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IOT based water flow meter using ThingSpeak

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Abstract

The Large scale manufacturing companies are fully automated. Soft Drink Industries and Chemical industries have to constantly measure and quantify the liquids that they are handling during this automation process, and the most common sensor used to measure the flow of a liquid is a Flow Sensor. By using a flow sensor with a microcontroller like NodeMCU, we can calculate the flow rate, and check the volume of liquid that has passed through a pipe, and control it as required. Apart from manufacturing industries, flow sensors can also be found in the agriculture sector, food processing, water management, mining industry, water recycling, coffee machines etc. Further, a water flow sensor will be a good addition to projects like Automatic water dispenser and smart irrigation systems where we need to monitor and control the flow of liquids. In this project, we are going to build a water flow meter using NodeMCU. We will interface the water flow sensor with NodeMCU and LCDI2C, and program it to display the volume of water, which has passed through the valve. For this particular project, we are going to use the YF-S201 water flow sensor, which uses a hall effect to sense the flow rate of the liquid. The measured values are also communicated to the ThingSpeak cloud. The parameters can be monitored remotely form any part of the world. When the volume exceeds the threshold value, Thingspeak will activate the Thingspeak react to send a message to the responsible person with help of the IFTTT applet.

Keywords: IoT; NodeMCU; ESP8266 Sensor; Buzzer; Flow rate; ThingSpeak cloud; IFTTT

1. Introduction

Water is one of the most essential substances on earth and water wastage is a problem in some households and businesses, which leads to excessive bills. High usage of water through some taps can be mainly due to watering the garden or washing cars. Technology can play a huge part in saving water where possible through water usage notifications. [1]. IoT based liquid flow monitoring and controlling system has emerged as a basic distribution infrastructure allowing an efficient water supply. Thus, the pipeline is a significant way to transport water from water sources to consumers for short or long distances and in different conditions. Despite this tremendous growth of such system, it can be contaminated by different events such as pipe bursts and pervasive leakage problems which cause a catastrophic water loss. Consequently, this system becomes a significant challenge for structural monitoring and requires continuous control process. For that, water utilities are mainly concerned to overcome the water losses by studying the different water services such as privatization to maintain water supply carefully like it is highlighted. Other works in the industry domain are interested on defining water system resources, equipment, devices and their best geographical distribution to be efficiently exploited. Accordingly, it is very important to maintain a continuous flow monitoring of liquid to save the environment from various disasters. Furthermore, the emergent use of pipelines in industrial domain for reliable water transmission requires a serious monitoring and immediate reaction in the case of problems to reinforce the system robustness.

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2. Literature survey

Some important works have been done in this field. The works associated in this field are outlined as follows. Saloni Khandwa et al developed an IOT based Water Monitoring System using Arduino, ultrasonic sensor, water flow sensor, Node MCU and firebase cloud. In their work, they measured the water level using ultrasonic sensor and communicated the data through the Node MCU to the fire base cloud. The measurement value displayed in the serial monitor. They did not use the display elements [3].Kanishk Shrotriya et al proposed a digital water meter using Arduino. This design uses an Arduino Uno, Water flow sensor and a GSM. The flow rate was measured with help of hall effect flow sensor in terms of pulses. . The measurement values were communicated to the Arduino Uno to calculate the flow rate. The same value is sent as a SMS with help of the GSM module. [4]. Juhriyansyah Dalle et al designed a Water Debit Measurement Using Microcontroller-Connected Flow Meters. It is developed by using a Wemos D1 microcontroller, flow meter and a power bank. The values are updated time to time in a website as a graph. [5]

Nurhening Yuniarti et al developed an IoT Based Water Flow Monitoring for Pico Hydro Power Plant.The main objective of this study is to design a water flow monitoring (WAFLOW-MT) device based on the Internet of Things (IoT). This device may help the technicians at the Pico hydro power plant in monitoring the speed of water flow at the river so that the water debit is recorded all the time. The main components used in the work are microcontroller Arduino UNO R3, ESP8266 IoT module, YF-S201 water flow sensor, and power supply. proposed system has been tested on the basis of functionality testing. The test has been conducted by setting the WAFLOW-MT device on the river up for 6 days at specific time periods. In those periods, the WAFLOW-MT device is successfully sent the data to the ThingSpeak webserver. [6].

