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Automated Tank Water-level Monitoring system (Overflow and Underflow) using Sensors

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ABSTRACT
In daily life, water supply is very necessary for every activity and functions as water consumption. In urban areas where water supply is regulated for a specific time, a person must be present at that specific time to turn on their water pumps and store water in their water storage tank, and also the water tank is empty (the water level is below the tank). If they are not present at that time, they have to go through hardships caused by a lack of water. It intelligently (without the need of any person) turns on the motor when the water is supplied and turns off the motor when the tank is filled. Nowadays, more and more people turn on the motor and forget to turn it off, causing waste of water and electricity due to overflowing of the water tank. The system is designed using an ultrasonic sensor, an automatic switching module, an IOT based ultrasonic sensor, and a pumping machine for automatic water filling switching. When using an ultrasonic sensor, an ultrasonic transmitter is mounted on the top of the tank, which sends an ultrasonic pulse down into the tank. The motor will remain on and fill the tank until another water sensor in the tank signals the ultrasonic sensor that the tank is full. When the tank is full, the ultrasonic sensor with the received signal will automatically turn off the water pump motor. When the tank is empty, the ultrasonic sensor with the received signal automatically turns on the water pump motor. This eliminates the need for a person to be physically present in time to turn on/off the water pump motor. It will be used, people will enjoy the water supply without worrying about spilling water and wasting electricity.
Keywords : Ultrasonic sensor, IOT, Intelligent , Water pump motor

1. Introduction

Maintaining water resources is one of the main issues lately due to the uncontrolled wastage of the available fresh water. This is why most water is wasted overflowing water reservoirs. In most cases, these are water reservoirs are manually controlled by the operator. In the absence of person, the water overflows until the engine is turned on off. In some other projects that are automated, there are submersible sensors are implemented. Due to contact with water, there is a high probability of rusting of the material used in the sensor. The smart water tank implements IoT with which the user can directly monitor and control tank activity through Smartphone and from anywhere in the world. This paper proposes an IoT-based high-level water monitoring system for real-time water level monitoring. The data from the sensor is collected and the Smart water tank performs IoT, through which the client can specifically monitor and control the operation of the tank through a mobile phone and from anywhere in the world. The Android app is built with the goal of sending information compiled from the cloud to the app.

1.1 INTERNET OF THINGS (IoT)

The Internet of Things (IoT) is an ecosystem of connected physical objects that are accessible via the Internet. It is a system of interrelated computing devices, mechanical and digital machines, objects, or people that are provided unique identifiers and the ability to transfer data over a network without the

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need for human-to-human or human-to-computer connections interaction. It includes traditional computing devices such as laptops, tablets, and smartphones, but also it includes a growing list of other devices that have recently made the Internet possible. This includes, for example, household appliances, automobiles, wearable electronics, security cameras, and many other things. For the device to be part of The Internet of Things must be able to communicate with other devices. Therefore, it requires some type of built-in cable connection or wireless communication. Most IoT devices support Wi-Fi, but Bluetooth can also be used to transfer data facilities in the vicinity. IoT devices are commonly called "smart devices" because they can communicate with others things. In addition to being able to communicate, many IoT devices also contain a variety of useful sensor information. Although the Internet of Things is still in its infancy, it provides promising opportunities for the future. In Over time, the Internet of Things will become less of an abstract idea and more of a way of life.

1.2 Smart Home:

Smart Home has become a revolutionary ladder of success in living spaces and is predicted as Smart homes will be as common as smartphones. With IoT, we could turn on the air conditioner before coming home or switch turn off the lights even after you leave home, or you can unlock the door for friends for temporary access even when you're not home. Smart Home products promise to save time, energy, and money.

