

Water Conservation in Multistoried Apartment Buildings Using Arduino with Zigbee

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ABSTRACT

Now- a- days the multiple overhead tanks installed in houses, apartments are evident and to monitor these tanks is difficult as they are kept at the remote places for example in multi-storied apartments. The conservation of water is the main aim of this project. In the existing water tank control systems there is control for only one tank. But in apartments there is separate tank for each house and it is necessary to monitor all the tanks simultaneously. For that we need to install separate system for every tank. In this project we made a single controlling system to control all the tanks at a time. This control system will be used to monitor many tanks by controlling the operation of motor which pumps water from the sump to the overhead tanks automatically without the help of manpower using Arduino and Zigbee. And LCD display is provided to show the status of the tanks. Multiple tank control system saves the overhead cost of electricity bill, time, manpower and wastage of water. This project will be helpful to minimize the water scarcity in the society.

Keywords: Arduino, Zigbee, Water Level.

1. INTRODUCTION

A water supply is an essential requirement for all people. Providing water is never free. The water needs to be collected, stored, treated and distributed. Using too much water is a waste of money. Taking too much water from a limited source may deprive people elsewhere of water and have adverse Environmental and health impacts. To control water scarcity some devices should be used in the houses. To avoid the excess usage of water we are proposing a system which can be used to control the motor automatically and fill the overhead tanks in the apartments simultaneously. This project will also be used to know the water usage of each house holders. And hence we can control them from using much water. In this project Arduino Uno is used as a controller which monitors and controls the water level of each tank and provides the status of those tanks to the zigbee and also the water usage of each house holders. This project is mainly designed to avoid the manual operation. In this report let us see the detailed view of the project.

2. EXISTING METHODS

1. Automation of tank level sensing using PLC.
2. Microcontroller based water level sensing and controlling.
3. Water tank depth sensor using Arduino lab view.

Drawbacks of existing methods

1. The controller is provided to control a single tank only.
2. If only one overhead tank is used in an apartment then much water may be used by one family. It affects the water usage of others.
3. If more than one tank is used then there is a need of separate controller for each tank.
4. Counter is not provided.

3. PROPOSED METHOD

For overcoming the drawbacks in the existing systems we have designed “water conservation in multi-storied apartment buildings using ARDUINO and zigbee” project. In these two sensors for each tank are available for indicating low level and high level. And for indicating low level for sump one sensor is available in the sump. The sensor used here is magnetic float sensor. And to open and close water flow pipe solenoid valves are used. For each tank separate solenoid valves are used. This will be operated by the Arduino.

Arduino is used as controller. It is also programmed to indicate the water level in the tank through displays. Arduino has input from 5 sensors, 4 from water tank and 1 from sump. It takes it as input and sends the signal to the zigbee at the transmitter side. The signal is received by the another zigbee that is present at the receiver side. Then Arduino opens the solenoid valve and drives the motor according to the input conditions programmed in the Arduino and Zigbee. The operation is done in wireless manner.

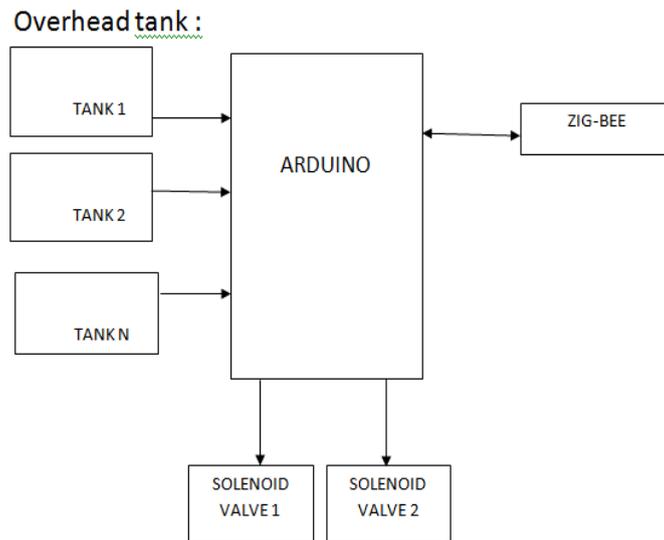


Fig 3.1. Block diagram of overhead tank

BASE TANK:

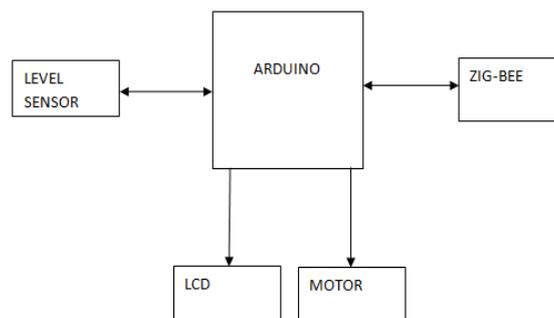


Fig 3.2. Block diagram of base tank

Fig 3.1 explains the working of this project and it is a model having N number of tanks. We designed a model of 2 tanks for demonstration purpose. It can be expanded up to several tanks.