3. Block diagram

The Block diagram consists of power supply, Arduino UNO, Meany sensors like (Heart Beat Sensor, Temperature Sensor, Humidity Sensor, and Acceleration Sensor) and ESP8266 Wi-Fi module.

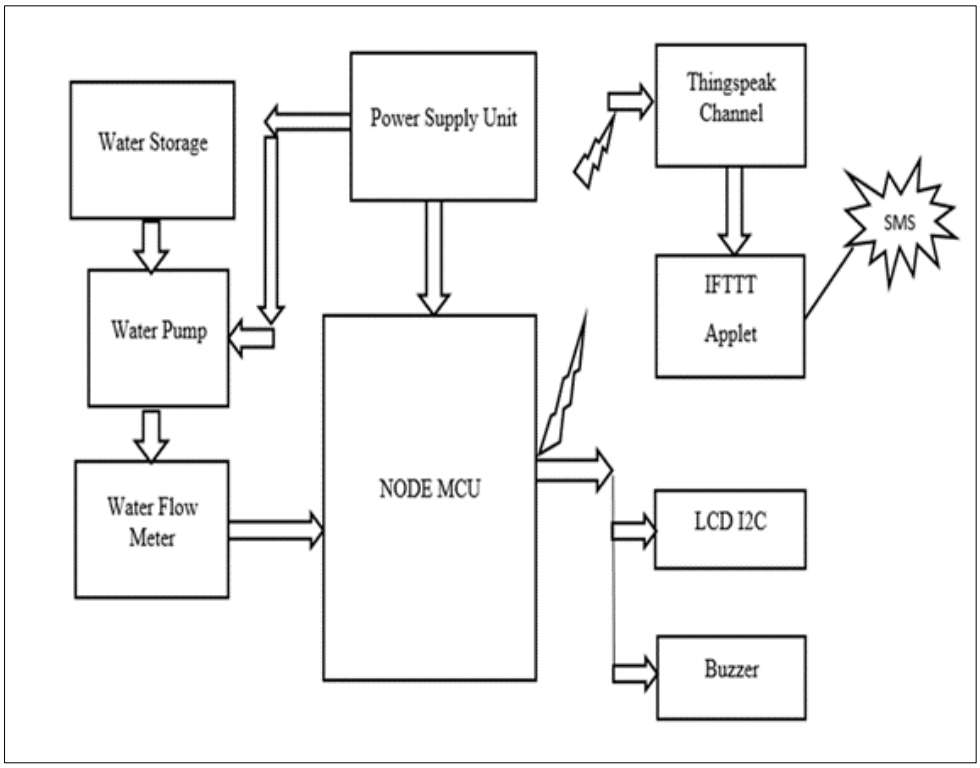

Figure 1 Block Diagram

4. Thing speak server and IFTTT app

Thingspeak is an IOT analytics platform service that allows to aggregate, visualize and analyze live data streams in the cloud. It provides instant visualizations of data posted by your devices to Thingspeak. With the ability to execute

MATLAB code in Thingspeak you can perform online analysis and processing of the data as it comes in. Thingspeak is often used for prototyping and proof of concept IOT systems that require analytics. IOT solutions are built for many vertical applications such as environmental monitoring and control, health monitoring, vehicle fleet monitoring, industrial monitoring and control, and home automation.

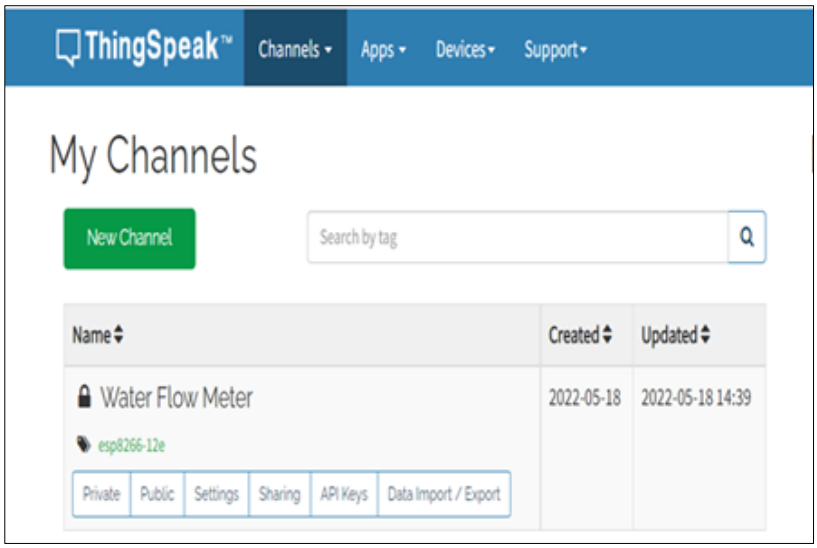

Figure 2 Thingspeak Channel

IFTTT is a free app which can help you to connect all your app or device together. In our project we are using IFTTT app to connected with Thingspeak channel. Her we will explain how to create an event in the IFTTT app and how connected to the ThingHTTP.

