IOT based Water Monitoring System

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Abstract **- The major problem we're concerned about is water conservation practices. Throughout the country various measures are being exercised for retaining water levels. To interpret this problem we bring in our fully automated water consumption system which helps us in minimizing wastage of water. Here human work and time are saved. An IoT based system helps in notifying water consumed and spreads awareness amongst the households. It helps in avoiding wasteful use of water by realizing its usage. An ultrasonic water flow meter positioned on a water pipe uses sound waves to determine the velocity of the water flowing in a pipe. By mathematically calculating velocity with respect to time, volume of water can be obtained. Along with it Arduino UNO microcontroller fetches the quantity of water and transmits it to the Wifi module which functions to load this data on a webpage. So we're providing this web-based application to those who are concerned about their daily water usage. Objectives behind this dissertation work are enlisted below :**

1. **To contribute government and society by exercising water conservation practices, for a healthy sustainable development.**
2. **To employ IoT (Internet of Things) for solving this global issue on a grassroot level.**
3. **This highly efficient and low-cost arduino UNO based system is completely reliable and is of great scope in future.**
4. **Water consumption system is efficient for measuring the quantity of water used on a day-to-day basis.**

Key Words- **Ultrasonic water flow meter, Arduino UNO, Wifi Module, Webpage, Internet of Things.**

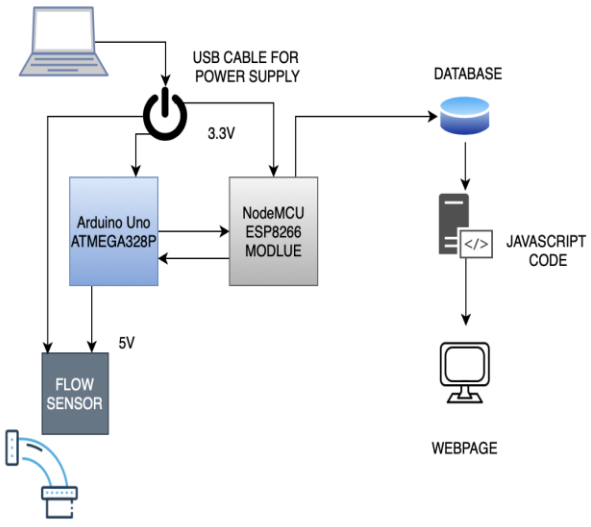
I. INTRODUCTION

IOT based applications are evolving and contemporary to our day-to-day needs. These functional technologies can be of higher use and can
be bought easily to the grassroot level for resolving problems we face on a daily basis. The presented system is an IoT device which helps to manage and plan the usage of water. This system can be easily
installed and maintained for a long run. The Laser sensor is placed on the tank which continuously monitors the water level in real time. This information will be updated in the cloud and users can analyze the amount of water. According to the level of water in the tank, the motor functioning is automatically controlled. When the water level falls below the
threshold level the motor will be again turned on automatically.

