WATER LEVEL MONITORING SYSTEM

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Abstract - *In today's global scenario, water wastage and water shortage are an over rising problem. With the world population rising minute by minute, the need for water is increasing and therefore water conservation is the need of the hour. This paper proposes a solution for the soaring water problems. Today's industries need huge amount of manpower for system supervision. We have come out with a solution where we use sensors to measure the water level of the storage system and be informed about the same, saving human efforts. Here, sensors are fit in the storage tank at different levels. The sensors are further connected to a microcontroller. The sensors detect the water level and inform it to the microcontroller which displays the storage tank status on the Liquid Crystal Display (LCD). A gate mechanism is also attached to this system which is triggered when the water level reaches the brim of the storage system.*

***Key Words*: Microcontroller, Motor, Gate mechanism, Electrode, liquid-crystal display**

1. INTRODUCTION

Water scarcity and water wastage is an increasing problem in a country like India. In this paper we have tried to provide an aid to this problem. Embedded systems are now-a-days playing a vital role in Engineering design process for efficient analysis and effective operation. Due to time complexity in electronic aspects embedded systems have become a major part of our daily life. So therefore, with the help of embedded systems we have designed a project which can measure the water level of a storage tank and display it on the LCD. This not only provides us with the required information about the status of the water tank but also helps and reduces the manpower required in this whole process. Our project is a contribution towards the solution for water scarcity problems. Also, the application of embedded systems reduces the probability of error caused by human intervention.

2. LITERATURE SURVEY

In an analytical study conducted by the Delhi Committee of the Associated Chambers of Commerce and Industry of India (ASSOCHAM), it has been revealed that there has been a substantial increase in the wastage of water due to numerous reasons. According to ASSOCHAM, the percentage of water wasted has been increased to an alarming 40% as compared to the previous year. On February 11, 2018 the British Broadcasting Corporation (BBC) put Bengaluru on a list of 11 major cities in the modern era having maximum water related problems. The BBC blames a spike in population growth and new property developments, Bengaluru's struggle to manage its water and sewage systems, and a colossal waste of drinking water due to poor plumbing. Also, many villages in the interior of Maharashtra and many other states are facing major water shortage due to drought and water supply mismanagement. Our system is an initiative to help curb or at least reduce these water wastage and scarcity issues throughout the nation [1].

Delhi Jal Board had taken a decision to punish the consumers for overflowing tanks. Water consumers who switch on their motors to fill their overhead tanks and then forget to switch them off have to pay the respective penalties [2].

3. PROPOSED MODEL
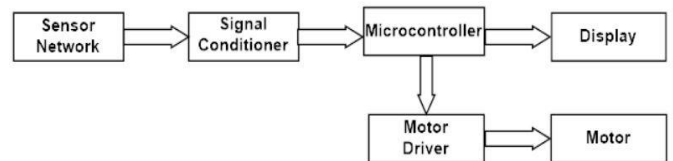
3.1 Block Diagram:

Fig 1 Block Diagram of water tank level monitoring and pump control system.

The proposed system uses five sensors to sense various levels of the storage. Whenever the water level rises or decreases and comes in contact of any sensor then the circuit is complete and current flows due to which the corresponding transistor conducts and circuit is closed. The output of the sensor circuit triggers the microcontroller. Whenever the water level rises above the highest level or decreases below the lowest threshold level then the sensor circuit triggers the microcontroller. According to the code written and burnt in the microcontroller, it will drive the DC motor. The motor driver is provided to drive and control the motor. An LCD is provided to inform the user about the status of the water level in the tank [3].

3.2 LCD

LCD modules are very commonly used in most embedded projects, the reason being its cheap price, availability and programmer friendly. 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. 16×2 LCD is named so because; it has 16 Columns and 2 Rows. It will have (16×2=32) 32 characters in total and each character will be made of 5×8 Pixel Dots. Each character has (5×8=40) 40 Pixels and for 32

characters we will have (32×40) 1280 Pixels. Further, the LCD should also be instructed about the Position of the Pixels. Hence it will be a hectic task to handle everything with the help of MCU, hence an Interface IC like HD44780 is used, which is mounted on the backside of the LCD Module itself. The function of this IC is to get the Commands and Data from the MCU and process them to display meaningful information onto our LCD Screen.