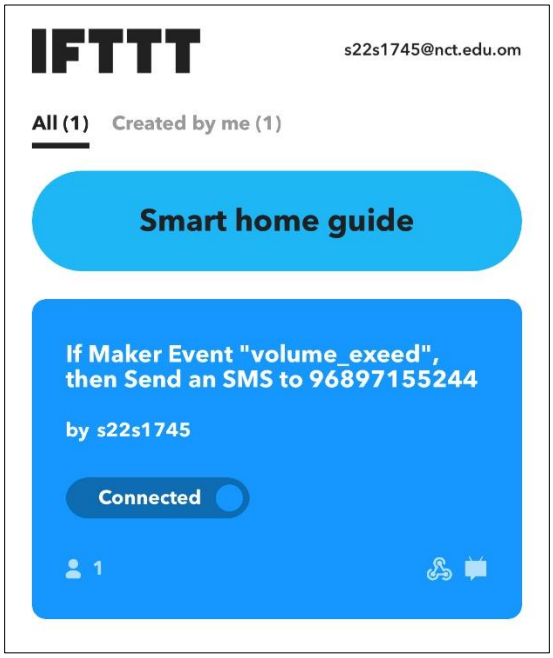

Figure 3 IFTTT Applet

ThingHTTP enables communication among devices, websites, and web services without having to implement the protocol on the device level. We can specify actions in ThingHTTP, which we trigger using other Thingspeak apps such as Tweet Control, Time Control, and React. Trigger the ThingHTTP using a GET or POST HTTP request, Tweet Control, Time Control, or React. Use a POST request if we include data or use custom replacement keys. Requests triggered by POST, Time Control, or React can pass certain variables to ThingHTTP.

