

IoT Thermometer

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Introduction

IoT Thermometer is designed for portable temperature measuring by using conventional internet connection. It is possible to locate anywhere where internet connection is available. The thermometer sends temperature information to the webserver in every second, where it can be read by using browser based responsive user interface.

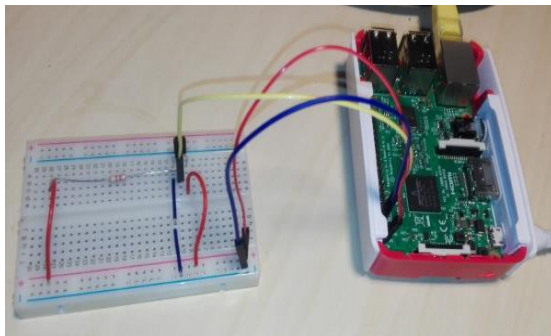


FIGURE 1. Thermometer prototype

Objectives

The goal of this project was to create an IoT thermometer with real-time web user interface by using light IoT protocol (MQTT) and embedded system architecture. As a student, the goal was also to learn agile Kanban technic and project management with Trello.com.

Methods

The Hardware contains Raspberry Pi 3 board, Dallas DS18B20 1-WIRE sensor, connected to GPIO-pin of Raspberry Pi board over 4.7kΩ resistor.

Project
Embedded Systems Development Project
Date of publication: 2017, Autumn
Instructor Jukka Jauhiainen

The project based on the agile Kanban method that was maintained on Trello.com project management system.

The data transfer methods were 1-WIRE from sensor to Raspberry Pi and MQTT from Raspberry Pi to internet server. Communication between UI and server was made by websocket. The UI itself was made by HTML5, CSS3 and Javascript.

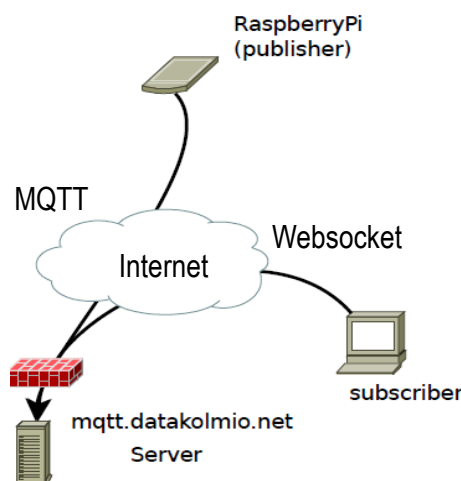


FIGURE 2. Network topology

The system based on MQTT has two parts: publisher and subscriber. Publisher (Raspberry Pi) sends data with certain topic that Subscriber receives. Publisher can maintain multiple concurrent topics that several subscribers can listen simultaneously.

Results

As a result of the project is a stable online IoT thermometer with sophisticated responsive user interface. The UI includes real time temperature value that updates automatically every second. It also includes a graphical chart for last 1 minute temperature history with average value

and control to switch unit between Celsius and Fahrenheit. The UI is scalable, using responsive device width. URL of the UI is

<http://www1.datakolmio.net/mqtt/>

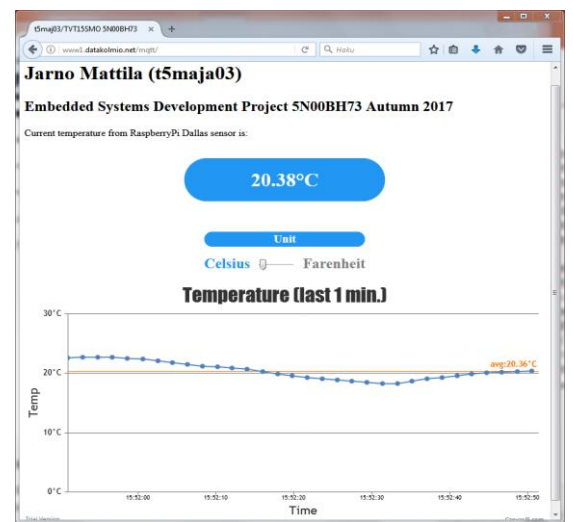


FIGURE 3. User Interface

Conclusions

In the beginning, it was clear that the MQTT protocol would be the key thing for achieving a successful project. The implementation of MQTT managed very well and it was proven that MQTT is suitable for embedded IoT using.

Flexibility of Linux platform is notable too. As a platform of Raspberry Pi (GPIO) and webserver, it also offered out-of-the-box tools (Mosquitto) to implement MQTT.

References

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- Linux Raspian OS
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