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IOT BASED WATER LEVEL MONITORING

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Abstract: Most of the people in residential areas face the problem of running out of water and overflow of water in water tanks due to excess supply of water. It becomes difficult for users to judge the level of water in water tanks, due to which at times of need users may run out of water. Even when the pump is turned on users will not realize when the water tank is filled which may result in overflow. Water tank monitoring system is used to sort out the issues associated with water tank. It is also possible to check the level of the water using sensor so that whenever the water goes below certain threshold limit, a notification is sent to user through the android application and user needs to turn on the pump. Also when there is overflow of water in water tank it uses sensor to detect the water level so that if the water level goes above certain limit the pump gets turned off automatically. This system prevents wastage of water.

Keyword: *Microcontroller, IoT, WIFI, Water Motor, LED*

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I INTRODUCTION

Water is a universal solvent which plays an important role in everyday life. The total amount of water available on earth has been estimated at 1.4 billion cubic kilometers, enough to cover the planet with a layer of about 3km. About 95% of the Earth's water is unfit for human consumption. About 4% is locked in the polar ice caps, and the rest 1% constitutes all fresh water found in rivers, streams and lakes which is suitable for our consumption. A study estimated that a person in India consumes an average of 135 liters per day. This consumption would rise by 40% by the year 2025. This signifies the need to preserve our fresh water resources. Many houses make use of supplementary water tank to store water that is collected from rain water or water pumped from well or underground. At present, water meters are used to calculate the amount of water used at homes. This doesn't provide an efficient method of monitoring the water usage. The water is wasted at each and every outlet knowingly or unknowingly which adds up to huge amount in the end. Efficient management of the water used at homes is very much necessary as, about 50% of water supplied to the cities gets wasted through its improper usage. Water management is only possible, if the user is aware of the quantity of water he uses and the quantity available to him. Hence there is a need for modifying the traditional water meters for the users to continuously monitor their water usage which is always not possible. At present, water meters are used to calculate the amount of water used at homes. This doesn't provide an efficient method of monitoring the water usage. IOT based water level monitoring system is an innovative system which will inform the users about the level of water and will prevent from overflowing. And also it will inform when there is low water level so user can fill the tank up.

II OBJECTIVE

- To develop water level control system to control the water level in the tank.

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- To check the level of water in the tank. Depending on the water level, the motor switches ON when the water level goes below a predetermined level or the motor switches OFF when the tank is full.
- To display the water level and other important data on LCD Display.
- To monitor the level of water in the tank. If the level inside the tank is low.

III LITERATURE SURVEY

YEAR	PAPER NAME	AUTHOR	METHODOLOGY
2019 IJLR	IoT Based Water Level Monitoring System for Lake in a Cloud Environment	S.Sheeba Rani, S.Balakrishnan, V.Kamatchi Sundari, K.C.Ramya	Concept to build up a framework to monitor a water level of a water source from an inaccessible area in a lake. Continuous monitoring is done using the concept Internet of things (IoT) in a cloud environment via the wireless sensor nodes.
2017 IRJET	Water level monitoring system using IOT	Priya J, Sailusha Chekuri	Based on the method of automation various types are as follows: 1. Bluetooth based Water Level Monitoring: Here Bluetooth plays a major role in alerting the anomalies. 2. Remote Water Level Monitoring: In this, the system is controlled remotely. 3. Automatic Water Level Monitoring: The system is programmed to automatically perform some
2017 IJIRSET	An IoT based model for smart water distribution with quality monitoring	Joy Shah	The paper focuses on water distribution using water flow sensor and water control valve will help in even distribution of water and provide adequate amount of water.
2016 IEEE	Smart water management using IoT	Sayali Wadekar, Vinayak Vakare, Ram Ratan Prajapati	Water level sensor will provide the level of water present in the water tank and according to the level of water, water motor will automatically turn ON and OFF. Data is displayed on android application.
2015 IEEE	Design of water management system	F Ntambi, C P Kruger, B J Silva, G P Hancke	The system consists of 3 wireless sensor sub-systems. All communicate with each other wirelessly and send information to gateway connected to a computer which hosts the GUI.

