Water level monitoring

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Abstract:

A Water Level Indicator is used to detect and indicate the water level in an overhead tank or any other water container. In this paper, we investigated the design of a water level sensor device using Arudino UNO, that can detect the level of water in a water storage system. An ultrasonic sensor is used to generate ultrasonic waves, a water sensor to detect the water level, LEDs to signify the importance of different water levels, PC to observe the levels of water. We indicated a green LED for safe water level, one red LED for about to reach max level and two red LEDs for maximum water level. This circuit is efficient and can be used for any application involving the levels of any liquid.

Keyword: Arduino UNO, water sensor, water level, LEDs

I.   Introduction:

The total amount of water available on Earth has been estimated at 1.4 billion cubic km, enough to cover the planet with a layer of about 3 km. About 95% of the Earth's water is in the oceans, which is unfit for human consumption. Researchers have estimated that by 2025 more than half of the world population will face water shortages. A study estimated that a person in India consumes an average of 135 litres per day. This consumption would rise by 40% by the year 2025. This signifies the need to preserve our fresh water resources (Dipanjan Rakshit, et al).

Many studies were done before on monitoring technology with special focus on disaster management. Some researchers have designed monitoring technology to monitor air pollution [Khedo K K, et al, Siregar B et al) telecommunication monitoring to monitor water quality [Danve et al, Rahmat et al) .

II.   Background:

Knowing the level of water in an overhead tank is a tedious task which usually leads to climbing up the stairs to the tank and checking the level manually or allowing the water overflowing from the top. But electronic water level indicators can fix this issue. Most of the available systems use dipped electrodes or float switches, which may not perform well in the long run. This project provides a different approach to knowing the water level using an Ultrasonic module with Arduino and with LEDs. This method is contactless, so issues like corrosion of the electrodes won't affect this system. The initial electric water controllers in the early 1990's helped professionals to track water levels in chemical industries, and also in agricultural and irrigation projects. They were initially used in tracking liquid levels in irrigation lakes, water tanks, boilers etc. However, the initial designs proved to be imperfect and a long-term solution were attempted with solid state electronics. These new solid-state electronics along with integrated electronics offer greater performance with low cost as well efficient along with easy installation. Also monitoring with the help of LEDs can make the operators have an advantage to visually scan the issue in order to perform suitable operation.

Water level sensors indicators are devices which can manage the levels of water on a variety of applications such as water tubs, pumps, pools etc. their main function is to monitor the flow of water and optimize the system performance. They will

1) Save Power: In an era of energy conservation, these devices are very beneficial to save energy. Hence electrical power wastage can be reduced. These sensor control water levels and minimize the usage of electricity
2) Automatically works: These sensors can work automatically when connected to timer devices.
3) These are low cost and easy to install devices
4) The design is compact and with low maintenance and cam clearly indicate the water levels in the overhead tank
5) AS they can be fully automatic, they save time and avoid seepage of roofs and walls due to overflowing tanks.
6) These sensors take less energy and can be used for continuous operation

III. Project description:

Hardware required:

- Arduino UNO
- Water level sensor
- Connecting wires
- Personal computer
- LED lights

Overview:

The Arduino Uno board is a microcontroller based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; It can be easily connected to a PC by a USB cable The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

IV. Circuit diagram:
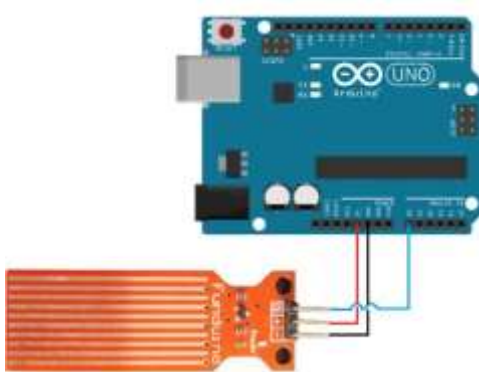
Sensor S pin   with   Arduino Analog pin A0
Sensor + pin   with   Arduino 5V
Sensor – pin   with   Arduino GND

V.   Block Diagram:
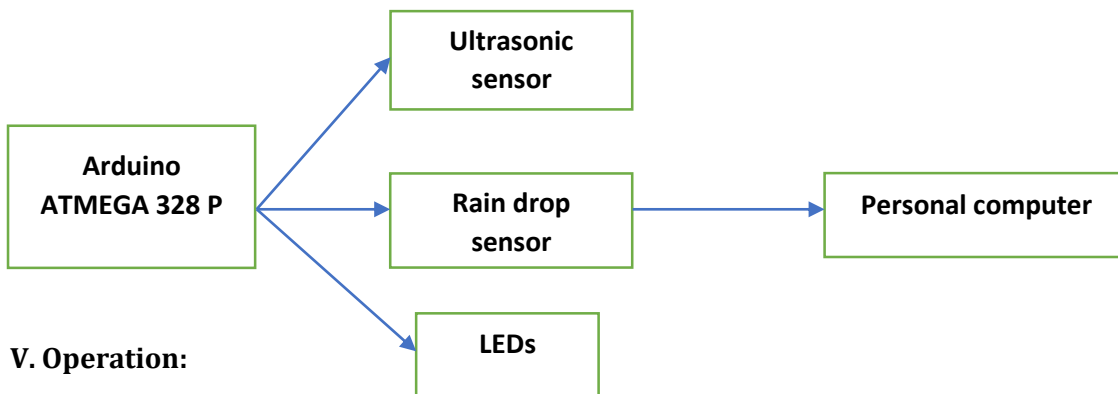
V. Operation:

After proper hardware connections, a USB cable the ports from the Arduino to the PC. Using suitable code, the results are displayed in the monitor. As the water level increases, water gets in contact with the sensor and the LEDs glow**.**

Our project titled "water level indicator using Arduino" has three criteria:

1. There is water available in a safe level in the source tank. In this condition, green LED lights up showing a sage zone.

