International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 06 | June 2021 www.irjet.net p-ISSN: 2395-0072

Relay based Water Level Indicating and Controlling System using Arduino

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Abstract - *Water is very precious for the living beings and scarcity is also gradually increasing day by day. Many of the cities in India are facing this problem. This is one of the proposed work in order to save water. This is a water level indicating and controlling system proposed work. This proposed work is based on the daily life problems we face during switching on the motor and switching off the motor. This device will help to get rid of the problem. The main theme of this proposed work is the water tank has three levels higher level, medium level, and lower level. The device acts according to the water level present in the tank. By this there will be no need of checking the water level always in the tank and switching on the motor and if tank is full switching off the motor. There will be no external work required for this device. it will take care of function. Due to some personal work we may forget to turn off the motor but in the case of this proposed work there is no need of any person for maintaining particularly. By the help of the sensors used and with the help of the Arduino this proposed work runs and functions according to that. Arduino plays a major role in this proposed work as the circuit connections are done on this component. Relay is also used in this which acts as switch. In future this proposed work will make a major change in every house.*

Keywords **- water level, Motor, Arduino, Indicating, Controling.**

1.INTRODUCTION

API stands for application programming interface. It is an interface(or)communication protocol between a client and a server intended to simplify a client-side software [1]. This API related to a software library.API can specify the interface between an application and the operating system.API may be web-based system, data-based system, operating system, computer hardware or software library.API includes specification for data structure.

A device is needed that can runs automatically for indicating and controlling of water. So this setup was made. There are many uses with this proposed work. The water tank has three levels higher level, medium level, and lower level. The device acts according to the water level present in the tank. By this there will be no need of checking the water level always in the tank and switching on the motor and if tank is full switching off the motor.

first collect all the required components. After collecting the components code is written in arduino ide designed by (arduino.cc) and connections are performed as per code written arduino ide. After compiling the code then code is dumped into arduino uno r3 board. Then the required system is ready.

The values shown by sensors are accurate. The main motto this is to solve the water problem which we waste water after the tank is full [1]. after the tank fills it gives the indication and automatically off the motor so that there is no need of external work or any person for operating this. it does its own duty which is very useful and helpful for many purposes. the motor will be on when the tank has medium and low levels. when its is in high level it only indicates the level and the motor is in off position.

2. COM PONENTS REQUIRED

2.1 Arduino

Fig -1: Arduino

arduino Microcontroller ATmega328P is an 8 bit AVR family microcontroller which consist of Operating Voltage 5V and

Recommended Input Voltage in range 7-12V and Input Voltage Limits in range from 6-20V. This microcontroller is equipped with 6 (A0 – A5) Analog Input Pins and 14 Digital I/O Pins, out of 14 digital input output pins 6 are pwm pins. 16 MHz Frequency (Clock Speed). DC Current on I/O Pins has 40 mA. DC Current on 3.3V Pin was 50 mA. Flash Memory was 32 KB in which 0.5 KB is used for Boot loader. consist of 2KB SRAM ,1kb EEPROM.

2.2 Ultrasonic sensor

Fig -2:Ultrasonic Sensor

This is the HC-SR04 ultrasonic ranging sensor. This economical sensor provides 2cm to 400cm of non-contact measurement functionality with a ranging accuracy that can reach up to 3mm. Each HC-SR04 module includes an ultrasonic transmitter, a receiver and a control circuit. There are only four pins for HC-SR04: VCC (Power), Trig (Trigger), Echo (Receive), and GND (Ground).

2.3 Four Channel Relay

Fig -3:Four Channel Relay

In arrange to separate two circuits electrically and to connect them attractively transfers are utilized. They are exceptionally valuable in switching from one circuit to another when they are completely isolated. The transfers contain of an input and an yield area. The input area contains a coil which produces attractive field when a little voltage from an electrical circuit is connected. This connected voltage is known as the working voltage. four channel relay module consist of Ground reference for the relay module(gnd), four inputs in1,in2,in3,in4,power supply(vcc).this module consist of four optocouplers.

2.4 Bread Board

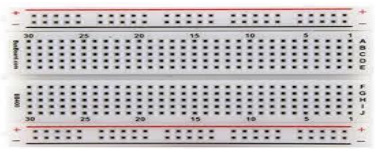

Fig -4:Bread Board

It is a solderless device, to test the circuits. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate.

2.5 connecting wires

Fig -5:Connecting Wires

In this male to male, male to female and female to female connecting wires are used. this are called as jumper wires available in different colors which has zero resistance theoretically .to connect between any two components tis are essential.

2.6 Bulb and holder

Fig -6:Bulb and holder

In this It is used as a indicator if the sensor readings crosses threshold value then bulb glows. In this it is connected with relay and bulb is connected to the holder.

