
ISSN: 2321-2152
IJMECE
International Journal of modern
electronics and communication engineering
E-Mail
editor.ijmece@gmail.com
editor@ijmece.com
www.ijmece.com

ISSN 2321-2152
www.ijmece.com
Vol 13, Issue 2, 2025

An Internet of Things (IoT) Water Flow Meter

[1]M. Saila Bhanu, [2]Sanakabathula Vinay Kumar, [3]Senapathi Harsha Shanmukh, [4]Shaik Sura Saheb,
[1]Assistant Professor, Department of ECE, Rajamahendri Institute Of Engineering & Technology.
[2,3,4]Student, Department of ECE, Rajamahendri Institute Of Engineering & Technology.

ABSTRACT:

A combination of factors, including increased urbanization and water usage, is making water shortage an increasingly pressing issue. Unnecessary water wasting occurs because traditional water monitoring systems do not have automatic alarms or real-time tracking. To solve this problem, this project suggests an Internet of Things (IoT) smart water monitoring system that combines a water level sensor, a flow sensor, the IoT, and a buzzer to provide an economical, efficient, and automated way to manage water. By transmitting data in real-time to a cloud-based system, the Water Level Sensor keeps a constant eye on the water level in storage tanks, preventing overflow. By tracking how much water is being used, the Flow Sensor keeps consumers apprised of their daily use. Consumers and authorities are able to remotely monitor water levels thanks to the data sent by the IoT module to a web or mobile application. In addition, a buzzer alarm is sent off when the water level drops dangerously low or if there is an indication of excessive water consumption, so that immediate action may be taken. The goals of this system are to reduce water waste, improve the precision of monitoring, and notify users in real-time. Sustainable and effective water conservation may be achieved by the automated water management solution, which can be advantageous for families, industries, and municipal water supply systems. Automated leak detection systems, smart billing systems, and AI-based predictive analytics are some potential future upgrades that might further minimize water consumption.

Introduction

The need for water has surged due to population expansion and rapid urbanization, impacting several sectors such as agriculture, manufacturing, housing, and hospitals, among others. The quantity of water used by each family and company fluctuates with the changing seasons. We have developed a technology that can alleviate water scarcity. The price remains same year-round, regardless of whether consumers use more water in the summer or less. In this case, smart water meters are useful for determining the cost according to consumption. After determining which homes use the most and least water, it adjusts the price appropriately. Smart water meters are the most fair method for providers to bill customers for water based on how much is used. They also reduce energy and chemical expenses, which means that consumers pay less overall.

The suggested setup generates an intelligent system that can regulate water flow on its own. This project outperforms previous methods while being more cost-effective. This suggested technology allows for the autonomous management and tracking of water flow. This causes the required quantity of water to be released. This method is applicable to all of the company's fluid needs. The real-time project's automated water management system is simple and effective in reducing water waste.

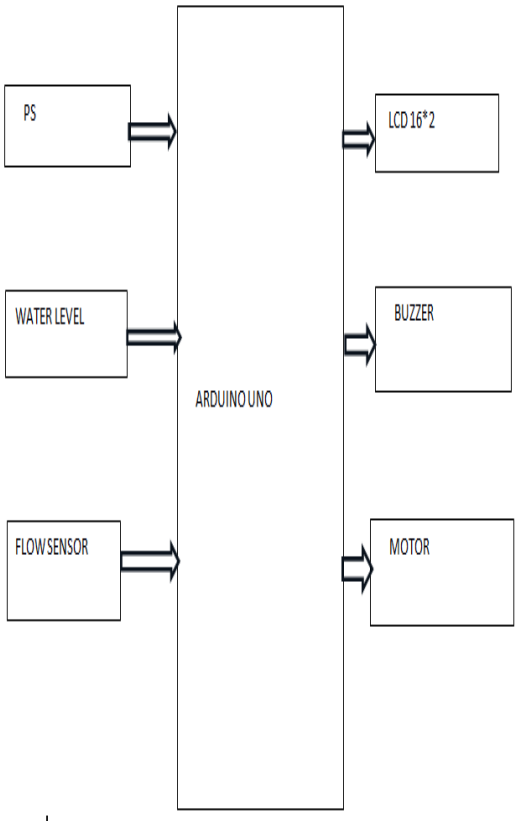
LITERATURE SURVEY

To find out how much water certain households consumed, the author [1] employed technology that was based on the Internet of things (IoT). A smart flow meter tracks the user's fluid use, notifies them when it's running low, and provides real-time data. An approach to finding possible leaks in the client's property was proposed by the author [2]. Sensors installed in flow meters have quantified the quantity of water that each user consumes. The liquid crystal display (LCD) shows the amount of water used. To help their customers manage and reduce their water usage, water utilities can use the method proposed by the author [3] to do two things: (i) give smart meters better active leakage targeting and detection capabilities through the use of Automated Meter Reading (AMR) technology, and (ii) give customers clear consumption trends. An AMR monitor was set up at the demonstration location, and the data collected allowed for the rapid detection of a water leak on campus, according to the proposed strategy. The author proposed a method in [4] that details an automated system for controlling water supplies and keeping tabs on their flow in real time.

