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Water monitoring and conservation in tanks by effective methodology using raspberry PI

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***Abstract*---**Water is an essential resource. Due to the frequent climate change, urbanization, and insufficient administration of water, the demand for water has been increased immensely all over the world over the past few years. Water quality must be considered important so it is necessary to check whether the water is polluted or not. The raspberry pi can be used in a wide range of applications since it became easy to implement due to the availability of advanced sensors and also the advancement in wireless communication techs. The turbidity sensors can be used to observe the water quality. It helps in detecting the water quality by analyzing the data that is gathered when it is immersed in the water. The ultrasonic sensor is a dependable circuit. It is used to identify the water level in the overhead tanks. To monitor the sediments that are present under the tank a single camera is used. The raspberry pi 3b and also the sensors present inside are the main thing that the framework depends on.

Keywords---ultrasonic sensor, turbidity sensor, raspberry Pi 3B, Pi cam, blynk app.

Introduction

Water is an important and essential source, which acts as the main source for the people doing agribusiness, industries and it is also important for the presence of living things on earth. As per the projections made, the earth can experience a gap of 40 percent between the expected amount of water and the water that can be accessible by the year 2030 due to the rapid growth of the population that is occurring currently. So as a result of this, it is important to use water efficiently and conserving it while we can to achieve water management in the home as well as t in the office. To reduce the unneccessary usage of water it is necessary to practice water conservation. One more significant issue connected with water will be the water quality. The overutilization of the natural resources made us in questioning the quality of water. As a interest for ecological security is expanding, the need to safeguard the water environment turns into a significant component.

The meaning of holding water quality shows the rising need of innovations for observing the water and deal with the water quality. The water level monitoring is used to ensure that the water is not flooded. The current robotized technique for level location is depicted and that can be utilized to make a gadget on/off. The earlier technique involves a person to perform tests of water and the testing of water will be done physically which will consume a huge amount of time. As of now, the progression in innovation has prompted the improvement of programmed frameworks with worldwide frameworks for versatile correspondence (GSM)/worldwide bundle for radio help (GPRS) innovation utilizing sensors. The power utilization has been greatly reduced due to the development in the wireless sensor networks. The framework conveys the information with respect to sensors during the endorsed time span. In the past investigations, the framework carried out for the quality of water and the water tank is finished with the help of IoT. There will be more power utilized for checking the level of water and the quality of water in the previous studies of correspondence convention for versatile correspondence (GSM) and Wi-Fi. There is an absence of a continuous framework that helps in observing the level & quality of water and it also controls the water pump at the same time with help of an equipment model using the wireless communication. In order to beat those constraints, we have proposed raspberry pi empowered design and framework for observing the water tank with modified equipment . The IoT system gives the benefit of further developed proficiency, exactness and also it avails low cost.

Literature Survey

For the estimation of water, the creators have proposed a new framework. This framework depends on the wireless sensor network which utilizes the ZigBee.One more significant truth of this framework is the simple establishment of the framework that is the base station can be set at the nearby home near the objective region and the observing undertaking should be possible by any individual with extremely less preparation toward the start of the framework

establishment. One significant perspective is the framework ought to work in various climates in the most viable way, however, it will be difficult to obtain a dependable result in every possible situation using this framework (1).

The level of water in dams and waterways is investigated with constant information from the framework. This system consists of a camera to provide live streaming, also communicates with the web administrations by using a map type apparatus, and it also uses a few no of sensors for the estimation of level of water that is taken continuously. This entire cycle will be connected to a server locally through portable organization. The core objective of this process is to observe and to monitor the flood kind of calamities(2). To prevent the wastage of water due to the flooding of water in those tanks, a buzzer alert is added which will generate an alarm(3). In this we introduced a framework which measures the quality of water on the basis of a remote sensor network. The base station and few sensor nodes are responsible for the establishment of the framework. The pH sensor and the temperature sensor are used to gather the information about the quality of water on the node side. To communicate among the sensors and the GSM module, Arduino uno 3 is used as an equipment part. To quantify the quality of water in a particular pH and in certain temperature our proposed framework contains just two boundaries(4).