2. Intermediate level i.e. when the water level is above safe level and about to reach the critical level. In this region, a single red LED light glows up alerting the person that the water level is about to reach the maximum level

3. There is ample amount of water available in the source tank and the water overflows. In this condition, two red LEDs glow up indicating that the water is overflowing from the tank.

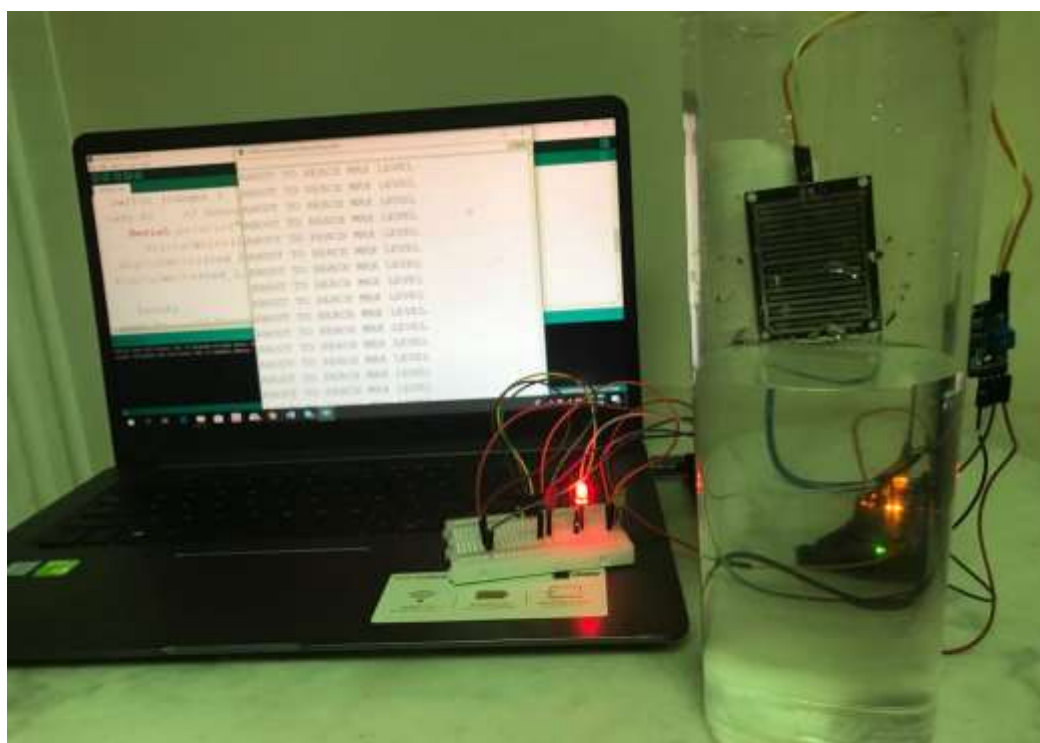**Table 1: colour of LEDs with water level**

S.No.	Legend	Visible parameter
1	Safe level	Green LED
2	About to reach max level	Single Red LED
3	Max level or liquid over flowing	Double red LEDs
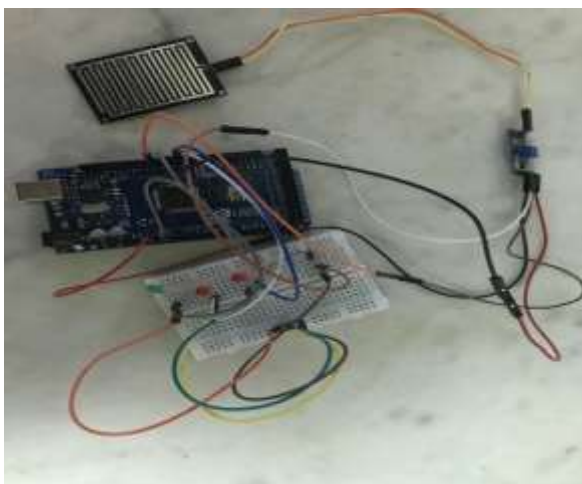
Fig 1 : The circuit

Fig 2: safe level

Fig 3: About to reach maximum level

Fig 4: Maximum level

VI.   Conclusion and Scope: Applications of Water Level Indicator:

If this system is used at residence to monitor the water level in the water tank, we may fix the sensor such that it faces the water in the tank. The main control board with indication LEDs can be fixed inside the home at any comfortable visible position. Any multi-cored cables (ethernet cable) can be used to connect the sensor and the rest of the circuitry. A buzzer may be included if LEDs are not preferred.

1. Hotels and restaurants, residential as well commercial complexes, factories, drainage etc can use these water level indicators. They can be fixed for any motor as they can be easily amalgamated into any circuit.

2. These sensors can be used as fuel level indicators in vehicles and as liquid level indicators in chemical industries.

VII.   References:

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