

AUTOMATED WINDOW CONTROL SYSTEM WITH TEMPERATURE AND VOICE-INTEGRATION

Mini-project on Embedded Systems and Microprocessors

PROBLEM STATEMENT

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INTRODUCTION:

The primary objective of this project is to create an advanced and inventive automated window control system that significantly improves the comfort level within a room. This improvement is achieved through the implementation of intelligent window operations that respond dynamically to changes in temperature and can be controlled using voice commands.

Our project aims to use raspberry pi 3 model B+ to use Wi-Fi modules in it. The room has a temperature sensor (DS18B20), and the system can get information on local temperatures from the OpenWeather API. The room temperature and current time will be shown on an LCD display. Based on the difference in temperature, the system sends a signal to open/close the windows to the stepper/continuous servo motors. Two stepper/continuous servo motors are attached at the ends of the window connected by a chain, and from the signal received, one of the motors rotates a fixed number of rotations (as coded). Small suction hooks attach a part of the chain to the window. This would let air flow happen/stop, which gives desired output.

There is a voice-recognized system that makes the system user control. There are three commands for the user, namely open, close, and automate, which will perform as they are called. There is also a plan to detect the luminous intensity and rain and add them to the current automation. If there is too much light intensity, the window will close; when there is low to moderate rain, the window will open, or else it will close. The hierarchy goes as follows Voice controlled, (photosensitive), (precipitation level), temperature controlled.

MOTIVATION:

Our project is driven by observing the difficulties in maintaining optimal indoor comfort, particularly in balancing temperature and individual well-being. The conventional methods of window control often fall short, especially in rapidly changing temperature conditions. To address this, we aim to develop an innovative smart system that leverages automation for intelligent window management. The system can autonomously decide when to open or close windows by utilizing real-time temperature data to ensure optimal indoor conditions. Our primary goal is to simplify window control. Manual adjustments can be cumbersome and inefficient. By integrating precise temperature data and automation, we intend to enhance indoor comfort significantly. Moreover, we're incorporating voice control into the system to enhance user-friendliness and interactivity. With voice commands, users can effortlessly manage window operations, customizing the system to their preferences. This not only offers direct control but also personalizes the experience. In essence, our project aims to redefine the concept of window control. Through automation and voice integration, we aspire to create indoor environments that are more adaptable, user-centric, and attuned to individual needs.

COMPONENTS REQUIRED:

- Raspberry Pi 3 Model B+ Kit with 8GB (1)

Sensors:

- DHT22 (or AM2302) Temperature and Humidity Sensor (1)

Others:

- Cycle Chain (1)
- Free wheels (2)
- Continuous Servo Motors (2)
- Weather API (to fetch outdoor temperature data)
- Wi-Fi Connectivity
- 16X2 LCD Display for Raspberry Pi (1)
- Suction Hooks (4)
- Microphone for Raspberry Pi (1)

BUDGET:

S.No	Components	Price (Rupees)
1	Raspberry Pi 3 Model B+ Kit with 8GB (1)	5,000
2	DHT22 (or AM2302) Temperature and Humidity Sensor (1)	169
3	Cycle Chain (1) and Free Wheels (2)	440
4	Continuous Servo/Stepper Motors (2)	1,273
5	Suction Hooks (4)	199
6	16X2 LCD Display for Raspberry Pi (1)	265
7	Microphone for Raspberry Pi (1)	169
	Total Price	5000 + 2,515

BLOCK DIAGRAM:

