COMPUTING VOLUMETRIC WATER FLOW RATE AND STORING THE DATA IN WEBSITE

Ms. MANASA C [1], Ms. NISARGA Y P[2], Ms. PAVANI K N[3], Ms. POOJA M[4], Prof. RAVI M V[5]

[1,2,3,4,5]ECE, SJCIT CHIKKABALLAPUR

manasagowdaca@gmail.com, nisargayp1201@gmail.com, pavanikn99@gmail.com, Poojam1742000@gmail.com, ravimvreddy86@gmail.com

Abstract: We know that water is the most essential basic need. Water is required for all the basic purposes such as bathing, cleaning, agricultural practices, industries, constructional works, and for other various requirements water is essential. Today, many countries are facing water scarcity. Hence the demand for water is increasing drastically, since water is naturally abundant and is readily available in nature free of cost. But now a day's lot of groundwater level has decreased because of excess amount of wastage of water. Nowadays more bore wells are drilled for private usage. So the demand for water is skyrocketing. It is crucial to bring a proper water management system. Some parts of the world are completely deprived of clean water while some have it in abundance. We must come together to do our best to ensure that everyone is getting access to safe water daily so that we can lead a happy life.

Introduction:

The Water Management System that are proposing shall be implement in an apartment/ residential area. The Water Management System can provide information regarding the water usage by the family on each floor in an apartment. Apart from that, it also helps to supply the amount of water required to the floors [1]. In this project it is proposed such that the interactive android based mobile application. It will be equipped with the external hardware system to sense a tap water flow rate and control it (on/off) the water supply line when necessary. The tenant will the registered user with the login ID and password. The tenant can view their respective house's current water flowage from the screen's dashboard. The extra usage of water will lead to the extra billing according to their usage. [11] This system can measure the water usage of every household by using water flow rate sensors. Where the details are visible in website consists of two sections such as the admin section and tenant or resident section. The admin section will be handled by the owner or in charge of the apartment and the tenant section will be for people residing in the apartment. Every tenant will be given a unique ID and password to login and to check the water usage. At the end of every month, the website calculates the individual monthly water usage and will produce the water bill to the users. Website will also support online payment [2].

Objectives:

- The main objective of our project is to calculate the volumetric water flow rate and storing the data in website.
- Assigning the minimum water usage per person every day.
- Calculating the water flow rate. Data storing of water usage in website.
- Monitoring the water flow and usage by the tenant through the mobile Application.
- Rising the bill based on water usage.

Problem statement:

Water is naturally abundant and readily available source in nature. But now a day's lot of ground water level is decreased because of excess amount of water wastage. According to developers and builders, there are about 75,000 small and big apartments in the city. This means that about 70% of apartments are either dependent on bore wells or private tankers for their water needs. Only a handful of these apartments have proper water management

systems. Previously the owner will average all tenants water usage and he generated bill but now the owner will not generate the bill the website only generates a bill based on water usage of every flat.

Methodology:

- The water is discharged from the source and supplied to water storage tanks. The stored water is sent to each and every flat according the requirement. The water required will be sent to each and every flat is recorded in website and bill is generated.

- The water flow sensors will be calculating the water rate and store in the Node MCU which will be attached to it. The Node MCU will be having an inbuilt Wi-Fi module; it transfers the data to the cloud on a real time basis. This cloud will transfer the data to the website. The website we created will be having two sections one is admin section and other is for the users.

- The owner of the apartments will access the admin section, while the tenants staying in the apartments will be using the user section in the website. Every tenant will be provided with the separate login credentials. They can login to the website any time required and monitor their respective water usage. While owner will be aware of data of all the tenants.

- The website will be showing us the log table of water usage of every house in the apartment for 30 days. After 30 days the tenant will be able to get automatically a water bill. The online payment mode is also available for the user.

- The admin section in website will be having the additional features along the water monitoring features. The admin can fix the price for water per liter and also the fine is applied for tenants who will exceeds the water usage limit to monitor the wastage of water along with the usage of water using cost effective hardware and software. Therefore, it will be reducing the water wastage, cost and usage.

