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COLLEGE OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING,

MICROPROCESSORS (COE 381)

GROUP 8

TEMPERATURE CONTROLLED/SMART FAN

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PROBLEM BACKGROUND

In modern office environments, maintaining a comfortable temperature is essential for employee productivity and well-being. However, manually adjusting fans based on temperature changes can be inefficient and time-consuming. To address this issue, an automatic temperature-controlled Bluetooth fan system can be developed to regulate airflow and maintain optimal conditions.

PROBLEM STATEMENT

Design and implement an automatic temperature-controlled Bluetooth fan system for office spaces that adjusts fan speed based on temperature changes.

OBJECTIVES

1. Temperature Sensing:

Utilize sensors to accurately measure the temperature in the office environment.

2. Bluetooth Connectivity:

Incorporate Bluetooth technology to enable remote control and monitoring of the fan system via a smartphone or tablet.

3. Fan Speed Control:

Automatically adjust the fan speed based on real-time temperature readings to maintain a comfortable environment.

4. Efficiency:

Ensure the system operates efficiently, minimizing energy consumption while providing effective temperature control.

SUGGESTED SOLUTION

After thorough consideration, the team decided to develop an automatic temperature-controlled Bluetooth fan system as the most suitable solution. This system utilizes temperature sensors to detect environmental changes and adjusts fan speed accordingly. Additionally, Bluetooth connectivity allows users to control the fan remotely using a mobile app.

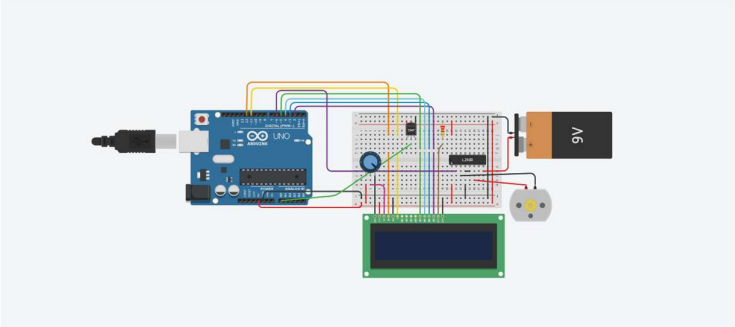
COMPONENTS

1. Arduino Board
2. Temperature Sensor (e.g., DHT22)
3. Bluetooth Module (e.g., HC-05)
4. DC Fan
5. BC 457 Transistor
6. 9v Battery
7. Power Supply
8. Jumper Wires

SOLUTION DESIGN

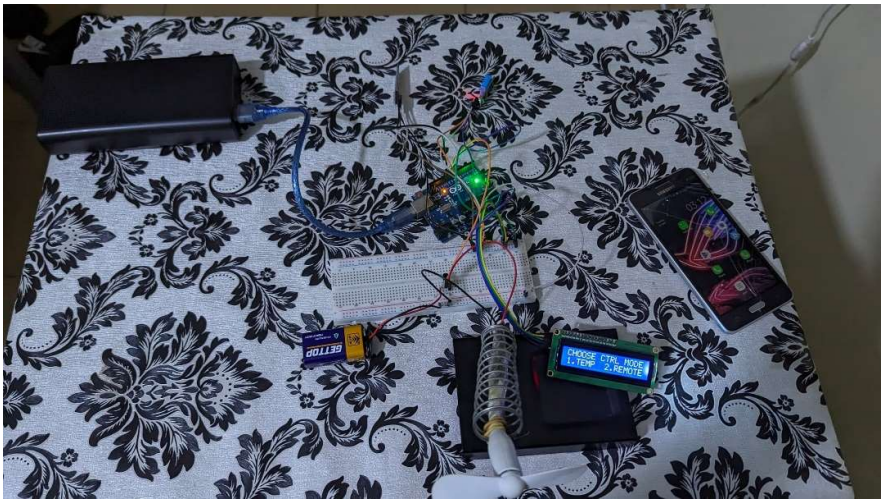
SIMULATION

To begin the design process, the project was simulated using software tools like Tinkercad or Proteus. The hardware connections were established, and code was written to simulate the functionality of the temperature-controlled Bluetooth fan system.



HARDWARE ASSEMBLY

Following successful simulation, the necessary hardware components were assembled. The Arduino board served as the central processing unit, connected to the temperature sensor, Bluetooth module, motor driver, and DC fan. Proper wiring and connections were ensured to facilitate seamless operation.



SOFTWARE DEVELOPMENT

The code development process commenced with the inclusion of required libraries and modules for sensor data acquisition and Bluetooth communication. Using an object-oriented approach, instances of each component were created within the setup function.

This Arduino code orchestrates a temperature-controlled Bluetooth fan system. It's designed to provide users with flexibility in controlling fan operation either based on real-time temperature readings or through manual speed adjustments via Bluetooth commands.

The setup initializes essential components, including the DHT temperature sensor, Bluetooth module, and Liquid Crystal Display (LCD). It prompts users to pair with the Bluetooth module and select the desired control mode—either temperature-based or remote control.

