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Water Level Detection and Monitoring Using Arduino

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Abstract: ***Most of the individuals in residential areas experience the problem of running out of water and overflow tanks. It becomes more difficult for the consumer to gauge the amount of water in the tank. When the pump is ON, the user will not realize that the water tank is filled, which may result in an overflow. Auto water pump switch is used to troubleshoot problems with the water tank. The consumer can use this technology to fill an empty tank without having to take any effort. When the tank is empty, the system automatically turns ON, and when the tank is filled, it automatically turns OFF. Water is not wasted with this technique***

I. INTRODUCTION

Water, the very cause for the existence of living beings on this planet, makes up more than70% of the planet's surface area. Water is the mystical liquid that gives life to all living things, including animals, plants, trees, microbes and, viruses. The fact that Earth can host life while other plants cannot is due to the presence of water. Up to 60% of the human body is comprised of water. While there is a wealth of water on the planet, not everything can be consumed by human beings and animals. Only 3% of the water on the earth is freshwater, which is portable and safe to consume. All living organisms depend on a small amount of water for their growth and survival. Plants and trees use it for photosynthesis to develop. Every day, animals and humans drink and use water for different purposes. Because water is non-renewable and diminishing at an ever-increasing rate, smart use of after is required. Water will be obsolete for future generations if things continue this way. According to one survey, the average person in India makes use of 135 liters of water each day. By 2025 this utilization would ascend by 40%. This denotes the requirement to safeguard our freshwater. A lot of households make usage of a supplemental water tank to store water that is collected from rainwater or water pumped from a well or underground. The objective of the project is to fill the tank automatically.

"PROGRAMED WATER PUMP SWITCH" project, the water is being measured by the water level sensor. Initially the tank is considered to be full. The motor pump is automatically turned ON when the water level is low and turned OFF when the tank is full.

II. LITERATURE SURVEY

A. This paper has an implemented Automatic water level control system consisted of arduino to automate the process of water pumping in a tank and has the ability to detect the level of water in a tank and switches ON or OFF the pump accordingly and displays the status on the LCD screen. The system also monitors the level of water in the sump tank (source tank). If the level inside the sump tank is low, the pump will not be switched ON and this protects the motor from dry running. A beep sound is generated when the level in the sump tank is low or if there is any fault with the sensors.

B. This paper have developed a system which initially tests the availability of water in the tank with the help of a level detector and then adjusts the state of the water pump according to the information collected through the level detector. This design makes use of seven segment display and a motor pump. The proposed system consists of digital logic processor circuit. The proposed system eliminates manually controlling of water requirements in home and agricultural fields.

C. This paper introduced a system which proposes a simple water level monitoring system with different levels indicated. It also signifies when the water level is below and above than the requirement.

D. This paper introduced a system which measures water level by using water level detector. The system makes use of water level indicator, water level detector, water pump controlling system and microcontroller. Ultrasonic sensor gets water level reading and it will send a signal to microcontroller and starts to echo the pulses.

E. The system used microcontroller 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 accordingly and display the status on an LCD

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III. PROPOSED SYSTEM

We propsed a system in which arduino will automate the process of water pumping in a tank and has the ability to detect the level of water in a tank and switches ON or OFF the pump accordingly and displays the status on the LCD screen.

IV. COMPONENTS AND SOFTWARE DESCRIPTIO

A. *Components*

1) Arduino*:* Arduino is an open-source electronics platform that uses simplistic hardware and software to make it easy to use. Arduino boards can take inputs- such as light from a sensor, a finger on a button, or a Twitter message and converts to outputs – such as turning on an LED, triggering a motor, or publishing anything online. By delivering a series of instructions to the board's microcontroller, you may tell it to perform something. The ATmega328 microcontroller is built inside the Arduino UNO. There are is a total of 28 pins in Arduino. There are 14 digital I/O pins on the board, out of which 6 give PWM output. It is open-source and gives the model stage. It has a 16MHX crystal oscillator appended to it. Notwithstanding the above highlights, it additionally has a USB association, a power jack, an ICSP, header and, a reset button. It can simply be connected to a pc using a USB cable. A 6Vdc to 12Vdc supply voltage applied to Vin will power the Arduino microcontroller, overcome any line or contact resistance voltage loss, and given power output to the Arduino's 5V and 3.3V pins to power peripheral components.



Fig

2) *Motor Pump:* A water pump is a pump that employs mechanical and hydraulic principles to move water through a piping system and generate adequate force for future use. Because of early civilization, they have been roughly in one structure or another. These pumps are currently used in a variety of applications including housing, farming, municipal, and manufacturing.