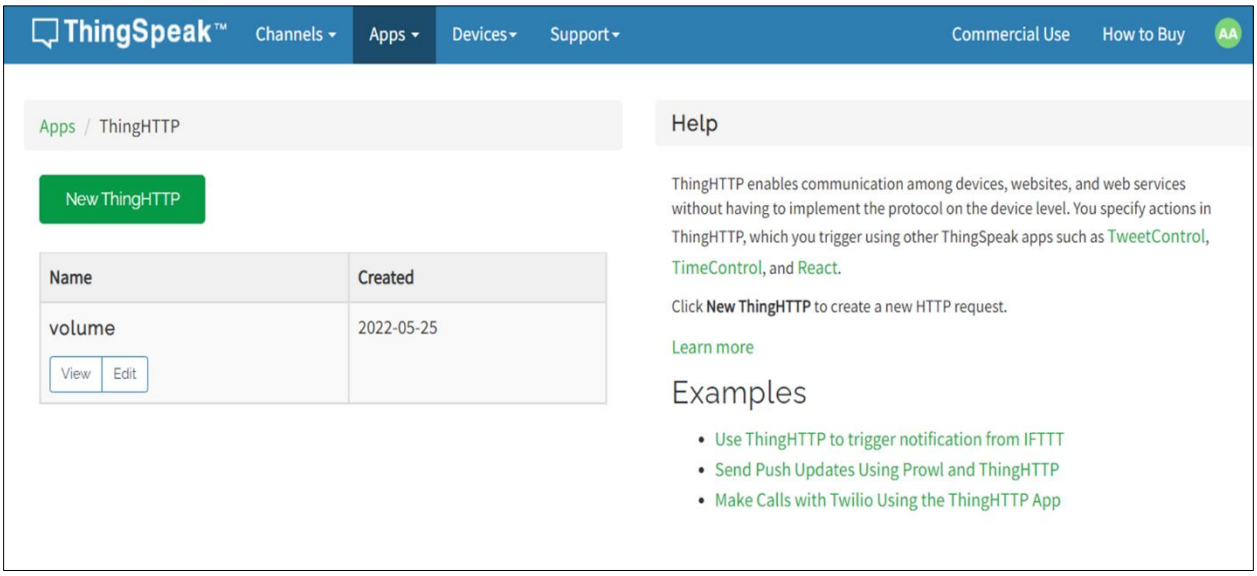

Figure 4 Thingspeak HTTP

React works with ThingHTTP, ThingTweet, and MATLAB® Analysis apps to perform actions when channel data meets a certain condition. . Reacts allow you to trig-ger a ThingHTTP request or send a tweet using ThingTweet when your ThingSpeak Channel meets a certain condition. For example, we can have our thermostat turn on by the time we get home from work by creating a Geo Location React. We could post a Twitter status when our power use is higher than normal by creating a Numeric React. We can create lots of different reactions to sensor data with the React, a ThingSpeak App.

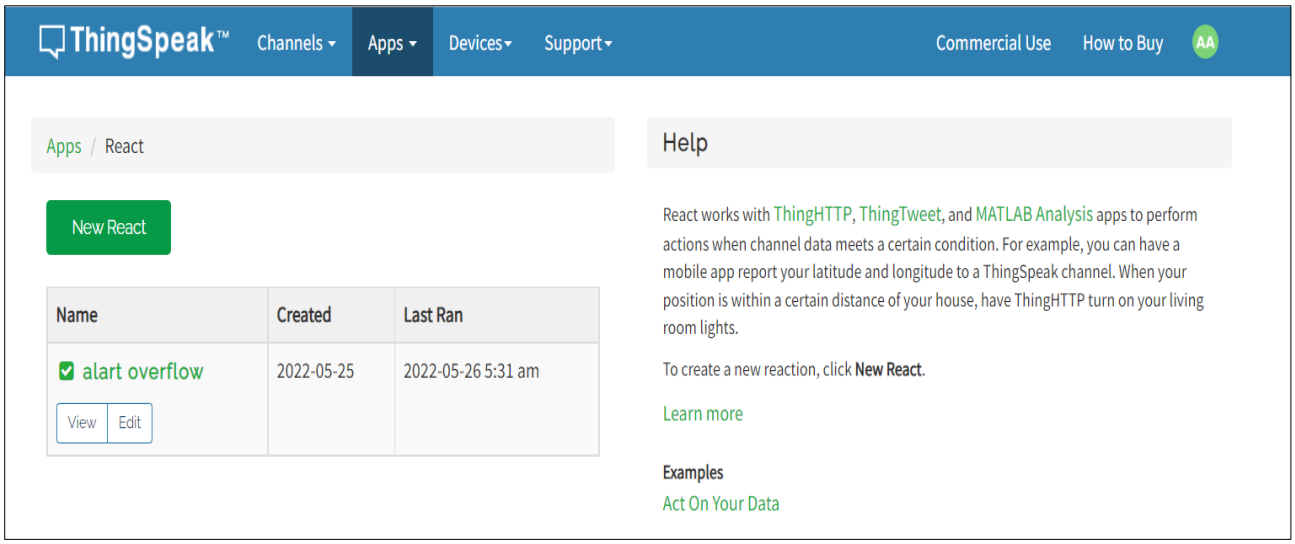

Figure 5 Thingspeak React

5. Results

The IOT based health monitoring system had developed with help of NodeMCU and Thingspeak. This chapter discuss about the implementation of our project. First, testing of the flowmeter with Liquid Crystal display I2C is presented. Thinngapeak channel creation and applet development was presented. Finally, the implementation of water flow measurement system with IOT is presented with the output.