The examination of the plan and the execution of the water level control framework which will be programmed, remote, costly, and solid is done in this. It utilizes two radio frequency handsets alongside a regulator each introduced in the tank as well as in the sump. For remote correspondence, the radio frequency handsets are utilized. With the help of a miniature regulator, it will be computerized totally.The framework needn't bother with any consideration of the client except if the sump is vacant. Establishment cost is decreased since the framework is remote. It is solid since it has no issues emerging after establishment like breakage of wire (5). A turbidity sensor that is cost-effective is utilized in this task for the continuous estimation of the quality of water. To make the entire interaction be processed remotely this work uses the internet of things (IoT).To make the sensor consume less power it is also made to work remotely bringing about a financially savvy turbidity sensor (6).

For turning on and off the engine, the total arrangements has been made in the tank. To check the degree of water HC-04 (Ultra Sonic Sensor) is used. The Arduino board will act as a controller unit. The water level can be found with the help of the reverberation beats from the ultra sonic sensor (7). The contactless ultrasonic sensor is used to estimate the information about the water level in the littoral vibe. This task is also useful to gauge unfamiliar particles which will gather in the ocean water in every weather condition/pattern with 1mm precision. Significantly weather patterns like temperature and dampness are estimated since the framework is exposed to open climate (8). In this task, the quality of water in the pipe inlets will be estimated. This information will be further inspected by looking at certain boundaries like the turbidity level, defilement level, and also pH level. These are done by developing a calculation with an alert message that has been sent to the mobile phone by means of the web (9).

A savvy water quality and control frameworkis introduced. To screen the quality of water and to identify the toxin area, this system uses the mobile wireless sensors. Remote controlled UAVs are incorporated for the stamping, partition and expulsion of contamination. The specialized difficulties, for example, sensor choice and remote control are tended to with modified novel calculations. However, UAV control calculation isn't productive technique for control remote frameworks (10). For checking the quality of water an objective which is based on the solar energy and IEEE 802.15.2.4 has been depicted. For the purpose of energy protection, this model uses ECHERP routing protocol. To guarantee that the framework will be towards the end for a significant stretch of time this model uses sunlight-powered chargers instead of using normal batteries. Be that as it may, clearly sun based energy innovations stay to be expensive other option. The manufacture of solar modules and their establishment involve enormous measure of assets (11).

Using the raspberry pi, home security, and surveillance were also executed in this work. A video camera and a movement recognition sensor were also used. Once the process begins, the camera will begin to record and it will stream it to the client's mobile with the help of a Wi-Fi dongle. For additional confirmation and for some security reason this information will be stored in a cloud server for future use (12). To quantify the water quality a real-time product is used. It also involves some specs like the turbidity level, pH level, temperature, and also total dissolved solids. It was planned with less amount of sensors since it was costly. This work uses the internet of things area which is known to be the primary benefit of this work. The information gathered from all the sensors will be sent to an approved individual by means of internet (13). For the purpose of security concerns the raspberry pi and also a single camera was used. For avoiding the monitoring time in identifying the movements, an artificial intelligence calculation is created by using the python language. Using mobile or PC, live monitoring will be implemented (14). Using the microcontroller of eight-bit, the parameters like the pH and the total dissolved salt in the water available in the rural areas can be found by using the sensor networks. The saltiness and reduction of oxygen potential can also be found with the help of these two parameters along with some mathematical functions. The result and some alert messages can be found on the mobile phone by means of text messages or emails or so on (15).

Proposed Methodology

An overhead tank is implemented with turbidity, and ultrasonic sensors in order to measurequality and the water level. A pi cam is used for the live streaming of the tank. This entire setup is composed of a Raspberry pi 3B model which will be acting as a controller unit. This process runs through the internet of things(IoT) stage.