3. PROPOSED WORK

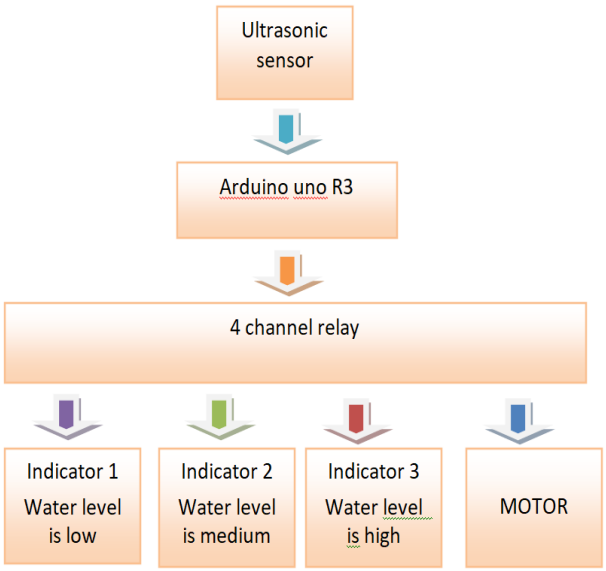

Fig -7: Architecture

Fig 7 describes architectur of the proposed work where ultrasonic sensor is inpu to the arduino micro controller and four channel relay is output to ardino micro controller..

Table -1: Circuit Explanation

Sensor	Arduino pin connected
Ultrasonic sensor	2(echo),3(trig) ,ground,vcc.
Four channel relay	4,5,6,7(digitalpins),ground,vcc.

The above table describes the connection of ultrasonic sensor and relay module to arduino micro controller.After the code written in Arduino ide it is uploaded to Arduino board. Connections are done as per code written. Digital 5,6,7 pins of arduino are connected to 4 channel relay. 2nd and 3rd pins of arduino are connected to echo and trigger pins respectively of ultrasonic sensor 3 bulbs are required for indicating three different mediums like high,low and medium levels it is according to the depth of the tank. the motor controller if the water level is medium or low automatically the motor will be on and water flows into the tank. The bulb holder one terminal is connected to “NO” of relay and Another terminal of bulb holder is connected to the one terminal of plug , another terminal of plug is connected to common port of relay.

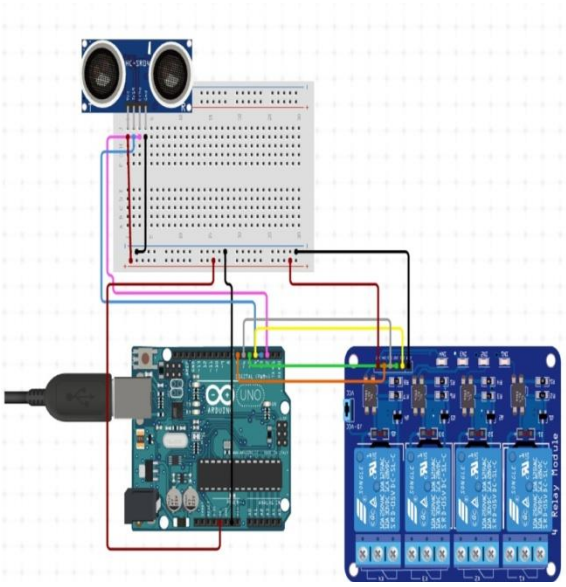

Fig -8: Circuit

Fig 8 describes the electronic circuit design with all required components for this proposed work.In this work ultrasonic sensor and 4 channel relay is used. In void setup we should declare the digital i/o ports means that the port is INPUT(or)OUTPUT. Pins which are connected to relay module is set as output, as per circuit 4,5,6,7pins of arduino. Pins which are connected to ultrasonic sensor is set for input. We have to write the status of echo and trigger of ultrasonic sensor so digital write is used for digital pins. After reading the values from sensors we will set some threshold values as per our requirement (Serial.print) is used to print the values read from the sensors. (Serial.println) is used to print the value in the next line. If we click on right upward icon which is in the serial monitor and we can see the values. As per the given threshold values if the value read from sensor crosses threshold value then the indicator used in this is bulb connected to relay output is high externally. In serial monitor all the values are printed and if the value crosses threshold then indicators will on. It indicate three levels they are low, medium & high, fourth is connected to motor .Then compile the code and if there is no error in the code then upload the code into the arduino board . Rule of Water Level Marker. The working rule of a water level pointer is really very straightforward. Water level pointers work by utilizing sensor tests to demonstrate water levels in a capacity tank. These tests send data back to the control board to trigger an caution or marker.

