IOT based Smart Water Pump Switch

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***Abstract*— The world population is increasing day by day, so demands for the resources like water and food also increases because these are the basic need for the people. People need the water for their daily uses. Even though your earth is covered mostly of water but it is not useful for humans to use. There is less amount of water that is useful. To save the water without wasting it. To reduce the water from wasting this is designed an automated switch that can automatically on and off the device when the tank is full of water, These reduce the overflow of water, it uses IOT (sensors)to make these processes automated. When the water level touches the sensor it turns off the water supplying pump. Since the electricity demand is very high, automatic water controllers save energy. To prevent over the labor of pumping machine and prevent it from getting worse. This water pump can be used for many purposes in the companies like it can be used as Liquid level detector and fuel detect the device, It also helps us to indicate the sudden increase of water during floods. A fully automated that is low cost and low maintenance with good compact and design which saves water and energy. This device is cost efficient.**

Keywords:-Diodes, Regulator, IC555, Push Button, Connecting wires, Crystal Oscillator, Switches.

I. INTRODUCTION

IOT (Internet of Thing) nowadays this becoming a major part of human life. In the future IOT plays the important role in human's life from waking up in the morning to going to sleep these IOT [2] devices used by humans in every aspect of their life. . For example when leaving the home without switching off the fans and lights, by using mobile it can switch off fans and lights and other things automatically. To make those things work through mobile by using IOT and another example is, switch on and off the light automatically when walking in the specific area in that particular area the light is on, after leaving that area the lights are turned off automatically. These both example reduce electricity consumption. So IOT is not only used for the people to work easily, but it also saves the energies like electricity, water etc.

That's why the devices present in this project work based on IOT. Using this hardware device which uses IOT, The water, and electric resources can be saved. This is a device that works using the IC555 [3] and the oscillator to sense the water. In this water can be saved without wasting it, this device turns off the motor when the water level is reached at top of the tank, resulting to reduce the water from waste. As the motor is working on continually although the water tank is full makes the water and electricity both would waste. So IOT corrects [4] the man's mistakes by turning the motor off. The IC connected in the circuit and the oscillator attached to the tank makes the relay that connects the motor and the circuit will turn on and off accordingly.

When the water level touches the top of the tank the oscillator sense the water and sends the signal [5] to the circuit the IC takes the signal through the wires that connect all the hardware components reacts to the signal and sends the on-off signal to the relay. As this relay is connected to the motor it breaks the circuit so that no electricity passes through it. Resulting in the motor being switch off same is repeated when the water level is low in the tank.

Water pumps are classified based on the applications they serve, the materials from which they are constructed, [6,7] the liqu ids they handle and even their orientation in space. An automatic water level controller can be used in hotels, home apartments, water tanks etc. All pump types generally fall into two main categories which are dynamic (centrifugal) pumps and positive displacement pumps. To get drinkable [8] water at several places all over the world and most of the times most of the people forgot to switch on the motor pump inappropriate times or even may forget to switch off the water pump for that reason there is a huge wastage of water as well as electricity. Hence this a simple and low-cost automatic water pump motor controller which makes your everyday water pump related problem quite easy and no person or labor work is required. The Monostable 555 [9]Timer circuit triggers on a negative-going heartbeat applied to stick 2 and this trigger heartbeat should be a lot more limited than the yield beat width permitting time for the circumstance capacitor to charge and afterward release completely. When set off, the 555 Monostable will stay in this "HIGH" precarious yield state until the time-frame set up by the R1 x C1 network has slipped by. The measure of time that the yield voltage stays "HIGH" or at a rationale "1" level, is given by the accompanying time steady condition. 555 Timer Example No1 A Monostable 555 Timer is needed to create a period delay inside a circuit. In the event that a 10uF planning capacitor is utilized, compute the[10] estimation of the resistor needed to create a base yield time postponement of 500ms. 500ms is equivalent to saying 0.5s so by revamping the recipe above, we get the determined incentive for the resistor, R as: The determined incentive for the circumstance resistor needed to deliver the necessary time steady of 500ms is in this way, 45.5KΩ's. In any case, the resistor estimation