ISSN 2321-2152
www.ijmece.com
Vol 13, Issue 2, 2025

With the use of software administration, this gadget can continuously measure the water meter's degree and send out bills for the water usage. The amount of water that a household or a person drinks is determined by what the author [5] suggests. When the water use reaches a certain point, the supply is cut off.

Methodology



Block diagram

Working

To guarantee effective water consumption and conservation, the suggested Internet of Things (IoT) smart water monitoring system incorporates Water Level Sensors, Flow Sensors, IoT connection, and a Buzzer. If there is ever a risk of water scarcity, the Water Level Sensor will keep an eye on the storage tanks and report any changes in real time. Users may monitor daily use and identify issues like leaks or excessive consumption with the help of the Flow Sensor, which monitors the rate of water consumption. Users may receive water use statistics in real-time thanks to the system's connection to an Internet of Things (IoT) cloud platform that allows remote monitoring via a mobile or online application. A buzzer alarm mechanism is included into the system to help it work more efficiently. It will sound an audible warning when the water level drops below a certain point, when it detects excessive use, or when it finds a leak. The system is run by an Arduino microcontroller, which interprets data from sensors, notifies users, keeps records up-to-date, and may limit water flow based on user input. Water management is optimized by this automated, cost-effective approach via less waste, improved resource usage, and quick user action for correction.

Arduino uno

A microcontroller board based on the Atmega328, the Arduino Uno is described in the datasheet. A 16 MHz crystal oscillator, 6 analogue inputs, 14 digital input/output pins (including 6 PWM outputs), 1 USB port, 1 power connector, 1 ICSP header, and 1 reset button are all part of it. All you need is a USB cable, an AC-to-DC converter, or a battery to get it going; it comes with everything you need to support the microcontroller.

Because it forgoes the FTDI USB-to-serial driver chip, the Uno stands apart from all previous boards. In its place, you'll find the Atmega8U2 configured to convert USB to serial. "Uno" signifies "One" in Italian and is chosen to commemorate the impending release of Arduino 1.0. Going forward, the Uno and version 1.0 will serve as the reference versions of Arduino. See the index of Arduino boards for a comparison with earlier generations; the Uno is the newest in a series of USB Arduino boards and the platform's standard model.

The USB port or an external power source are both viable options for powering the Arduino Uno. It chooses the power source mechanically. You may use a battery or an AC-to-DC converter (wall-wart) to power it from the outside (not via USB). It is possible to attach the adapter by inserting a 2.1mm center-positive connector into the power port on the board. The POWER connector's Gnd and Vin pin headers are suitable for inserting battery leads. The board is compatible with power sources ranging from 6 to 20 volts. But if the voltage is lower than 7V, the 5V pin could not give 5V and the board might become unstable. The voltage regulator might become too hot and ruin the board if you use more than 12V. A

ISSN 2321-2152
www.ijmece.com
Vol 13, Issue 2, 2025

voltage range of 7 to 12 volts is suggested.

LIQUID CRYSTAL DISPLAY

In front of a light source or reflector, a thin, flat display device called a liquid crystal display (LCD) arrays a large number of color or monochrome pixels. Pile of liquid crystal molecules held aloft by two transparent electrodes and two polarizing filters, whose polarity axes orthogonal to one another, make up each pixel. If there weren't liquid crystals interposed, one would block the other from light. Light that enters one filter is able to pass through the other because the liquid crystal bends its polarity.

A program's ability to communicate with the outside world depends on its input and output devices, which in turn rely on human communication. An LCD display is a typical accessory for controllers. The 16x1, 16x2, and 20x2 LCDs are among the most popular types of displays that are attached to the controllers. This equates to sixteen characters on a single line. The first set has 16 characters on each line while the second set has 20 characters on each line.

BUZZER

In a magnetic transducer, the circuitry includes an iron core, a yoke plate, a wound coil, a permanent magnet, and a vibrating diaphragm that can be moved. The magnet's field gently draws the diaphragm up nearer the core's surface. A positive alternating current (AC) signal causes the diaphragm to move up and down, which in turn vibrates the air. This is achieved by the current passing through the excitation coil, which forms a fluctuating magnetic field. A resonator, which is composed of a cavity and one or more sound holes, may amplify vibrations in order to generate a loud sound.

ESP8266 Wi-Fi Module

This project revolves on this. The module plays a crucial role in the project as it is centered on WIFI control of appliances. A low-cost Wi-Fi chip with full TCP/IP capability, the ESP8266 Arduino compatible module has an amazing built-in MCU (Micro Controller Unit) that allows you to control I/O digital pins using a simple programming language that is almost pseudo-code like. The Chinese company Es press if Systems is situated in Shanghai and makes this gadget. In August 2014, this chip made its debut in the ESP-01 version module manufactured by the third-party company AIThinker. The MCU can establish basic TCP/IP connections and connect to WiFi networks with the help of this little module. In his Many hackers and tech enthusiasts were interested in exploring and using it for a wide range of projects because to its tiny size and very inexpensive pricing (1.7$ to 3.5$). Since it has been so successful, Espressif has released other variants with varying proportions and technological specs. Among the following is the ESP32. Numerous projects and applications, such as home automation, may be found online.