In the loop function, it continuously checks for incoming serial commands from both the Arduino IDE (Serial) and the Bluetooth module (mySerial). Depending on the received commands, it toggles between temperature control and manual control modes, turns the fan on or off, and adjusts fan speed accordingly.

For temperature control, the system reads temperature data from the DHT sensor and adjusts the fan speed based on predefined temperature thresholds. The LCD displays real-time temperature readings and fan status.

In manual control mode, users can choose from four predefined fan speed modes by sending corresponding commands via Bluetooth. The LCD provides feedback on the selected speed mode.

The code consisted of several functions with distinct purposes:

1. Temperature Reading:

The system continuously monitored temperature readings from the sensor to assess environmental conditions.

2. Bluetooth Communication:

Utilizing Bluetooth connectivity, the system established communication with mobile devices for remote control and monitoring.

3. Fan Speed Control:

Based on temperature data, the system dynamically adjusted the fan speed using PWM modulation to achieve optimal airflow and comfort.

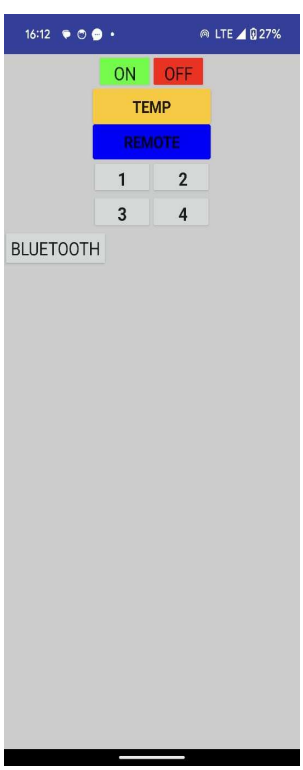
4. Efficiency Optimization:

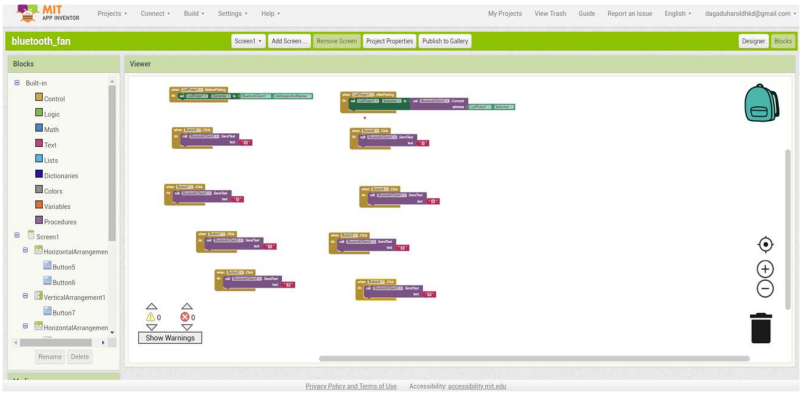
Efforts were made to optimize the system's efficiency, ensuring minimal energy consumption while maintaining effective temperature control.

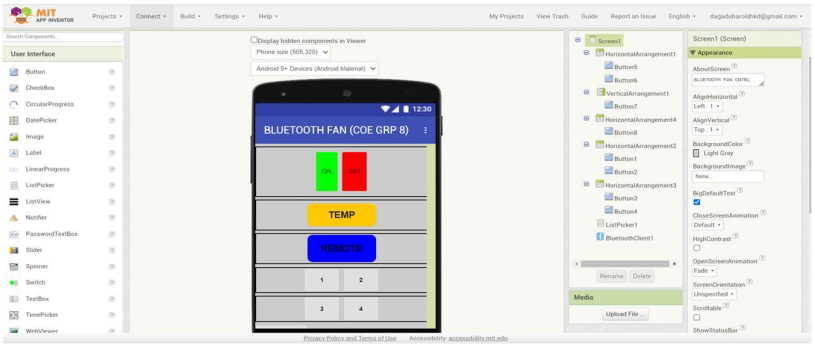
THE BLUETOOTH APP ON THE MOBILE PHONE

We also created an app for controlling a Bluetooth fan using MIT App Inventor. We started by designing an intuitive interface with buttons and sliders for easy fan control. Next, we integrated Bluetooth functionality to establish communication with the HC-05 module, allowing seamless interaction with the fan.

Afterwards, we focused on programming the app's logic, ensuring that user inputs triggered the appropriate commands for fan operation. Through thorough testing and debugging, we fine-tuned the app's performance, ensuring smooth functionality. Once satisfied, we exported the app as an APK file for easy installation on Android devices. Our collaborative effort resulted in a user-friendly app that empowers users to effortlessly control their Bluetooth fan, bridging convenience with technology.







CONCLUSION

The automatic temperature-controlled Bluetooth fan system provides an efficient solution for regulating office temperature, enhancing employee comfort, and productivity. Through the integration of sensors, Bluetooth technology, and intelligent control algorithms, the system offers seamless operation and effective temperature management.

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