Block diagram

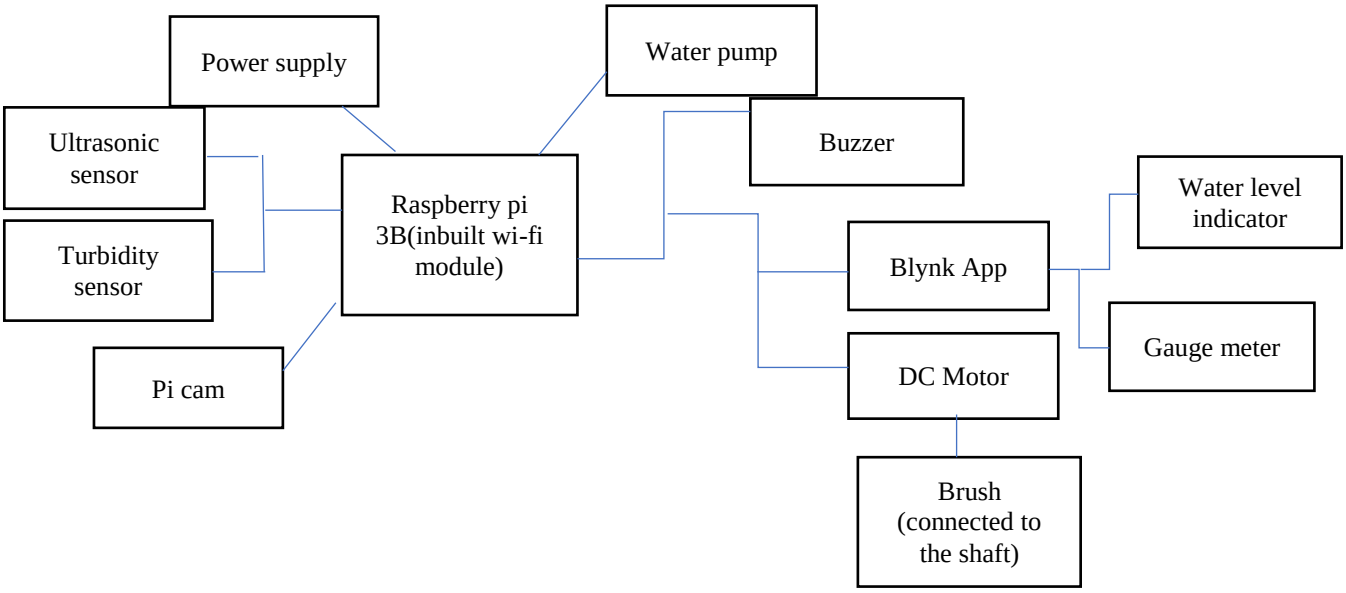

Fig 1. Block diagram of proposed system

Communication and connectivity

The internet acts as a bridge for communication between the hardware and the mobile phone. To secure the data a local network is used. The Raspberry pi board is associated with the local network. So by using the IP address we will be able to see the screen. By using the putty and the VNC watcher applications we can also see the other processes from our mobile phones too. To see the results and also to get notifications the Blynk application can be used. The Blynk application creates an authentication between the application and the hardware which will be verified later. The IP address of the Raspberry pi also takes care of the live streaming of the tank.

