AUTOMATIC WATER PUMP CONTROLLER

ABSTRACT

Water is very precious for the living beings and availability of potable water is gradually decreasing.

Most of the cities in the county and that of the world are facing this problem. This is one of the motivations for the current work and to deploy techniques in order to save water and help the environment which in turn ensures water for the future.

In many houses there exists unnecessary wastage of water due to overflow from overhead tanks, leakages, unutilized flow etc. An Intelligent Water Level Controller can provide a solution to this problem.

The system proposed uses a micro-controller/ Arduino to automate the process of water pumping in an overhead storage tank system. An water flow sensor is used to measure the amount of water outflow that is there through out a particular time-period . The information is logged sent to the controller for a decision whether water to be pumped to the overhead tank for every a particular period of time. Additionally the system senses continuous flow of water, if present, as possible leakage and issues warning alarm.

Utilizing this concept both water and the power conservation is accomplished.

CONTENTS

LIST OF FIGURES

ABBREVATIONS

MHz	Megahertz
ASK	Amplitude Shift Keying
RF	Radio Frequency

1. INTRODUCTION

Water scarcity is a major problem that is gripping the major metro cities of the World; the main culprit is not availability but undue wastage. Most of the people who have easy access to resources like water have careless attitude toward this kind of issues but people who face this problem knows the worth of clean drinkable water and water for routine usage. The barrier on wastage not only gives us more financial savings, it also helps the environment and water cycle which in turn ensures that we save water for our future.

The solution to this problem is to use an automatic water level controller to avoid the water overflow and wastage. The automatic water level controllers are highly recommended for metro cities or areas where water is supplied through pipelines which are further distributed in homes, hotels, society's etc. Now days it is becoming necessary for big and small houses, bungalows, corporate, hospitals and multi storey buildings, especially in metro cities and big towns where there is no fixed time for water supply. In this regard the automatic water level controller reduces the wastage of water by cutting down any further overflow than what is needed.

The automatic water level controller designed here uses an water flow sensor which monitor the water flow for every second and this information is sent to the micro-controller with help of an transmitter for every an hour and the information is received with the help of an receiver attached to the micro-controller and micro-controller takes care about the time limit of pump to be on and off and in this way the automatic water pump controllers works.

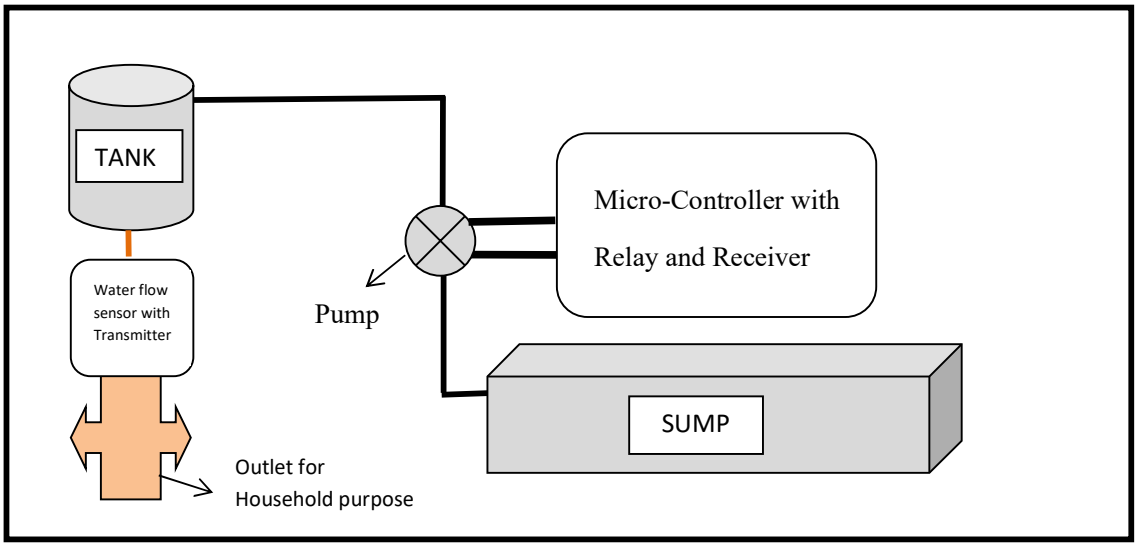

Fig 1 Functional block diagram of automatic water level controller.

2. LITERATURE REVIEW

Jaehyoung Yu Harnsoo Han,2006] explained the monitoring water level in a river or in a reservoir is important in the applications related to agriculture , flood prevention and fishing industry etc. The schemes developed for measuring water level can be categorized as 4 types based on measuring features: pressure, supersonic waves , heat, image .

Muhd Asran Bin Abdullah,2004-His theory gave how Human supervision is limited for several hours and the accuracy is almost not perfect. Sensors introduces a better solution in accurate level measurements and automatic processing of water levels.

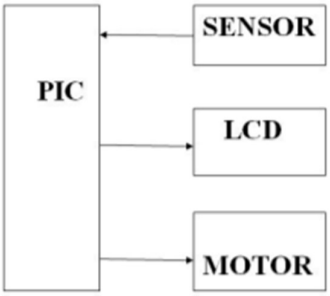

Fig 2 Block Diagram

According to Dana Gardens, By the year 2000,50% of all engineers will design with sensors, up from 16% who routinely used them at all beginning of the decade.

B. Y.Lee and B.Y.park,2008-Gave pressure sensor which is easy to use,it has a limitation that it should be calibrated and replaced frequently due to possible breakdown by continuous water pressure.Supersonic wave sensor is free from water pressure since it measures the time of supersonic wave pulse from emitter to receiver reflected by the water surface.

Kon et.al,2009 Explained the use of image sensor for measuring water level is the most recent approach. Different from other types of sensors, it can provide the surrounding information around the sensor as well as the water level so that the measured data can be confirmed. It also has an advantage that it is unaffected by weather. Commenting on his experience with the radar sensor the environment Agency's Rikk Smith says,"We have been very pleased with this sensor because it was quick and easy to install and we have not had to touch it since it was installed over five months ago".

Jerry C.Whitaker,2010 explained that Ultrasound echo ranging transducers can be used in either wet (contact) or dry (non-contact) configuration for continuous measurements of liquid level.An interesting application of wet transducers is as depth finders and fish finders for ships and boats.dry transducers can also be used with bilk materials such as grains and powders.

3. PROPOSED SYSTEM

The automatic water level controller designed here uses an water flow sensor which monitor the water flow for every second and this information is sent to the micro-controller with help of an transmitter for every an hour and the information is received with the help of an receiver attached to the micro-controller and micro-controller takes care about the time limit of pump to be on and off and in this way the automatic water pump controller works.

Working of the Automatic Water Level Controller

The water flow sensor attached to the outlet of the overhead tank calculates the amount of water that is flowing out through it and for every an hour the total volume of water outlet is sent to the receiver with the help of 433MGHz transmitter .And the information is received and then the micro-controller takes care of the pump whether it to be on or off.

For Example let the amount of water be 4 litre that means 4000ml which had flown through the outlet of the overhead tank and let the capacity of the pump be 100 litre per hour that means

100 *(1000) ml --------> 1 Hr(3600seconds)

? ---------> 1second

That is approximately 27.7 ml of water is pumped per each second on this basis as we have assumed that the amount of water that have out-flowed is 4000 ml. Then amount of time the pump is switched on is given by

(AMOUNT OF WATER THROUGH OUTLET(in ml)/ 27.7) in seconds.(100 litre/h pump).

As of this above example the amount of water required is around =144.40 seconds

And this calculation vary as per the specifications of the water pump.