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of 45.5KΩ's doesn't exist as a standard worth resistor, so we would have to choose the closest favored worth resistor of 47kω's which is accessible in every one of the standard scopes of resilience from the E12 (10%) to the E96 (1%), giving us another recalculated time postponement of 517ms. In the event that this time distinction of 17ms (500 – 517ms) is inadmissible rather than one single planning resistor, two diverse worth resistor could be associated together in arrangement to change the beat width to the specific wanted worth, or an alternate planning capacitor esteem picked. We presently realize that the time deferral or yield beat width of a monostable 555 clock is controlled when consistent of the associated RC organization. On the off chance that long time delays are needed in the 10's of seconds, it isn't generally fitting to utilize high worth planning capacitors as they can be actually huge, costly and have enormous worth resiliences, e.g, ±20%. One elective arrangement is to utilize a little worth planning capacitor and a lot bigger worth resistor up to about 20MΩ's to deliver the require time delay. Likewise by utilizing one more modest worth planning capacitor and distinctive resistor esteems associated with it through a multi-position revolving switch, we can deliver a Monostable 555 clock oscillator circuit that can create diverse heartbeat widths at each switch turn, for example, the switchable Monostable 555 clock circuit appeared underneath.

II. HARDWARE ARCHITECTURE

This IOT based Smart Water Pump Switch is a device work based on the hardware components. There is a lot of hardware component present in this water pump switch. The Hardware components that are [9] required Relay, Diode, Regulator, Pc Board, Switches, LED's, IC555, IC Socket, Push Button, and Connecting Wires. In this device the main hardware components are IC555 It is an integrated Circuit contain the three types of the timer in it. one of the purposes of using this is because it is very cheap of cost and it can also be used as a timing device. It Contains [1,2] 8 types of pins in it those are Ground, Trigger, Output, Reset, +vcc, Discharge, Threshold, Control Voltage. This is a fully automated system that contains hardware without any programmed devices present in it. This device works on the principle that present in the oscillator which converts the vibration signals into electrical signals. This oscillator acts as a sensor as it is an IOT device. The LEDs present in these device indicates whether the motor in on or off. These LEDs signal the motor status. The relay used in this acts as a switch that is connected to the IC555 as shown in figure 1 [1]. Depending on signals sent by the IC the relay works according to that. This cuts the power supply to the motor and the motor turns off. The IC555 is a timer device that is used in the device, this works promptly which can turn on and off at regular intervals of time. As this device is a hardware component [10] it should be away from the water dipping the sensors only into the water. This is a simple circuit that can be easily understandable to everyone and can easily connect to the components between them.

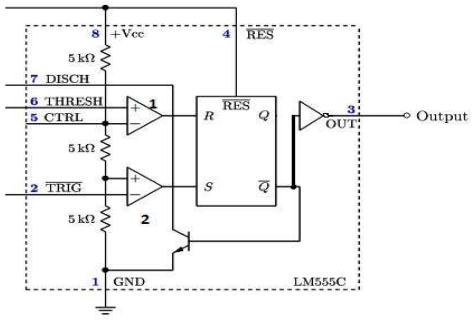

Figure 1: IC555 Architecture [1]

This is A IOT device that sends the signal without any wire contact. This device is designed using sensors that can sense and send the signal to the device from the tank to the hardware. Now a day's people are busy with their works and forgot to switch on and off the motor for the tanks. This device [11] helps a lot for the people this is fully automated that works using IOT. As the future is concerned this can be widely used for household purpose. This contains hardware component which works on electricity, but these do not consume [12] ah huge amount of power supply that why it is easy to maintain. The hardware architecture is built in a way that there is no scope for the circuit breakdown as shown in figure 2 because it contains the regulator and diode. This component keeps the circuit from unstable electricity from the power input.

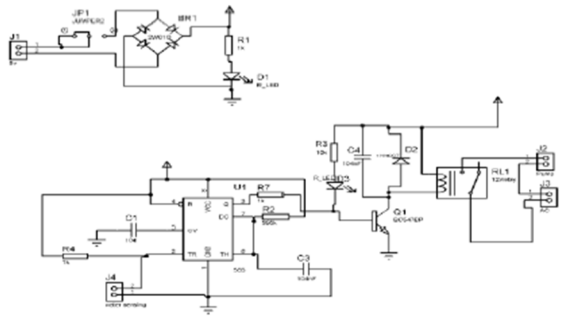

Figure 2: Circuit Diagram of Water Pump Switch.

