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IoT Based Waste and Water Management System for Smart Street

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Abstract— **It's very common in India to see overflowing garbage bins from corner to corner and street to street leading pollution resulting in spread of diseases; also it creates unhygienic conditions for people, and damages the aesthetic value of that place. The proposed system monitors the bin periodically and provides data of the fill inside the bin and provides prior information of the filling of the bin to the municipal governing body. Hence they can clean the bin at regular intervals and safeguard the environment. The water delivery to each and every locality is done manually which is highly tedious and time consuming process. Drinking water is often an important a part of lifestyle as a result of the world environmental state of affairs water management and conservation is significant for mankind. The main aim of this project is to develop an embedded system with multiple sensors addressing the following problems extending to an IoT based garbage and water monitoring control system that measures water usage of the every home in a single street and the garbage bin in real-time. IoT is an emerging technology that creates a massive network of things communicating with one another governed by a base station or a server. Development of a smart street helps in the modernization of a nation by increasing its standard with technology. It is possible to communicate transparently and seamlessly with large number of homogeneous and heterogeneous systems while having selected access to data for designing numerous digital services. Hence through a smart system developed to address these very common issues of our daily life is achieved through this project.**

Keywords: **- IoT (Internet of Things), Garbage System, Water flow Sensors**

I. INTRODUCTION

Internet of Things (IoT) is an ecosystem which physical objects that are accessible through the internet. The 'thing' in IoT could be a person with a heart monitor or an automobile with built-in-sensors, i.e. objects that have been assigned an IP address and have the ability to collect and transfer data over a network without manual assistance or intervention. The embedded technology in the resources allows them over to communicate with interior reports or the exterior environment which often impacts the conclusions brought. Internet of Things can connect devices embedded in various systems to the internet. Whenever devices/objects may represent themselves digitally they could be managed from any shade. The connection then assists us record further information from additional spots ensuring further methods of raising performance and developing safety and IoT security.

II. LITERATURE REVIEW

"Internet of Things for Smart Cities" by Andrea Zanella, Nicola Bui, Angelo Castellani, Lorenzo Vangelista, and Michele Zorzi. It offers an extensive review of the allowing technologies protocols and also structure for an urban IoT.

"Internet of Things: Challenges and state-of-the-art solutions in Internet-scale Sensor Information Management and Mobile analytics" by Arkady Zaslavsky, Dimitrios Georgakopoulos. This paper gave us the details about mobile analysis and sensor information management that will help in data segregation of various dustbins. [2]

"IoT Based Water Management System for A Campus" by Prachet verma, akshay kumar, Nihesh rathod, Pratik jain, mallik arjun, renu Subramanian. It provides an IoT based system for management of the water distribution system in a large campus. [4]

"Smartbin: Smart Waste Management System" by Fachmin Folianto, Yong Sheng Low, Wai Leong Yeow. It tells that Smart bin system that identifies fullness of litter bin. The system is designed to collect data and to deliver the data through wireless mesh network [6].

Problem identified by above methods using zig bee technology it is High cost, low data speed, high complexity and short range. Using Telephone line its Graphical user interface has not been provided for users, Users have to remember the access codes, Users have to remember which buttons to press for control of connected devices. Using Blue-tooth the Battery loss is significant this system is not efficient for real time applications. For those reasons we are using the Node MCU Module to find the garbage level and water flow.

III. TOOLS USED

Arduino IDE:

The open-source **Arduino** Software (**IDE**) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button and turn it into an output - activating a motor, turning on an LED.

Node MCU:

It is an open source platform for an IoT. It consist of firmware (ESP8266) and also the hardware. Lua scripting language is used by the Node MCU.

Ultrasonic Sensor:

Sensor emits short bursts of sound and listens for this sound to echo off of nearby objects. The frequency of the sound is too high for humans to hear (it is ultrasonic). Sensor measures the time of flight of the sound burst

UBIDOT:

Ubidots allows you to push data from almost any device then create a dashboard to display, analyze and share that data. You can also set triggers and alert that can automate responses to

data thresholds you set. Finally, all this is accessed by a powerful, standard and fairly well documented Application Programming Interface (API).

MIT App Inventor:

It permits beginners to computer programming to build software applications for the android operating-system(OS).It makes use of a graphical user interface similar to damage along with the star logo consumer user interface that enables users to draw and drop visual objects to create an application that can run on Android devices.

