Due Date: February 02, 2025 **Submit to: sergiy.palguyev@intusurg.com**

Problem

You are given a robot with many subsystems that each generate their own individual temperature measurement. There are also multiple fans onboard the robot that are used to cool the electronics to prevent overheating. Because the fans are very loud when running all the time, and because the robot operates alongside humans, the fan speeds are set so that the noise level is minimized without endangering the electronics. Conceptually the robot can be imagined as a set of IoT devices on a common network.

Task

Your task is to develop an application to monitor temperature, control fan speeds and report out the state of the system to an external location for reporting and visualization. The application should meet the following requirements:

- The temperature of each subsystem is provided as a floating-point number in °C via external communication to the subsystem.
- The number of subsystems and the number of fans present should both be configurable at startup. You may assume that the number of each is constant after startup.
- The speed in RPM of each fan is managed by your system. You can assume that the plumbing to the low-level hardware is managed for you after updating some internal state variable.
- The maximum speed may be different for different fans. You may assume that 0 RPM always represents 0% of max speed.
- Your system logs all the system data to an external location outside the subsystems.

Your fan control algorithm should behave as follows:

- The **most recent** temperature measurements from each subsystem should be collected, and the fan max speed should be computed from **the maximum** of all subsystems.
- All fans should be set to the same percentage of max speed.
- If the temperature is 25°C or below, the fans should run at 20% of max speed.
- If the temperature is 75°C or above, the fans should run at 100% of max speed.
- If the maximum measured subsystem temperature is in between 25°C and 75°C, the fans should run at a percentage of max speed linearly interpolated between 20% and 100%.

The submission should include a small demo program to communicate subsystem temperatures and update fan speeds. Minimalist interfaces for reading temperature measurements between subsystems, configuring the application and outputting the system state to a logging destination should be mocked out as you see fit. **For your test program, you may make up the number of fans, the number of subsystems, and the max RPM of each fan as you please**.

Guidelines

The submission should adhere to the following guidelines:

- You may use additional open-source libraries and tools for your submission but be prepared to discuss them and explain how they work.
- Please include any deployment/runtime infrastructure and instructions with your design in a README file.

Notes

Don’t hesitate to ask questions if you need clarity. The challenge is intentionally open ended, so focus on the parts of the challenge that you feel are most valuable. Organize your effort so that what you believe to be the most critical pieces are completed to a level that you would consider production ready.