IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 9, Issue 6, June 2021

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.542

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 6, June 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0906095 |

Automated Domestic Water Reutilization System using IoT

Bhat Shreevatsa Ramanatha, Pasala Sandeep Reddy, Sagi Sathya Vishnu Sudeepthi, Nisha C,

Asst. Prof. Ms. Vidhya S

UG Students, Dept. of Information Science & Engineering, The Oxford College of Engineering, Bangalore, India

Assistant Professor, Dept. of Information Science & Engineering, The Oxford College of Engineering, Bangalore, India

ABSTRACT: The levels at which groundwater is depleting around the world is alarming and there is an impending necessity to be judicious with water usage. This led to the formulation of a consolidated architecture to monitor water consumption at the household level. Internet of Things (IoT) is combined with the apache tomcat server and Android App to facilitate an efficient dashboard for consumers. The proposed model aims at imbibing a sense of responsibility in the citizens as it helps keep a track of water usage periodically using visually appealing charts, lays down the monthly water utility costs as well as collect the used water and passes through filtration process for reutilization.This paper presents a tested prototype and the pipeline connecting the hardware and software components responsible for streamlining the process of data transfer from IoT to server and from cloud to the android application

KEYWORDS: Automated, reuse water, water level, Reutilization system.

I. INTRODUCTION

Water is one of the primary sources of survival for all life forms on earth. A lot of our day to day activities such as bathing, cooking, washing is dependent on the use of water. The community needs water for various activities beginning with the production of food and irrigation. But now the world is heading towards a water crisis due to the excessive and uneconomical use of water by the large human population. The World Economic Forum has announced in 2015 that the water crisis ranks the eighth global risk with the highest likelihood of occurring within 10 years. This has left many fearing that the shortage of water is probably going to be the most important cause of conflict in the coming years. The importance of groundwater conservation practices has undergone a gradual increase as it can lessen wastewater discharge which can further result in improved water quality. They also diminish the necessity to search for or create new water sources, leaving them in reserve for future use.

Hence it is extremely important to conserve groundwater by constantly monitoring and regulating usage starting at the individual household level. The designated system strives to achieve just that. One of the main objectives of the system is to imbibe a sense of responsibility in the citizens by preaching the importance of water and its conservation. The monitoring dashboard provides tips for being conservative with the daily usage consumption and also allows them to set limits on the same. Once the limit is approached or has reached, the consumer receives an alert regarding the same, leaving room for usage reduction

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 6, June 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0906095 |

II. PROBLEM STATEMENT

Water is a world resource that is a gift of nature and important to farming, manufacturing, and the life of human beings on earth. Currently, drinking water facilities face new real-world problems. Due to the limited water resources, intensive money requirements, growing population, urban change in rural areas, and the excessive use of sea resources for salt extraction has significantly worsened the water available to people. The high use of chemicals in manufacturing, construction and other industries, fertilizers in farms and also directly leaving the polluted water from industries into nearby water bodies have made a huge contribution to the global water reduction, which has become an important problem. Even due to containment water various water born are increasing day by day, due to which many human beings are losing their lives.

III. EXISTING SYSTEM

Sustaining available resources is the most important issue faced globally. Increase in the population, urbanization and shortage of water due to less rainfall makes it difficult to provide fair distribution of water resource in real time.
Traditionally, Water Consumption Monitoring System was manually performed. Such techniques do not provide data in real-time.

Disadvantages:

- Manual process
- This process wastes water
- Difficult to handle

IV. LITERATURE SURVEY

[1] Title: Smart Water Usage Monitor
Author: Bhagya VD, Hemalatha NM, Nethra K, P Vaishnavi, Shyamala G
Year: 2018
Sustaining available resources is the most important issue faced globally. Increase in the population, urbanization and shortage of water due to less rainfall makes it difficult to provide fair distribution of water resource in real time. To solve this problem, we need an efficient system that provides better monitoring and controlling the consumption of water. Idea of IoT is used for uninterrupted monitoring and tracking of water consumption using Wi-Fi/LAN. Server collects readings of sensors showing the usage of water at every outlet through WiFi/LAN. Users can continuously track the water usage in mobile application. The application can retrieve data stored in cloud and display it to users in a better format. Same application can be used to notify users if their water consumption exceeds a predefined range. This automation can help users to efficiently monitor the usage and keep track of the bills. Unknown leakage in distribution pipe is a major issue that adds up to wastage of water. Wireless Sensor Network Consisting of Water flow sensors can be used for leakage detection in pipes. Proposed system aims at notifying respective authorities whenever the leakage is detected so that immediate actions can be taken.

