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Review of Automatic Water Tank Filling System Using Arduino

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Abstract: ***This project revolves around an Arduino- based automatic water level controller and indicator, employing ultrasonic sensors for water level measurement. These sensors operate on the "echo" principle, wherein transmitted sound waves return after striking an obstacle. Utilizing this principle enables the calculation of travel time for both outgoing and returning waves, facilitating the determination of distance. This fundamental concept is integrated into the project design. The system activates the motor pump automatically when the water level is low, addressing the pressing issue of drinking water scarcity prevalent in India and other countries. The project aims to contribute to water conservation efforts, given the prevalent crisis. Many households in India use overhead tanks, resulting in water overflow and substantial wastage of both water and electricity. To combat this, the project introduces an automatic water level controller, eliminating the need for manual switching ON and OFF of the motor pump. The device continuously monitors the water level and triggers a relay, subsequently activating the motor pump. This automated process not only minimizes water and electricity wastage but also reduces the reliance on manual operation, thereby optimizing efficiency.***

Keywords-*Arduino, Float Sensor, Water level, Overhead, underground etc.*

I. INTRODUCTION

It is observing that the water is the prime requirement for the public places, school, college,hospital etc. Form drinking to cleaning the place the water is always required. To fulfil the demand of waterin such places, the tank is constructed on the top of thebuilding and to store the cooperation water in some places the underground tank is constructed. To fill theoverhead tank water pump are use which is generally connected from wells, Burwell, and underground tanks. The person is always required to turn on/off the pump if the overhead tank gets empty.

If person forgot to turn off the tank, then the water gets overflow form tank it wastes the waster as well as electricity. So, loss of electricity and water ultimately is a big headache to society and the otherpublic places. If the tank is empty and the who operate the switch forgot to ON, the pump then the people face the problem of water in washroom and other issues. The water scarcity is the biggest issue in public place due to this the people can face the problem related to their health and other issues. Some of the peoples who have easy access the resource of water they are more careless about this, they on the pump and leave it after the filing of tank. The barrier on wastage not only gives us more financial savings, it also helps the environment and water cycle which in turn ensures that water is savedfor our future. The solution to this problem is to usean automatic water level monitor and controller to avoid the water overflow and wastage.

The presented automatic water level controller operates on an electromechanical system utilizing digital technology [1], [2]. It is compatible with electrical probes or sensors, and in this setup, magnetic sensors are employed in conjunction witha power supply and a motor.

The sensor is placed inside the tank, and the motor activates as the watersurpasses the sensor in the sump tank. The water sensor, functioning as the level controller, detects both low and high-water levels in the tank. When water exceeds the sensor in the sump tank, the motoroperates until the overhead tank is full.

This automatic water pump controller encompassesa series of functions to manage the Automatic WaterPump Controller Circuit in a reservoir or pump tank.The water level sensor is submerged in the sump tank, positioned about one foot above the bottom, enabling level detection in the sump or undergroundtank.

In daily life, certain physical elements require controlfor them to operate as intended. Automatic control involves designing a system that operates with minimal or no human interference. Intelligent systems find applications in diverse fields, such as medical sciences, financial sciences,education, law, etc., and are embedded in everyday devices.

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II. LITRETURE REVIEW

There is a multitude of commercial companies in the market offering solutions for single sump or bore motors, but none are providing customized solutions.

In this context, a customized solution refers to a system where the bore motor starts only when the water in the sump tank falls below the defined level. This approach is believed to enhance water level management, reducing both power consumption and the risk of water overflow.

The proposed system introduces a microcontroller-based water level sensing and control mechanism, applicable in both wired and wireless environments.

This system is characterized by its flexibility, cost- effectiveness, and easy configurability. It is designed around a low-cost P89V51RD2 microcontroller. Additionally, the proposal includes a web and cellular-based monitoring service protocol, allowing for the global determination and sensing of water levels.

