DESIGN OF A WATER LEVEL INDICATOR AND CONTROLLER BY EMBEDDING A CONTROL SYSTEM TO AUTOMATE THE PROCESS OF WATER PUMPING IN AN OVER-HEAD TANK STORAGE

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ABSTRACT

Water scarcity is one of the major problems facing major cities of the world and wastage during transmission has been identified as a major culprit. To create barrier to wastage an effort has been made in this research, to deploy computing techniques in creating in order to not only provide more financial gains and energy saving, but also help the environment and water cycle which in turn ensures that we save water for our future. An initiative has been adopted in this research by embedding a control system into an automatic water pump controller throughlogic gate IC, Resistors, LED, TIP 127, Buzzer and Diode to automate the process of water pumping in an over-head tank storage system to detect the level of water in a tank, switch on/off the pump accordingly the status on tank.Provision has been made to the pump which makes it stop to operate and a high signal to the buzzer connected to the transistor which notifies the user that the container is full by making continuous repetitive sound. Thus, the pump is stopped as soon as the container gets filled. Thus, water level is controlled.

KEYWORDS: Water Scarcity, LED, Storage Tank, Level Indicator, Controller, Microcontroller, Resistors

Water is most essential thing on earth. Safe drinking water is essential to human and other life forms even though it pro-vides no calories or organic nutrients. The drinking water crisis in India is reaching alarming proportions. It might very soon attain the nature of global crisis.This may be due to both natural and human factors. But, many reports suggest that the scarcity is more due to the human factor than anything – such as industrialization, irrigation, domestic use, etc. (International decade, 2005-2015).One drop of water waste can be vary for us. 750 million people around the world lack access to safe water [Yuihana, 2014]. Hence, it is of utmost importance to preserve water. In many houses there is unnecessary wastage of water due to overflow in Overhead Tanks. Automatic Water Level Controller can provide a solution to this problem ((Murmu&Yadav 2013). Water Level Indicator may be defined as a system by which we can get the information of any water reservoir. Water level indicator system is quite useful to reduce the wastage of water from any reservoir, while filling such reservoir (Rakshit D. etal2016) .The operation of water level controller works upon the fact that water conducts electricity. So water can be used to open or close a circuit. As the water level rises or falls, different circuits in the controller send different signals (Murmu&Yadav 2013). Water and energy conservation techniques and technological interventions are important to

attain sustainable solutions to our environment that is currently at risk due to excessive use of such natural resources as a result of increase in population, human demand and economic growth. According to United Nations (UN) report, almost half of the world's workers work in water-related sectors showing most of the jobs dependent on water (water jobs, 2016, USA). Different researchers have investigated the microcontroller based water level sensing and controlling in a wired and wireless environment. Water Level management approach would help in reducing the home power consumption and as well as water overflow. For experiment this design we have been using an 8 bit microcontroller, an inverter, a reserve tank (res. tank), water tank and water pump. Water pump has been controlled using water level sensor. (Reza Khaled S.M. 2010). Initiative has been made design of a water level indicator with PIC microcontroller which is applicable for both reservoir and main tank in home or industries, PIC 18F452 used .There is also buzzer and LCD in this design. LCD used to show the level of water in both reservoir and main tank. Buzzer used to create a siren to stop the pump or water coming channel (Abdullah 2015).Arduino based automatic water level indicator and controller has been developed in India to measure the water level by using ultrasonic sensors. Basic principal of ultrasonic distance measurement is based on ECHO (Panigraphi, 2017).

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In this project an effort has been made to design and implement a simple water level indicator by using simple electronic devices (Mazidi, 2011) like logic gate IC,Resistors, LED, TIP 127, Buzzer and Diode which is different from other complex water level indicators.

MATERIALS AND METHODS

To design and implement Water Level Indicator and Controller, following electronic devices were used and connected as per the circuit diagram provided in figure 1.

Electronic devices	Number
100kΩ resistor :	6
1kΩ resistor :	7
LED	6
TIP 127	1
Pump	1
Buzzer	1
Diode	6

Point 1 is clamped to 0V i.e. grounded.Point 2, 3, 4, 5, 6, 7 are all the sensor pads or rather the conducting points through which the system can understand the level of water and thus take necessary actions regarding that.

As we can see from the figure, at the top most level of the indicator and controller circuit, the sensor pad is connected to the diode and gets supply through 100kΩ resistor and then passes on to a diode (directly connected to supply) which is then connected in series with a LED and then a 1kΩ resistor in parallel, along with a transistor specified as TIP 127 in series which carries out the main function of the system.

