

IoT Based Tank Water Level Monitoring and Controlling: A Review

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Abstract-In this paper we propose a more efficient water monitoring and control system for water utility to reduce the current water wastage problem. This approach will help utilities operators improve low cost water management systems, especially by using rising technologies and IoT is one of them. The Internet of Things (IoT) could prove to be one of the most important methods for developing more utility-proper systems and for making the consumption of water resources more efficient.

Keywords-Android Devices, Ultrasonic Sensors, Water Tank, Arduino, Raspberry Pi, Node MCU and IoT.

1. INTRODUCTION

Currently drinking water is very prized for all the humans. In recent times all the humans and creatures on the earth all the human beings and creatures on the earth facing troubles because of growing population, aging infrastructure etc. So it's too important to find the solution for water monitoring & control system [02]. We need modern methods to protect and preserve as much water. The wastage of water through storage tanks not only waste water but also waste electrical and mechanical energy required to utilize the pumps [01].

2. RELATED CONCEPT

In this paper we will discuss about how many options are available to develop such a project.

2.1. Arduino

Arduino is a single-board microcontroller to make using electronics in multidisciplinary projects more accessible. The hardware consists of a simple open source hardware board designed around an 8-bit Atmel AVR microcontroller, or a 32-bit Atmel ARM. The software consists of a standard programming language compiler and a boot loader that executes on the microcontroller [13] It not only control devices but also can read data from all types of sensor. 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/O pins and 6 analog input pins to connect various sensors that gives analog inputs.



Fig 1.Arduino Board

2.2. Raspberry Pi

The Raspberry Pi is a very powerful, small computer having the dimensions of credit card which is invented with the hope of inspiring generation of learners to be creative.

This computer uses ARM (Advanced RISC Machines) processor, the processor at the heart of the Raspberry Pi system is a Broadcom BCM2835 system-on-chip (SoC) multimedia processor.

This review paper provides a description of the raspberry pi technology which is a very powerful computer [09].



Fig 2.Raspberry Pi

2.3. Ultrasonic sensors

An ultrasonic sensor transmits ultrasonic waves into the air and detects reflected waves from an object. There are many applications for ultrasonic sensors, such as in intrusion alarm systems, automatic door openers and Backup sensors for automobiles [11].

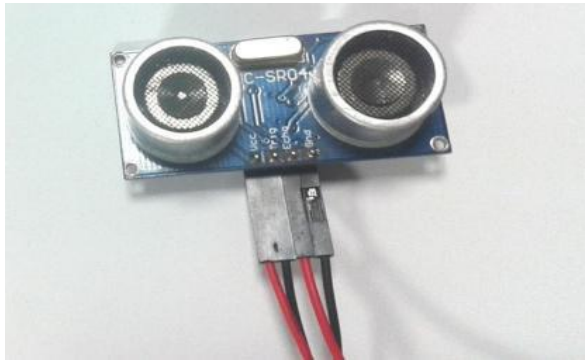


Fig 3. Ultrasonic Sensors

2.4 Node MCU

This module comes with a built in USB connector and a rich assortment of pin-outs. With a micro USB cable, you can connect NodeMCU devkit to your laptop and flash it without any trouble, just like Arduino. It is also immediately breadboard friendly. Node MCU is an open source iot platform. It includes firmware which runs on the ESP8266 Wi-Fi Soc from Espressif system, and hardware which is based on the ESP-12 module.[12].

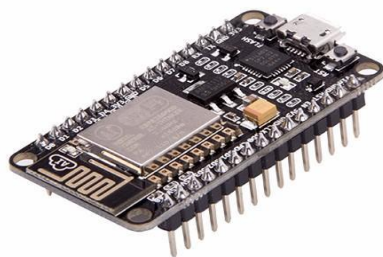


Fig 4. Node MCU

2.5 Android Application

By using android application it will easy to monitor and control water tank. Also the android app can be installing on multiple devices and observe the level of water in the tank.

2.6 Relay

Relay is an electromagnetic device which is used to isolate two circuits electrically and connect them magnetically. They are very useful devices and allow one circuit to switch another one while they are completely separate. A relay switch can be divided into two parts: input and output [03].



Fig. 5 Relay

2.7 Seven Segment Display

A seven segment display is the most basic electronic display device that can display digits from 0-9. They find wide application in devices that display numeric information like digital clocks, radio, microwave ovens, electronic meters etc.

The most common configuration has an array of eight LEDs arranged in a special pattern to display these digits. They are laid out as a squared-off figure '8'. Every LED is assigned a name from 'a' to 'h' and is identified by its name. Seven LEDs 'a' to 'g' are used to display the numerals while eighth LED 'h' is used to display the dot/decimal [03].