1) Gunturi (2013) designed a distinctive automaticplant irrigation system controlled by a microcontroller.The primary objective of the study was to offer automated irrigation for plants, minimizing the need for manual intervention. This not only results in cost and water savings but also enhances efficiency. The researcher programmed the 8051 microcontrollers to deliver pulse signals to the sprinkler, effectively controlling the entire system. Temperature and humidity sensors were integrated into the microcontroller's internal ports through a comparator.Whenever there was a shift in the surrounding temperature or humidity, these sensors detected the changes and sent interrupt signals to the microcontroller, triggering the activation of the sprinkler [4].

2) "Revolution Agricultural Irrigation: A Breakthrough in Automatic Water Flow Measurement Explored in the International Journal of Computer Science, Engineering, and Applications (IJCSEA), Vol.3, No.3, June 2013". Within the pages of this groundbreaking research manuscript authored by Ria Sood, Manjit Kaur, andHemant Lenka, the spotlight is on the critical role ofa water level controller in revolutionizing irrigationpractices in agriculture. The paper illuminates the fact that each crop has distinct water requirements and advocates for the adoption of an automatic waterlevel controller to mitigate water wastage. The authors introduce an innovative technique forprecisely measuring the flow rate of water in irrigation pipelines, utilizing a Hall Effect Sensor forunparalleled accuracy. At the heart of this measurement system is the G1/2 Hall Effect water flow sensor, incorporating a turbine rotor whose rotational dynamics mirror the nuanced changes in the water flow rate.

3) Integration of SMS Notifications in an Automatic Water Level Controller System (Featured in the International Journal of Scientific and Research Publications, Volume 4, Issue 9, September 2014)" Authored by Sanam Pudasaini, Anuj Pathak, Sukirti Dhakal, and Milan Paudel, this research paper introduces a sophisticated automatic water level controller system with Short Messaging Service (SMS) notification capabilities. The addition of SMS notifications enhances user control over water management, particularly during load shedding. The synergy between the automatic level controller systemand the SMS system is a key feature of this innovative approach. Developed in the Arduino programming environment and deployed onto the Microcontroller, the program facilitates automatic water level control, powered by a battery. When the system detects an empty level during load shedding, it promptly sends anSMS notification to the user. The system streamlines the process by utilizing a single sensor unit in the tank, conducting periodic water level measurements, and autonomously controlling the motor. This groundbreaking system not only eliminates the need for manual tank filling but also provides a preventive measure against overflow.

4) A Trailblazing Automatic Water Level Control System Revealed in the International Journal ofScience and Research (IJSR)" Within the depths of this research expedition authored by Asaad Ahmed Mohammedahmed Eltaieb and Zhang Jian Min, an unprecedented automatic water level control system emerges. This groundbreaking system intricately weaves a tapestry of software and hardware architecture, crafting a fluid interface. Harnessing state-of-the-art sensing technology, the system artfully employs Arduino and relays to govern the motor. Ingeniously placed wires, akin to musical notes on a score, reside at distinct junctions within the beaker. Aswater gracefully pours into the vessel, these wires choreograph a real-time symphony of data, providing insights into the tank's water level. The researchers showcase their creative prowess by orchestrating this aquatic symphony on an LCD stage.The relay system, a virtuoso conductor, precisely orchestrates the motor's movements, epitomizing an unparalleled mastery over water level dynamics.

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III. BLOCK DIAGRAM

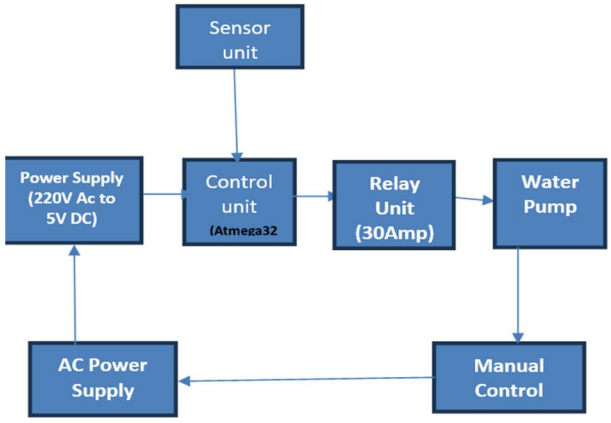
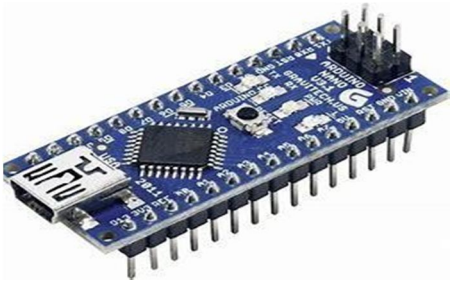