3.3 Arduino Uno

Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board

microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. The UNO is the best board to get started with electronics and coding. The UNO is the most used and documented board of the whole Arduino family. Arduino Uno is a microcontroller board based on the ATmega328 [4]. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Arduino Uno is cheap and can therefore be used with a mindset of not worrying about the board [5][6].

3.4 Water level sensor

In this project we have used five electrodes to sense the water in a tank. These five sensors are placed in the tank at 20%, 40%, 60%, 80% and at the top or 100% of the tank level. As given in the circuit, we put one wire of 5V supply in the bottom of the tank and remaining wires at different equally spaced levels in the tank. When water is around 25% then 5V supply wire and electrode at 20% will be short and the circuit will be completed.

4. SYSTEM FUNCTIONALITY

The proposed system is simulated by using Proteus and design suit software. Wires are used as a sensor for simple yet ameliorated understanding. Five sensors are placed at equal intervals in the storage system. These five sensors provide input to the Arduino Uno pins (A1 to A5). When water level reaches the sensor level, that respective branch is connected to the 5-volt DC supply using the probs. Arduino reads the analog input from the sensors as per the requirement. Arduino then produces the needed (high or low) output on the motor pin. The output to the motor pin is then given to the motor driver, as shown in fig 2. Here, L293D (6 pin motor driver) is used to control the DC motor [7]. The Arduino is interfaced with the LCD. The Arduino is programmed such that depending on the input from the analog pins, percentage of water in the storage system and the status of the motor is displayed on the

screen. When the water in the storage system reaches the topmost sensor, the motor interfaced with an Arduino board is turned off symbolizing a system overflow [8].
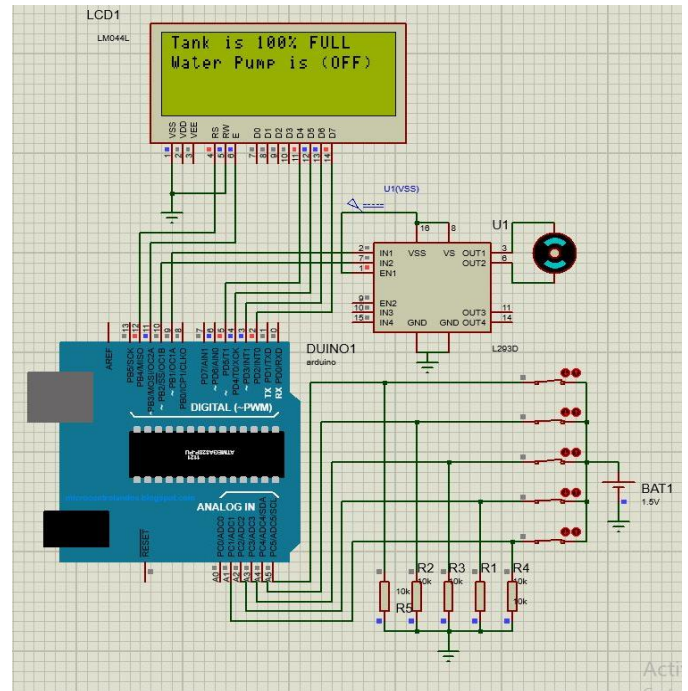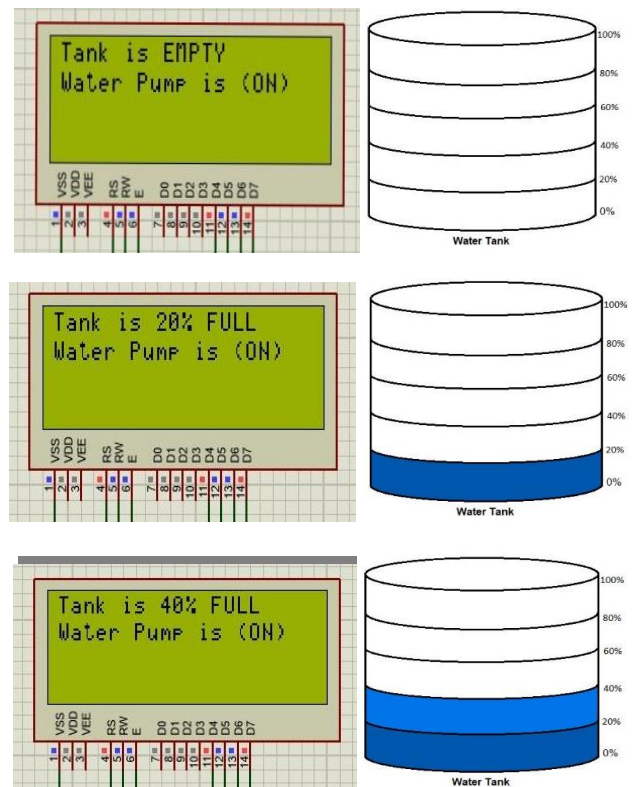