RELAYS

Many household and commercial equipment, as well as industrial control systems, make use of electrically controlled switches called relays. By using a relay, two independent voltage sources may be isolated from one another; in other words, a little quantity of voltage or current on one side can manage a big amount of current or voltage on the other side, and vice versa.

SOFTWARES

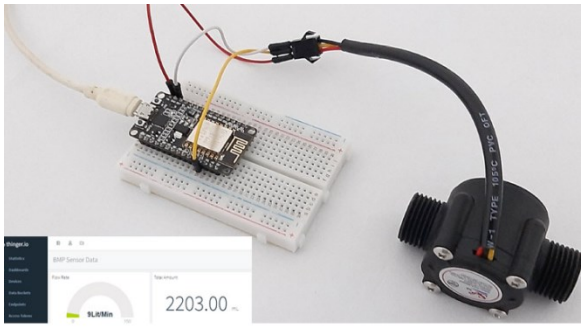
The Arduino platform is an open-source, user-friendly hardware and software environment for prototyping. It is comprised of a programmable circuit board (also called a microcontroller) and an Integrated Development Environment (IDE) called Arduino that is pre-made for writing and uploading code to the physical board.The main characteristics are:

• Many sensors can send signals in digital or analog formats to Arduino boards, which may then be used to activate motors, control LEDs, establish connections to the cloud, and much more.
• The Arduino IDE (also called "uploading software") allows you to command your board's operations by communicating with the microcontroller on the board. • A separate device, known as a programmer, is not required to load fresh code into an Arduino board, in contrast to most prior programmable circuit boards. The usage of a USB connection is all that is required. • The Arduino IDE employs a streamlined version of C++, which facilitates programming learning. Last but not least, Arduino offers a standardized form factor that simplifies the microcontroller's tasks.

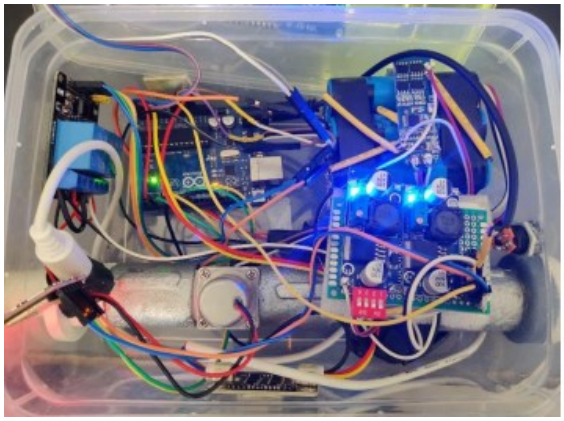
Now that we know what the Arduino UNO board is and how it works, we can go on to setting up the Arduino IDE. As soon as we figure this out, we can upload our software to the Arduino board.

ISSN 2321-2152
www.ijmece.com
Vol 13, Issue 2, 2025

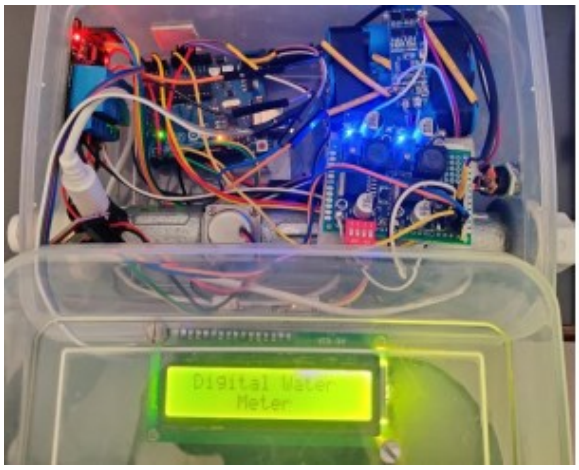
RESULTS



Model



Mode2



CONCLUSION

An effective and novel approach to measuring water use and conservation is the Internet of Things (IoT)-based smart water monitoring system. The system incorporates water level sensors, flow sensors, internet of things (IoT) technologies, and a buzzer to allow for remote tracking of water consumption, automatic alarms, and real-time monitoring. This device revolutionizes water management by promptly detecting leaks, significant shortages, and excessive consumption. It allows for fast remedial measures, unlike old techniques. Through the use of online and mobile apps, users are able to get remote control and monitoring capabilities, thanks to the Internet of Things (IoT) connection. Potential future upgrades might include automated control valves, solar-powered sensors for sustainable monitoring, and AI-driven predictive analysis for water consumption patterns. Smart water management has taken a giant leap forward with this scalable, reasonably priced system that aids in water conservation and waste prevention for homes, businesses, and communities.

REFERENCES

[1]. hmed 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]. [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]. [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.