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IV PROPOSED METHODOLOGY

Block Diagram

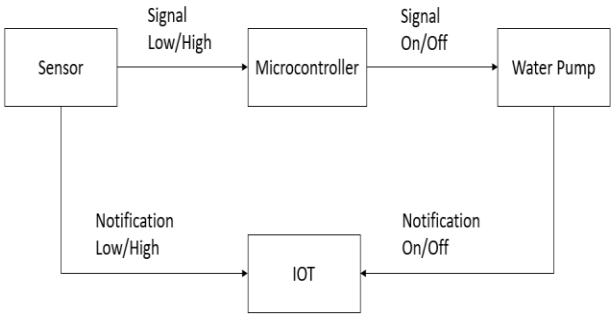

Fig.1. Block diagram of water level monitoring system using IOT

Block Diagram Explanation

"Water level monitoring and controlling systems" uses a water level sensor which is installed inside the tank. This sensor will continuously monitor the water level and will send the signal to microcontroller. Microcontroller will turn ON or turn OFF the pump automatically. The respective message will be displayed on Android app with the help of IOT.

Now the operation can be divided in two parts as follows

When water level is low

When the water level is low, sensor will send signal to the microcontroller. According to that signal microcontroller will turn on the Water pump automatically and Water tank will start filling up and message will be displayed on channel that tank is empty and motor in on

When water level is high

When the water level is High, sensor will send signal to the microcontroller. According to that signal microcontroller will turn Off the Water pump automatically and Water tank will stop filling up and message will be displayed on channel that tank is empty and motor in on.

V TECHNICAL DETAILS

Hardware Implementation

- Microcontroller 8051

Fig.5.1.1 Microcontroller 8051

8051 microcontroller is designed by Intel in 1981. It is an 8-bit microcontroller. It is built with 40 pins DIP (dual inline package), 4kb of ROM storage and 128 bytes of RAM storage, 2 16-bit timers. It consists of are four parallel 8-bit ports, which are programmable as well as addressable as per the requirement. An on-chip crystal oscillator is integrated in the microcontroller having crystal frequency of 12 MHz.

- WI-FI Module

Fig.5.1.2 Node MCU ESP8266

The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another

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application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much Wi-Fi -ability as a Wi-Fi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

- Water Motor

Fig.5.1.3 Water motor

The pump definition is, it is a typical mechanical apparatus, and the main function of this device is to force a gas otherwise liquid to move ahead in a pipeline. These are also used for compressing gases otherwise fill air into tires. Pumps use mechanical energy to draw the liquid inside and to discharge them throughout the exit by pressurizing them. The energy sources of pumps mainly include wind power, manual operation, electricity & engines.

- LCD

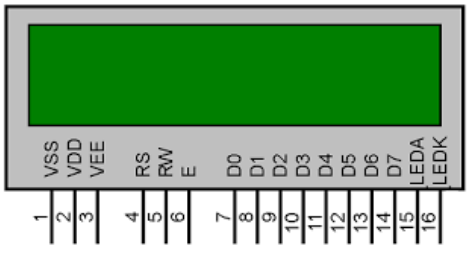

Fig. 5.1.4 LCD Display Pin Diagram

LCD modules are very commonly used in most embedded projects, the reason being its cheap price, availability and programmer friendly. 16×2 LCD is named so because; it has 16 Columns and 2 Rows. There are a lot of combinations available like, 8×1, 8×2, 10×2, 16×1, etc. but the most used one is the 16×2 LCD. So, it will have (16×2=32) 32 characters in total and each character will be made of 5×8 Pixel Dots.

