

# Embedded Systems Intern Assignment – upliance.ai

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## Part 1: System Design

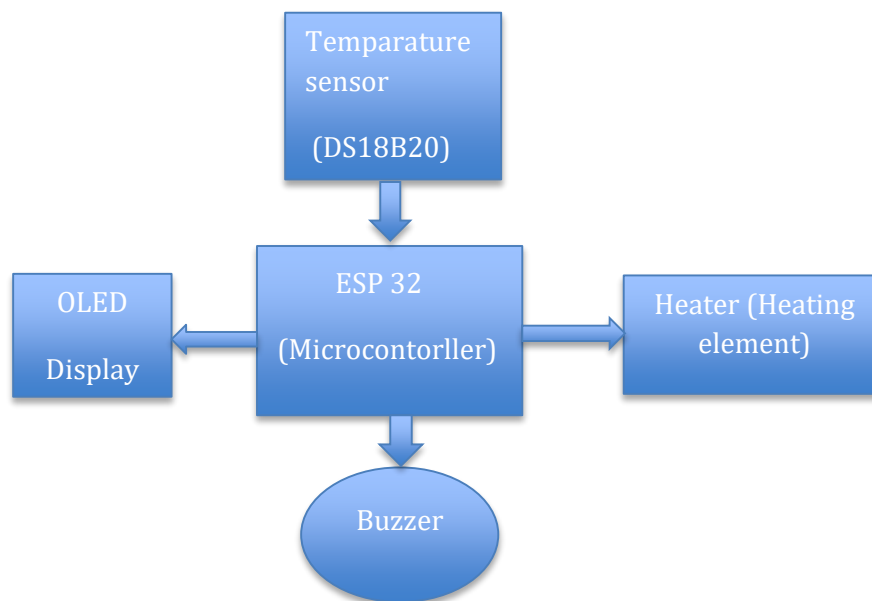
- **Minimum Sensors Required:**

1. Temperature Sensor (DS18B20): Required to read ambient/system temperature for heater control.

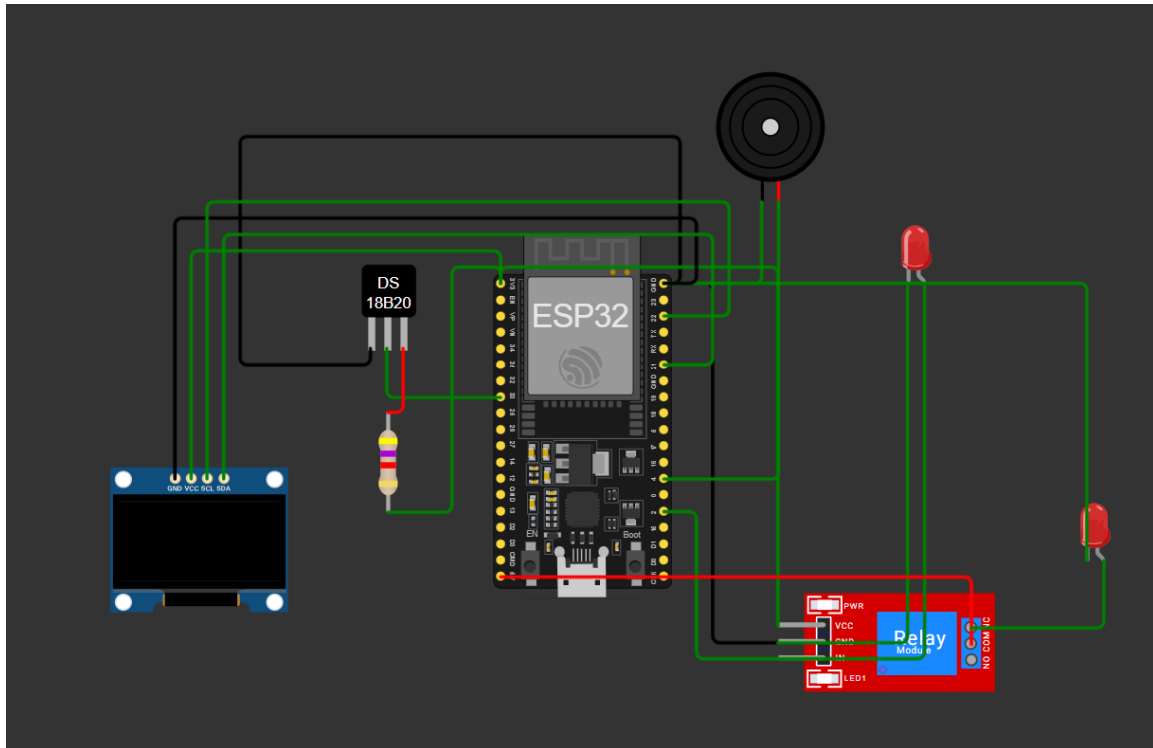
- **Communication Protocol:**

**OneWire** protocol is used by DS18B20 and allows communication over a single data pin with a pull-up resistor.

**Block Diagram:**



## Circuit Diagram:



## Future Roadmap:

- Multiple heating profiles via buttons or mobile input
- BLE/Wi-Fi dashboard
- FreeRTOS task scheduling

## Part 2: Embedded Implementation

### Implemented States:

- IDLE
- HEATING
- STABILIZING
- TARGET\_REACHED
- OVERHEAT

## Key Features:

- Reads temperature from DS18B20
- LED simulates heater
- Buzzer triggers on overheat
- State machine logic
- Serial logging

## README

### Heater Control System – upliance.ai Internship

This project implements a simple heater control system using an ESP32 and DS18B20 temperature sensor on Wokwi. It simulates a heater with an LED and alerts overheating via a buzzer. With the included oled display we can monitor the real time Temperatures of the system and included a Relay module to control the Heater (heating element), and we included a Buzzer for overheat alert indication.

#### Features:

- State machine with 5 states
- DS18B20 temperature input
- Heater simulated via LED
- Buzzer alert for overheat
- Serial monitor logging

#### Hardware (Simulated):

- ESP 32
- DS18B20 on pin 4
- Heater LED on pin 2
- Buzzer on pin 3

#### Simulation Link:

<https://wokwi.com/projects/430560139721110529>

#### Future Improvements:

- BLE/Wi-Fi for remote control
- Multiple profiles
- FreeRTOS integration