III. METHODOLOGY

This Water pump smart switch used IOT to word and include a lot of hardware components all there are connected by the connecting wires. Automatic products are increased along with technology. This reduces the complexity of the problems and helps to do the work quickly. Self-Water Pump Smart Switcher [13] is also the system that will be operated automatically when it senses water and decreases human work. The design is to build a simple idea that simply turns on or off your pump according to your water supply. So whenever the incoming water is sensed the relay circuit simply switches the [14] Pump On and when the water supply is of the relay switches off the motor. In modern and business applications press catches can be connected together by a

mechanical linkage so the demonstration of pressing one catch makes the other catch be delivered. Thusly, a stop catch can "power" a beginning catch to be delivered. This technique for linkage is utilized in straightforward manual activities in which the machine or cycle have no electrical circuits for control. Pushbuttons are frequently shading coded to connect them with their capacity so the administrator won't press some unacceptable catch in mistake. Regularly utilized tones are red for halting the machine or interaction and green for beginning the machine or cycle. Red pushbuttons can likewise have huge heads (mushroom formed) for simple activity and to work with the halting of a machine. These pushbuttons are called crisis stop fastens and are ordered by the electrical code in numerous purviews for expanded security. This enormous mushroom shape can [11] likewise be found in catches for use with administrators who need to wear gloves for their work and couldn't incite an ordinary flush-mounted press button. As a guide for administrators and clients in mechanical or business applications, a pilot light is normally added to draw the consideration of the client and to give input if the catch is pushed. Ordinarily this light is incorporated into the focal point of the [13] pushbutton and a focal point replaces the pushbutton hard focus plate. The wellspring of the energy to enlighten the light isn't straightforwardly attached to the contacts on the rear of the pushbutton however to the activity the pushbutton controls. In this manner a beginning catch when pushed will cause the cycle or machine activity to be begun and an optional contact planned into the activity or interaction will near turn on[14] the pilot light and imply the activity of pressing the catch made the resultant cycle or activity start. In mainstream society, the expression "the catch" alludes to a (generally anecdotal) button that a military or government pioneer could press to dispatch atomic weapons. LEDs are semiconductor gadgets. Like semiconductors, [11] and different diodes, LEDs are made out of silicon. What makes a LED radiate light are the modest quantities of compound pollutants that are added to the silicon, like gallium, arsenide, indium, and nitride.

At the point when current goes through the LED, it radiates photons as a result. Typical lights produce light by warming a metal fiber until it is white hot. LEDs produce photons straightforwardly and not by means of warmth, they are definitely [20] more proficient than glowing bulbs. Resistors are utilized as a feature of electrical organizations and electronic circuits. They are very ordinary in most electronic gear. Useful resistors can be made of different mixtures and movies, just as obstruction (wire made of a high-resistivity amalgam, like nickel/chrome). The essential qualities of resistors are their opposition and the force they can scatter. Different qualities incorporate temperature coefficient, commotion, and inductance. Less notable is basic obstruction,[10] the worth underneath which power scattering limits the greatest allowed current stream, or more which the cutoff is applied voltage. Basic opposition relies on the materials comprising the resistor just as its actual measurements; it's dictated by plan. The electrical usefulness of a resistor is determined by its obstruction: basic business resistors are made over a [8]scope of in excess of 9 significant degrees. While indicating that obstruction in an electronic plan, the necessary exactness of the opposition may expect regard for the assembling resilience of the picked resistor, as per its particular application.[7] The temperature coefficient of the opposition may likewise be of worry in some exactness applications. Down to earth resistors are likewise indicated as having a greatest force rating which should surpass the expected force dispersal of that resistor in a specific circuit: this is primarily of worry in power gadgets applications. Resistors with higher force evaluations are truly bigger and may require heat sinking. In a high voltage circuit, consideration should now and then be paid to the evaluated most extreme working voltage of the resistor.

