

Wireless Water Tank Monitoring System Using IOT

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Abstract: IoT based water level monitoring and controlling systems are new and upcoming technology in residential and commercial sectors that have many benefits in terms of electricity and environment. This study presents a comprehensive review and evaluation of various types of water level monitoring systems and its associated equipment in liquid level sensor and logic controller. A comparison is made on manual and IoT based system in terms of power consumption and wastage of water. Now with the advent of Machine-to-Machine Communication which leads to devices communicating among themselves and accordingly analyzing the data intelligently, we here have developed an "IoT Based Water Level Monitoring System". The controller-based Water level monitoring is used to indicate the level of water in the tank to agent. Sensor Based Water Level Detection, it will check the water by using wireless sensor

Key Words: IoT, NodeMCU, Water level, Cloud, Relay

INTRODUCTION

Water is very precious and needed for many and every activity. The storage of water for the domestic, industrial, agricultural, other such needs is especially important. For inspecting the water, quality manual efforts were needed for examination. This system monitors the water level of the reservoir and automatically switches ON/OFF when the tank or container is Partially Empty or Full. Here the model can design according to the circuit is used to discover and control the accurate water level automatically in overhead tank using controller can avoid the overflow of the water. The water level sensor is mounted on the top of reservoir. In our day to day lives we come across many water wastage problems such as Tap Leakage, Overflow of Water tanks, while washing clothes, utensils, or having baths etc. It came to our notice that some of these problems can be tackled by manual work and a sense of awareness on water wastage. This brought our attention towards the problem of Overflow of Water Tanks and to minimize this problem, our group started devising ideas until we found one. The idea was making of a system that will be automatic and can be controlled and monitored wirelessly. Thus, we came up with this project of IoT based water level monitoring system which will help in monitoring the water levels and also control the main motor to start and stop the supply of Water.

EXISTING SYSTEM

- [1] This existing system presents of water level monitoring and proposing on using the WiFi or wireless based type of monitoring using the Arduino.
- [2] This paper deals with brief explanation of using Arduino to automate the homes. The existing system of the Bluetooth method of automation limitations was analyzed to prove that Android and Arduino make up for a better method of automation. The hardware and software specifications are also explained.
- [3] A prototype for Water Level Monitoring is developed for detecting water level through the internet. A central device like microprocessor connects to the internet and receives orders to control sensors. A server manages the users and devices. Android Application acts as a front-end to interact. design and implementation concepts for a wireless real-time Water level monitoring system based on Arduino Uno microcontroller as central controllers. The proposed system has two operational modes.
- [4] manually-automated mode in which the user can monitor and control the home appliances from anywhere in the world using the cellular phone through Wi-Fi communication technology. The existing system presents a low cost and flexible water level monitoring system using an embedded microprocessor and microcontroller, with IP connectivity for accessing and controlling devices and appliances remotely using Smartphone application. The proposed system does not require a dedicated server PC with respect to similar systems and offers a novel communication protocol to monitor and control the home environment with more than just the switching functionality.

PROPOSED SYSTEM.

In this system we are taking 3 overhead tanks. Every tank consists of water level sensor, controller and IoT module. When water level sensor of tank 1 gets a signal, that is water level of tank 1 is low, then that signal gets transmitted through wireless system (wifi Module). Taking the help of android application we can check the water level at the underground tank and if water level is sufficient to fill overhead tanks, then the actuator of tank 1 gets ON through the android application. Similarly, while filling the remaining tanks, priority will be given to the tank which started filling first. After filling a considerable amount of water in a tank for e.g., 50% the next tank will be priorities to be filled and so on the next tanks would be filled one by one. Once a tank is full, it's obvious that the next tank which requires water will be filled. Our system will not only be helpful in keeping a track of water levels in the tanks but will also prevent the motor from getting damaged due to dry run, which usually happens when the motor is operated manually. This system will ease the work of people and need of continuously monitoring by a human. The IoT system, used will be helpful in giving commands

like 'Turn On', 'Turn OFF' and checking the water levels. Also, it will be providing a daily data about the water levels in a form of notifications to the system or the number given and the android application will be more usefull for this system .