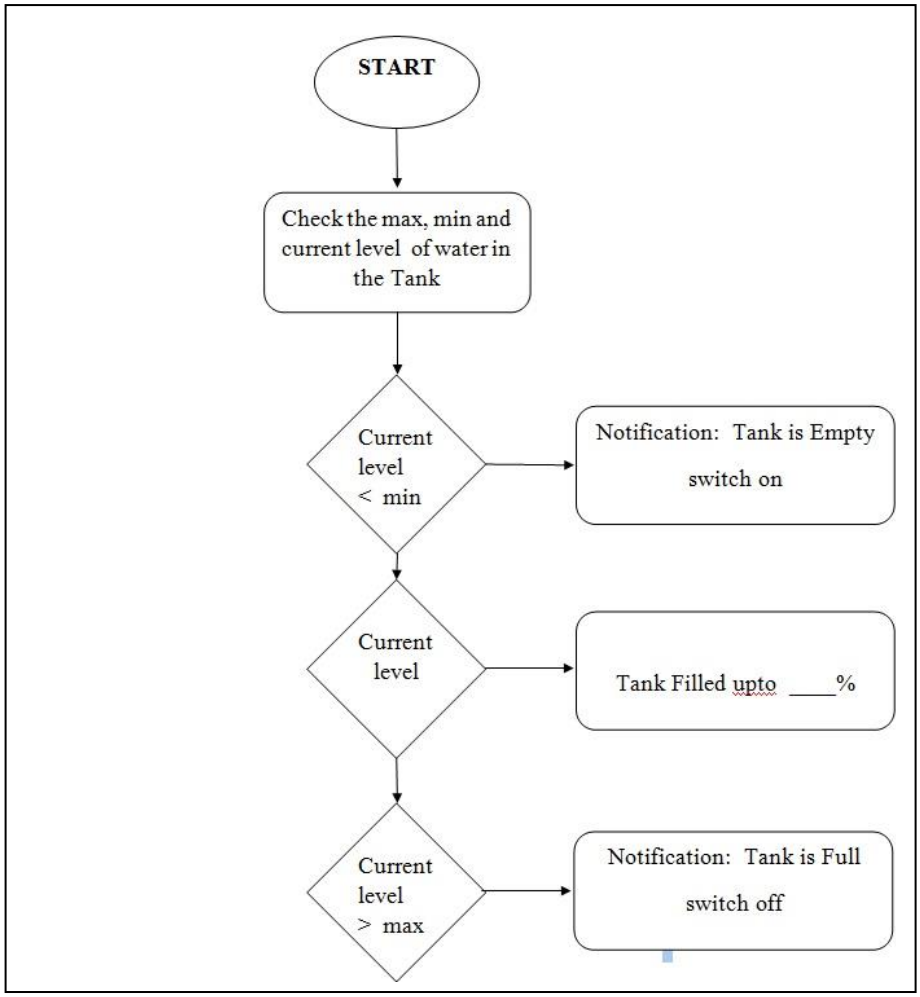

FIG 1.Flow Diagram

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2. Automated Tank Water-Level Monitoring Process :

It is often difficult to measure the water level in the upper patio water tanks, which can lead to water overflow and waste. Water tank overflow switches can automate the process. These switches use sensors to detect the water level in your tank and can automatically turn the water pump on or off accordingly.

In this fully automatic process, the water overflow controller automatically turns on the water pump when the water level in the tank is low and turns it off when the water level in the tank is full. This technology is a fully automatic water overflow and underflow controller, it also comes with an automatic level sensor mode that can be controlled manually and allows you to get fresh water even when the water tank is full.

2.1 ESP – 8266

It is a Wi-Fi module that can connect to the Internet via a hotspot . It can be programmed to implement analytical statements as a required project. An ultrasonic sensor detects the distance of the water surface and returns it to the ESP. ESP when connected to the internet, uploads this value to a cloud database. That too retrieves some values from the database that are set by the user in the Android app. Accordingly, the functioning motor depends on the current water level and max and minimum values.