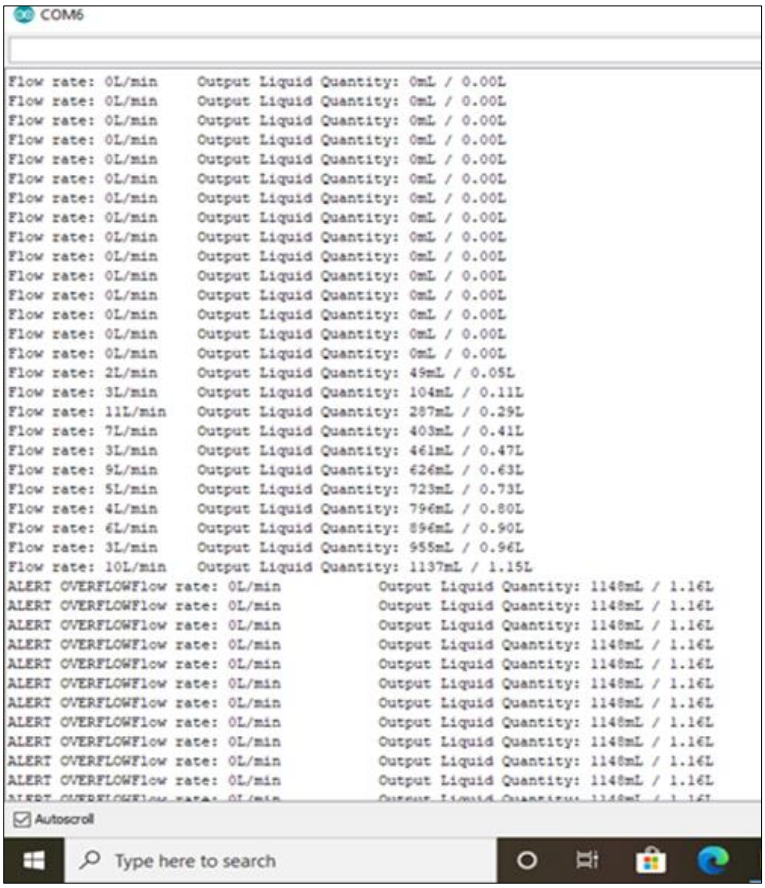

Figure 6 Serial Monitor

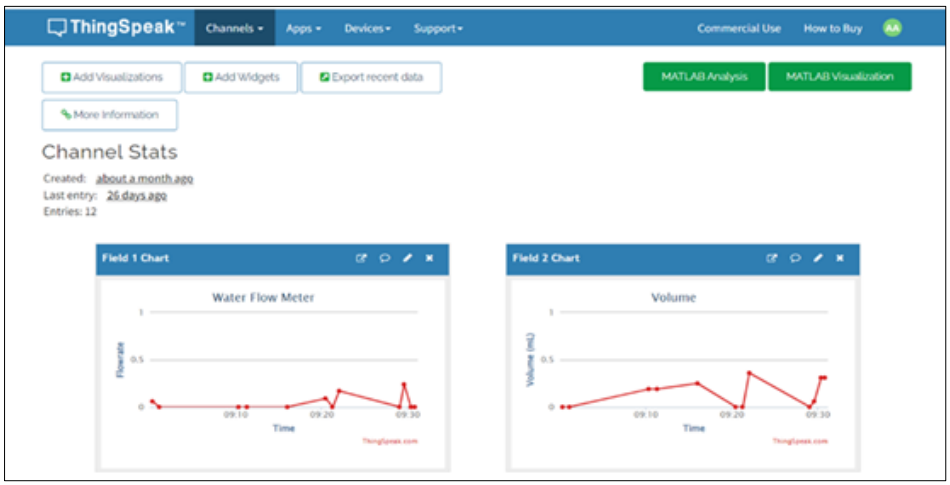

Figure 7 Thingspeak channel Results

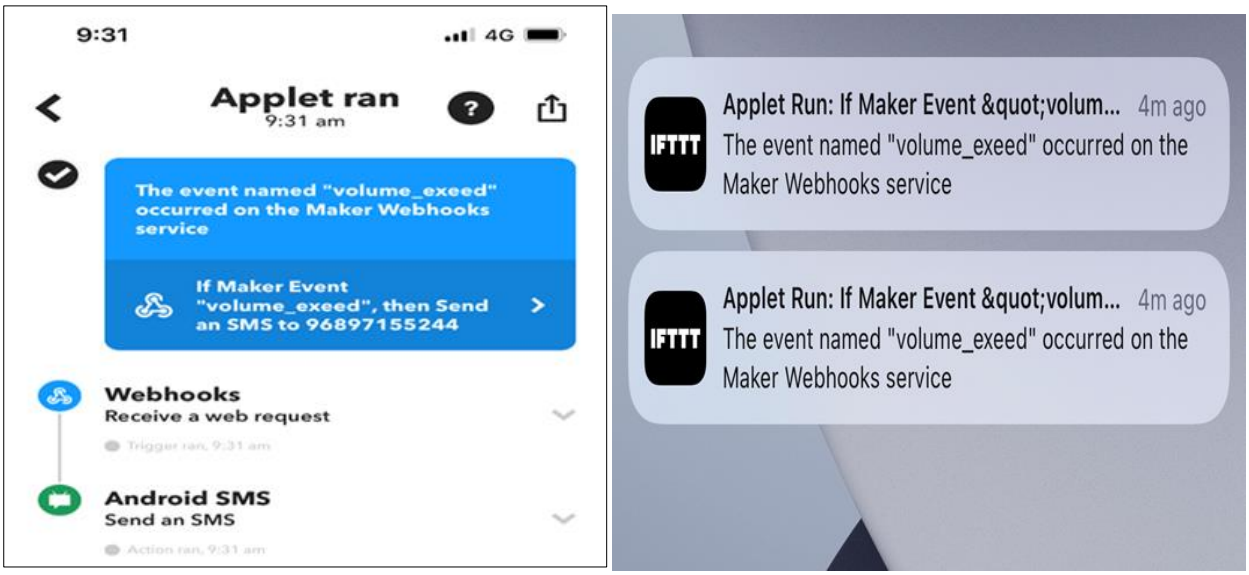

Figure 8 SMS received by IFTTT app

6. Conclusion

Water is an important resource and should be used very efficiently. The uncontrolled use of water leads to wastage of water and ultimately causes water scarcity. This system helps to measure the usage of water and people can use water in an efficient way. The aim of our project is achieved using NodeMCU , water flow meter, buzzer and an LCDI2C. Water flow Sensor measures flow rate in terms of pulses and send to NodeMCU . Then Node MCU automatically reads the number of pulses and calculated the flow rate and volume using the logic given in the program. The calculated values are displayed in the LCDI2C and displays the values in the Thingspeak channel. Also buzzer activated after it reached the threshold value and also the Thingspeak channel is sending SMS to the responsible persons.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

[1] Ahmed Hussain Sain, Sajid M. Sheikh, Benjamin C. Molefhi , An Internet of Things Tap Water Usage Monitoring System Device, International Journal of Electrical Engineering and Technology,Volume 11, Number 1, pp. 1-12, 2021.

[2] Shirish Satpute, Dipali Khadap, Shanta Khairate, Prof. Dr. Anagha Kunte, IoT based water flow monitoring and controlling system, International Journal of advance scientific research and Engineering Trends, Volume 4, Special Issue 12 ,2020.

[3] Saloni Khandelwa,Prateek Dubey ,IOT based Water Monitoring System using Arduino, International Journal of Engineering Research and Technology ,Volume 8, Issue 11,ISSN: 2278-0181.2020

