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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.

1. INTRODUCTION:

IOT based operations are evolving and contemporary to our day- to- day requirements. These functional technologies can be of advanced use and can be bought fluently to the lawn- root position for resolving problems we face on a diurnal base. The presented system is an IoT device which helps to manage and plan the operation of water. This system can be fluently installed and maintained for the long run. The Ray detector is placed on the tank which continuously monitors the water position in real time. This information will be streamlined in the pall and druggies can dissect the quantum of water. According to the tank's water position, the motor functioning is automatically controlled. When the water position falls below the threshold position the motor will be again turned on automatically.

LITERATURE :

[a] ADVANCE IN SMART ENVIRONMENT MONITORING SYSTEMS USING IoT AND SENSORS

Author : Silvi Liberata Ullo, G.R Sinha
Year : 2020

Abstract :
Air quality, water pollution, and radiation pollution are major factors that pose genuine challenges in the environment. Suitable monitoring is necessary so that the world can achieve sustainable growth, by maintaining a healthy society. In recent years, environment monitoring has

turned into a smart environment monitoring (SEM) system, with the advances in the Internet of Things (IoT) and the development of modern sensors. Under this scenario, the present manuscript aims to accomplish a critical review of noteworthy contributions and research studies on SEM, that involve monitoring of air quality, water quality, radiation pollution, and agriculture systems. The review is divided on the basis of the purposes where SEM methods are applied, and then each purpose is further analyzed in terms of the sensors used, machine learning techniques involved, and classification methods used. The detailed analysis follows the extensive review which has suggested major recommendations and impacts of SEM research on the basis of discussion results and research trends analyzed. The authors have critically studied how the advances in sensor technology, IoT and machine learning methods make environment monitoring a truly smart monitoring system. Finally, the framework of robust methods of machine learning; denoising methods, and development of suitable standards for wireless sensor networks (WSNs) has been suggested.

Keywords:
Environment; **pollution**; **internet of things (IoT)**; **sensors**; **smart environment monitoring (SEM)**; **smart sensor**; **wireless sensor networks (WSNs)**

[b] IOT BASED SMART WATER QUALITY MONITORING: RECENT TECHNIQUES, TRENDS AND CHALLENGES FOR DOMESTIC APPLICATIONS

Author : Farmanullah Jan, Nasro Min-Allah, Dilek
Year : 2021

Abstract :
Safe water is becoming a scarce resource, due to the combined effects of increased population, pollution, and climate changes. Water quality monitoring is thus paramount, especially for domestic water. Traditionally used laboratory-based testing approaches are manual, costly, time consuming, and lack real-time feedback. Recently developed systems utilizing wireless sensor network (WSN) technology have reported weaknesses in energy management, data security, and communication coverage. Due to the recent advances in Internet-of-Things (IoT) that can be applied in the development of more efficient, secure, and cheaper systems with real-time capabilities, we present here a survey aimed at summarizing the current state of the art regarding IoT-based smart water quality monitoring systems (IoT-WQMS) specially dedicated for domestic applications. In brief, this study probes into common water-quality monitoring (WQM) parameters, their safe limits for drinking water, related smart sensors, critical review, and ratification of contemporary IoT-WQMS via a proposed empirical metric, analysis, and discussion and, finally, design recommendations for an efficient system. No doubt, this study will benefit the developing field of smart homes, offices, and cities.

Keywords:
Internet-of-Things; water quality; smart water tank; smart city; smart home; smart offices; smart embedded systems