THINKER.IO:

It is also one of the open source platform in IoT. This provides a good to go scalable cloud infrastructure for involving countless systems. We can control them with our easy to use admin console, or integrate them with an easy way.

Water Flow Sensor:

Water flow sensor comprises of a plastic-type valve body system water rotor along with a Hall Effect sensor. Speed of the rotor changes with totally different rate of flow because the water flows through the rotor starts rotate. Hall Effect sensor yields the comparing beat flag solenoid valve 12v dc control the stream of water utilizing the stream of electrons.

Solenoid Valve12v Dc:

It handles the stream of water using the supply of electrons. This water valve would make an extraordinary expansion to our venture there are two 1/2" ostensible (non-taped national pipe) outlets typically the valve is shut. At the level whenever 12vdc is connected to the two terminals the valve opens and then water can force throughout. The valve has a gasket plan inside so there is a base weight prerequisite of 0.02 Mpa (3PSI) likewise water can just stream one direction.

IV. BLOCK DIAGRAM

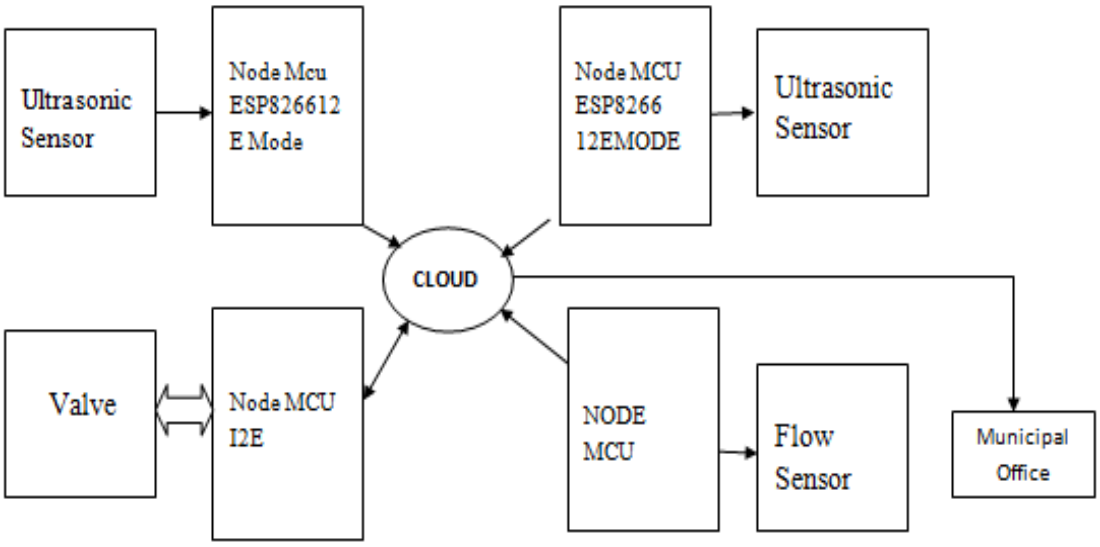

Fig 1.1 Block Diagram

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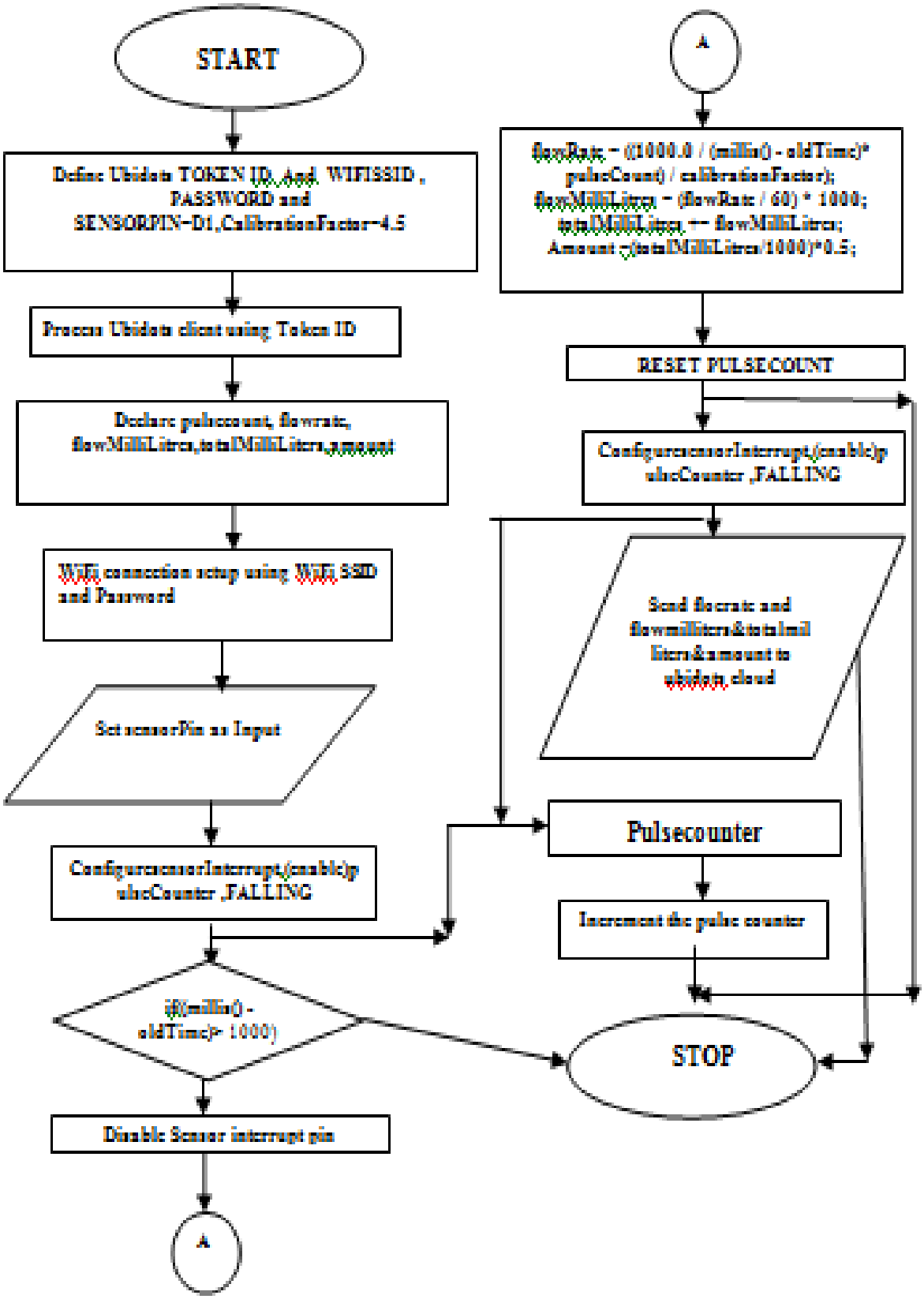
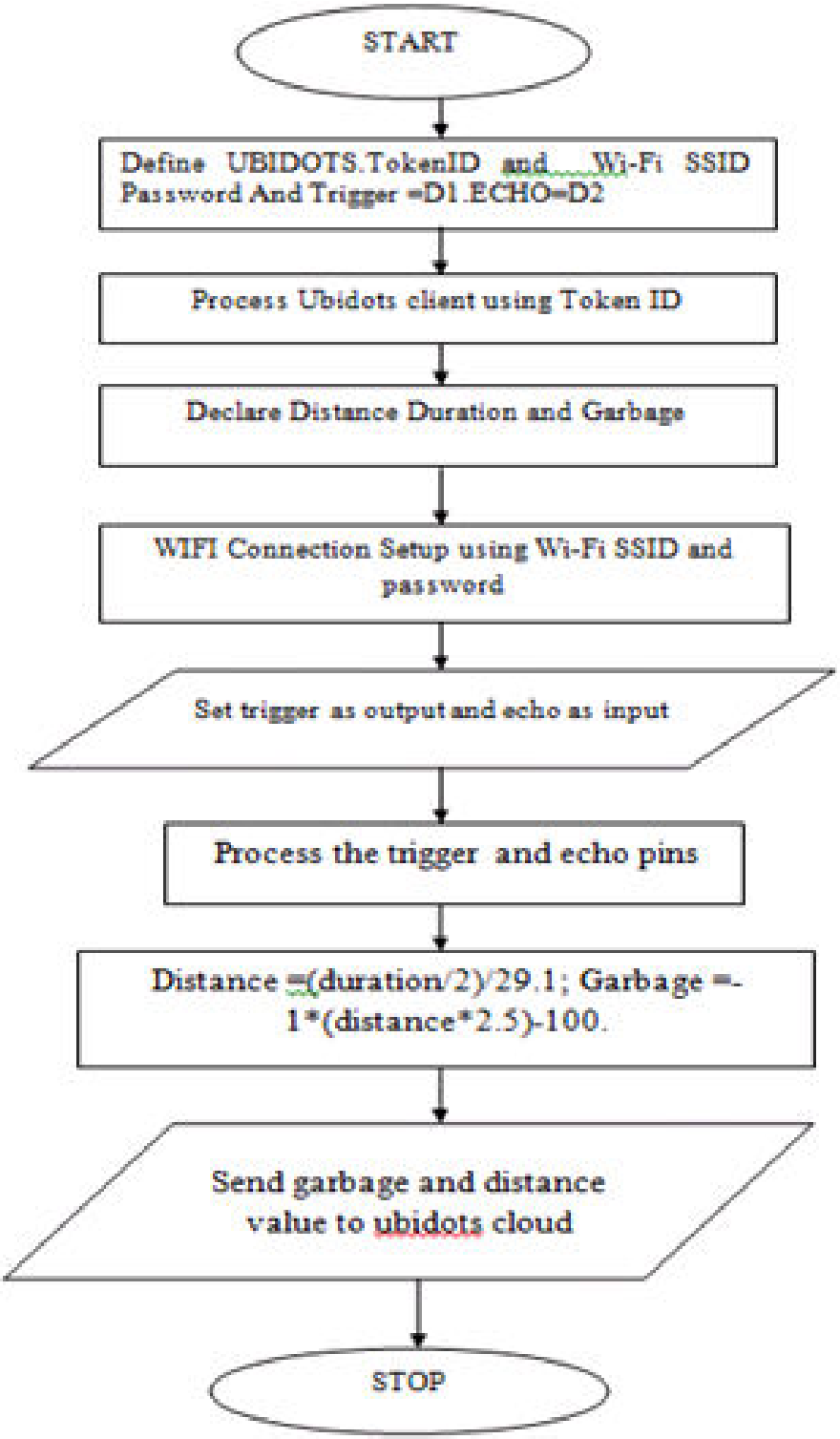
V. ACTIVITY CHART