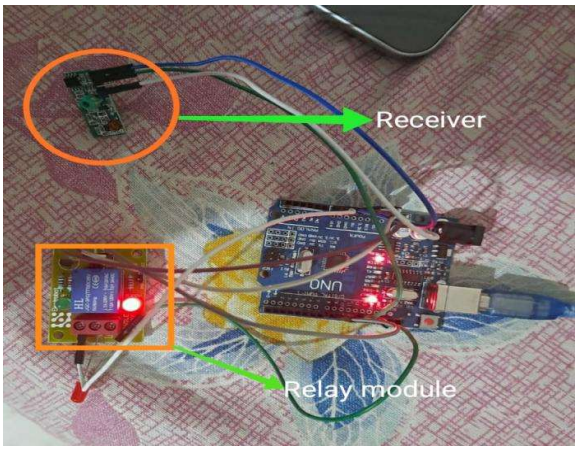

Fig 3 Receiver Setup

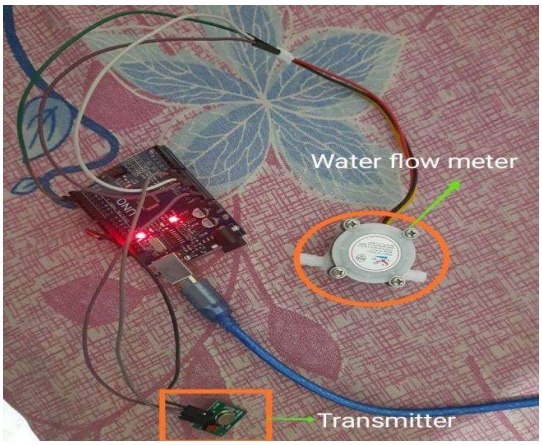

Fig 4 Transmitter Setup

4. RESULT S AND DISCUSSION

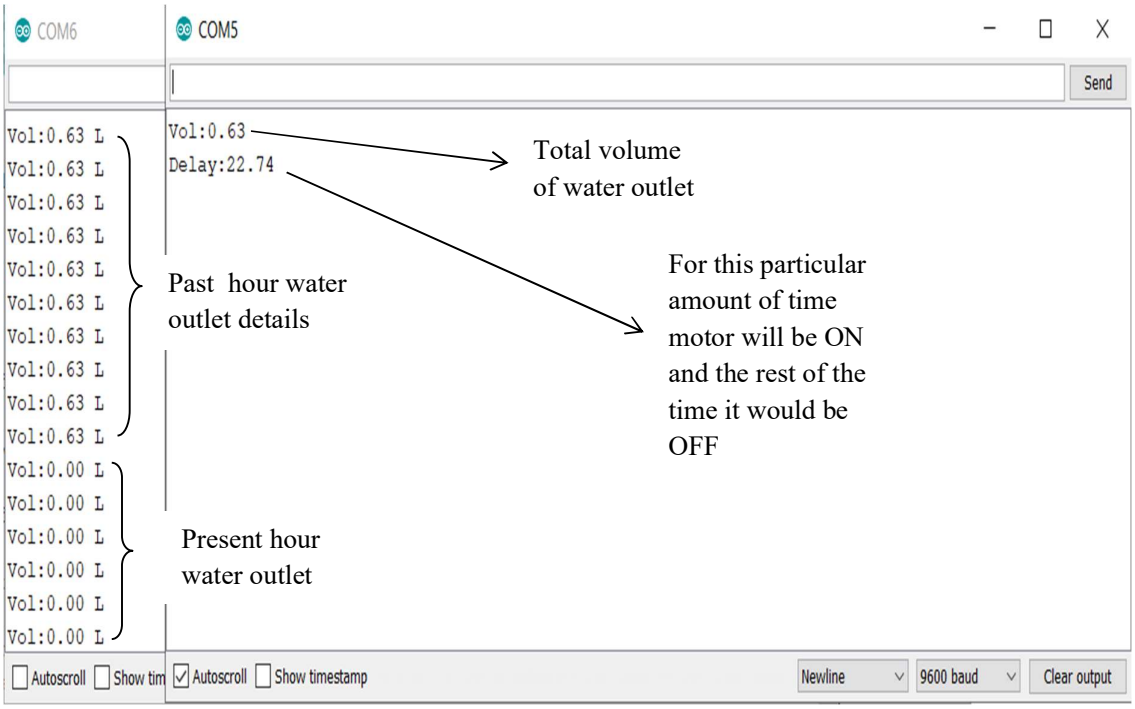

Fig 5 Serial monitor view of Output

As we can see from the above figure the volume of water that is flowing out is calculated through out an hour and will be sent to the Micro-controller and this takes care about the pump whether to be ON or OFF.

ADVANTAGES AND APPLICATIONS

The Flexible water level controller and indicator is very useful gadget for house hold and industrial applications. It can be used for various fluid level controls in industries etc. Following are the few advantages and applications listed.

Advantages

- Easy installation.
  Low maintenance.
  Compact and elegant design.
  Users can control the required level of water in over head tank.
  Avoids wastage of water from tanks. I
  It can maintain exact preset water levels.
  The system is very versatile, a numbers of tailor made variations like control of multiple tanks or multiple pumps are possible.
  Being automatic saves man power.

Applications

Used in buildings where the manual monitoring is difficult.
Used in industries to control the water level and in chemical mixing etc.

5 . CONCLUSION AND FUTURESCOPE

This paper was intended to design a simple and low cost water level indicator. This is not only for water tank but also used for oil level and chemical lab. To design this system, we used micro-controller as a platform and local materials for low cost. Our target was to design a system in such a way that its components will be able to prevent the wastage of water. Micro-controller code was deployed here. The whole system operates automatically. So it does not need any expert person to operate it. It is not so expensive. This design has much more scope for future research and development.

Agriculture is India's largest industry and farmlands are spread all over the country. Every crop cannot be cultivated in all places as the soil is not suitable. Even if the soil is suitable due to scarcity of water the land may not be usable. The farmers are mostly dependent on monsoon rain. So the usage of water appropriately is the need of the hour to get the maximum yield. So in this scenario in our proposed system three water level sensors can be used at three different heights from ground level. According to the water requirements by the crops, water can be allowed to the field by the motor. This is one of the aspects that we can improve in our system. The proposed system can be made more versatile. A number of tailor made variations like control of multiple tanks or multiple pumps are also possible in the future.