[4] Shrotriya Kanishk, Jain Manish, Mittal Madhur, Yadav Lokesh, Vijay Nidhi,Digital Water Meter Using Arduino,International Journal of Engineering and Management Research (IJEMR), Volume : 7, Issue : 2 2017.

[5] Juhriyansyah Dalle , M. Ziki Elfirman , Muhammad Sufyan ,Implementation of Water Debit Measurement Using Microcontroller-Connected Flow Meters,TEM Journal. Volume 9, Issue 4, Pages 1467-1474, ISSN 2217-8309, DOI: 10.18421/TEM94-19, November 2020.

[6] Nurhening Yuniarti ,, Didik Hariyanto, Sigit Yatmono, and Muchlis Abdillah,Design and Development of IoT Based Water Flow Monitoring for Pico Hydro Power Plant,International Journal of Interactive Mobile Technologies , Vol. 15, No. 07, 2021.

[7] Aldrin C. Tasonga, , Roland P. Abao, Design and Development of an IoT Application with Visual Analytics for Water Consumption Monitoring,Procedia Computer Science 157 (2019) 205–213 .

[8] Bharathi mohan , Ramanan, Sanmugavel , Tharma pratheesh,Ms.priyadarshini ,IoT BASED SMART WATER MANAGEMENT SYSTEM,International Research Journal of Engineering and Technology (IRJET),Volume: 06 Issue: 03 | Mar 2019.

[9] Raad AL-Madhrahi1 , Jiwa Abdullah,An Efficient IoT-based Smart Water Meter System of Smart City Environment ,International Journal of Advanced Computer Science and Applications ,Vol. 12, No. 8, 2021.

[10] https://acoptex.com/project/359/basics-project-071a-water-flow-sensor-yf-s201-at-acoptexcom/

[11] https://www.vovyopump.com/dc-water-pump/eprolabs, Flow Sensor YF-S201, 3 June 2020. [Online]. Available: https://wiki.eprolabs.com/index.php?title=Flow_Sensor_YF_S201.