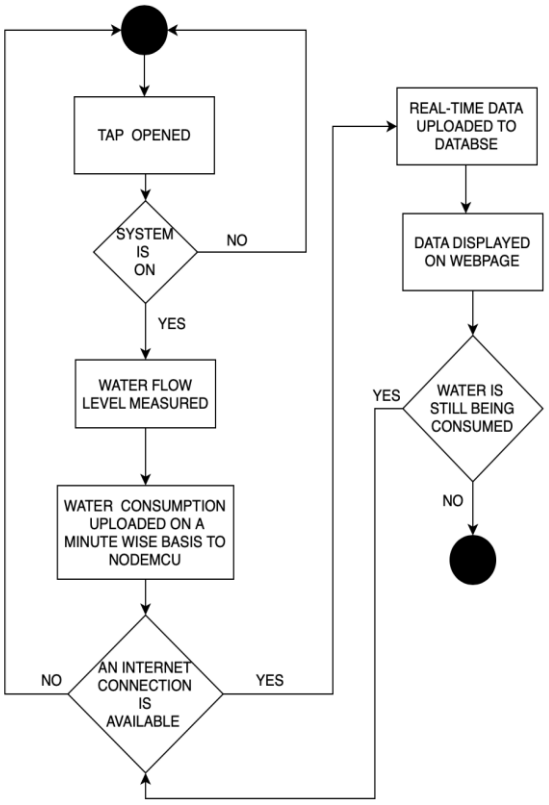
II. PROPOSED SYSTEM

Water conservation practices can be explained by our proposed system. This structure keeps an eye on water flowing through your pipe and updates you about the volume of water in your tank on regular intervals. An ultrasonic sensor is positioned on a pipe which keeps on calculating the amount of water in your tank. This job is performed with the help of Arduino UNO. Water flow meter is serially connected to the Arduino UNO. The flow sensor used here works on the principle of "Hall Effect". According to which, a voltage difference is induced in a conductor transverse to the electric current and the magnetic field perpendicular to it. Here, Hall Effect is utilized in the flow meter using a small propeller shaped rotor which is placed in the path of the liquid flowing. The output is obtained on a serial monitor. Once the amount of water is calculated it is stored in a database using NodeMCU ESP8266 module.

A. Block Diagram



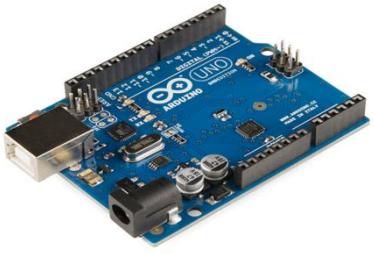
B. *FLOWCHART*



III. COMPONENTS

A. *Arduino UNO*

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328Pmicrocontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable.We are interfacing Wi-Fi module ESP8266 for giving it an internet based approach.



B. *Ultrasonic Water Flow Metre*

For continues, water stream rate estimation YF-S201 is used. Affiliations required for this stream rate sensor with respect to Arduino's is particularly irrelevant. It has a working temperature extent of - 25°C - 80°C which is wide enough for our application to work viably. Stream sensor is used to measure the movement of water. This sensor basically involves a plastic valve body, a rotor and a Passageway Effect sensor. The pinwheel rotor turns when water/liquid travels through the valve and its speed will be genuinely relating to the stream rate. The Hall Effect sensor will give an electrical heartbeat every rebellion of the pinwheel rotor.

C. *NodeMCU*

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-FiSoC from Espressif Systems, and hardware which is based on the ESP-12 module.The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language.

IV. SOFTWARE SPECIFICATIONS

A. *Firebase*

Firebase Realtime Database is a Cloud hosted database, i.e. it runs on a cloud and access to the user is provided as a service. It stores data in JSON format, a format to store or transport data. All the users connected to it can get access to the data at Real Time.

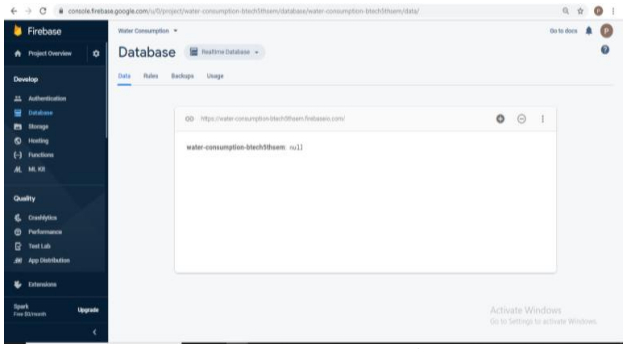


Fig.1- Creating database using firebase

B. 4.2 Webpage

An HTML Webpage to display real-time data.

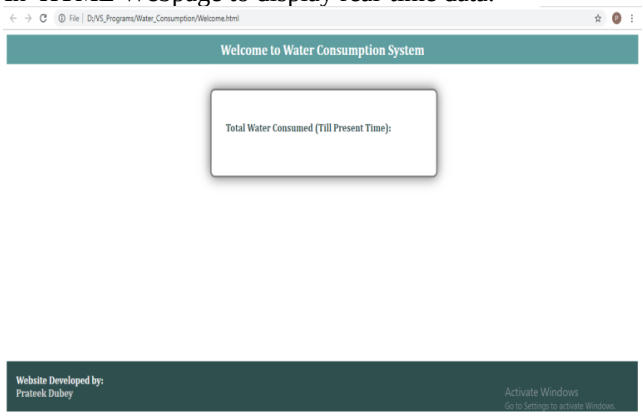
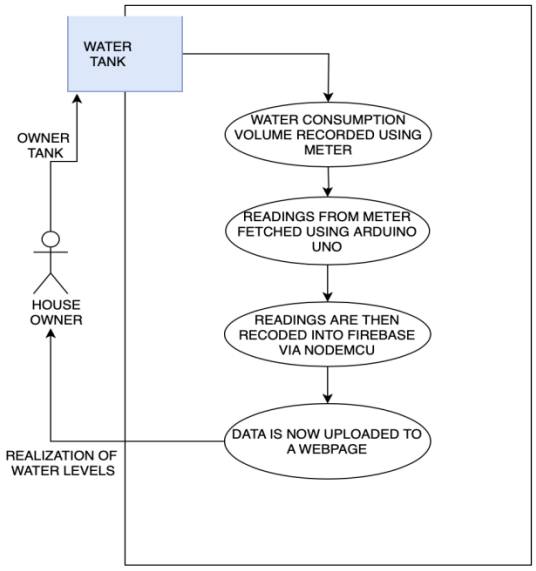