[c] IoT-Based Water Monitoring Systems

Author : Che Zalina Zulkifli
Year : 2022

Objective : Water quality monitoring plays a significant part in the transition towards intelligent and smart agriculture and provides an easy transition to automated monitoring of crucial components of human daily needs as new technologies are continuously developed and adopted in agricultural and human daily life (water). For the monitoring and management of water quality, this effort, however, requires reliable models with accurate and thorough datasets. Analyzing water quality monitoring

models by utilizing sensors that gather water properties during live experiments is possible due to the necessity for precision in modeling. To convey numerous conclusions regarding the concerns, issues, difficulties, and research gaps that have existed throughout the past five years (2018–2022), this review article thoroughly examines the water quality literature. To find trustworthy peer-reviewed publications, several digital databases were searched and examined, including IEEE Xplore®, ScienceDirect, Scopus, and Web of Science. Only 50 articles out of the 946 papers obtained, were used in the study of the water quality monitoring research area. There are more rules for article inclusion in the second stage of the filtration process. Utilizing a real-time data acquisition system, the criteria for inclusion for the second phase of filtration looked at the implementation of water quality monitoring and characterization procedures. Reviews and experimental studies comprised most of the articles, which were divided into three categories. To organize the literature into articles with similar types of experimental conditions, a taxonomy of the three literature was created. Topics for recommendations are also provided to facilitate and speed up the pace of advancement in this field of study. By conducting a thorough analysis of the earlier suggested methodologies, research gaps are made clear. The investigation largely pointed out the problems in the accuracy of the models, the development of data-gathering systems, and the types of data used in the proposed frameworks. Finally, by examining critical topics required for the development of this research area, research directions toward smart water quality are presented.

[d] Internet of things for water quality monitoring and assessment

Author : Joshua O Ighalo, Adewale George Adeniyi

Year : 2021

Objective : The implementation of urbanisation and industrialisation plans lead to the proliferation of contaminants in water resources which is a severe public challenge. These have led to calls for innovative means of water quality monitoring and mitigation, as highlighted in the sustainable development goals. Environmental engineering researchers are now seeking more intricate techniques conducting real-time monitoring and assessing of the quality of surface and groundwater that is assessable to the human population across various locations. Numerous recent technologies now utilize the Internet of Things (IoT) as a platform in water quality monitoring and assessment. Wireless sensor network and IoT environments are currently being used more frequently in contemporary times. In this paper, the recent technologies harnessing the potential and possibilities in the IoT for water quality monitoring and assessment are comprehensively discussed. The main contribution of this paper is to present the research progress, highlight recent innovations, and identify interesting and challenging areas that can be explored in future studies.

[e] A review of the applications of the internet of things (IoT) for agricultural automation

Author : Wan-Soo Kim, Won-Suk Lee, Yong-Joo Kim

Year : 2021

Purpose :

The Internet of Things (IoT) is a network of devices for communicating machine to machine (M2M) based on wired and wireless Internet. IoT in agriculture is a revolutionary technology that can be applied to agricultural production year-round. The aim of this study is to summarize cases of IoT being applied to agricultural automation in the agricultural sector and to discuss the limitations and prospects for expanding the application of IoT technology in Korea.

Methods :

The application of IoT in agriculture was classified and analyzed based on previous data, and the sensors and communication technologies used were compared. Based on the analysis results, the limitations of and prospects for IoT in agriculture were discussed**.** IoT was widely used in agriculture, such as management systems, monitoring systems, control systems, and unmanned machinery. In

addition, the various wireless communication technologies used in agriculture, such as Wi-Fi, long-range wide area network (LoRaWAN), mobile communication (e.g., 2G, 3G, and 4G), ZigBee, and Bluetooth, were also used in IoT-based agriculture. With the development of various communication technologies, such as 5G, it is expected that faster and broader IoT technologies will be applied to various agricultural processes in the future. IoT-based agriculture equipped with a communication system suitable for each agricultural environment can contribute to agricultural automation by increasing crop quality and production and reducing labor.each agricultural environment can contribute to agricultural automation by increasing crop quality and production and reducing labor.