SYSTEM ARCHITECTURE

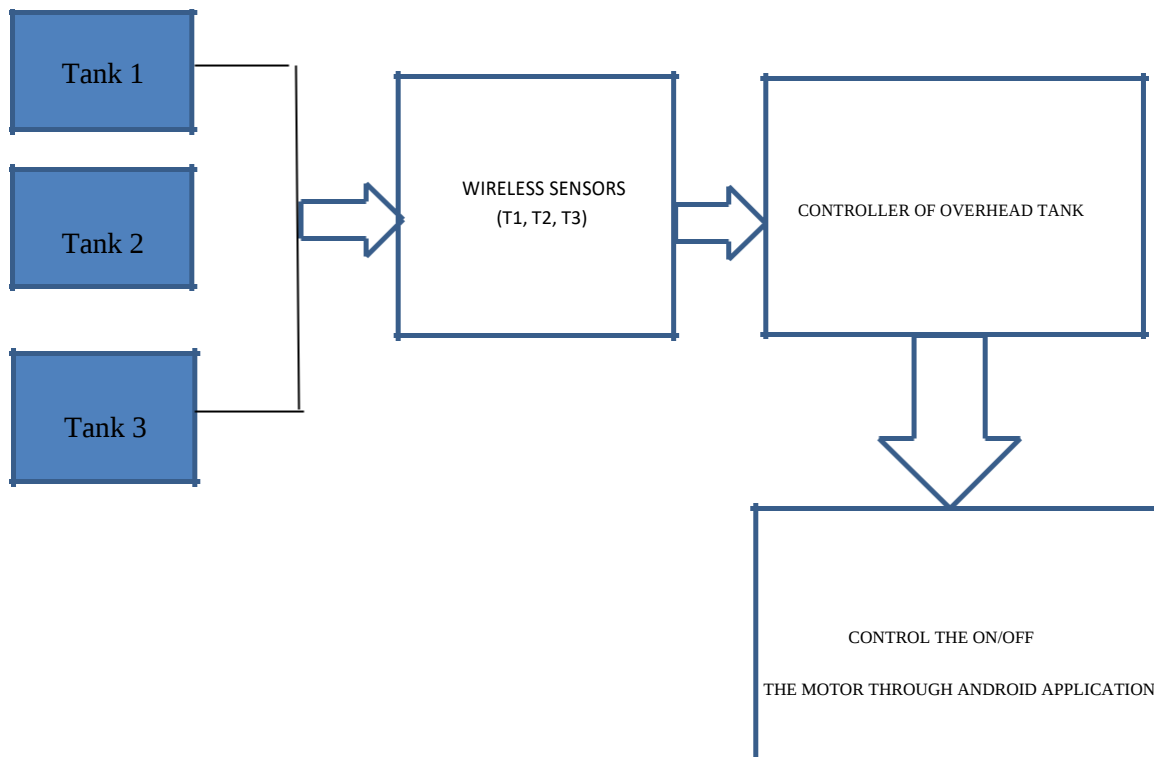
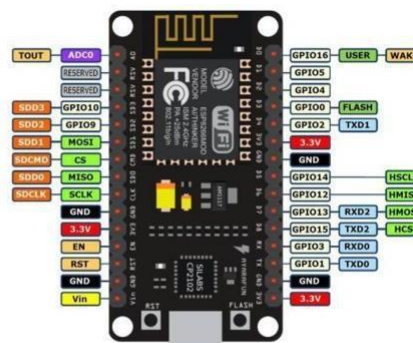


Fig -1: System Block Diagram

Node MCU ESP8266

ESP8266 is a highly integrated chip designed for the needs of a new connected world. It offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor.

- Built-in Micro-USB, with flash and reset switches, easy to program
- Full I/O port and Wireless 802.11 supported, direct download no need to reset



Ultrasonic sensor

A typical HC-SR04 ultrasonic sensor used in this project is shown below. Ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves and converts the reflected sound into an electrical signal.

Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has traveled to and from the target). To calculate the distance between the sensor and the object, the sensor measures the time it takes between the emissions of the sound by the transmitter to its contact with the receiver.

The formula for this calculation is- $D = \frac{1}{2} T \times C$

where :- D is distance,

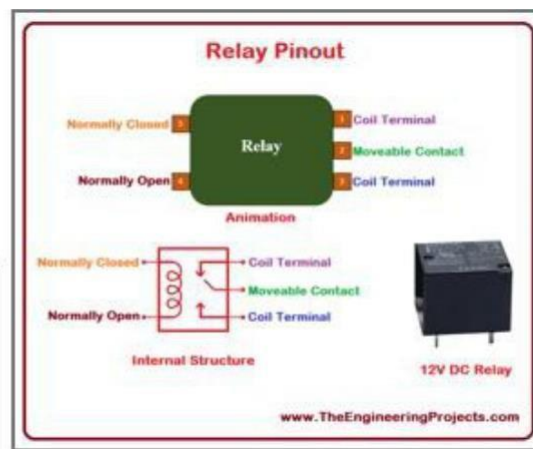
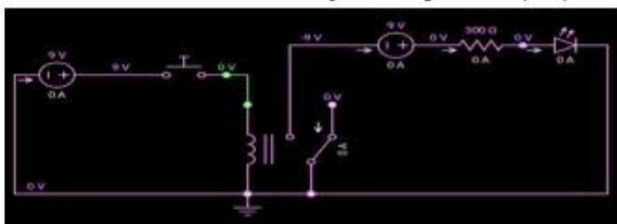
T is Time,

