IoT weather station

Tomi Maanselkä TVT18SPL
Information Technology, Product and Device Design

Introduction

The aims of this project were to make a NB-IoT connected weather station using Arduino MKR NB 1500 (figure 1) and DS18B20 temperature sensor which temperature values would be sent to a Raspberry Pi using MQTT protocol. The measures would be able to see through a web site with REST API (REpresentational State Transfer) (figure 3).

Objectives

The basic objectives were to place the Arduino in a summer cottage with the temperature sensor where it wirelessly communicates with the Raspberry Pi via NB-IoT network (figure 2).

The Raspberry Pi would then receive the data and storage the data to a MySQL database.

The Raspberry Pi also runs a web server which uses REST API requests to obtain the data from the database.

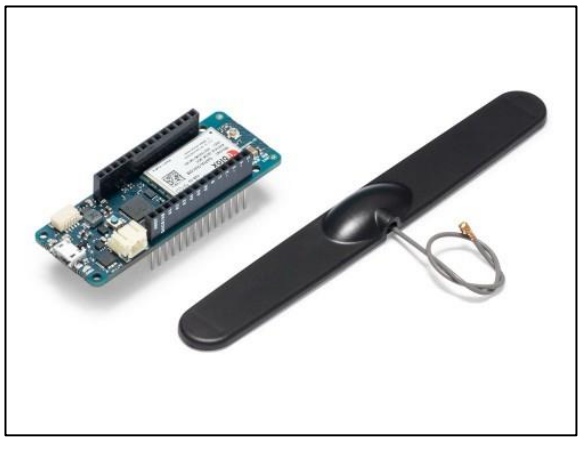

FIGURE 1. Arduino MKR NB 1500

Methods

Arduino MKR NB 1500 microcontroller used in this project use SARA-R410M-02B NB-IoT chipset that allows narrowband connection between the devices.

DS18B20 is a digital temperature sensor which provides 9-bit to12-bit celsius temperature measurements. The DS18B20 communicates over a 1-wire bus that requires only one data line for communication with the Arduino.

The Arduino sends requested data to the Raspberry Pi via MQTT protocol. The Raspberry Pi storages the data to the MySQL database.

The database forwards the data to the REST API web server which displays the data on a website in json format. With HTTP methods (GET, POST, PUT, DELETE) user can view, post, update and delete the data.

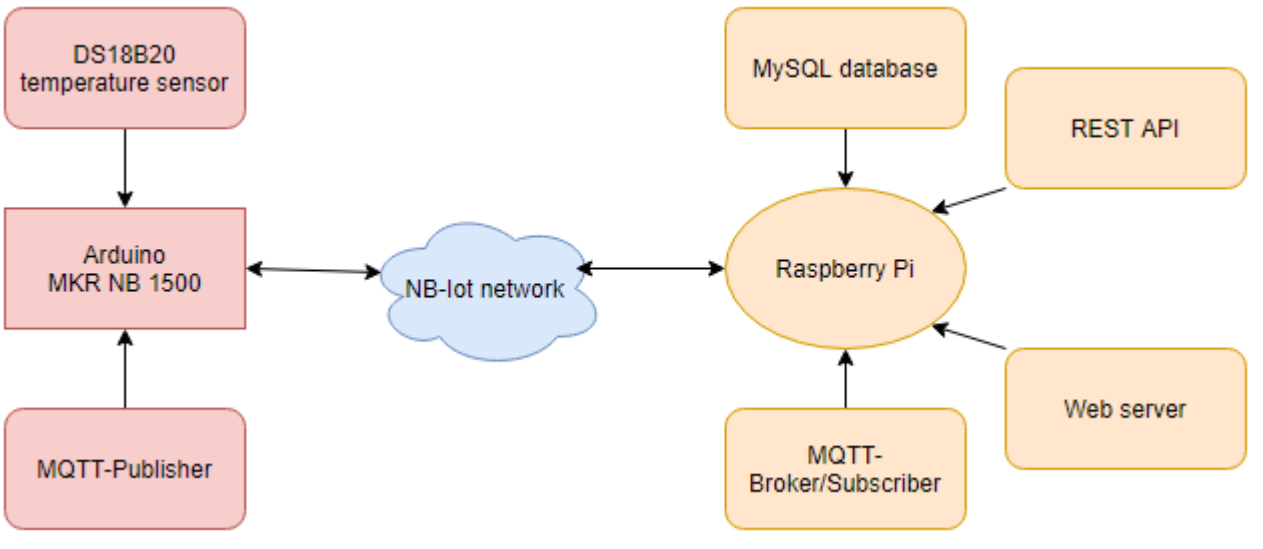

FIGURE 2. The system diagram

References

1. Arduino MKR NB 1500: https://store.arduino.cc/arduino-mkr-nb-1500-1413

2. Raspberry Pi 3 model B+: https://www.raspberrypi.org/products/raspberry-pi-3-model-b-plus/

3. DS18B20 datasheet source: https://datasheets.maximintegrated.com/en/ds/DS18B20.pdf

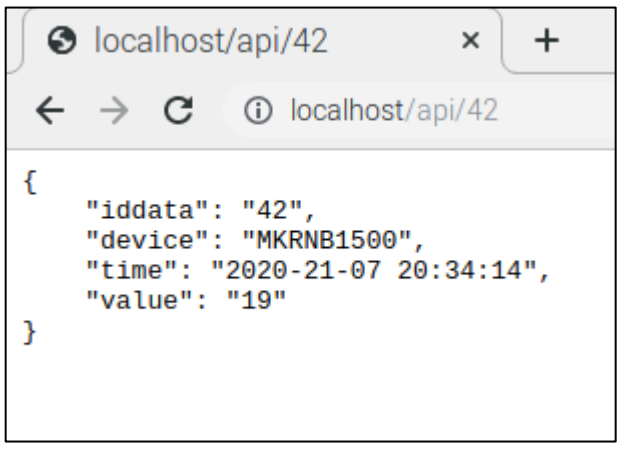

FIGURE 3. REST API GET view on the website

Date of Publication: 2020, Summer

Instructors: Kari Jyrkkä