[2] Title: A case study of Internet of Things: a wireless household water consumption monitoring system
Author: Shuang-Hua Yang, Xi Chen, Xiaomin Chen, Lili Yang, Baichong Chao, Jiangtao Cao
Year: 2015
In this paper IoT application is illustrated through a real implementation of global household water consumption monitoring system across two countries in the Europe. A novel wireless water consumption monitoring system is designed, in which flow rate/temperature sensors are placed at different detection spots in a house to collect data, and the collected data is routed to a remote computer server via the home WiFi and the Internet. The designed system was installed and tested in 30 recruited households, 10 in Sosnowiec, Poland and 20 in Skiathos, Greece. It has been demonstrated that the global system is capable of providing remote, near real-time monitoring of water consumption in different households. Lessons learned from this real application has been summarized to guide further work

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 6, June 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0906095 |

[3] Title: IoT Water Consumption Monitoring & Alert System
Author: Zainal HishamCheSoh1 , Muhammad S. Shafie1 , Mohd. AffandiShafie1 ,SitiNoraini Sulaiman1 and Mohammad Nizam Ibrahim1, Syahrul Afzal Che Abdullah2
Year: 2018
The water consumption monitoring and alert system via Internet of Things (IoT) Ubidots Cloud is a one of the platform to monitor amount of water usage in domestic household per day, per week and per year in the real-time on mobile phone or laptop. The Ubidots Dashboard provide interface to display the water consumption level data and also can be illustrated using graph. The graph shown water consumption per day in household, when the water start flowing through the sensor, that sensor start measuring the volume of water and send data to UbidotsIoT platform. Using Ubidots Event, when the data reach the specified limit of water consumption specified, an alert on the excessive usage of water is send to the home user through telegram or email on the phone.

V. PROPOSED SYSTEM

The system starts with the water flow sensors with an intrusive mechanism that are installed at the individual pipelines. These sensors start measuring the water flowing through the pipes and send the data to the server. The system has been designed, keeping in mind the interaction required between hardware and software components and the role played by network connectivity to get them to communicate with each other, to streamline the whole process of transfer of data from one medium to another. Server communication APIs played a major role in this transfer of data from IoT to cloud and from cloud to the mobile application and a good internet connectivity plays a pivotal role in making the transfer seamless.

VI. METHODOLOGY

Collect shower and wash basin water
collection of shower water is the easiest and simplest way to reuse water at home. Water from the shower can be reused after a bath by plugging the drain and letting the bath fill up. It can then be automatically collected from the bathtub using IoT based system. After bath, the collected water can be reused for watering outdoor flowers and lawns.

Rainwater
Collecting rainwater is equally part of water reuse that many people do not recognize. The installation of gutters for diverting rainwater to where it can be stored does the work. After collection, the water can be used in the garden to water plants, for laundry and many other purposes as rainwater is considered clean and safe compared to other types of used water such as greywater.

Fine filtration of water for reuse
Fine filtration can as well be used to make wastewater more useful. The difference is that fine filtration is majorly used to remove microbes from water. If properly filtered, the water is fit for human consumption and cooking. There is a basic structure recommended for a fine filtration system and once it is set up, the greywater can be filtered then directed to a collection point where it can be used for various purposes.

Agricultural wastewater reuse
Wastewater can be used for agricultural purposes such as watering landscaped gardens and lawns. It can equally be used to irrigate vegetable and fruit nurseries or flower.

Server communication
The system starts with the water flow sensors with an intrusive mechanism that are installed at the individual pipelines. These sensors start measuring the water flowing through the pipes and send the data to the server.
The system has been designed, keeping in mind the interaction required between hardware and software components and the role played by network connectivity to get them to communicate with each other, to streamline the whole process of transfer of data from one medium to another. Server communication APIs played a major role in this transfer of data from IoT to server and from server to the mobile application and a good internet connectivity plays a pivotal role in making the transfer seamless.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 6, June 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0906095 |

VII. RESULTS

Checks Tank1 water level(L0) and sends signal to microcontroller.Microcontroller sends signal to storage water pump.Checks Tank1 water level (L1) and send signal to microcontroller.Tank1 supplies water to kitchen, water basin and shower.Collects used water from kitchen, shower water and water basin and supplied to used water storage.Water is passed through used water storage to filtration module.Filtration module filters the water and send to Tank 2.Tank 2 passes water to flush ,garden and cleaning purposes. Sends filtered, used and fresh water volume from T2, used water storage and T1 to server.