C is speed of sound ~ 343 meters/second



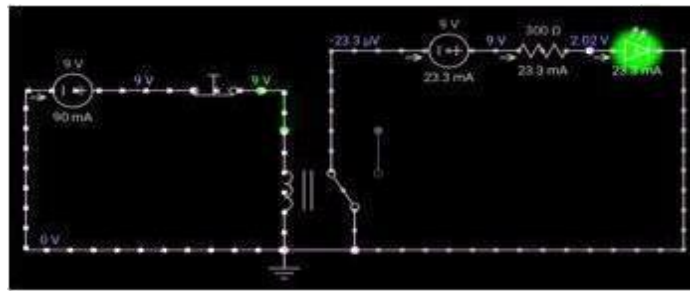
Relay module

When no voltage is applied to the core, it cannot generate any magnetic field and it doesn't act as a magnet. Therefore, it cannot attract the movable armature. Thus, the initial position itself is the armature connected in normally closed position (NC).



Relay in NORMALLY OPENED condition:

When sufficient voltage is applied to the core it starts to create a magnetic field around it and acts as a magnet. Since the movable armature is placed within its range, it gets attracted to that magnetic field created by the core, thus the position of the armature is being altered. It is now connected to the normally opened pin of the relay and external circuit connected to it function in a different manner.



Modern tools / Software:

Proteus 7.1

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

It is a software suite containing schematic, simulation as well as PCB designing.

ISIS is the software used to draw schematics and simulate the circuits in real time. The simulation allows human access during run time, thus providing real time simulation.

Arduino IDE Software

The Arduino integrated development environment (IDE) is a cross-platform application (for Microsoft Windows, macOS, and Linux) that is written in the Java programming language. It originated from the IDE for the languages Processing and Wiring. It includes a code editor with features such as text cutting and pasting, searching and replacing text, automatic indenting, brace matching, and syntax highlighting, and provides simple one-click mechanisms to compile and upload programs to an Arduino board. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub `main()` into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program `avrdude` to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

ADVANTAGES

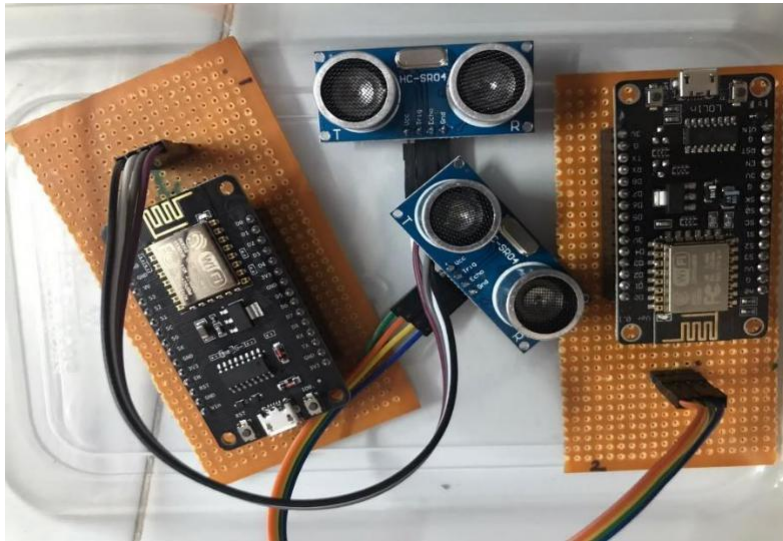
1. Avoid overflow of water from tank.
2. Saving of electricity.
3. Wireless communication through IoT module.
4. Less Manpower / Manual Operation
5. Required Internet Connection
6. System can be observed and operated anytime anywhere 24x7.

APPLICATION:

1. Water tanks of commercial & residential Buildings,colleges,schools.
2. Agriculture use.
3. Industrial use,etc.

METHODOLOGY

In our day to day lives we come across many water wastage problems such as Tap Leakage, Overflow of Water tanks, while washing clothes, utensils, or having baths etc. It came to our notice that some of these problems can be tackled by manual work and a sense of awareness on water wastage. This brought our attention towards the problem of Overflow of Water Tanks and to minimize this problem, our group started devising ideas until we found one. The idea was making of a system that will be automatic and can be controlled and monitored wirelessly. Thus, we came up with this project of IoT based water level monitoring system which will help in monitoring the water levels and also control the main motor to start and stop the supply of Water.

RESULT:**CONCLUSION**

This System is very efficient in monitoring and controlling of the water levels in tanks and controlling the motor. Advancements can be made in this system to get more data on the water, tanks, and the motor. Some future scopes can be: To fit water sensors that will provide with the data of the water's pH. Value helping in getting to know if the water is drinkable or not. Sensors can be placed to monitor the condition of tanks, pipes so that their maintenance will be easy and will be done on time increasing the life of tanks and pipes.

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