[e] IoT and ICT-based smart water management, monitoring and controlling system

Author : Hajar Maseeh Yasin

Year : 2020

Objective : Water is a basic human need in all economic operations. Farmland, renewable energy, the industrial industry, and mining are all critical economic areas. Water supplies are under severe strain. With the population increase, the requirement for water from competing economic sectors is increased. So, there is not enough water left to meet human needs and maintain environmental flows that maintain the integrity of our ecosystems. Underground water is becoming depleted in many sectors, making now and future generations near the point of being deprived of protection from the increasing climate variability. Therefore, the critical role that information technology methods and internet communication technologies (ICT) play in water resources managing to limit the excessive waste of fresh water and to control and monitor water pollution. In this paper, we have to review research that uses the internet of things (IoT) as a communication technology that controls the preservation of the available amount of water and not wastes it by homeowners and farmers. In contrast, they use water, and we have also reviewed some researches that preserve water quality and reduce its pollution.

[f] Role of IoT technology in agriculture

Author : Muhammad Shoaib Farooq

Year : 2020

Objective : The growing demand for food in terms of quality and quantity has increased the need for industrialization and intensification in the agriculture field. Internet of Things (IoT) is a highly promising technology that is offering many innovative solutions to modernize the agriculture sector. Research institutions and scientific groups are continuously working to deliver solutions and products using IoT to address different domains of agriculture. This paper presents a systematic literature review (SLR) by conducting a survey of IoT technologies and their current utilization in different application domains of the agriculture sector. The underlying SLR has been compiled by reviewing research articles published in well-reputed venues between 2006 and 2019. A total of 67 papers were carefully selected through a systematic process and classified accordingly. The primary objective of this systematic study is the collection of all relevant research on IoT agricultural applications, sensors/devices, communication protocols, and network types. Furthermore, it also discusses the main issues and challenges that are being investigated in the field of agriculture. Moreover, an IoT agriculture framework has been presented that contextualizes the representation of a wide range of current solutions in the field of agriculture. Similarly, country policies for IoT-based agriculture have also been presented. Lastly, open issues and challenges have been presented to provide the researchers with promising future directions in the domain of IoT agriculture**.**

1. Study of water- leak detection
2. Study of IoT Architecture
3. Study about Wireless technology

2.1 Study of water-leak detection

According to Farah and Shahrour(2017) conducted a study, where an intelligent dimension system is enforced to descry possible leaks in a university lot, and it's proposed to combine the Water Balance rules with Minimum Night Flow(MNF), which results in 97 delicacy, therefore, is achieved to reduce the waste of water by leakage. In the exploration composition by Schultz . etal.(2018), a gate is enforced in a megacity of California where residers can cover their water consumption; therefore, for leak discovery, it's proposed to establish based on an normal(AVG) a limit(7.5 gph) of nonstop water consumed during a 24- h period; likewise, its results show that druggies who used the system came to reduce by 50 the chances of having a leak again, but highlights that their methodology doesn't descry leaks lower than the established limit. On the other hand, Farah and Shahrour(2018) demonstrated that using an automatic dimension system(AMR) for monitoring water been consumed, some water leakage can be detected snappily, for this they use a viscosity probability function in order to identify regions of more or less chances of leakage based on data that was consumed ahead, during workdays, weekends, leaves, in this way, redounded they were suitable to descry 3 types of leaks in the Scientific Lot of the University of Lille-durante during 2015. In addition, Patabendige-etal.(2018) observed that utmost marketable water consumption systems only give introductory statistics; still, they don't descry complex patterns of geste of anomalous water consumption; thus, they propose the use of the K-Nearest Neighbors(K- NN) algorithm to calculate the score anomaly for each day, and the results show that during one time they detected 31 days of leaks, where it was achieved and reached an delicacy of 74. Eventually, with the end that people avoid wasting water due to leaks, an algorithm is proposed by Luciani etal.(2019) that detects leaks using the rules MNF and CNZ, which they reach a 98 delicacy.

2.2 Study of IoT Architecture

The technological solutions for the measurement of water consumption are supported on an IoT architecture, and this refers to the design of the layers of the system that will allow communication between smart devices, together with analysis and decision-making based on the data collected of these devices (Lloret et al. 2016), for these reasons we review some of these architectures. In a study conducted by Lloret et al. (2016), an integrated IoT architecture is proposed that includes a review of the main features of smart meters and the existing communication protocols for smart measurement of electricity, water, and gas between different systems for a smart city.