Nowadays, we always use the devices which are made up of LCDs such as CD players, DVD players, digital watches, computers, etc. These are commonly used in the screen industries to replace the utilization of CRTs. Cathode Ray Tubes use huge power when compared with LCDs, and CRTs heavier as well as bigger. These devices are thinner as well power consumption is extremely less. The LCD 16×2 working principle is, it blocks the light rather than dissipate. This article discusses an overview of LCD 16X2, pin configuration and its working.

Software Implementation

- Keil uvision

Keil uvision 4 is an IDE by ARM. The uvision IDE combines project management, run-time environment, build facilities, source code and program debugging in a single powerful environment. It supports multiple screens and allows creating individual layouts. It also has a debugger which provides facility to test, verify and optimize the application code. The debugger includes traditional features like simple and complex breakpoints, watch windows and execution control provides full visibility to device peripherals.

- Proteus 8 Professional

Proteus is a proprietary software toll used primarily for electronic design automation. It has modules for schematic capture, simulation and PCB layout design. All PCB Design products include an auto-router and basic mode SPICE simulation capabilities. The 3D viewer module allows the board under development to be viewed in 3D together with a semi-transparent height plane that

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represents the board's enclosure. STEP output can then be used to transfer to mechanical CAD software for accurate mounting and posit ironing of the board.

Proteus 8 Professional is software which can be used to draw schematics, PCB layout, and code and even simulate the schematic. You can simulate your work and be more efficient in completing the task at hand. Hope this articles about Proteus 8 Professional is useful.

Steps to Create Channel for IOT

I. Create a free Math works account or sign into ThingSpeak using an existing account.

II. Select the ThingSpeak channel you want your data to stream into. See Collect Data in a New Channel for help creating a new channel.