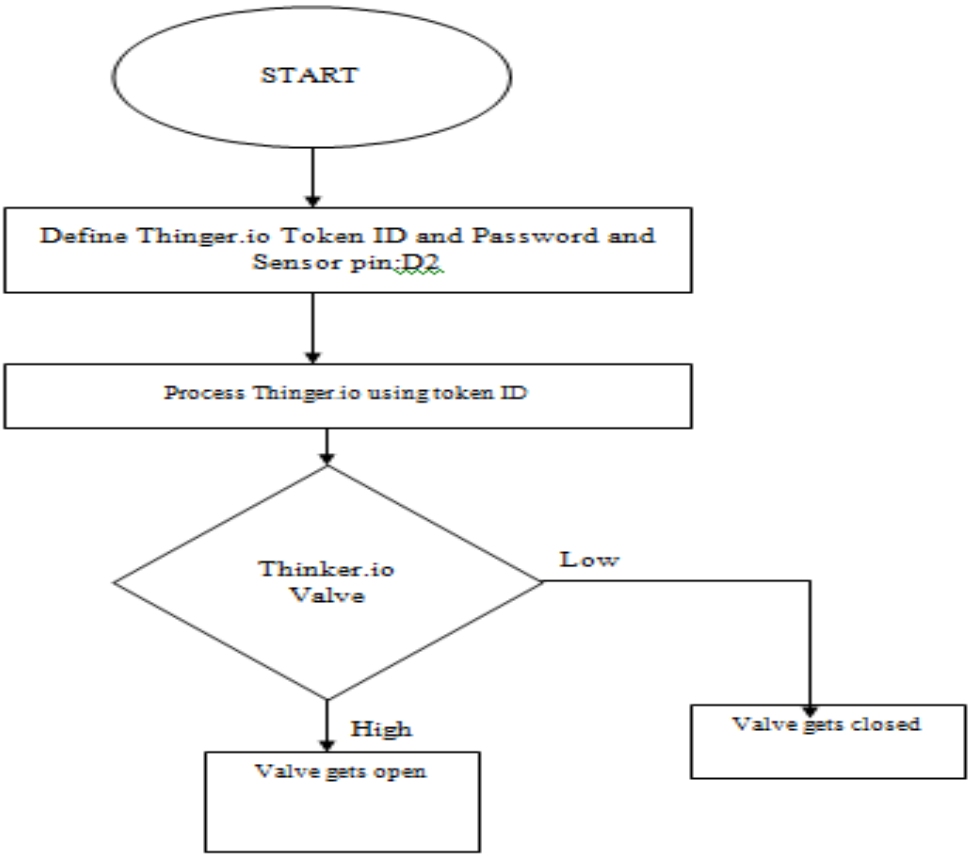
WASTE MANAGEMENT SYSTEM:



WATER MANAGEMENT SYSTEM:



VALVE CONTROL FLOW CHART:



WASTE MANAGEMENT SYSTEM:

Wastes are materials that are not prime products that is things created for the marketplace in which the generator does not have additional use in terms of their own purposes of production, transformation or consumption, and of which he/she wants to dispose.In this, Water management system ESP8266 Wi-Fi module is built in the Node MCU and it is used to sense the level of the water. Valve control is measured the amount of water and it is controlled by the municipal office.

This system is used to clean the dustbins at the time of exceeding the particular threshold level. From this approach we can prevent the pollution problem or health problem for the nearby people.

VI. EXPERIMENTAL RESULTS

WASTE MANAGEMENT PROTOTYPE:

Fig 1.2 Circuit diagram for Waste Management System

Ultrasonic sensor and Node MCU is used to find the garbage level of the dustbin in the streets. Ultrasonic sensor sends the echo pulse or trigger pulse to the dustbins so that from that pulse we can find the level of the dustbin. That level value is send to the Node MCU.

OUTPUT:

Garbage Capacity:

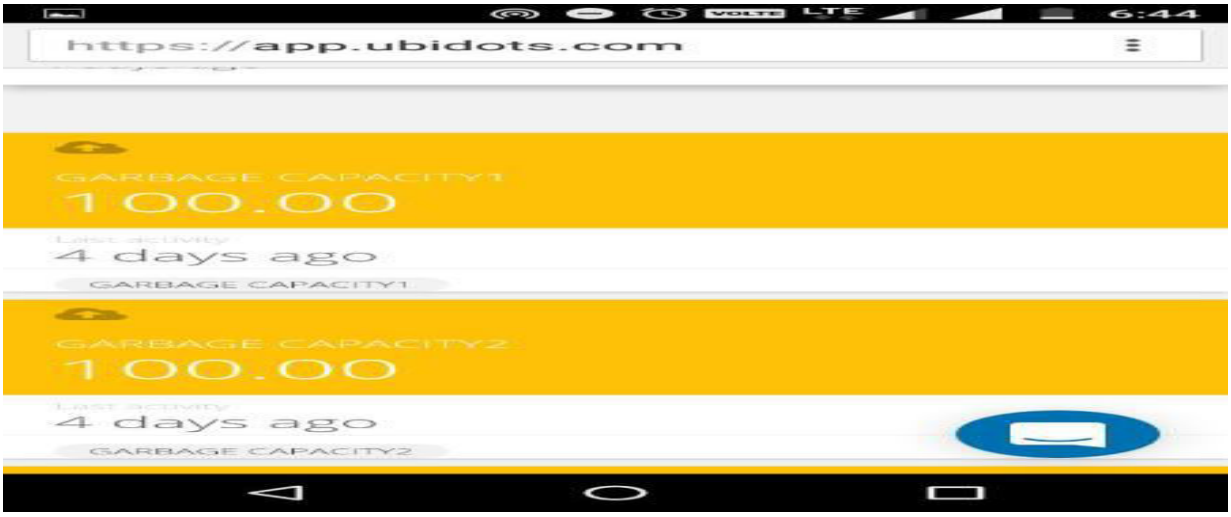


Fig 1.3 Garbage Capacities

UBIDOTS software is used to monitoring the as the garbage Quantity increases its starts intimate by displaying the value as 100(maximum).

MESSAGE INTIMATION:

Fig 1.4 Message intimation for Garbage Capacity

After that garbage value reaches its level i.e 100 messages has been sent to the cloud from that cleaner should clean that garbage. After that cleaning process the dustbin gets empty. After that process message has been to the municipal office.