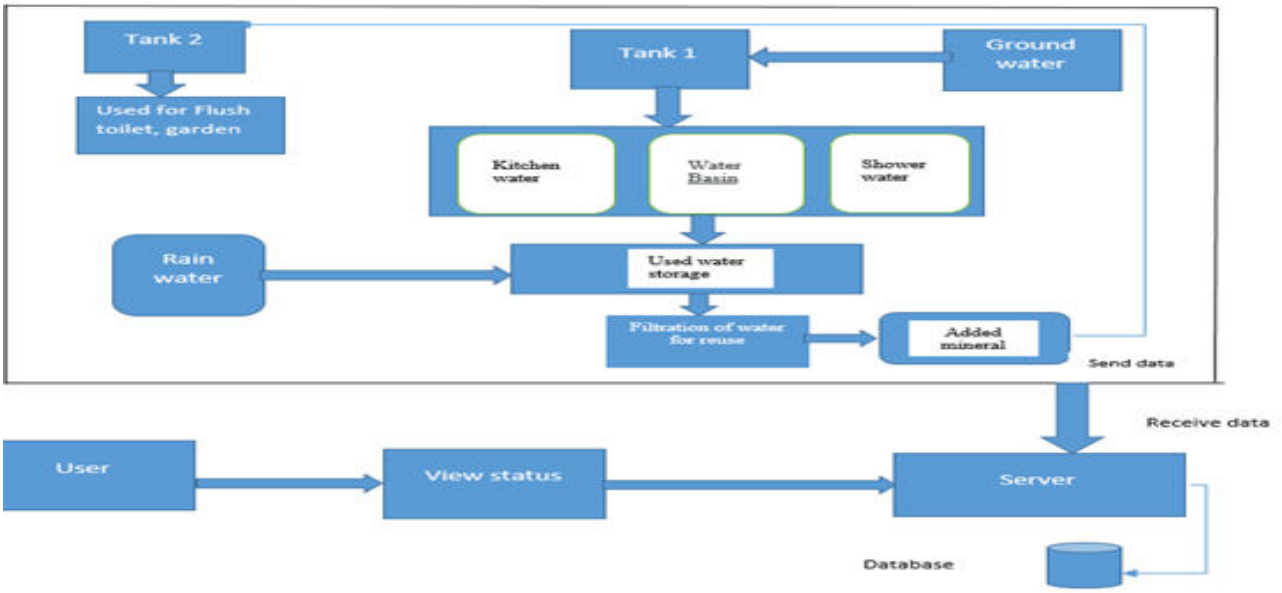

fig. 1. System Architecture

Fig 2 : Shows the setup of the water reutilization setup

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 6, June 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0906095 |

