Smart Water Dispenser and Monitoring Water Level in IoT and Android Environment

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Abstract— About 71% of earth is covered with water but sadly only 2.5% of it is used for drinking purpose, the reason for this is with rise in population, pollution and climate change, humans waste a lot of water due to our negligence. In this paper the automatic water dispenser and water level monitoring is been proposed using sensors in IoT environment. For a automatic water dispenser they used node MCU and ultrasonic sensor in IoT environment. Here the manual taps are replaced with a smart taps that opens and closes on its own automatically due to this saving of water is achieved which is a biggest challenge nowadays. This technique changes the lifestyle of the public since they don't need to operate the tap manually through their hands. In this paper not only saves the water but the smart water dispenser sends a notification when the level of water becomes low in the dispenser through an app based on android to the authorized person. Once the authorized person receives notification for low water level, the android application will provide to order water to water cans or water tanks.

Keywords—— Arduino, Servo motor, Ultrasonic sensor, IR sensor, Jumper wires, Power Bank, memory card, IoT.

I. INTRODUCTION

In day to day life Water is very essential for Public, so there is a requirement of avoiding wastage of Drinking water. There are many places were water gets wasted due to human negligence where people forget to off the tap after drinking the water. It is necessary for controlling the drinking water by using Automatic Water Dispenser based on IoT sensors in which the IoT devices are used to 'ON' and 'OFF' the water taps automatically using sensors and also monitor the water level and gives notification about level of water to the authorized person by informing when the water level becomes LOW. Hence replace all manual taps with smart one that 'ON' and 'OFF' automatically, we don't have to operate tap with our hands. In day to day life there are a number of water dispensers for providing drinking water. Such as in colleges, office and in many institutions. These dispensers are managed manually by a person checks each of the dispensers individually and accordingly manages it. Many offices nowada2ys are superstructure buildings and occupy a large workforce. Same goes for colleges too. In order to fulfil the drinking water requirement a number of dispensers are placed throughout the building. Now their management has become difficult. The purpose of IOT technology is to make our life style easier. So with the advantage of technologies like internet of things we can change the way we do things in a better way.

The management of water dispenser becomes smart and easy using IOT. In this project our main concentration is to manage the water dispensers by measuring the water levels. The system monitors the water dispensers by ultrasonic sensors placed over the dispenser and compare the level with threshold volume of the dispenser and informs about the level of the water left in the water dispenser via a mobile application to administrator. The main goal of our paper is to monitor the water level and manage the overall water dispenser. It will provide faster, easier, and cost-effective management. It also includes the design of monitoring system with advantages of low cost and accuracy.

II. LITERATURE SURVEY

There are many researchers done their research work in this field few of them are studied as follows. In [1], an electronic system is designed to control and monitor the level of water in a tank or a reservoir based on water detector sensor information. The electronic system is designed automatically that control and display water levels from low to high level. The proposed system eliminates manual monitoring and controlling for home, agricultural or industrial uses. In [3], the online water quality monitoring System based on GPRS/GSM. The module collects and sends the data to monitoring centre through GPRS. It is an artificial method hence collection of data and other process will be done slowly. In [4], The water quality monitoring system based on WSN. This framework in light of remote sensor arranges that comprises of wireless water quality monitoring network and remote data Centred. WSN test the water quality and sends the information to the internet with the assistance of the

GPRS DTU. In [5], water quality monitoring framework, In this framework they made water quality brilliant sensors so sensors send the information remotely to the gadget which gathers information from everyone of the hubs. In[6],smart water monitoring system using wireless sensor network at Home/office: this paper is about developing a water monitoring system. By using monitoring system, we can find a more optional way to preserve the water, hence saving it for the present and the future generations. In [7], A writing survey of the current water quality checking framework that gives a short clarification of the frameworks that are as underneath. In[8], studied the survey of water quality monitoring framework. In that framework they made water quality brilliant sensors so the sensors send information remotely to the gadget which gathers information from every one of the hubs. In [9], CPCB Real time water quality is monitoring maintenance in this method quality of water in gangas and Yamuna River is tested by using sensors. Since they are most populated river in our country CPCB plans for analysing the water standards. And this is more expensive.

In[10], water quality monitoring system using Zigbee Based wireless sensor networks: the proposed implementation of high power Zigbee based WSN for water quality monitoring system offering low power consumption with high reliability is presented. In [11], the online water quality monitoring system based on GPRS/GSM. The module connects and sends the data to monitoring centre through GPRS. In[12], solar powered water quality monitoring system using wireless sensor networks, the Base Station (BS) gathered information from distant remote sensor. In [13], IoT Enabled Water Quality Monitoring System, The system is built up on a microcontroller Based platform Arduino board which is interfaced with GSM modem and ultrasonic sensor. The ultrasonic sensor is placed at the top of the can which helps in measuring the stature of the can. In[14], the authors proposed ultrasonic sensor for measurements of liquid level, volume and volumetric flow in a tank. This paper presented a plan of an application of industrial interest. It helps in assessing the capacity of tank, measuring and controlling the liquid level and flow by using ultrasonic sensor. In[15], the authors built a water quality monitoring framework for dispensing with the cost expending occupations of manual checking. In this framework the deliberate information of water quality checking sensor are gathered by the information pack. In [16], a remote water quality monitoring system utilizing wireless sensors. In proposing framework the remote water quality sensors send the information carefully to the information obtaining pack which gathers the information transmitted from all sensors. In the existing system whenever the smart dispenser is empty definitely there should be a notification that has to be sent to the concerned authority. All the water management system will now do this action. Use of camera for water line detection: the various smart dispensers developed till date use cameras in it. Testing with the installed cameras with a real-world