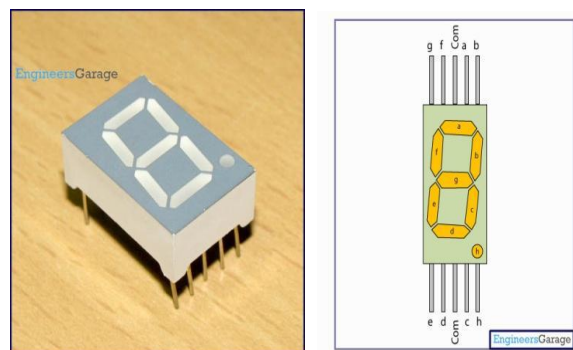


Fig 6. Seven Segment display

2.8 IoT

Internet of Things (IoT) term represents a general concept for the ability of network devices to sense and collect data from around the world, and then share that data across the Internet where it can be processed and

utilized for various interesting purposes. The IoT is comprised of smart machines interacting and communicating with other machines, objects, environments and infrastructures [06].

3. FIGURE

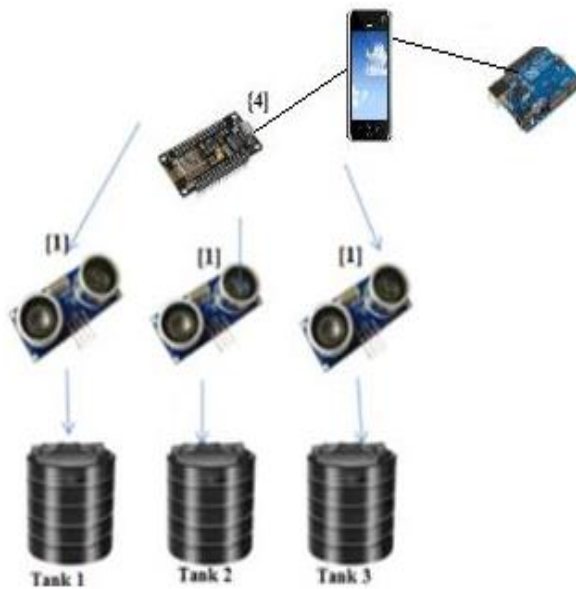


Fig 7. Model Diagram

4. PROPOSED SYSTEM

Above we have discussed various systems component for automatic water pump controlling and monitoring water tank level. These systems have drawbacks like complexity, less communication range etc [7]. Also bluetooth system can be having its limited communication problem.

Also by using node MCU this will be easy to monitor and control the water pump. All the sensors are connected to Wi-Fi module. Wi-Fi module needs the internet. So here Mobile data or Wi-Fi is the access point for the internet.

And other side ultrasonic sensor connected with Node MCU. This stored data is accessed by users. This enables the user to check the level of water and if it goes full then automatic stop. Other parameters related to water like water quality can also monitor for prevent wastage of water [02].

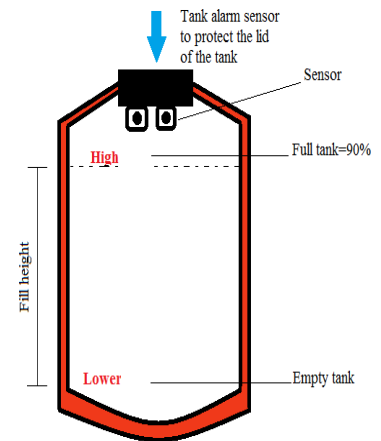


Fig 8. Actual diagram for Water Tank

5. FLOWCHART

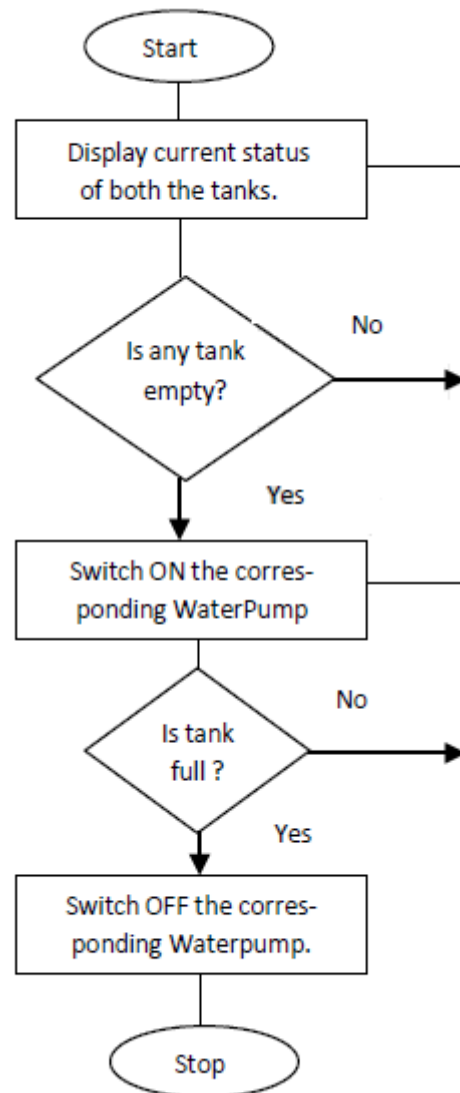


Fig 9. Flowchart for Water Tank Level Indicator

5. CONCLUSION

In this paper we review such a system which name indicates its description. This paper is represented the water tank level indicator and its controlling and what kinds of hardware and software are used for controlling and monitoring the water tank, motor pump.

And for observing the level of water the ultrasonic sensors are used which main purpose is analysis. Ultrasonic sensors are placed on top of the water tank.

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