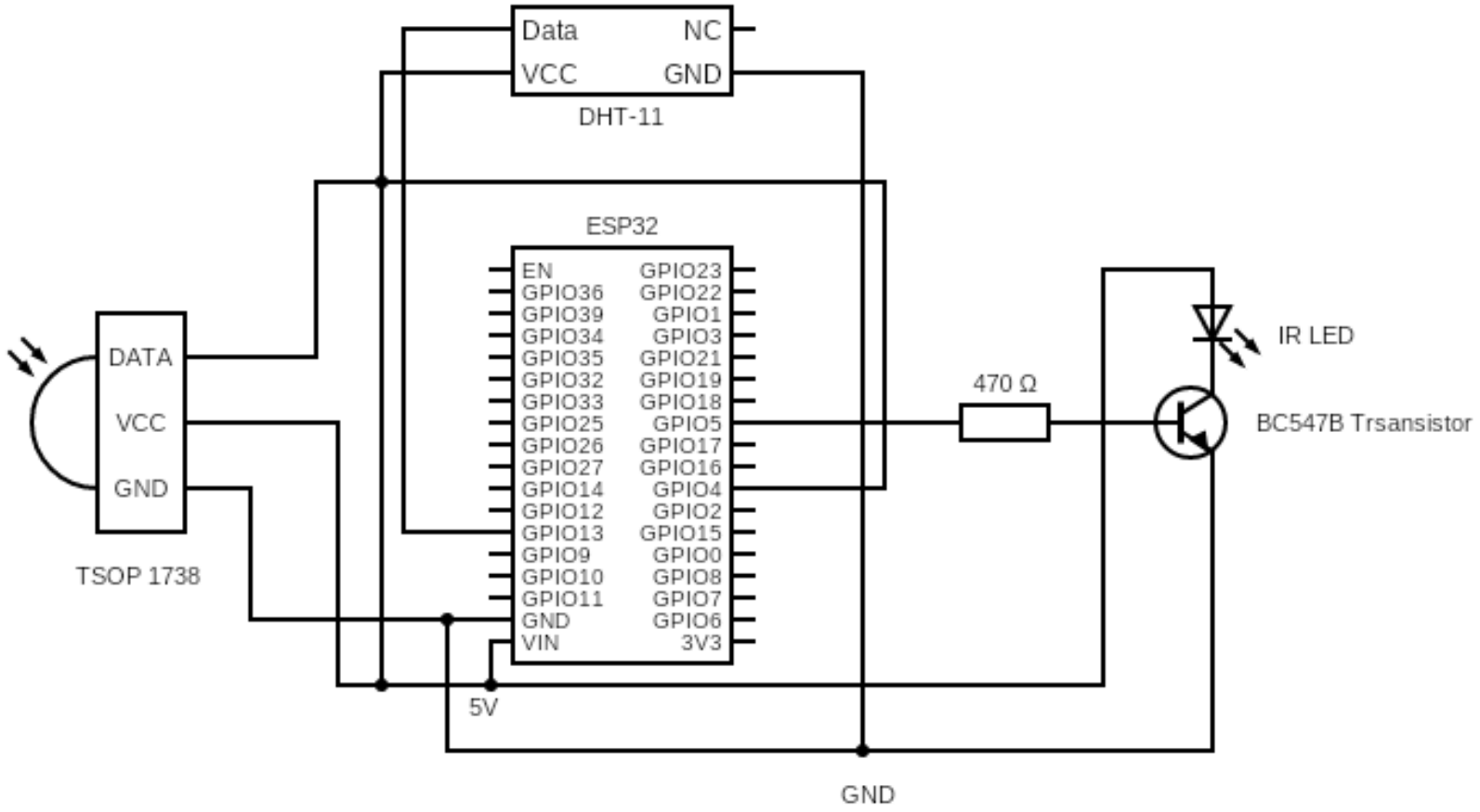
Power supply: A power supply is required to power the NodeMCU board and the IR sensor.

USB cable: A USB cable is used to connect the NodeMCU board to a computer for programming and power.