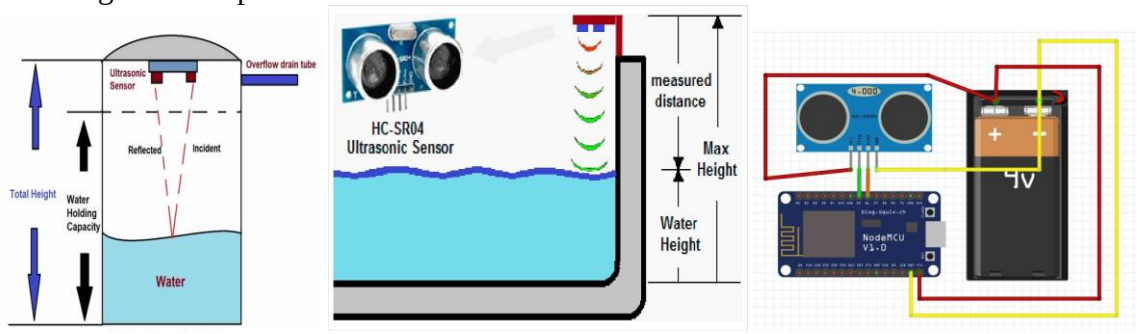

FIG 2. Schematic of a water tank level monitoring process

3. SENSORS

We live in a world of sensors. In our homes, offices, cars, etc., you can find different types of sensors that make our lives easier by turning on the lights by detecting our presence, adjusting the room temperature, detecting smoke or fire, making us delicious coffee, opening the garage door once our car is at the door and many other tasks.

All these and many other automation tasks are possible thanks to sensors. Before we get into the details of what a sensor is, what the different types of sensors are, and the applications of these different types of sensors, let's first look at a simple example of an automated system made possible by sensors (and many other components).

3.1 Ultrasonic sensor

An ultrasonic sensor is an electronic device that uses ultrasonic sound waves to measure the distance of a target object and converts the reflected sound into an electrical signal. Ultrasound waves travel faster than the speed of audible sound (that is, sound that humans can hear). Ultrasonic sensors have two main components: a transmitter (which emits sound using piezoelectric crystals) and a receiver (which encounters the sound after it has traveled to and from the target).

In order to calculate the distance between the sensor and the object, the sensor measures the time that elapses between the sound emitted by the transmitter and its contact with the receiver. The formula for this calculation is D = ½ T x C (where D is distance, T is time, and C is the speed of sound ~ 343 meters/s). For example, if a scientist set up an ultrasound sensor pointed at a box and it took 0.025 seconds for the sound to bounce back, the distance between the ultrasound sensor and the box would be:

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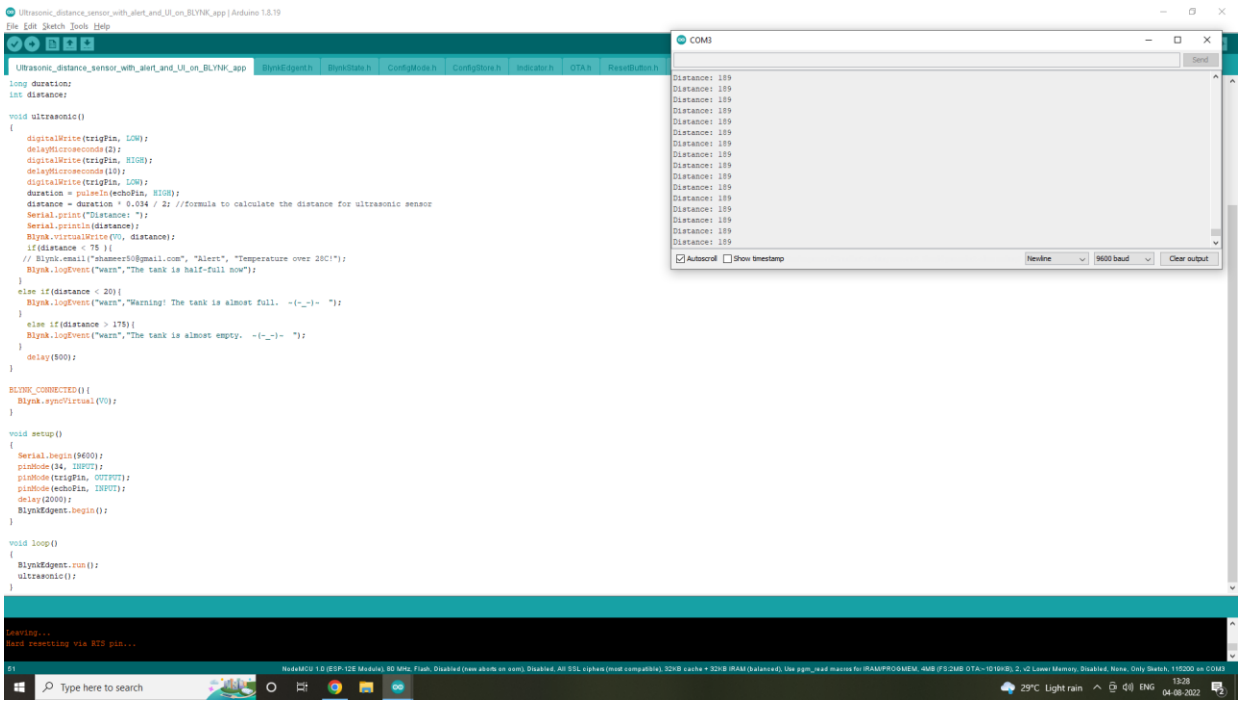
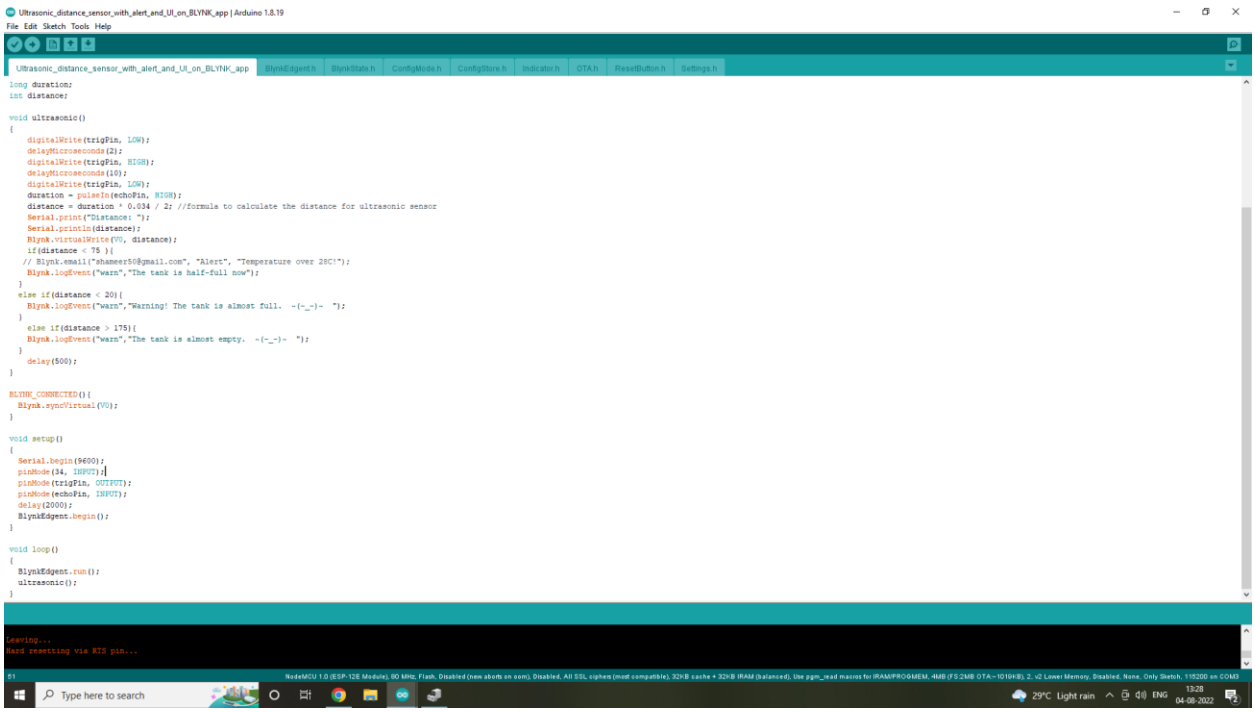
D = 0.5 x 0.025 x 343