Fig 3.1 block diagram of automatic tank filling system

IV. COMPONANT

A. *Arduino Nano*



This The Arduino Nano is part of the Arduino family of microcontroller boards. It is compact, equipped with an Atmega328 microcontroller, and features the same functionality as the larger Arduino Uno board but in a smaller form factor.
It comes with integrated USB, allowing for easy connectivity to a computer for programming and power. Key features of the Arduino Nano include digital and analog pins, PWM (Pulse Width Modulation) outputs, serial communication capabilities, and the ability to interface with sensors, actuators, and other electronic components. It is suitable for a wide range of applications, from simple LED projects to complex robotic systems. Due to its small size and versatility, the Arduino Nano is often favored for projects with space constraints, such as wearables, drones, and compactelectronic gadgets. Its open-source nature, alongwith a vast community of developers and resources,makes it an accessible choice for both beginners andexperienced electronics enthusiasts.

B. *Float Sensor*

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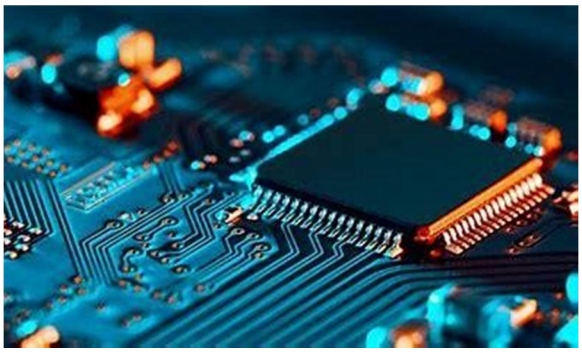
A float switch sensor is a device commonly used in various industries and applications to detect the liquidlevel within a container, tank, or reservoir. The sensoroperates based on the principle of buoyancy, utilizinga buoyant object or float that rises or falls with the liquid level. As the float moves, it triggers the switch mechanism to open or close an electrical circuit, providing a signal indicating the liquid level. This Float switch generally use in industry for the long timeuses. This sensor required only single pole that is positive or negative. The sensor can move up and down according to the liquid level present in tank or any surface. It can open or close according to the liquid level.

C. PCB



A PCB is the basic electronics component. The PCB Stand for Printed Circuit Board. PCB providing track to electronics component by reducing the wire in the circuit. It provides a mechanically stable and electrically conductive structure for the assembly and interconnection of electronic components. A PCB is play very important role in electronics to reduce the wire and difficulty of the circuit. With thehelp of PCB, we can reduce the size of hardware andmake the hardware simple by reducing the complexity of circuit. The PCB are available in many layer, it can provide track to both the components SMD (surface-mount device) and Trough hole.

V. CONCLUSION

This ambitious undertaking has triumphantly realized its core objectives, marking a noteworthy achievement. Beyond the immediate success, the project's essence lies in its intricate design and development of an automatic water level control system, which unraveled an innovative fusion of software and hardware architecture for seamless interfacing. It navigated the technological landscape with a finesse that harmonized the intricacies of both realms. The system's core, illuminated by advanced sensing technology, elegantly discerns water levels with precision.

Functionally, this system emerges as a boon in diverse landscapes, transcending the dichotomy of rural and urban environments.

Its prowess lies in optimizing the utilization of available water sources, ushering in an era of efficiency. However, the true transformative potential is unveiled on a grand scale, where itassumes the mantle of a guardian for water conservation.

