Storage & Safe Custody of Medicines using Temperature Management

Project Proposal

CO326: Computer Systems Engineering: Industrial Networks

Group Members

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1.Introduction

The storage of many drugs, serum, and vaccines at specified temperature limits is very important. Therefore, it is necessary to read and record the ambient temperature and control the refrigerating device according to the limiting values specified by the user. Taking into account these requirements, a new PIC microprocessor-based temperature monitoring system that triggers the AM2301 temperature sensor and controls the running of the refrigerator system will be designed and developed.

2.Objectives

1. In the future, sensors can be easily added or removed.

- Since this is the initial step of the project, only the temperature can be measured and controlled. But in future the parameters which can measure can be increased.

2. Something either goes wrong or is about to go wrong a notification is sent (via a led) and then can be fixed immediately.

- With Lab Sensor Solutions' sensors reporting temperatures on a minute-by-minute basis, appropriate actions can be taken to correct any excursions since notifications are instantaneous. Staff is alerted immediately when the temperature violates an upper or lower range. In fact, staff members can take action before a violation occurs simply by looking at the trends or by receiving alerts when temperatures are heading toward a violation.

3. Data Collection for Process Validation
- Each of our sensors has a calibration certificate proving readings are accurate to within one degree thus providing the ability to validate Standard Operating Procedures (SOP's). This is something that most healthcare departments do on an annual basis and can be time-consuming when not automated. The ability to quickly fetch validation data from by filtering the data for an accurate record of all process validation activities.

4. Statistical Process Control and Analysis

- Healthcare companies are now starting to utilize Statistical Process Control (SPC) to improve their processes and ensure quality outcomes. SPC methods have been used for decades in manufacturing and the application to healthcare requires processes to be routinely monitored. Being able to download data over any period of time for utilization and analysis by third-party software to study trends and conduct forecasts make SPC a lot easier to implement. Real time monitoring is critical to all SPC programs since what is measured improves.

3.Scope

Considering the limited time we are going to implement the system with only one temperature sensor. And the system is designed to implement easily adding more features. Therefore, more sensors can be added. And also protocols between web and hardware services will be implemented such as many of them can be added when they are needed.

4. Procedure

A controlling operation is performed by this system, if the temperature is increased or decreased in contrast to the limits, it will be indicated to the user through the dashboard (GUI). In other words if the user gets a warning message according to the temperature varies in contrast to the limits the user can get some action for it through the system as mentioned above.