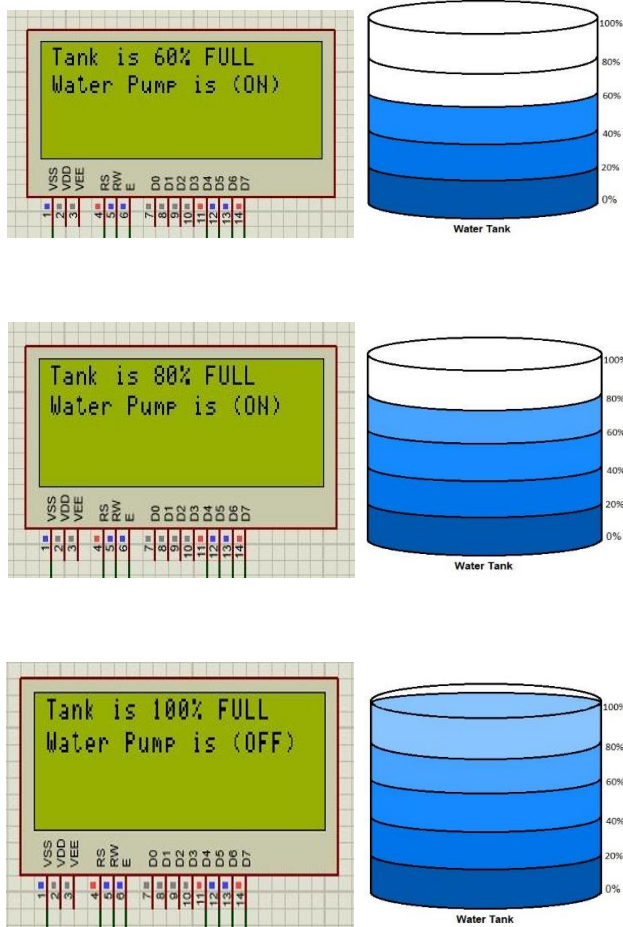**Fig 2** Circuit Diagram of water tank level monitoring and pump control system [9].

Fig 3 Displaying water level and motor status at 5 different conditions.

5. FUTURE SCOPE

As the world's water resources become increasingly stressed, effective systems for management become more important. Several water monitor systems are available but most of them are either expensive or requires manpower. Since wired technology is used in our proposed system there is scope to further modify it by using wireless RF technology. Thus, the communication between the controller and the driving element can be established wirelessly. Improvements can be made with minor changes in this model by eliminating the operator and providing the complete control to microcontroller (automatic level control). It can be used for level monitoring and control in industries. The system can also be extended to efficient functioning of dams. Therefore, a major future work can be possible in which a centralized control of all the dams in a state using GPRS or other wireless technology under central government can be beneficial to the whole country. On a local level, the control of all the water storage tanks in a society using wireless technology under a trusted authority can be beneficial as well.

6. CONCLUSION

The proposed mechanism of water control reduces the water wastage, ensures efficient use of available water resources and generates more precise and accurate results. There is no requirement of human laborer for monitoring the level, just one operator is sufficient for opening and closing the gate according to sensor output. Due to the number of sensors being more we can open or close the gate whenever necessary knowing the accurate level of water. Also, operation execution time is less. Because of its cost efficiency this system can be installed in various rural areas where the water problems are on a rise.

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