Fig.2- A webpage designed which takes readings from database

V. USE-CASE DIAGRAM



VI. SCOPE

Water is an extremely sacred resource for the existence of mankind and we are losing the actual amount of potable water that should be present on the planet. Water bodies like groundwater are exploited to the fullest for the vested interests of some people. This is resulting in shortage of drinking and potable water. For this reason water must be conserved with extreme measures. The rapid development and wide application of water informatics has significantly improved water level monitoring, management efficiency, and effectiveness. Accordingly our IOT based Water consumption system will help unite water conservation practices with households and citizens of Indian subcontinent. Thereafter generating awareness amongst people.

1. Water level management is used in Hotels, Home apartments, commercial complexes, and in factories.
2. Water consumption system is reliable for measuring the quantity of water used on a day-to-day basis.

VII. 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 monitor the usage of water and people can use water in an efficient way. It will help the society members to check the water level in the tank. Also members will be able to monitor their per flat water usage on the Android app. Water wastage can be avoided using the Android app by cutting off the water supply of the particular flat. This all automation helps to reduce human efforts and helps to manage water carefully and will also reduce the problem of water scarcity. In the future this project could be upgraded to be used at the industry level as a water flow sensor. This version would use thermodynamics and have a better set of sensors than the current one, which could distinguish air bubbles and water. Also, NodeMCU and ArduinoUNO are quite expensive smart boards. These can be replaced with a single stand alone ESP8266 microchip which aids not only with micro controlling but also with internet connectivity.

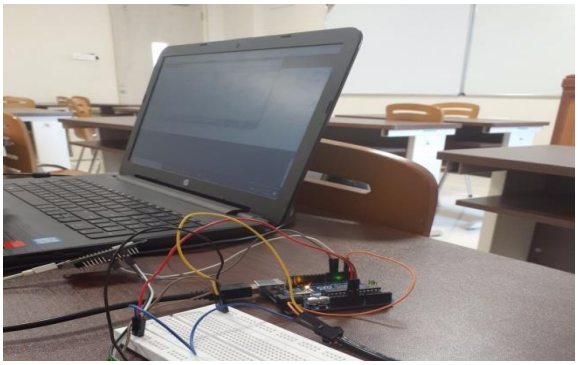


Fig.1- Working Model

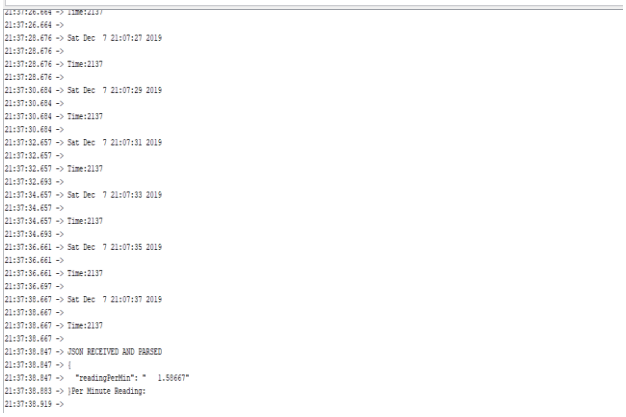


Fig.2- Readings on serial monitor

REFERENCES

[1] "A Benchmarking Model for Household Water Consumption Based On Adaptive Logic Networks" by Xiaomin Chena, Shuang-Hua Yanga`, Lili Yangb, Xi Chen.
[2] Hand Gesture Controlled Robot using Arduino by Kannu Priya.
[3] "Smart Water Quality Monitoring System" by A.N.Prasad, K. A. Mamun, F. R. Islam, H. Haqva.

BIOGRAPHIES

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