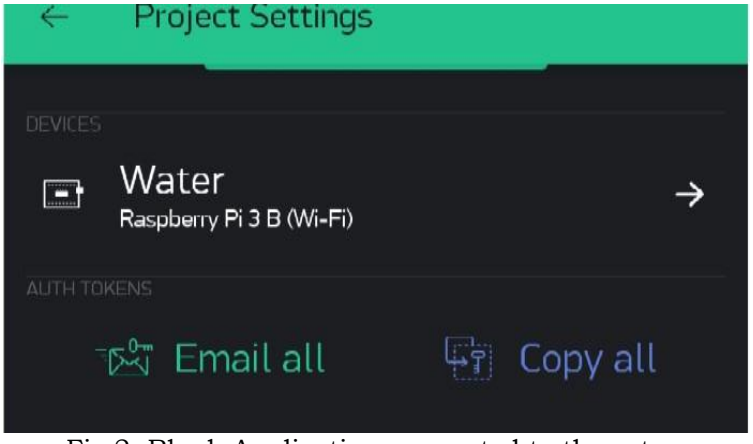

Fig 2. Blynk Application connected to the setup

Tank Automation

By utilizing the Ultrasonic sensor the tank will be observed. The sensor will be placed at an highest point of the tank. The sensor provides information the water level is low or high. Assuming the water level is low the engine is switched on and when the water arrives at the highest point of the tank the engine is switched off with a buzz sound. This entire process is automated.

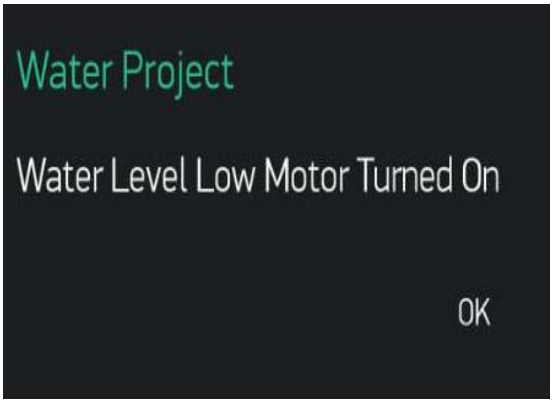

Fig 3. Notification showing the water level is low

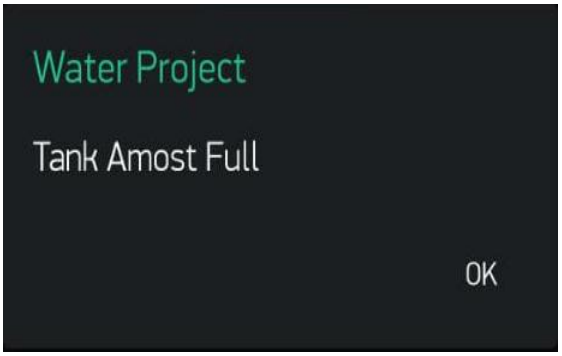

Fig 4. Notification showing the tank is full and that motor turned on automatically.

Live streaming

The tank will be under camera reconnaissance for that a Pi cam is installed and fixed at the highest point of the tank. Some solid sediments which remain in water should be monitored and cleaned often to avoid clogging in valves and pipes. We can watch the status of the tank anytime we want to see. For the purpose of cleaning the brush which will be attached to the shaft. It can be utilized by controlling the engine by using the mobile phone by means of the Blynk application.

Fig 5. Live streaming of water tank with sediments.

Quality measurement

The turbidity sensor is used to measure the nature of water present in the tank and the sensor will be submerged into the tank. Since this sensor is available at a low cost and also has a great amount of awareness for the total dissolved solids (TDS) particles, it is preferred. In the event that the turbidity level of the tank crosses the breaking point and increments, we get the buzzer indication and a text warning through the blynk application.

Results

The total setup of a multisensor network with a pi cam is handled and constrained by the Raspberry pi 3B. The results will be handy and are easily understandable. The acquired results can be seen in figures 2,3,4 and 5. Whenever the turbidity level of the water increases or is high, the Blynk application will send an text notification to the client. To control the cleaning setup of the motor, we can use the button widget that is available in the application.

Conclusion and future scope

As a result, we infer that we have successfully shown an easy way to understand and keep the water clean in overhead tanks. In this project, we have displayed every possible way to monitor the water parameters in the overhead water tanks. In this project, we have used a single camera to monitor the live checking of the overhead tanks. In the future, we like to carry out the same operation using computer vision by adding some sensors along with the camera. And we also like to use the solar panels for the purpose of power supply, since the entire setup is done in the overhead tank

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