image shows not so accurate detection of the water level with any different staff-gauge location. There also exists a complex challenge of viewpoints variations, low quality images as well as changing illumination conditions.

III. PROPOSED SYSTEM

The main goal of proposed system is to monitor the water level and manage the overall dispensers. It will provide faster, easier, and cost-effective management. It also includes the design of monitoring system with advantages of low cost and accuracy. Water dispenser management system proposed here it involves building of the smarter and automatic water dispensers. It opens and closes automatically. These dispensers are built with the help of Arduino. When the level of water left inside the dispenser reaches some calculated threshold value, then a notification is sent to the concerned authority through a mobile application. The mobile application then gets a push notification from the dispensers which are at a low level of water. Also, when the sensor is tempered or when the it stops functioning, a notification is sent. The methodology of this system gives a clear understanding of how the proposed system is being architectured. Firstly, the water level detection is done by using Arduino. When the water level reaches below a threshold value as specified by the user the sensor notifies to Arduino Uno. Then data from Ardunio is uploaded to the cloud storage. The android app then receives a push notification to authorized users.
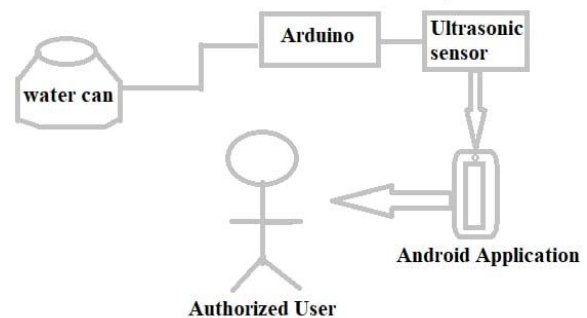

Figure1: System Architecture

i).Internet of Things (IoT)
Internet of Things is determined as the network of environmental objects or items which included devices, vehicles, and buildings which are embedded with sensor, micro-controller and network associativity. It enables these items to get together and interchange data to the various environments. The IOT is wide and big web of objects which are submerged and designed with different built in wireless telecommunications. The main conceptions behind every IOT technology and implementation are "Devices is integrated with virtual world of Internet and interacts with it

by following, sensing and monitoring object and their environment".
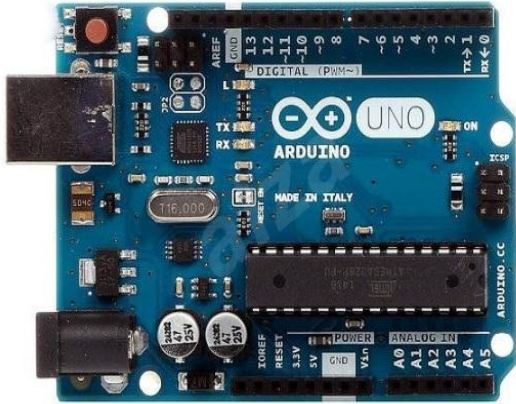
ii). Hardware Components

Figure 2: Arduino is used for the proposed work

Arduino is an open source hardware platform which is able to work with various sensors and communication technology. There are different types of Arduino microcontroller that are used for different purpose. It not only control devices but also can read data from all types of sensors. It is simple, low cost and easy to use. It takes 5V voltage as input speed 16 MHZ Arduino Uno contains the 14 digital I/p pins and 6 analog input pins to connect various sensors that gives analog inputs.

Figure 3: Ultrasonic Sensor in IOT

An ultrasonic sensor is a device that can measure the distance by using sound waves. It measures the distance by sending out a sound wave at a specific frequency which transducers have piezoelectric crystals which resonate to a desired frequency and convert electric power into acoustic power. An output signal is produced to perform a few sort of indicating or manipulate function.
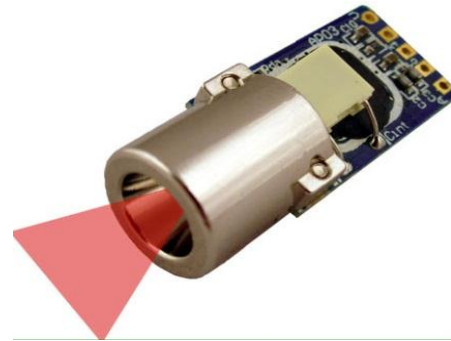

Figure 4: IR Sensor in IOT

This IR sensor detects the movement of the object in the environment. IR sensors work by using a specific light sensor to detect a selected light wavelength in the infra-RED (IR) spectrum. By using an LED which produces light at the same wavelength as what the sensor Is looking for, you can look at the intensity of the received light.