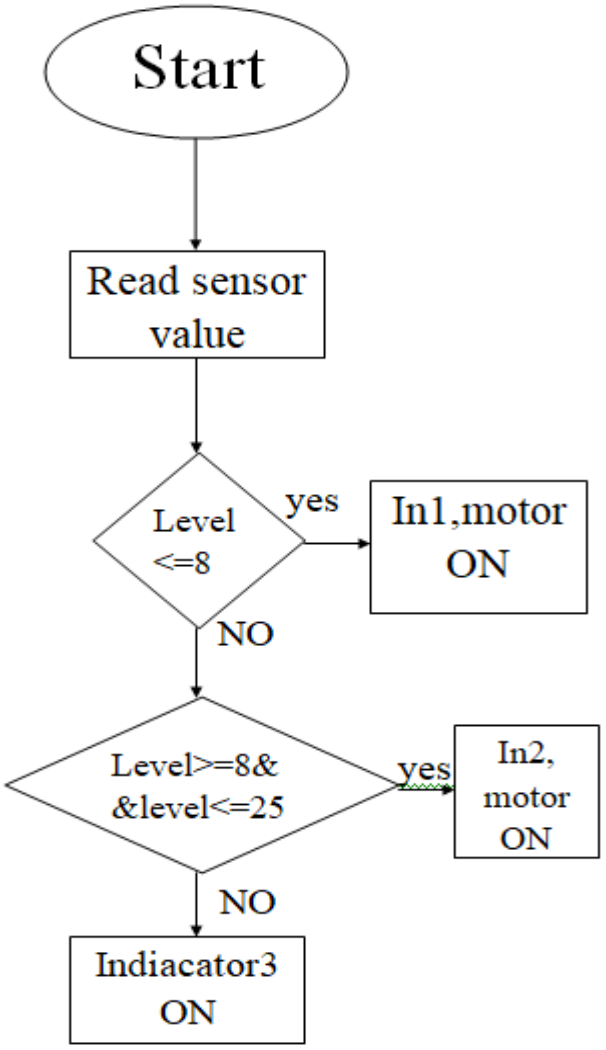

Fig -9: work flow

Fig 9 describes the work flow of the proposed work where sensor take input and perform operations with help of microcontroller. Level is shown in terms of centimeter.

Table -2: working

	Relay-1(in1)	**Relay-2(in2)**	**Relay-3(in3)**	**Relay-4(in4)**
Low level	0(ON)	1(OFF)	1(OFF)	0(ON)
Medium level	1(OFF)	0(ON)	1(OFF)	0(ON)
High level	1(OFF)	1(OFF)	0(ON)	1(OFF)

As we seen in the above table -2 the tank is divided into 3 levels high medium and low levels respectively. The device is set in the way that if the water is the low level it shows the indication as well as the controller activates that is the motor also on and the water will flow into the tank. The relay is fourth indication is used as switch for on and off purpose. Next coming to medium level the indication in shown and the motor is also on. Next is the high level in this level only indication is shown that the water in the tank is full so that there is no need of on the motor. The indication is showed by using the bulbs. 3 bulbs are kept and connected to the relay so that for every level each bulb is shown. The whole system operates automatically. So it does not need any expert person to operate it. It is not at all very expensive. To design this system, we used Arduino as a platform connected to relay along with local materials for low cost.

4.RESULTS AND DISCUSSION

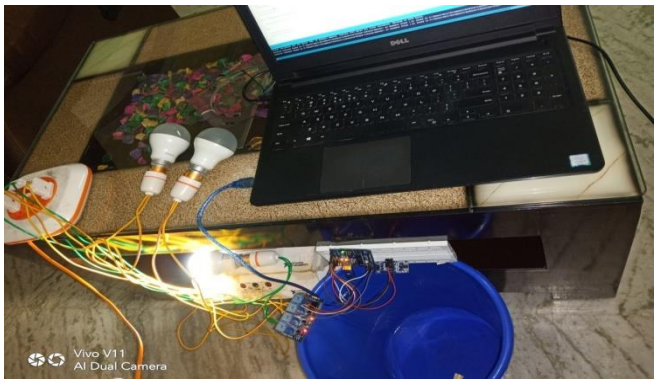

Fig -10: Indicating water is at low level

Fig 10 describes Indicating water is at low level then indication bulb will glow and motor turn on. With the help of sensor readings.