PERFORMANCE ANALYSISFOR WASTE &WATER MANAGEMENT SYSTEM:

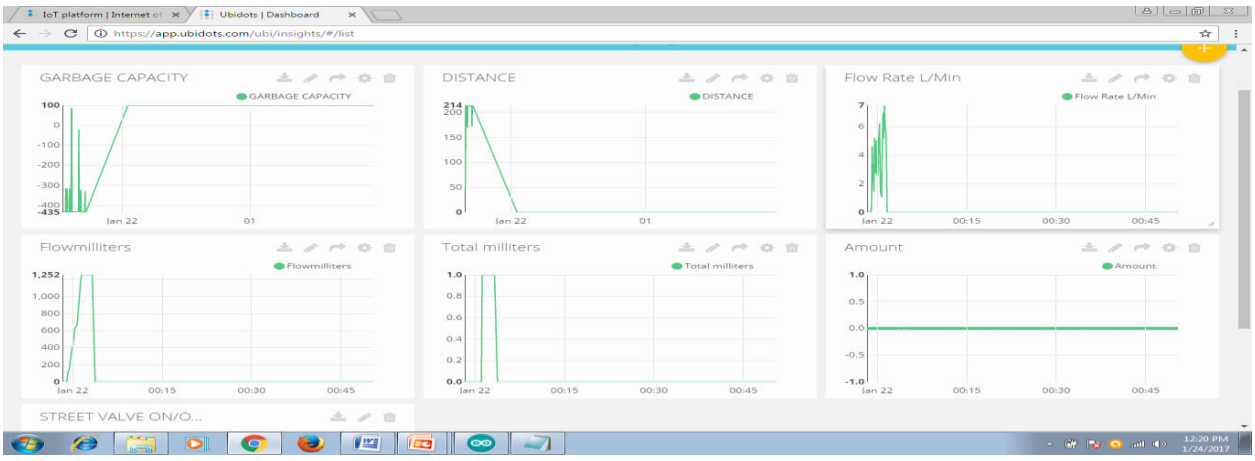


Fig 1.5 performance analysis graph

UBIDOTS software is used to show the performance analysis of the waste monitoring system and also the water monitoring system.

WATER MANAGEMENT SYSTEM:

IoT based water monitoring system is analyzed by using the Node MCU module and water sensor. By implementing this method we can save the water as much as possible.

WATER MANAGEMENT SYSTEM:

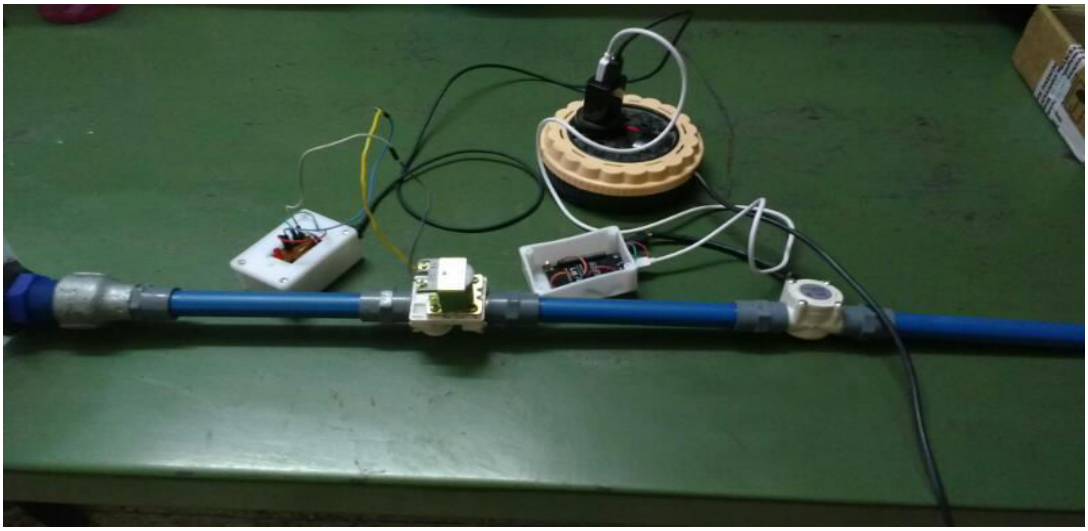


Fig 1.6 Water Management Systems

Equipments for water management system is given above. It consists of Water flow pipeline system, in accordance with Solenoid Valve for control and proper flow of water. Node MCU consists of water flow sensor.

VII. CONCLUSION

We have proposed that waste and water management system and it is used for the commercial usage. Waste management system is controlled by using the ultrasonic sensor to sense the garbage level of the dustbins. Water management system is controlled by using the water flow sensor. So these two methods are implemented by using the Node MCU component. Waste management system is prevent the environmental problem and also the health problem. Water management system is used to save water conservation.

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