Figure 5: Node MCU in IOT

Node MCU is one of the open sources, interactive, programmable and simple IOT platform. It consists of wireless firmware which runs in the ESP8226 soc from express if system and hardware that based at the ESP-12 module. The time period "Node MCU" which the aid of default refers to the wifirmware in place on the kits. The wi-firmware uses the Lua scripting language. The ESP8266 is a system on chip integrated with ten silica Xtensa LX106 middle, widely utilized on IOT.

Figure 6: Servo Motor in IOT

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A servo motor is a closed loop servo mechanism that uses position feedback to control its motion and final position. The input to its control is a signal representing the position commanded for the output shaft.
The motor is paired with some type of encoder to provide position and speed feedback.
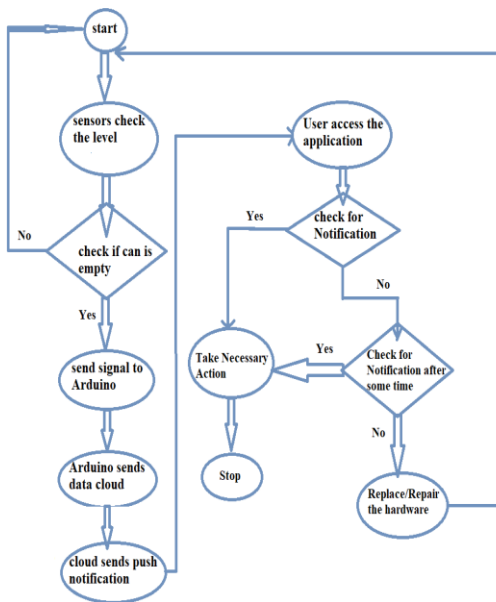

Figure 7: System Flow Chart

The working of the entire system can be represented by a flowchart. The system begins with the sensor connected to the water dispenser. It's 'ON' and 'OFF' automatically. The sensor checks the water level and sends signals to the Arduino Uno micro controller. If can is empty then send the notification about the water level. The data is sent as a push notification to the authorized user. In the above figure, the sensor checks the level of water if water is become empty it will send a notification by using IOT devices or sensors to the authorized person. Then the user will access the received message or notification about taking necessary action. An automatic water dispenser using node MCU and ultrasonic sensor. It will replace all manual taps with a smart one that opens and closes on its own automatically. Not only we can save water but also have heal their lifestyle since we don't have to operate the tap with our hands. In this system mobile application will be developed which is user friendly. Sensors can be protected by notifying the authorized person in case of any damage. Only a single person can manage multiple dispensers. The proposed system employs smart water dispensers which use ultrasonic sensors to measure the level of water. The proposed system is expensive and one system is used by one water dispenser. The proposed system

currently demonstrates only the admin module that can be logged in and be used to monitor the water dispenser. The users can also register, login and get some credentials as implementation of other modules.

IV.   EXPERIMENTAL RESULTS AND DISCUSSIONS

The connection requires jumper wires, USB cable and different IOT sensors. The Arduino will be connected to the different IOT sensors such that IR sensor, Ultrasonic sensor and Node MCU.

Figure 8: Automatic Water Dispenser and Water   Level Monitoring in IoT

The power supply will be given Arduino to computer by using USB cable. The Ultrasonic sensor is used for measuring the distance by using sound waves. Arduino is used for reading the data from different sensors. And IR sensor is used for detecting the movement of object. By using all these sensors, the tap will gives the water automatically when we place the hand near to it.
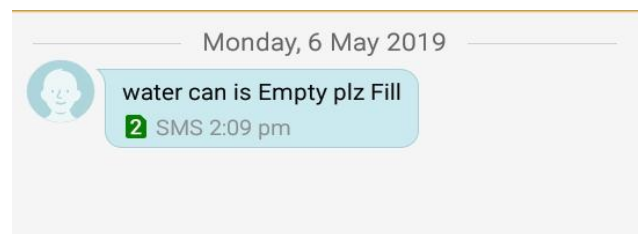

Figure 9: Getting SMS when water can is empty

When the level of water becomes low it will automatically send the push notification to the authorized user in real time.

V.   CONCLUSION AND FUTURE WORK

The proposed system is the design of automatic water dispenser and water level monitoring using Arduino and ultrasonic sensor in IoT environment also using android app

to send the notification about the water level in the dispenser. The experimental results have been conducted and analyzed. In this paper using the IoT sensors we are going to save the water as day by day public is facing lot of problems due to less rain and lack of water in the society. Hence there is a need to avoid wastage of water by conducting such experiments. Hence therefore we need to monitor the water level in the tank or can so that whenever there is less water or empty tank is found the notification will be sent to the authorized person who is in charge of water dispenser through android app. From the above analysis we can conclude that the entire system can be built with low cost there by providing an efficient water quality monitoring system in water dispensers using smart taps. In future the all the smart taps will be replaced by faucets taps

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