Block diagram:
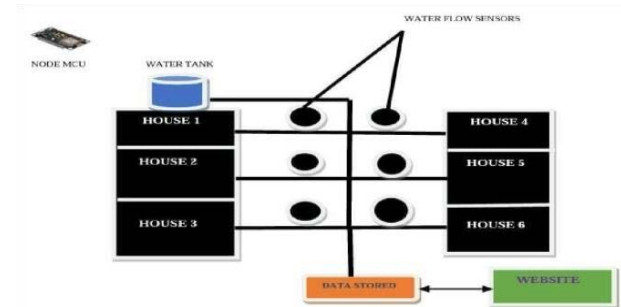
The above Block diagram shows the water data management and method followed in our project. The water supply is usually provided by apartment. The storage tank will be used to store the supplied water.

The each and every apartment will be provided with water according to the requirements. The water used will be calculated automatically by sensors based on the flow rate. The amount of water usage by tenants will be automatically recorded and stored in website managed by owners. For every equal interval of time the billing of the water used by every tenant will be calculated and displayed in website.

Flow chart
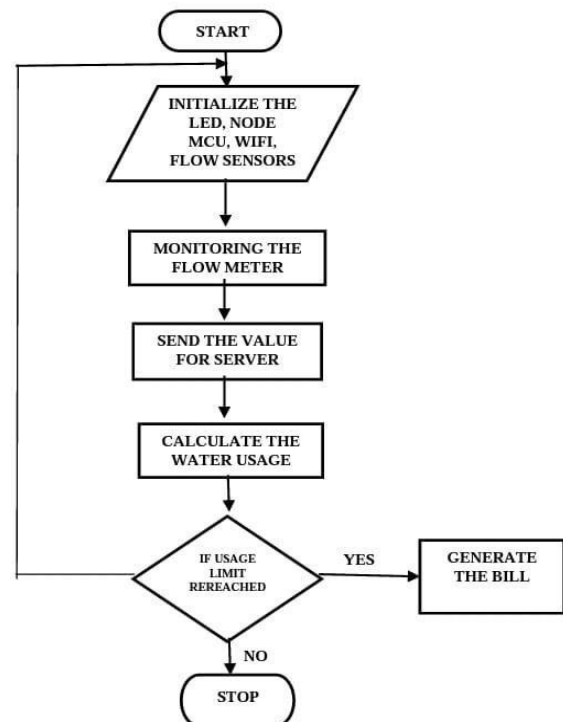
Hardware and software requirements
Hardware requirements:

1. **Node MCU** is a low-cost open-source Lua-based firmware. It has been developed to support IoT based applications. Node MCU means node microcontroller unit. It is a microcontroller. It has a built WIFI Module,

which helps in storing and transferring data on real time basis. The WIFI used in this is called ESP8266WIFISoC. It has a module called ESP-12 which helps in forecasting the hardware part of the MCU. It also comes with a module called ESP-12E and a chip processor ESP8266. The microprocessor will operate at 80MHz-150MHz. it can be powered by a V input pin and Micro USB Jack. The storage specification of MCU is as following – ROM-4MB RAM-128 KB.

Node MCU[11]

2. **Water flow rate sensor**encompassesof a copper body, a rotorand a hall effect sensor. when water flows through the rotor rolls its speed changes with different rate of flow. This is suitable to detect flow in water dispenser. It has two valve s-Inlet and Outlet valve, through which water will flow.

This equipment works on a principle called the hall effect. The rotor inside the water rate sensor will rotate when water flows through it. By using the half effect sensor, When water flows through the pipe, the rotor inside will rotate producing an output pulse signals. In this way the speed of water is calculated. So, when the rotation of the rotor starts there will be a potential difference produced in the conductor. It is the potential difference that cross to electric current. So this potential is calculated by hall effect sensor. The sensor has three wires: Red(5-22V), Yellow (half effect output) Black (ground wire) From the output of the sensor the pulses are calculated. Each pulse is approximate 2.30 ml. This sensor is cheaper and therefore the best.

Water flow sensor
Software requirements:
Visual studio code is a source-code editor made by Microsoft for windows, Linux and macOS.

