EŞKİŞEHİR TECHNICAL UNIVERSITY

ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

EEM449 – EMBEDDED SYSTEM DESIGN

Term Project 6 Report

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RAIN SENSOR USING WITH WEATHER API

In this project, it is aimed to detect precipitation using a rain sensor and weather api. First of all, the working principle of the rain sensor was investigated. The working principle of the rain sensor is based on the resistance of the nickel plated plates on it. The sensor measures the humidity through digital output pins and gives digital output after exceeding the specified humidity threshold. In other words, when raindrops fall on the board, parallel resistance occurs and the sensor gives a warning. The sensor has a bipolar resistance and resists depending on moisture. The sensor shows more resistance when dry, but less resistance when wet. The rain sensor has 4 pin inputs. These are vcc (supply voltage), ground, A0, D0. In this project, 3 pin inputs are used and these are; On the tm4c1294xl board, the vcc pin is connected to the + 5v pin; Ground pin is connected to GND pin; D0 pin is connected to PB4 GPIO pin. Digital reading is provided with "GPIO_read ()" method by assigning input to PB4 GPIO pin in EK_TM1294XL.c file in gpio config section. Precipitation data were received from such sensor.

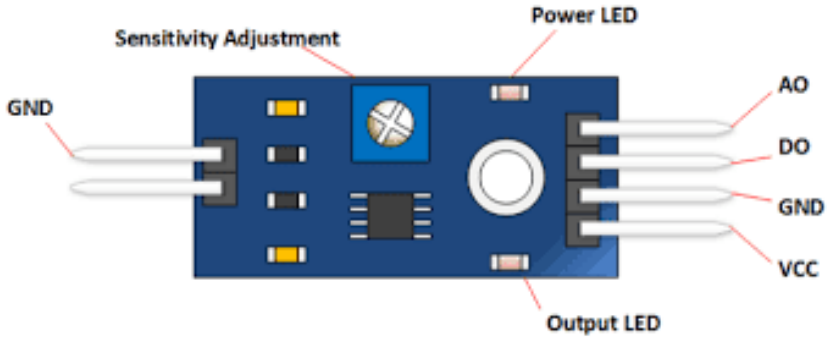
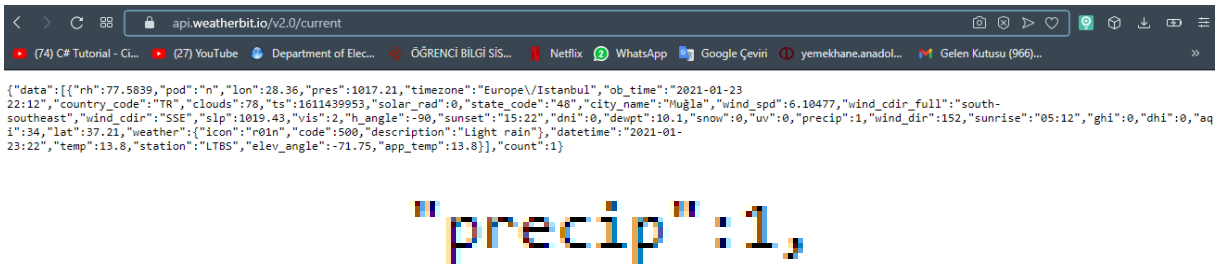


Figure 1:Rain Sensor

Secondly, "weatherbit" weather api was used to obtain precipitation data. Thanks to the use of Api, latitude, longitude, measurement unit type and language options were selected and the desired location was achieved to reach the api as desired. It is aimed to determine the corresponding number of the word "precip" in order to obtain rainfall data from these APIs, which can be accessed with special keys, because if this number is 0, there is no precipitation, if it is a value other than 0, the word "precip" is captured for the apinin taken. and its address is kept with the help of a pointer from the first letter to the comma. The target number is calculated how many characters will come later and assigned to another "char" variable. Thus, we have another option to determine the precipitation.




```
"precip":1,
```

When combining these two applications, the algorithm established; First of all, if a digital value can be read from the rain sensor, it is posted from this part with the help of "semaphore", pended in the api part, and the functions are arranged and collision is prevented. If a digital value cannot be read from the sensor, it is printed that there is no rain.

The algorithm that comes to the api section after digital reading has been sent to the "socket task" part with the help of the "mailbox" by taking the corresponding "precip" value from the api. In this section, this value is compared with the character "0" and whether there is rain in the weather condition is determined and suppressed.

Printed string words are as follows;

- ---NO RAINFALL---(SENSÖR YAĞIŞSIZ)
- ***THE WEATHER MAY BE RAINY***(HAVA DURUMUNDA YAĞIŞ YOK(FAKAT SENSÖR YAĞIŞLI))
- !!!BE CAREFUL! THE WEATHER IS RAINY!!! (SENSÖR VE HAVA DURUMU YAĞIŞLI)

With these notifications, it is aimed to receive time data from the ntp server, process it and put it at the beginning of the report. In addition, sensor activity is shown by connecting an external LED.

By tracking the data with the Herculus program, the program's operability is tested.

```
Mon Jan 25 01:30:14 2021
***THE WEATHER MAY BE RAINY***(HAVA DURUMUNDA YAĞIŞ YOK(FAKAT SENSÖR YAĞIŞLI))
Mon Jan 25 01:30:19 2021
***THE WEATHER MAY BE RAINY***(HAVA DURUMUNDA YAĞIŞ YOK(FAKAT SENSÖR YAĞIŞLI))
Mon Jan 25 01:30:25 2021
***THE WEATHER MAY BE RAINY***(HAVA DURUMUNDA YAĞIŞ YOK(FAKAT SENSÖR YAĞIŞLI))
Mon Jan 25 01:30:33 2021
---NO RAINFALL---(SENSÖR YAĞIŞSIZ)
Mon Jan 25 01:30:39 2021
---NO RAINFALL---(SENSÖR YAĞIŞSIZ)
Mon Jan 25 01:30:46 2021
---NO RAINFALL---(SENSÖR YAĞIŞSIZ)
Mon Jan 25 01:32:35 2021
!!!BE CAREFUL!  THE WEATHER IS RAINY!!! (SENSÖR VE HAVA DURUMU YAĞIŞLI)
Mon Jan 25 01:32:36 2021
!!!BE CAREFUL!  THE WEATHER IS RAINY!!! (SENSÖR VE HAVA DURUMU YAĞIŞLI)
Mon Jan 25 01:32:42 2021
!!!BE CAREFUL!  THE WEATHER IS RAINY!!! (SENSÖR VE HAVA DURUMU YAĞIŞLI)
Mon Jan 25 01:32:48 2021
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