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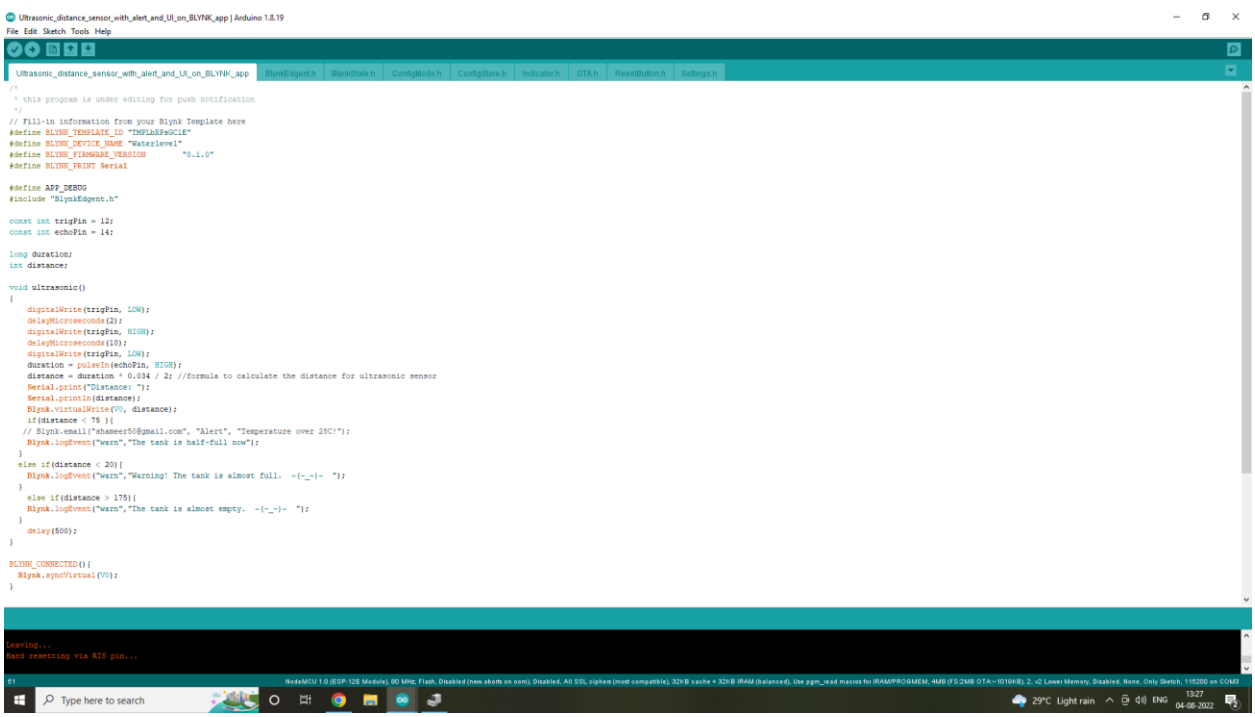

FIG 3.Implementation Process Snippets

5.THE PROPOSED SYSTEM REQUIREMENTS

This project in the automated water level monitoring system is suitable to be used in home activity contributing to the decrease of energy consumption due to water wastage. Moreover, it can help people analyze their water consumption. The prototype can be proposed to handle the water pump problems due to the utilization of the manual switch as well as the floating ball tap to stop the water tank from filling.