This is the software where we will build and merge the front end and back-end parts of the website. Visual studio code has additional features which like debugging, enabling the use of virtual environment, code snippet, intelligent auto code completion and many more which helps to build a secure and sophisticated website.

visual studio code
Front end developmentis a programming which focuses on the visual elements of a website or app that user will interact with the client side. This is the above the Back End layer and mainly contributes to the user interface. Here we mainly using **HTML**, **CSS** and **BOOTSTRAP** as the developing tools. HTML means Hypertext Markup Language. This is one of the main building blocks of the website. This defines the skeleton of the website. CSS stands for Cascading Style Sheets. This can assist HTML to improve the appearance and performance of the website. BOOTSTRAP is basically an CSS Framework. Bootstrap contains CSS based design templates to improve the quality of experience.


Front end tools (HTML, CSS, Bootstrap)

Back-end development focuses on the side of a website users cannot see (it was in server side).BackEnd is the brain and back bone of the website. The main component is used in building website isDjango. Django is a Framework just like BOOTSTRAP. But Django is based on Python. It is an Opensource web framework, which has many features like models, templates, admin section and others which makes the back end easy to code. It follows the MTV (Model Template View) Architecture pattern. So, using these languages, frameworks and building tools. The website for water management will be create.
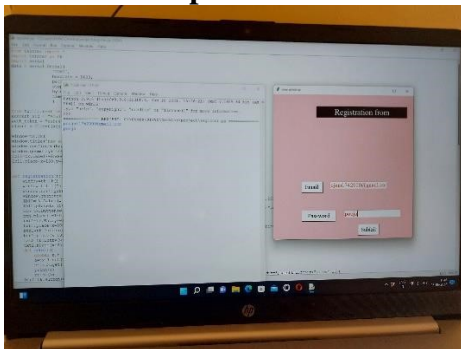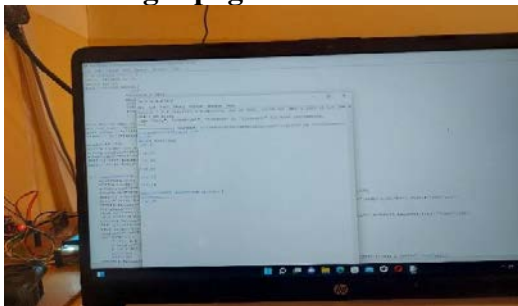
Back end tools(python, django)

Results:
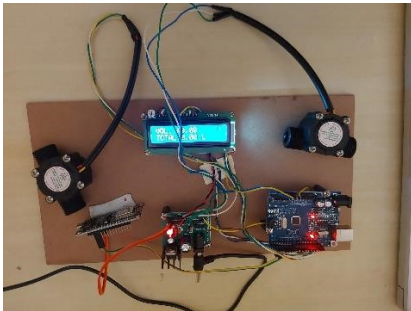
Hardware Implementation

Login page

Bill Generation

The water flow sensor is fixed at the water pipe to measure the rate of water flow and compute the amount of water flowing through the pipe, this works based on thePrincipleof hall effect. he sensor contains three wires. Red wire to connect with supply voltage. Black wire to connect to ground and a yellow wire to collect output from hall effect sensor. Power supply of 5V to 18V of DC is required. To display the measurements, we use the LCD display. Node MCU is connected to the LCD, power supply, where Node MCU is a lowcost open-source Lua-based firmware. It has been developed to support IoT based applications. Node MCU means node microcontroller unit. It is a microcontroller. It has a built WIFI Module, which helps in storing and transferring data on real time basis. The WIFI used in this is called ESP8266WIFISoC. It has a module called ESP-12 which helps in forecasting the hardware part of the MCU. It also comes with a module called ESP-12E and a chip processor ESP8266.

Advantages

- Preservation of water.
- Water usage monitoring in App.
- Taking the measurements on behalf of homeowner when there will be unusual reading
- Automatic billing based on water usage

Applications

- **Apartments:** Water usage by each flat in apartment is monitored and data stored in application.
- Online and offline mode of payment will be available.

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