Fig – Motor Pump

3) *LCD:* Liquid crystal material is placed between two sheets of glass in a liquid crystal display (LCD). Liquid crystal molecules align in parallel with the glass surface even when no voltage is provided between clear electrodes. They change direction and turn vertical to the glass surface when electricity is supplied. Depending on their orientation, they have different optical properties. A liquid crystal display (LCD) is anelectrical display module that produces a visible image using liquid crystal. The 162 LCD is a fairly basic module that can be found in many DIY projects and circuits. The 162 corresponds to a two-line display with 16 characters per line. Each character is presented in a 5x7 pixel matrix on this LCD.



Fig

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B. Software

1) Arduino IDE: The Arduino Integrated Development Environment (IDE) is a cross-platform application written in C and C++ functions for Windows, macOS, and Linux. It's used to write and upload programs to Arduino-compatible boards, as well as other vendor development boards with the support of third-party cores. The IDE's source code is available under the GNU General Public License, version 2. The Arduino IDE has specific code structuring guidelines to support the languages C and C++. The Wiring project is a software library that is included with the Arduino IDE and provides numerous common input and output processes.



Fig Arduino Software IDE

2) Protues: The Proteus Design Kit is a proprietary software tool suite that is primarily used to automate electronic design. Electronic design experts and technicians use the software to develop schematics and electronic prints for printed circuit board creation. The Proteus Design Suite is a Windows tool that allows you to record schematics, simulate them, and design PCB layouts. It comes in a variety of forms, depending on the size of the designs being created and the microcontroller simulation requirements. An auto-router and basic mixed-mode SPICE simulation capabilities are included in all PCB Design solutions.

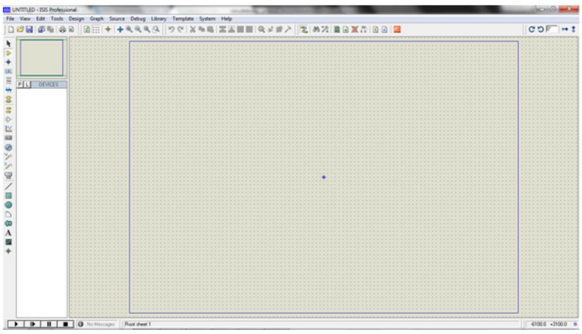


Fig Protues Software

V. SYSTEM DESIGN AND IMPLIMENTATION

The water level detector, water pump, and LCD screen are all connected to Arduino, as indicated in the block diagram.

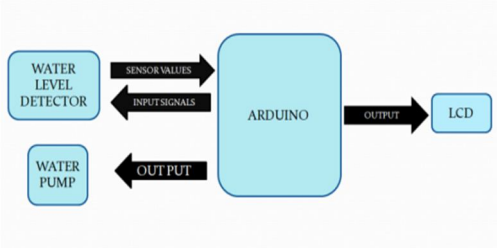


Fig Block Diagram

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VI. RESULTA AND DISCUSSION

When the water level in the tank drops below half, the pump automatically turns on and fills the tank. When the tank is full, the pump turns off automatically. The experiment model was built following the circuit schematic, and the outcomes are as expected. When the tank is below half full, the pump turns on, and when it is full, it turns off.

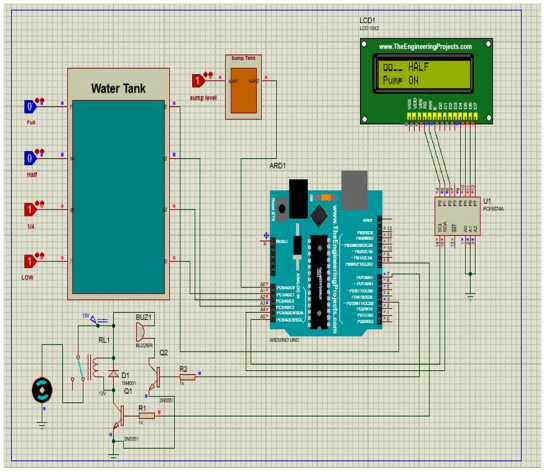


Fig Result

VII. ADVANTAGES

A. A water level indicator is great for saving energy in an age when we need to be more careful of how much energy we use. This system on the other hand, limit the amount of electricity used as well as the amount of water required to mange supply.

B. A water level controller helps in saving money by reducing water and electricity wastage. These devices precisely regulate the amount of energy utilized in order to avoid wasting water or power. The amount of money saved over times is fairly significant.

