Basic Heater Control System

Intern Assignment Submission

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Date: July 30, 2025

1. Introduction

This project involves designing and simulating a basic heater control system using a DS18B20 temperature sensor and Arduino UNO on the Wokwi simulator. The system reads temperature data and controls a simulated heater represented by LEDs. It ensures temperature is maintained within desired thresholds, indicating system states through serial logging and LEDs.

2. Minimum Sensors Required

Only one digital temperature sensor (DS18B20) is required for this system. It is accurate, simple to interface, and communicates using a single-wire protocol, which reduces wiring complexity.

3. Communication Protocol

The OneWire protocol is used for communication between the Arduino and the DS18B20 temperature sensor. This protocol supports multiple devices on a single data line and is ideal for low-speed communication with minimal wiring.

4. Block Diagram

The system consists of the following components:
- Arduino UNO (controller)
- DS18B20 temperature sensor connected via OneWire to Pin 2
- Yellow LED (Heater ON indicator) connected to Pin 6
- Red LED (Overheat warning) connected to Pin 7
- Serial monitor for temperature and status logging

5. Future Roadmap

- Add automatic overheat protection and recovery
- Support for multiple heating profiles (e.g., low/medium/high heat)
- Integrate BLE for mobile app communication and monitoring

- Add a buzzer for audible alert during overheat
- Implement FreeRTOS for task scheduling and efficiency