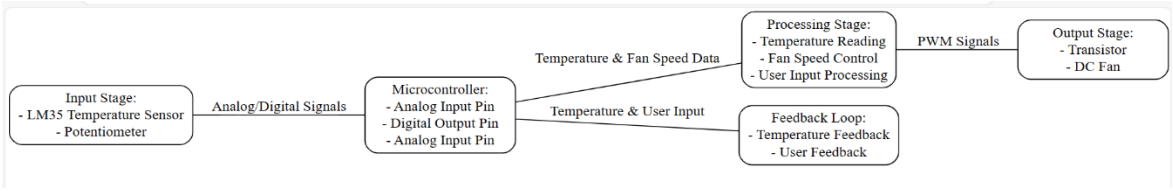
Temperature Controlled DC Fan using Microcontroller

Abstract:

The goal of the Temperature Controlled DC Fan project is to develop an intelligent system that can detect changes in the surrounding air temperature and automatically modify a DC fan's speed. This project achieves temperature-dependent fan speed control by using a potentiometer, an LM35 temperature sensor, and a microcontroller. The microcontroller receives analog voltage signals from the LM35 temperature sensor, which measures the ambient temperature precisely. These analog signals are processed by the microcontroller, which uses them to calculate the proper fan speed level by translating them into Celsius temperature values. Furthermore, users have the flexibility and customization options to manually adjust the fan speed thanks to a potentiometer. In order to maintain a comfortable environment, the system's processing stage continuously monitors temperature changes and adjusts the fan speed in real-time. The microcontroller generates PWM signals, which are then transmitted to a transistor for effective signal amplification and speed control of the DC fan. Overall, this project demonstrates how to combine intelligent control algorithms with hardware to create a workable and energy-efficient solution for regulating temperature in a variety of settings.

BLOCK DIAGRAM:



Input Stage:

LM35 Temperature Sensor and Potentiometer: These components serve as the inputs to the system. The LM35 sensor measures the ambient temperature and converts it into analog voltage signals, while the potentiometer allows manual adjustment of the fan speed.

Microcontroller:

Analog Input Pin: Connects to the LM35 sensor to read the analog voltage signals representing temperature values.

Digital Output Pin: Controls the speed of the DC fan through PWM (Pulse Width Modulation) signals sent to a transistor.

Analog Input Pin: Connects to the potentiometer to read the desired fan speed set by the user.

Processing Stage:

Temperature Reading: The microcontroller processes the analog signals from the LM35 sensor, converting them into Celsius temperature values.

Fan Speed Control: Based on the temperature reading, the microcontroller adjusts the fan speed by generating PWM signals that control the transistor's switching.

User Input Processing: The microcontroller also reads the analog input from the potentiometer, allowing users to set their desired fan speed manually.

Output Stage:

Transistor: Amplifies the PWM signals from the microcontroller, controlling the current flow to the DC fan and adjusting its speed accordingly.

DC Fan: Receives the adjusted voltage or PWM signals from the transistor, regulating its speed based on the control signals received.

Feedback Loop:

Temperature Feedback: The microcontroller continuously monitors the temperature readings from the LM35 sensor, ensuring that the fan speed is adjusted as per the ambient temperature changes.

User Feedback: Optionally, the microcontroller can provide feedback to the user through an LCD display or LED indicators, indicating the current temperature and fan speed settings.