➢ FLOW CHART:


APP
WIFI
IR RECEIVER
(TSOP1738)
Temperature Sensor
(DHT-11)
ESP32
IR LED
IR SIGNAL
AC UNIT

➢ CIRCUIT DIAGRAM:



➢ CIRCUIT DIAGRAM:

IR Receiver (TSOP1738):

We have Connected the output (OUT) pin of the IR receiver to GPIO 33 on the ESP32 board. And connected the GND and 5V to Vin

IR LED:

Connect the anode (longer leg) of the IR LED to GPIO 14 on the ESP32 board through BC547B Transistor.

DHT11 Sensor:

Connect the data pin of the DHT11 sensor to GPIO 13 on the ESP32 board.

5V and GND connection say.

➢ CIRCUIT DIAGRAM:

BC547B Transistor:

Connect the base of the transistor to GPIO 14 on the ESP32 board through a series resistor (e.g., 470 ohms).

Connect the collector of the transistor to the anode of the IR LED.

Connect the emitter of the transistor to the ground (GND) of the ESP32 board.

➢ WORKING PRINCIPLE:

The working principle of an IoT-based AC controller using NodeMCU involves capturing and sending IR signals to the AC unit through the internet. The following are the steps involved in the working principle of the system :

- The user accesses the web application through a device connected to the internet, such as a smartphone or computer.
- The web application sends commands to the NodeMCU board through Wi-Fi, such as adjusting the temperature, turning on/off the AC unit, or scheduling when the unit should be turned on/off.
- The NodeMCU board receives the commands and processes them, converting them into IR signals that are compatible with the AC unit.

➢ WORKING PRINCIPLE:

- The IR sensor captures the IR signals sent by the NodeMCU board and transmits them to the AC unit.
- The AC unit receives the IR signals and executes the corresponding action, such as turning on/off, adjusting temperature, etc.

Overall, the system's working principle relies on the conversion of commands from the web application into IR signals that are compatible with the AC unit. By capturing and sending IR signals through the internet, users can remotely control their AC unit, adding a new level of convenience and flexibility to their daily lives.

➢ ADVANTAGES:

- **Convenience:** Users can control their AC unit from anywhere with internet access, adding a new level of convenience and flexibility.
- **Cost-Effective:** The system uses low-cost hardware components, making it an affordable solution for anyone looking to remotely control their AC unit.
- **Easy to Install and Use:** The system's installation process is straightforward, and the user interface is user-friendly, making it easy to use.
- **Scalability:** The system can handle multiple AC units, making it an ideal solution for both homes and offices.

➢ LIMITATIONS:

- **Security:** The system is vulnerable to cybersecurity threats, and proper security measures need to be implemented to prevent unauthorized access.
- **Dependence on Wi-Fi:** The system relies on Wi-Fi connectivity, and a stable internet connection is necessary to ensure proper functionality.
- **Compatibility:** The system may not be compatible with all AC unit models, and some units may require specific IR codes that the system may not support.
- **Power Outages:** Power outages can disrupt the system's functionality, and the user may need to manually turn on the AC unit in case of power failure.

➢ FUTURE WORK

1. **Integration with voice assistants:** The AC remote control system could be integrated with popular voice assistants like Amazon Alexa or Google Assistant. This would allow users to control their AC using voice commands.
2. **Smart scheduling:** Adding a scheduling feature to the system would allow users to set their AC to turn on or off automatically at specific times of the day. This would improve energy efficiency and reduce user effort.
3. **Remote access:** The system could be improved to allow remote access to the AC control, meaning users could control their AC from anywhere in the world using a mobile app.
4. **Integration with other home automation systems:** The system could be integrated with other home automation systems, such as lighting or security systems, to create a complete smart home experience.
5. **Advanced sensors:** The system could be improved by using advanced sensors to monitor factors such as air quality or occupancy. This would allow for more intelligent and personalized control of the AC.

➢ CONCLUSION:

- In conclusion, an IoT-based AC controller using NodeMCU is a highly effective and accessible technology for remotely controlling AC units through the internet. With the use of the NodeMCU board, IR sensor, and IR LED, users can easily control their AC units from anywhere with an internet connection, using a mobile app or web-based interface.

- The system's adaptability and potential for integration with other IoT devices make it a highly versatile solution for home automation, while its ability to improve energy efficiency and reduce electricity bills make it an environmentally friendly and cost-effective solution.

- Overall, the IoT-based AC controller using NodeMCU is a promising technology with a wide range of benefits for users, making it an excellent choice for anyone looking to enhance their home automation capabilities and reduce their environmental impact.

➢ REFERENCES:

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