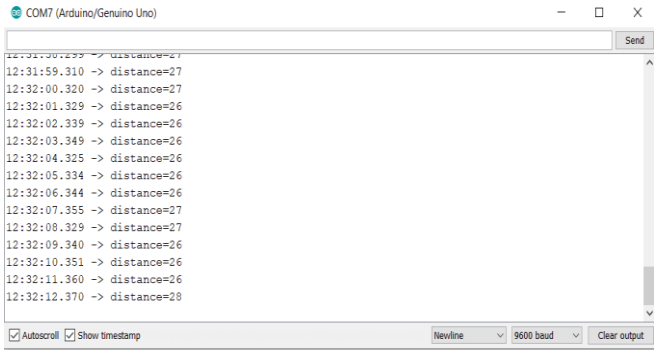

Fig -11: serial monitor Indicating water is at low level

Fig 11 describes serial monitor output as per written programme Indicating water is at low level With the help of sensor readings.

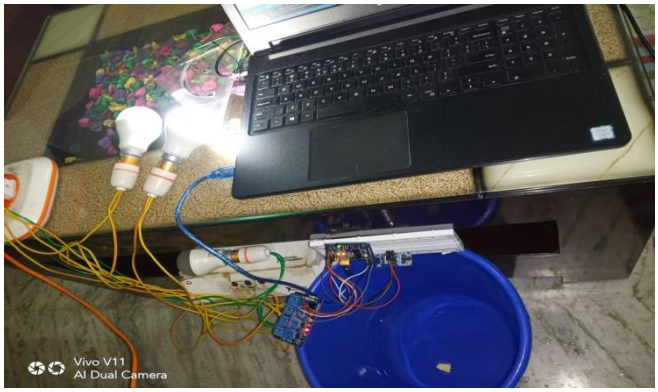

Fig -12: Indicating water is at medium level

Fig 12 describes Indicating water is at medium level then indication bulb will glow and motor turn on. With the help of sensor readings.

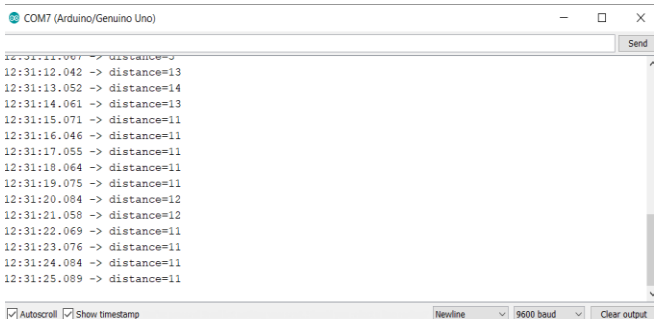

Fig -13: serial monitor Indicating water is at medium level

Fig 13 describes serial monitor output as per written programme Indicating water is at medium level With the help of sensor readings.

Fig -14: Indicating water is at high level

Fig 14 describes Indicating water is at high level then indication bulb will glow and motor turn on. With the help of sensor readings.

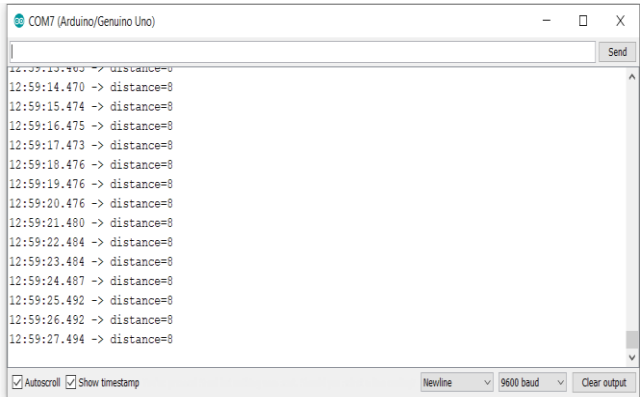

Fig -15: serial monitor Indicating water is at high level

Fig 15 describes serial monitor output as per written programme .Indicating water is at high level With the help of sensor readings.

5. CONCLUSION

Primary intension of this proposed work is to set up a adaptable, prudent and simple configurable framework which can fathom water losing problems. This paper was planning to plan a basic and moo taken a toll programmed water level marker and controller. It demonstrates in each level like in high , low, medium additionally engine controller is another marker which can pumps the water into the tank specifically within the moo condition. Typically not as it were for water tank but moreover can be utilized for different fluids & oil level in industries and chemical labs as well. To plan this framework, we utilized arduino as a stage associated to hand-off beside neighborhood materials for low taken a toll. We tried to plan a framework in such a way that its components will be available effortlessly and when connected together, will be able to avoid the wastage of water. The entire framework works consequently. So it does not require any master individual to function it. It isn't at all exceptionally costly. This plan has much more scope for future inquire about and advancement. In spite of the fact that it may be a venture, we trust a few adjustment in this extend will lead to a sensible differing qualities of utilization. This extend will be exceptionally valuable for the individuals and this was executed and executed without any problem.

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