Now all these labelled points (2, 3, 4, 5, 6, and 7) are connected to diodes which get supply voltage through a 100 kΩ resistor. When the container is empty then the supply voltage takes the easiest path and doesn't pass through the diode i.e. the output is low. As a result LED doesn't glow.
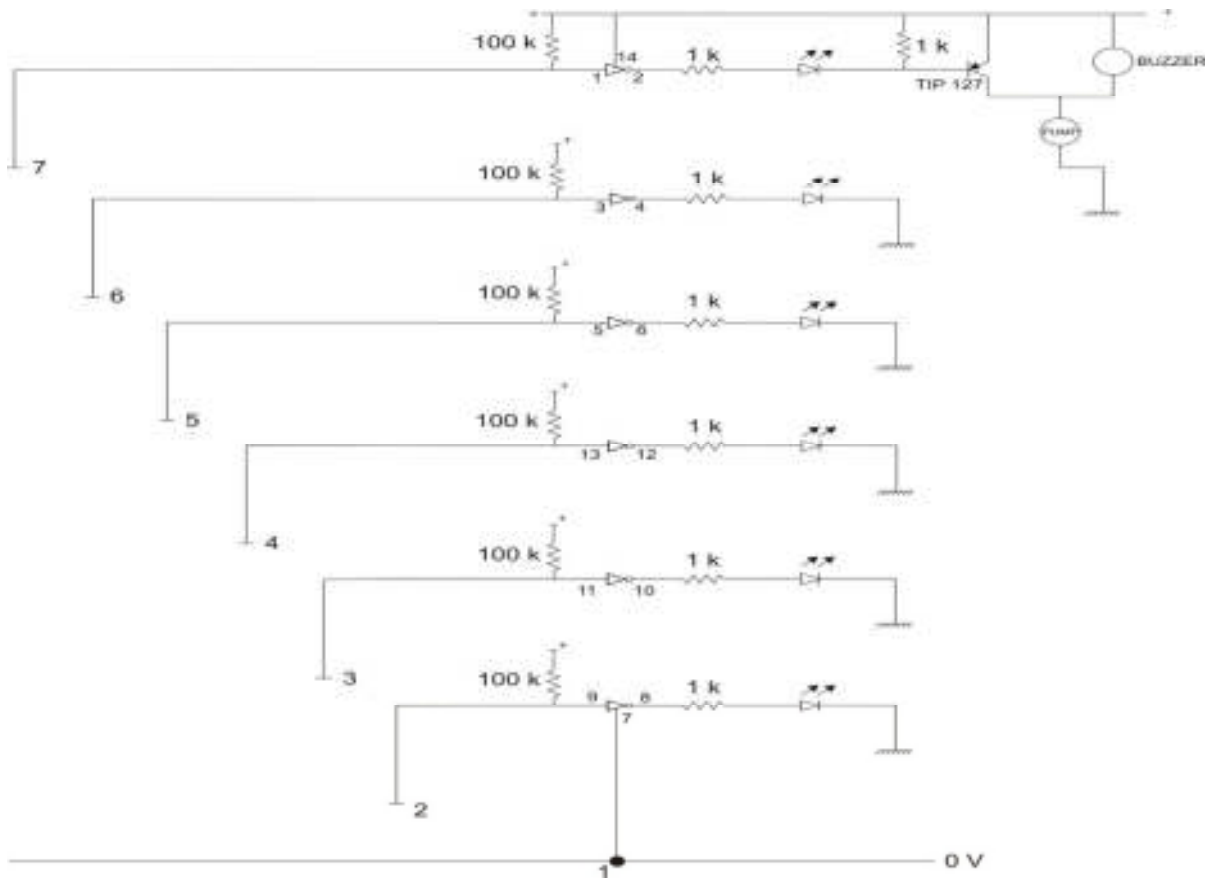

Figure 1: Circuit Diagram

Now, as soon as the water touches any 'labelled point', current flows through the diode and the 1kΩ resistor only to enlighten the LED. The current gets grounded after that as all the LED(s) except the topmost are grounded directly.

RERULTS

Under normal conditions, the transistor isbiased and thus sends high signal or an output that makes the pump run which is connected to the transistor. Now, as the pump is running and water is being stored, the water level gradually increases and touches those aforementioned labelled points, the LED glows to indicate the level of water present in the vessel.

Finally, when the water reaches the brim of the container i.e. when the container is full, the led glows and also the transistor gets biased. As a result it sends a low signal to the pump which makes it stop to operate and a high signal to the buzzer connected to the transistor which notifies the user that the container is full by making continuous repetitive sound. Thus, the pump is stopped as soon as the container gets filled. Thus, water level is controlled.

DISCUSSION

Automatic water pump control system employs the use of different technologies in its design, development, and implementation. The system used transistors and sensor pads to automate the process of water pumping in an over-head tank storage system and has the ability to detect the level of water in a tank, switch on/off the pump. This research has successfully provided an improvement on existing water level controllers by its use of calibrated circuit to indicate the water level and automatically use the pump judiciously. For successful completion such project implementation some precautions should be taken like -All the connections should be properly made, proper insulations should be used around connections to avoid short circuit and parts that can be damaged by water should be kept far away from water.

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