6. CONCLUSION

It has been verified that an IoT-based automated tank eater-level monitoring implementation works satisfactorily by connecting various sensor parameters to the cloud and was successfully controlled remotely via mobile app and web page. The proposed system not only monitors sensor data such as water level sensor, and ultrasound but also controls other parameters as required. The initial cost and installation of this system are cheap, so it can be implemented anywhere. With the development of sensor technology, the system can be upgraded to the next level, which helps users to use their investment in an economical way. If ultrasonic sensors can be installed, then the system can be adjusted to deliver fertilizer precisely to the garden. This system saves manpower and makes efficient use of available water resources, ultimately resulting in higher profits.

References:

1. Eka Cahya Prima, Siti Sarah Munifaha, Robby Salam, Muhamad Haidzar Aziz, Agustin Tia Suryani "Automatic Water Tank Filling System Controlled using ArduinoTM based Sensor for Home Application", 1877-7058 © 2017 The Authors. Published by Elsevier Lt.
2. S. Nallani, V.B. Hency, "Low power cost effective automatic irrigation system, Indian Journal of Science and Technology", 8 (2015) 1.
3. V. Devika, S. Khamuruddeen, S. Khamurunnisa, J. Thota, K. Shaik, "Arduino based automatic plant watering system, International Journal of Advanced Research in Computer Science and Software Engineering". 4 (2014) 449-456.

DOI:10.46647/ijetms.2022.v06i05.115 ISSN: 2581-4621

4. RC Jisha, G Vignesh, D Deekshit, " IOT based Water Level Monitoring and Implementation on both Agriculture and Domestic Areas ", 2019 2nd International Conference on Intelligent Computing,Instrumentation and control Technologies (ICICICT), DOI:10.1109/ICICICT46008.2019.8993272.
5. Chandra Afriade Siregar; Dudung Mulyadi; Agung Wahyudi Biantoro; Heri Sismoro; Yanti Irawati , " Automation and Control System on Water Level of Reservoir based on Microcontroller and Blynk", 2020 14th International Conference on Telecommunication Systems, Services, and Applications (TSSA).
6. Md. Jahirul Islam; Asaduzzaman , " Smart Water Quality Monitoring and Controlling System", 2021 5th International Conference on Electrical Information and Communication Technology (EICT).
7. S. Nalini Durga, Mathe Ramakrishna, G. Dayanandam," Autonomous Water tank Filling System using IoT" INTERNATIONAL JOURNAL OF COMPUTER SCIENCES AND ENGINEERING 6(9):1-4,DOI:10.26438/ijcse/v6i9.14.
8. L.A. Gama-Moreno, A. Corralejo, A. Ramirez-Molina,"A Design of a Water Tanks Monitoring System Based on Mobile Devices" 2016 International Conference on Mechatronics, Electronics and Automotive Engineering.
9. Canzong , Panpan Jiang " The design of High level water tank monitoring system based on internet on things" ,2020 7th International Forum on Electrical Engineering and Automation (IFEEA).
10. Priyen P. Shah, Anjali A. Patil, Subodh S. Ingleshwar , "IoT based Smart Water Tank with Android application" , International conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud).
11. N. SIVAIAH1 , K. PURNA SAI SOWMYA2 , K. SUSMITHA3, N. ANILA SAI4 , N. SUMA ," Internet of Things (Iot) Enabled Water Monitoring System " ICONIC RESEARCH AND ENGINEERING JOURNALS.
12. Dr. K. Raghava Rao , Sanagala Srinija , Kukkala Hima Bindu , D. Satish Kumar ,"IOT based water level and quality monitoring system in overhead tanks", International Journal of Engineering & Technology 2018.
13. Mohammad Taz Uddin; Tanvir Ahmed Chowdhury; Rashedur M. Rahman , " IoT Based Water Level Monitoring System with an Android Application" International Journal on Recent and innovation Trendasin computing and communication,ISSN:2321 816994-97.
14. J G Natividad[1] and T D Palaoag[2], " IOT oT based model for monitoring and controlling water distribution ,International Conference on Information Technology and Digital Applications (ICITDA 2018).
15. Pranita Mahajan, Prachi Shahane, "An IoT Based System for Water Quality Monitoring , *ICICNIS 2020*.