This Water pump smart switch is built by using the IC555 device which is the main component of these devices. This IC contains the[6] inbuilt timer in it, it controls the water pumping motor automatically. Firstly the power supply is connected to the device using the 25 voltage batters are more [15] than that voltage. This power supply is connected to the Diode which controls the flow of current in a single direction. This Diode is connected to the Regulator which regulates the flow of current. When voltage is suddenly increased or decreased, this sometimes results in circuit break down. The regulator regulates the currents and supplies an equal amount of current to the device all the times. All these are connected to the IC555 on the PC board. Connect the LEDs and Switches to it and [6, 7] make sure all are connected properly. Connect a push Button and IC sockets to the pc board and finally connect the crystal Oscillator. This Crystal Oscillator contains a sensor in it that can converts vibrations into electric signals. This Oscillator is attached [9] at the top of the tank. In the circuit, there is a Relay that acts as a switch and connects the circuit to the power supply when the tank is empty and disconnects the power supply when it is full. The power comes to the circuit through the power supply that is connected to the circuit. This diode sends the current in a single direction [13] and the regulator, regulates the current and supply to the circuit. The Crystal Oscillator which having the sensor attached at the top of the tank since the water vibrations when the tank is full and these signals are sent to the IC555 which works on a timely basis reacts to the signals that received from the oscillator and transfer the pump off signal to the relay which is connected to the IC. This relay reacts to the signal send by the IC and turn off the pump that is connected to the relay. This process stops the water from overflow. Same when the water is [4] down that is when the water is empty in the tank the Oscillator identify the vibrations and send the signal to the IC and the IC send the signal that the tank is empty the pump to be switch on the relay allows the pump to be switch on the current. Water pumps are designed [9] to move water from one place to another. In many places, water supply can be given at early mornings so the one should wake up and turn on the motor

and wait until it is full. If they fall asleep the tank gets filled and water should get waste. This device makes it very simple it, by making these process automatic. This fills the tank when the water level [3] is low and turn off when the water level is high. There will be some disadvantages like wastage of water, wastage of electricity decreases pump life because of over-usage.

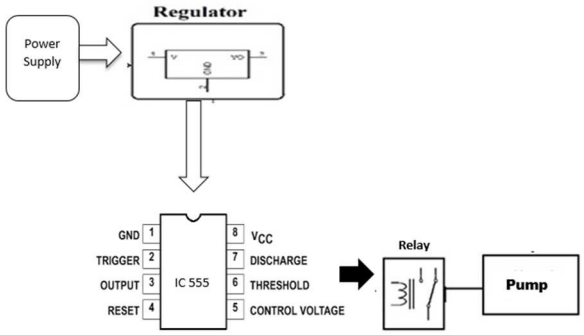

Figure 3: Block Diagram of the proposed water pump switch

All the motors which are using manually can give the current shocks sometimes while connecting to the power supply or when [8] motor gets the older the motor gives the shocks. To reduce this proposed design as shown in figure 3, the water pump smart switch is in a manner that just connects it to the power supply only once so that it will automatically switch the pump on and off and this last very long time because the IC used in works on timely and this devices start working and stops in regular intervals only according to the water level so these last long with good efficiency. Today many appliances are working on IOT which reducer the [11] manpower by making things automated and wireless. This water pump smart switch is also a good device that is designed for future purpose which can help people widely. This is easy to design and cost-efficient and easy to connect to the tanks at home as shown in table 1.

Table I. Motor Status

Sl.no	Water Level	Status of motor
1	When the water level reached below min point	ON
2	When the water level reached above the max point	OFF

IV. CONCLUSION

The main aim behind these devices and the project are that to decrease the wastage of water. Water is the essential natural resource present in the world that is using by both humans and non-humans. Using those devices can save the water from overflow when the tank is full by switching off the pump automatically. It is a low costs devices and the maintenance is also very low. It saves water as well as electricity that can also be wasted because of overuse. It is fully automated so manpower is also required and increase the pump lifetime by powering off in regular intervals of time. It can be used as a various application in hotels, homes and Drainages etc. These can predict floods when the water level increases suddenly. It also indicates the fuel when it is full. This is very compatible and used in every application as a liquid level indicator.

This device is cost efficient then compared to the all other IOT devices available in the market. This project designed with IC 555, whereas other IOT based water supply systems are designed by Arduino, JK flip-flop, Microcontrollers.

V. FUTURE WORKS

This is also a water monitoring device used in a various company to indicate the level of the liquid. Furtherly these can be improved by adding the alarm to it when the water is full. It is just to alert the people. This alarmist system is used in flood detection so that people can be alert before the food. Indicators can be used with LEDs in the proposed architecture. So that it indicates the level of water is present at the specific time. This is used in fuel level indicators to identify the fuel level present in the vehicles.

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