Temperature sensors are connected to the controller, it would be the Arduino board in our system, then the Arduino board is connected to the raspberry pi model as the controlling hardware. These two devices are connected using an USB serial port and a serial communication protocol is used for communicating between them. Most probably it would be a byte array. Raspberry pi has two services such as Hardware Service and Web Service. Hardware service is for USB serial port and web service is for the GUI. To communicate with these two services MQTT protocol is used. Finally, the dashboard (GUI) is connected to the web service through wifi module and MQTT protocol may be used for communication between them.
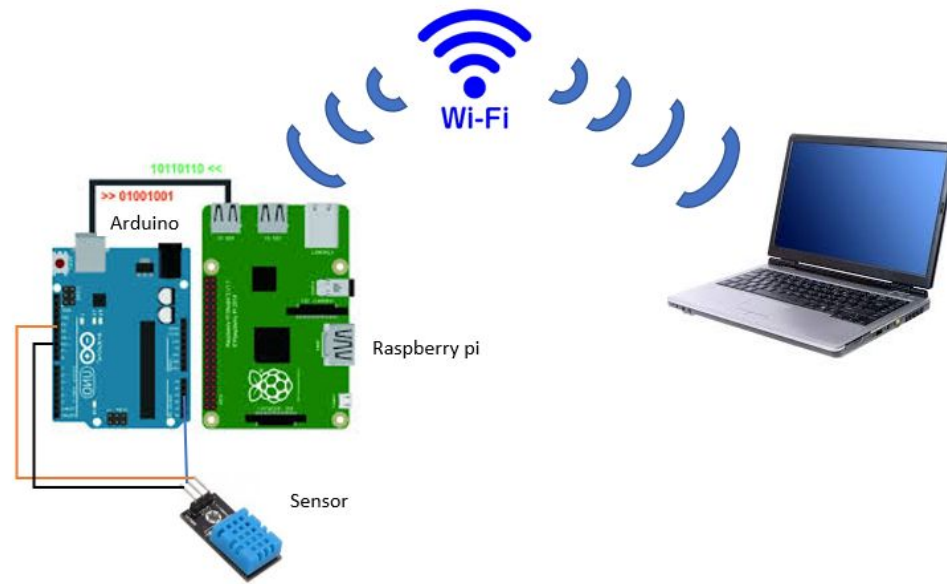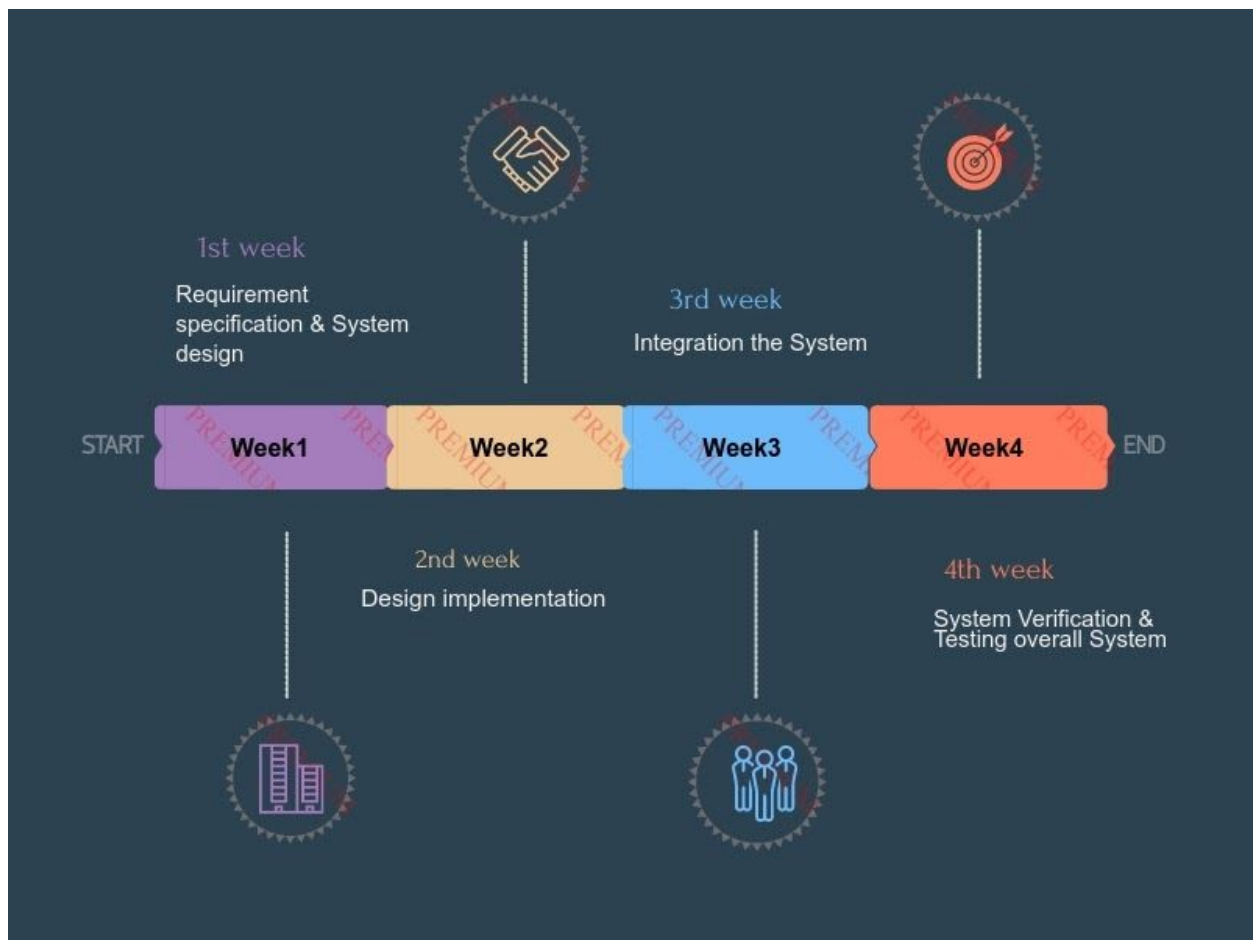
Figure 01 : Hardware setup

5.Hardware Equipments

- Raspberry pi
- Arduino
- Temperature sensor

6.Software Tools

- MQTT
- Java or Python
- Angular
- Node js

7.Project Timeline

8. References

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