Some work on IoT architectures for intelligent water measurement has focused on quality. Dong et al. (2015) explore three major subsystems for smart water quality monitoring system, namely the data collection subsystem, data transmission subsystem, and data management subsystem. Saravanan et al. (2018) proposed a SCADA system that uses IoT to perform real-time monitoring, where temperature, color, flow, PH, and pressure are measured. Chen and Han (2018) desired to show the feasibility of collecting real-time data with high frequencies and instantly display them online within a smart city, for this they build a water monitoring system based on the platform “Bristol Is Open” and conclude that its architecture is easily scalable for a larger network of sensors.

2.3 Study about Wireless technology

Technological results based on IoT bear wireless communication technologies, through which the bias can admit and shoot data effectively(Marais etal. 2016), so their review is necessary. In a exploration composition by Joo etal.(2015), several intercom tests between IoT bias were performed, where it was determined that using UHF and the internet(TCP/ IP) the signal is more stable compared with UHF, DCU, and Wibro, in addition, their results show that the average event of the packages was94.1. On the other hand, to cover and collect information(pH, temperature,etc.) of a swash’s inflow over a large area, in a study conducted by Chung and Yoo(2015), it's proposed to use a low- cost wireless detector network(WSN) whose results show that data loss is below 1 and network business is reduced to1/5. In addition, Marais etal.(2016) proposed to use ZigBee technology with mesh topology to make an expansive network of communicated bias that allow maximum effectiveness when entering and

transferring data and, based on their simulations, data loss redounded lower than0.14. A water monitoring system is erected by Chen and long-range Han(2018) in a megacity based on the " Bristol Is Open " platform; likewise, Wi-Fi is used due to its long range(up to 100m) and a trapackagen of over to 7 Gbps.

2 EXSISTING METHOD

In the being system home appliances are controlled by Node MCU, but it has a limited quantum of GPIO legs by that we can control the limited number of appliances. Traditionally, water operation and monitoring systems have been based on homemade readings or installed with precious detectors that bear regular conservation and estimation. This approach has been time- consuming, precious, and prone to crimes. Water cadence readings are frequently taken on a yearly base, and any leaks or damages in the water force system can go unnoticed for a long time. This results in wasted water and increased consumer, business, and cosmopolises costs.

3 PROPOSED METHOD

The proposed IoT-based water monitoring system is designed to overcome the limitations of the being system by furnishing a real- time water monitoring result with remote availability**.**

BLOCK DIAGRAM:

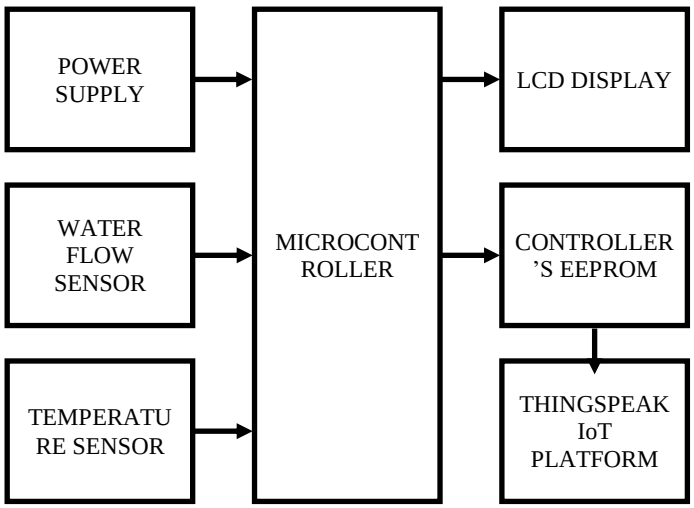

Fig 1. Block diagram of the project

The system is designed to measure and cover the water inflow, temperature, and volume. The system uses a inflow detector to measure the inflow of water and a temperature detector to measure the water temperature. The detectors are connected to an IoT module that sends the data to a pall- grounded garçon for farther processing and analysis. The system is also integrated with a TV display to display real- time data to druggies. also, the system is integrated with the Thing-speak platform to give access to data to authorised druggies .MMCU sis 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.