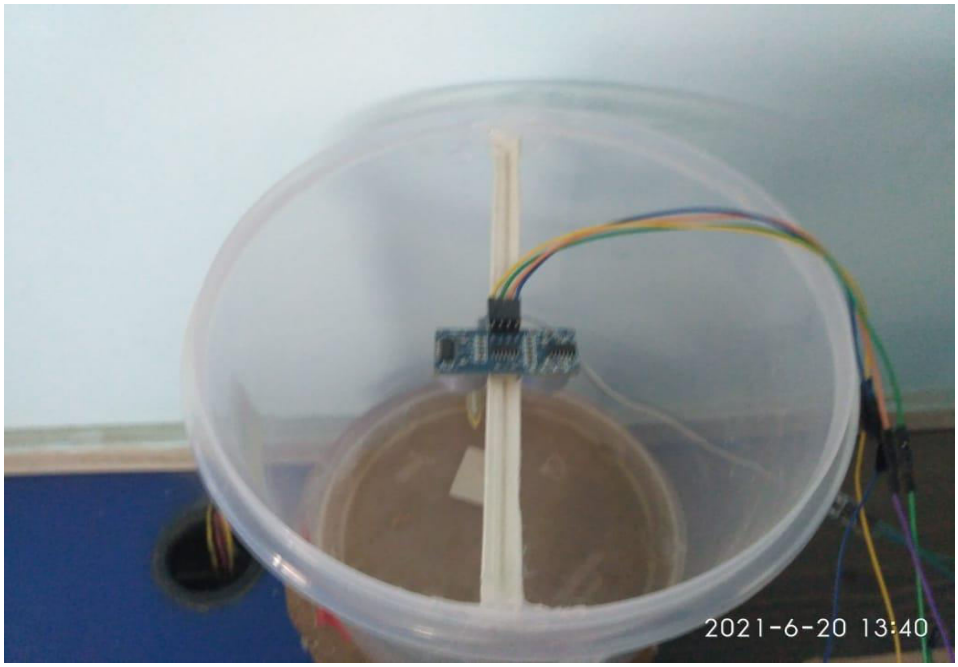

Fig 3 : Shows the setup of the water tank setup

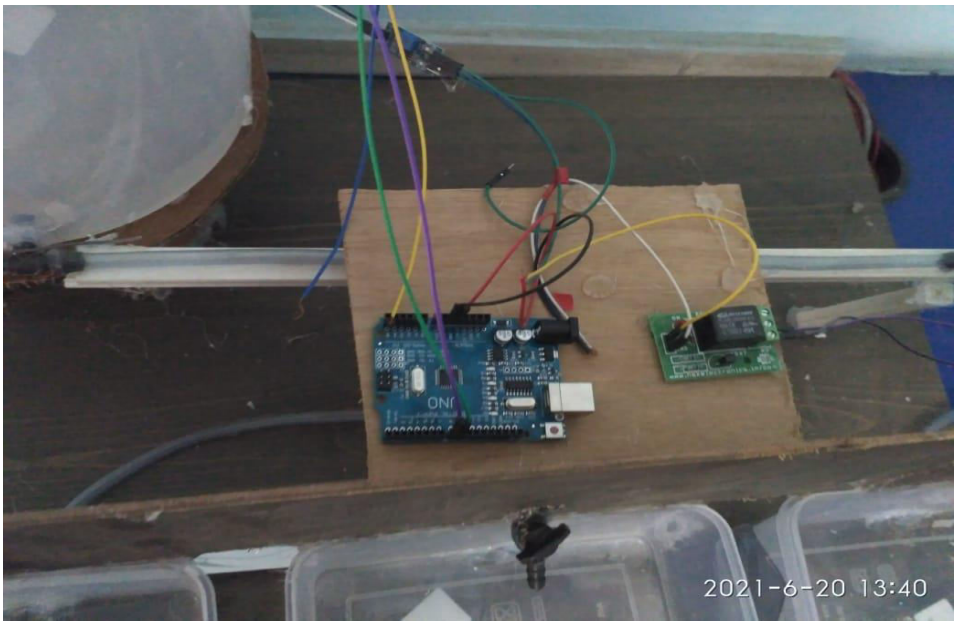

fig.4.Hardware Setup

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 6, June 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0906095 |

REFERENCES

[1] Shuang Hua Yang, Xi Chen, Xiaomin Chen, Lili Yang, Baichong Chao, "A case study of IOT: Wireless household water consumption monitoring" (base paper), IEEE ISSEWATUS project, pages: 6, 2015.
[2] Lili Yang, Shuang-Hua Yang, EwaMagiera, WojciechFroelich, Tomasz Jach, ChrysiLaspidou, School of Business and Economics, Loughborough University, UK, "Domestic water consumption monitoring and behavior invention by employing the internet of things technology", ScienceDirect ISS-EWATUS project, pages: 10, 2017.
[3] Zainal Hisham, Mohd. Shafie, Mohd. Ibrahim, "IoT water consumption monitoring and alert system", IEEE, pages: 6, 2018.
[4] World Economic Forum (2015).Global Risks 2015 Report. Jan, 2015.
[5] NamanSatiya, VinitVaru, AakankshaGadagkar, DarshanShaha, "Optimization of water consumption using dynamic quota based smart water management system", IEEE Region 10 Symposium, pages: 6, 2017.
[6] Sanket Salvi, Pramod Jain S.A, Sanjay H.A, Harshita T.K, M. Farhana, Naveen Jain, Suhas M, "Cloud-based data analysis and monitoring of smart multi-level irrigation system using IOT", IEEE, pages: 7, 2017.
[7] Raspberry Pi documentation, https://www.raspberrypi.org/documentation/
[8] Saraju P. Mohanty, Uma Choppali, Elias Kougianos, "Everything you need to know about smart cities", IEEE, pages: 11, 2016.
[9] Emilio Orsi and Sergio Nesmachnow, "Smart home energy planning using IoT and cloud", IEEE, pages: 5, 2014.
[10] Chanda Rajurkar, S R S Prabaharan, S.Muthulakshmi, "IoT based water management", IEEE, pages: 5, 2017.
[11] Marcello A. Gómez Maureira, "Thingspeak - an API and web service for Internet of Things", 2014.

INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 7.542

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details