C. Another remarkable benefit of these devices is that they self-regulate. The hassles of manually monitoring water tanks are lessened by using a timed switch to replace manual procedures. The automatic operation of this device ensure that water levels remain at the optimistic levels.

VIII. CONCLUSION

The automatic water tank filling system was successfully installed. The unique method is appropriate for use in domestic activities, reducing energy consumption as a result of water spills. It can also assist users in analysing their water usage. Due to the use of a manual switch and a floating ball tap to prevent the water tank from full, the prototype can be presented to address water pump problems. Both urban and rural communities benefit from this approach. It aids in the efficient use of available water resources and the reduction of both water and power waste. If used on a widespread scale, it will make a significant contribution to water conservation for us and future generations

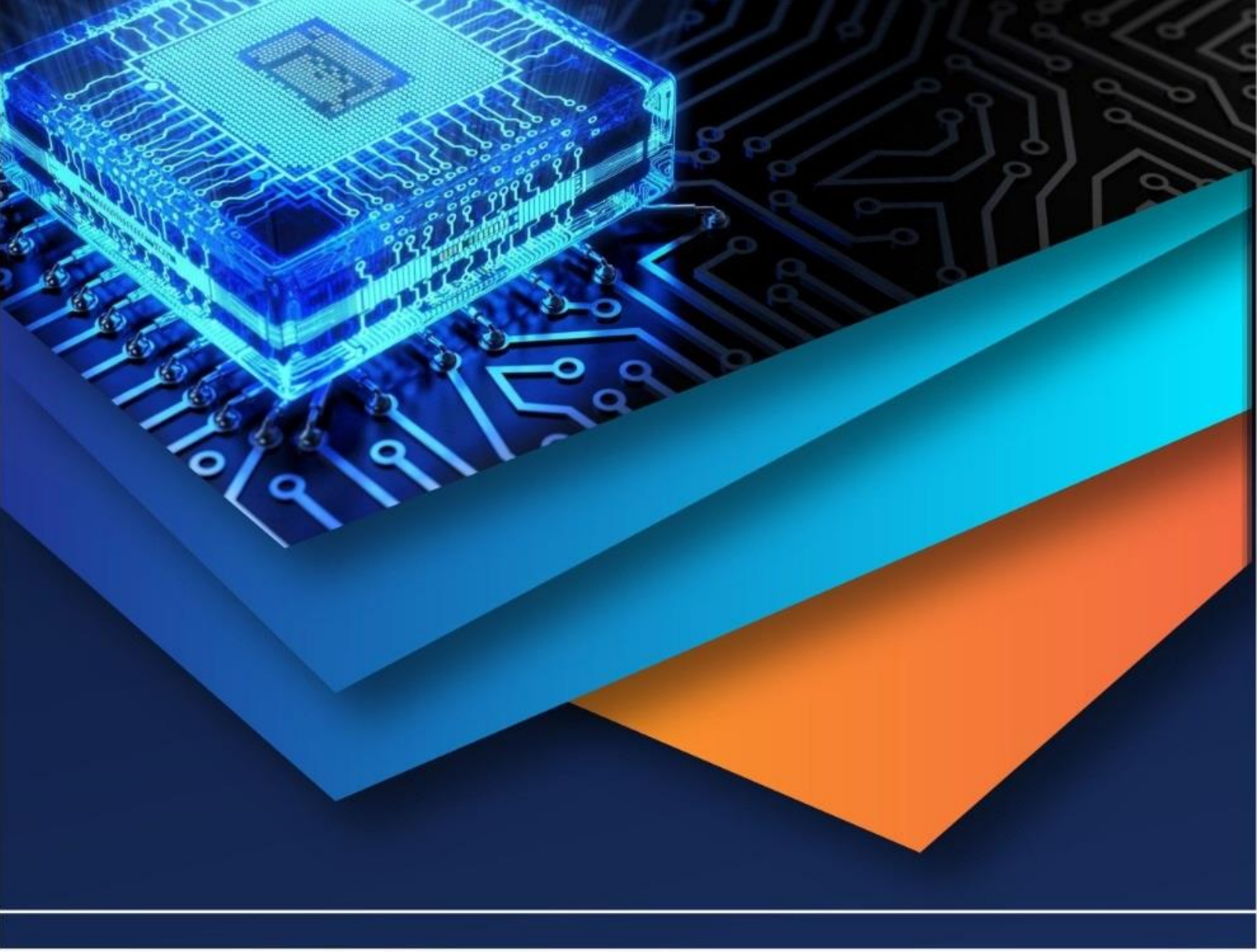
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