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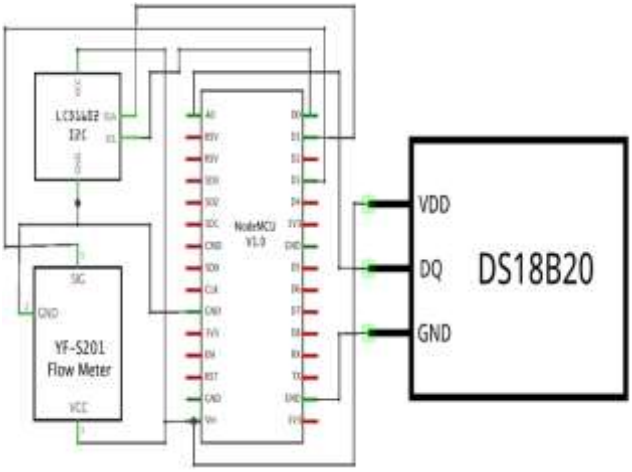

Fig 2.Circuit diagram of the project

4 RESULT

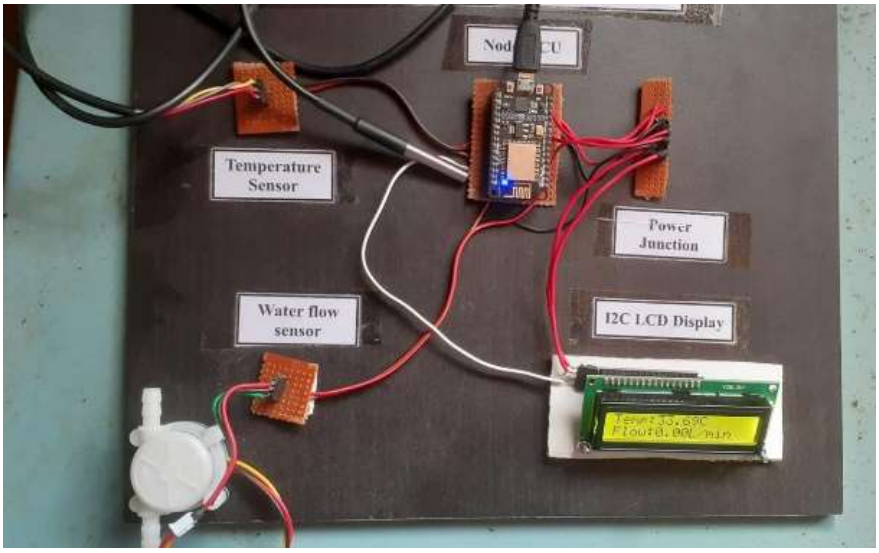

Fig 3. Output of the project

This Smart Water Monitoring system can fluently be powered by an AC socket and whenever the leakage occurs in pipes, it'll show a warning that nearly water getting leakage in pipe where you can see the leakage of water. After that the person can fix the issue in water leakage area.

5 CONCLUSION

Water is an important resource and should be used veritably efficiently. The unbridled use of water leads to destruction of water and eventually causes water failure. This system helps to cover the operation of water and people can use water in an effective way. It'll help the society members to check the water position in the tank. Also members will be suitable to cover their per flat water operation on the Android app. Water destruction can be avoided using the Android app by cutting off the water force of the particular flat. This all robotization helps to reduce mortal sweats and helps to manage water precisely and will also reduce the problem of water failure. In the future this design could be upgraded to be used at the assiduity position as a water inflow detector. This interpretation would use thermodynamics and have a better set of detectors than the current one, which could distinguish air bubbles and water.

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