III. Record the following for the selected channel:

IV. Channel ID, which is listed at the top of the channel view.

V. Write API key, which can be found on the API Keys tab of your channel view.

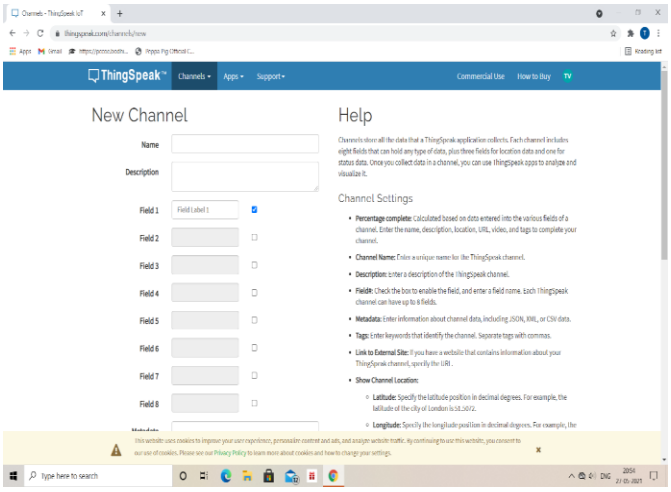

Fig.5.2.1 Steps to create channel

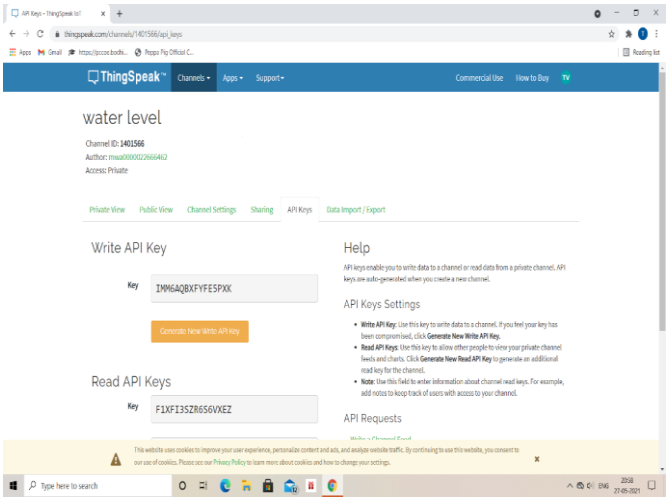

Fig.5.2.2 Steps to create channel

VI FLOW CHART

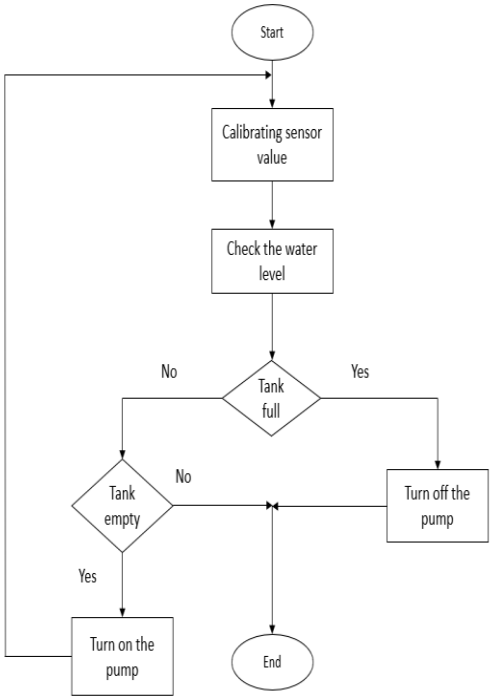

Fig.6.1 Flowchart of IOT based water level monitoring

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VISOFTWARE SIMULATION

6.1 When Tank is Full

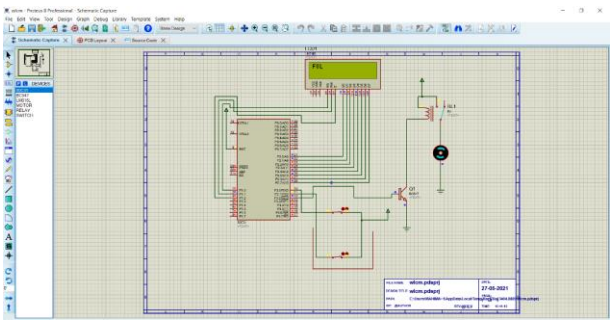

Fig.7.1.1 Simulation diagram when tank is full

6.2 When Tank is Empty

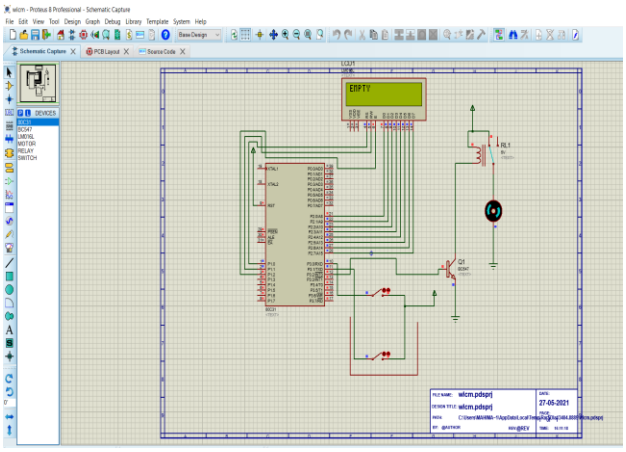

Fig.7.2.1 Simulation diagram when tank is empty

VII CONCLUSION

Nowadays water is being wasted in many ways and wastage due to overflowing of tanks is a major contributor for this. Thus, Water Tank Monitoring System helps to reduce the wastage of water due to overflowing by automatically turning off the pump when the water level in the tank reaches a threshold limit. Also whenever the tank is empty the water pump will be started to fill the tank again. Entire activity can be monitored from android.

VIII FUTURE SCOPE

This project can be further developed to calculate the water consumption in a time period. Then user can manage the water resource and reduce the water wastage. Also further modifications can be done and the system can be implemented for more than one tank.

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