If the water level goes below the specified level in a particular tank then the sensor placed for sensing low level senses it and open the solenoid valve corresponding to that tank and then it switch on the motor through relay. It pumps the water up and fills up the tank. If the water goes above the specified level in that tank then another sensor placed for sensing high level will sense that and turn the motor off and close the solenoid valves.

If the water level of the sump goes below the specified level then it is sensed by the low level sensor in the sump and the Arduino will turn off the motor. The Arduino can be also programmed to allow manual operation for controlling water flow. This will helpful to manually operate the device. To avoid wired operation and circuit complexity we are using Zigbee to send the signal through the wireless manner. Counter is added in the software to count how many times a tank is refilled by each householder so that the water usage can be identified. This is helpful in conserving water by avoiding overflow of water. Because it turn off the motor when the tank reaches high level. And this is useful for avoiding the dry running of motor. So electricity is saved. It is an automatic device so manual monitoring is not needed. And a display is provided for monitoring so we can continuously monitor it. With the help of this project uninterrupted water supply can be achieved.

In this project the components used are Arduino, Zigbee, Liquid crystal display, Magnetic float sensor, relay, motor, solenoid valve. Magnetic float sensor is used as input to the Arduino. Relay and LCD are the outputs. Solenoid valve and motor are connected with the relay shield. The block diagram explains connections of input and output components.

4. RESULT

In this project we have successfully controlled multiple water tanks simultaneously and got the usage measures of the water by counter using software programming.

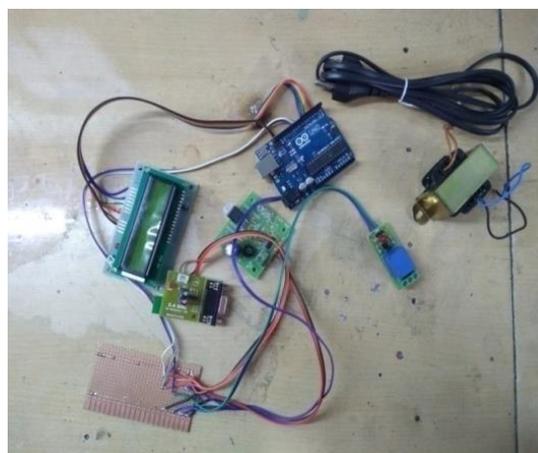


Fig 4.1 Receiver side-base tank

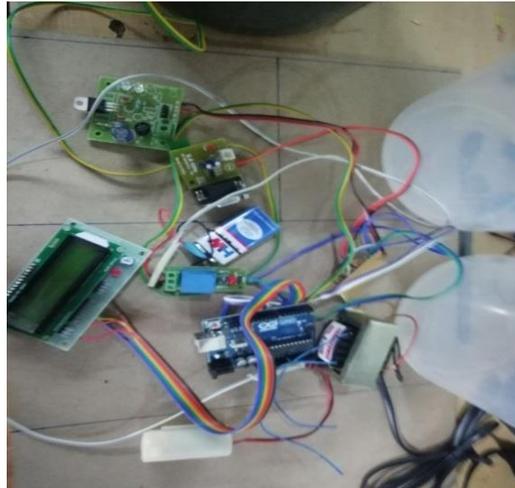


Fig 4.2 Transmitter side-overhead tank

5.CONCLUSION AND FUTURE SCOPE

Water is one of the most important basic needs for all living beings. But unfortunately a huge amount of water is being wasted by uncontrolled use. Some other automated water level monitoring system is also offered so far but most of the method has some shortness in practice. We tried to overcome these problems and implemented an efficient automated water level monitoring and controlling system. Our intension of this research work was to establish a flexible, economical and easy configurable system which can solve our water losing problem. We have been used a low cost Arduino UNO R3 and Zigbee in this system which is the key point to reduce cost. We have successfully experiment the system in lab and therefore proposed a water level monitoring and controlling device. This could have a substantial benefit from this research work for efficient management of water. In the future GSM, IOT can be included in this system and provide a information about the status of the water level to the end user through a message.

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