In the grand tapestry of environmental sustainability, this system, if widely adopted, could wield substantial influence. Its impact resonates beyond the immediate, standing as a testament to responsible resource management for the benefit ofthe current populace and bequeathing a legacy of environmental stewardship to future generations.

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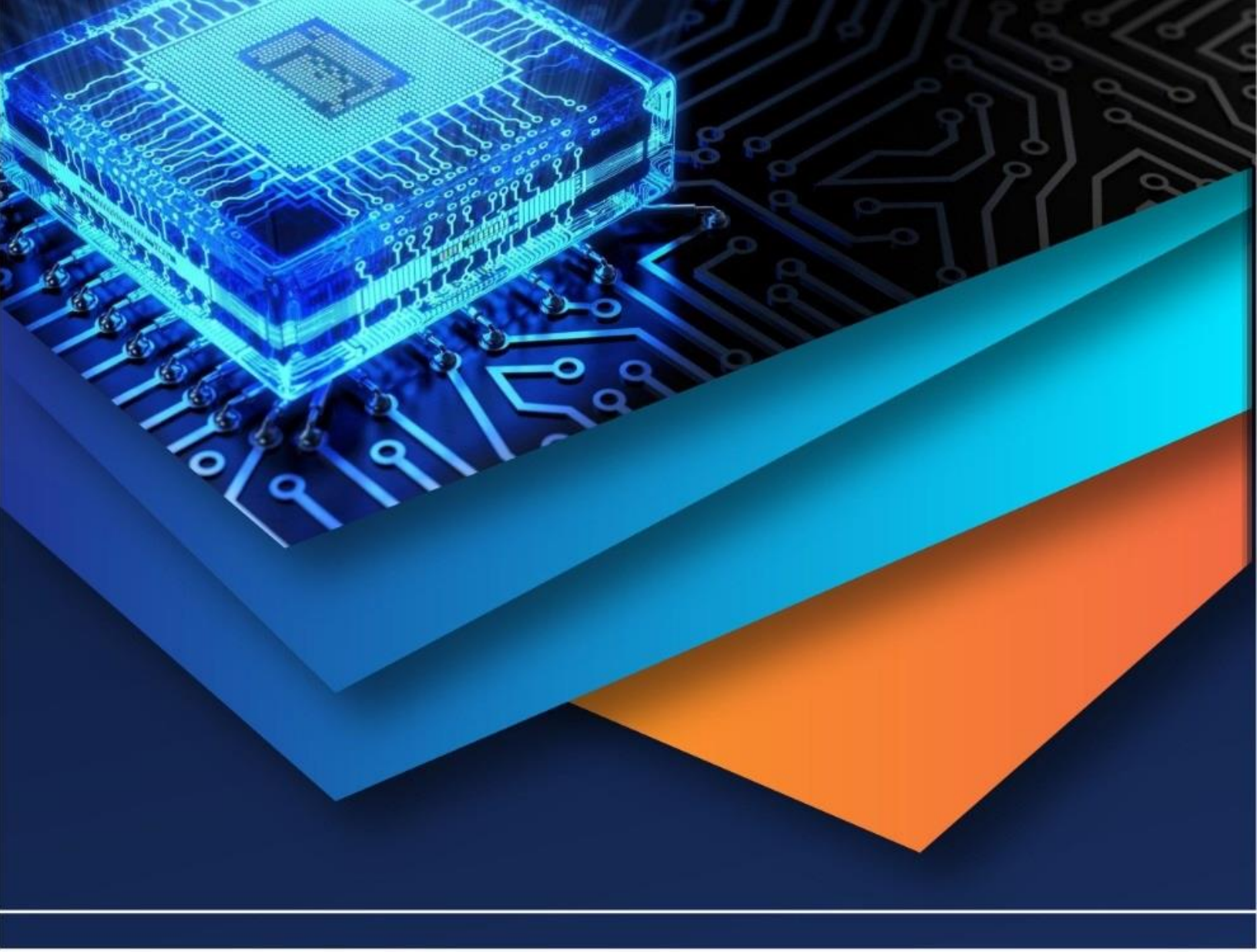

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