



## Automatic Water Pump Using Arduino Nano

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**Abstract** - This project file gives the design and implementation of an automated water pump gadget the use of Arduino Nano. The system is designed to display the water level in a tank and control a DC water pump for this reason. The number one additive used include a flow sensor, Arduino Nano, 5V relay module, 16x2 liquid crystal display, LEDs, a voltage regulator (LM7805), and a buzzer. The aim of the mission is to automate water management by means of using a flow sensor to locate water ranges and an Arduino Nano to govern the pump operation via a relay module. This document outlines the undertaking's targets, additives, layout, and operation, in addition to the consequences, future scope, and end.

Keywords— Arduino Nano, Water Pump, Float Sensor.

### I. INTRODUCTION

Water control is an important concern in numerous sectors which includes agriculture, families, and industrial programs. conventional techniques of monitoring and controlling water degrees are regularly labour-in depth, time-ingesting, and liable to human errors. insufficient water management can lead to problems like water wastage, overflows, and inadequate water supply. this assignment targets to develop an automatic water pump system using arduino nano to cope with those challenges effectively. the automated device ensures specific water stage detection and green pump control, thereby decreasing guide intervention and promoting sustainable water utilization.

### II. COMPONENTS USED

- A. **Arduino Nano:** The Arduino Nano is a compact microcontroller board primarily based on the ATmega328P, offering the important processing power to study sensor records and manipulate other components inside the system.



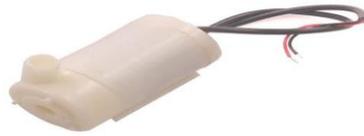
Arduino Nano

- B. **Float Sensor:** The drift sensor is used to stumble on the water level in the tank. It operates by way of floating on the water floor and changing its function based totally on the water level, sending a corresponding sign to the Arduino.



Float Sensor

- C. **DC Water Pump:** The DC water pump is chargeable for pumping water into the tank whilst the water level is low. It operates on a 12V DC strength deliver and might efficiently fill the tank.



DC water pump

- D. **16x2 LCD Display:** The lcd display gives real-time reputation updates on the water degree and pump operation. its miles related to the Arduino through the I2C interface, permitting smooth verbal exchange.



16x2 lcd display

- E. **5V Relay Module:** The relay module acts as a digital switch, allowing the Arduino to control the excessive-strength DC water pump. it is essential for setting apart the excessive-strength circuit from the low-electricity manipulate circuit.



5v Relay Module

- F. **12V DC Power Supply:** The power deliver gives the important voltage and present day to function the DC water pump and different additives inside the gadget.



12 DC Power Supply

- G. **LEDs (Red for Off and Green for On, with resistors):** LEDs are used to offer visible signs of the pump status. The LED indicates that the pump is off, or off even as the green LED shows that the pump is on.



Red and Green LEDs

**H. Voltage Regulator (LM7805):** The LM7805 voltage regulator guarantees a stable 5V supply to the Arduino Nano and different low-strength components, protective them from voltage fluctuations.



**I. Buzzer:** The buzzer gives audio indicators whilst the pump starts or stops, giving users an audible indication of the device's operation.



Buzzer

**J. Jumper Wires:** Jumper wires are used to attach diverse components on the breadboard, facilitating the advent of the circuit.



Jumper Wires

### III. DESIGN AND IMPLEMENTATION

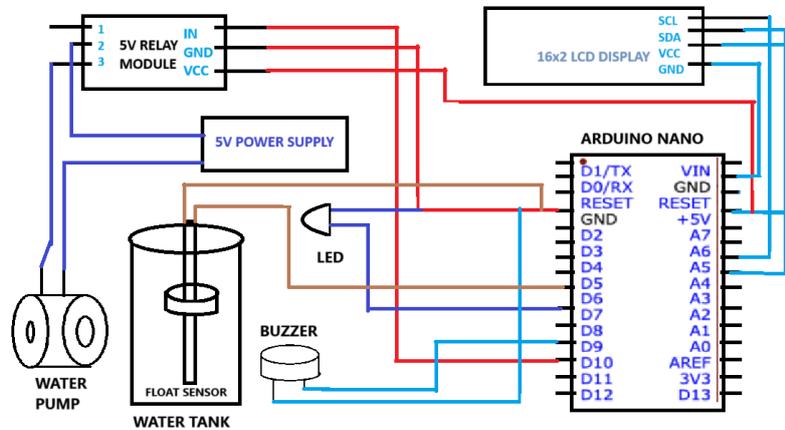
The additives are connected using a breadboard, following a scientific method to make certain proper capability. right, here's an in-depth explanation of the connections and operation:

- 1. Float Sensor:** The go with the drift sensor is hooked up to a virtual input pin on the Arduino Nano. at the same time as the water degree is low, the sensor returns '1'; whilst the water level is excessive, it returns '0'
- 2. Arduino Nano:** The Arduino techniques the sensor facts. If the water stage is low (sensor returns '1'), it sends a signal to the relay module to activate the pump. while the water degree is high (sensor returns 'zero'), it sends a sign to deactivate the pump.
- 3. Relay Module:** The relay module is hooked up to a virtual output pin on the Arduino and controls the energy supply to the DC water pump. It acts as a switch, turning the pump on or off based on the signs from the Arduino.
- 4. LCD Display:** The 16x2 liquid crystal display show is hooked up to the Arduino the usage of I2C communique. It indicates the water stage reputation (Low or immoderate) and the pump recognition (On or Off). This enables clients screen the tool in real-time.
- 5. LEDs:** The green LED is related to digital output pins on the Arduino thru resistors. The green LED lighting fixtures up whilst the pump is on, providing a brief visible indication of the pump reputation.
- 6. Buzzer:** The buzzer is connected to a virtual output pin on the Arduino. It emits a valid whilst the pump starts or stops, alerting customers to adjustments in the pump operation.

7. **Voltage Regulator:** The LM7805 voltage regulator is used to step down the 12V energy deliver to a strong 5V, which powers the Arduino Nano and different low-strength additives, making sure their cozy operation.

#### IV. CIRCUIT DIAGRAM

The circuit diagram consists of the following key connections:



Circuit Diagram

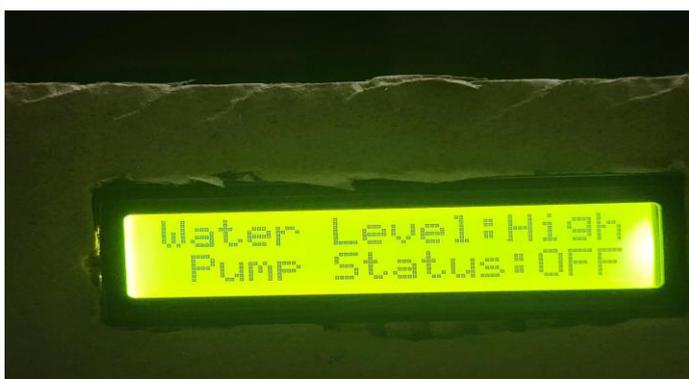
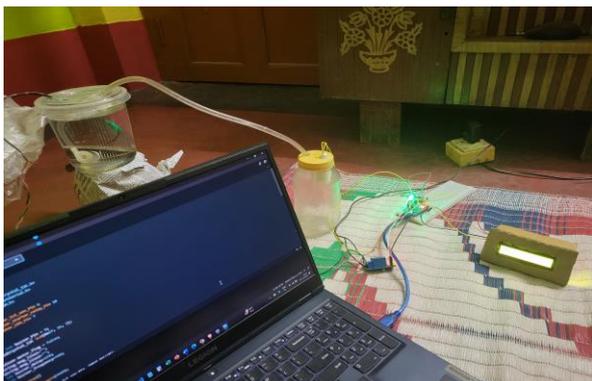
- The float sensor is connected to digital pin D6 on the Arduino Nano.
- The relay module is connected to digital pin D10, controlling the DC water pump.
- The LCD display is connected via the I2C interface, using pins A4 (SDA) and A5 (SCL).
- The green LED is connected to digital pin D7, with appropriate resistors.
- The buzzer is connected to digital pin D9.

#### V. OPERATION

The system operates as follows:

1. **Water Level Monitoring:** The flow sensor continuously monitors the water degree in the tank. while the water level is low, the sensor sends a sign (1) to the Arduino.
2. **Pump Control:** Upon receiving the low water stage signal, the Arduino turns on the relay module, which switches at the DC water pump to fill the tank. whilst the water degree turns into excessive, the sensor sends a signal (zero) to the Arduino, which then deactivates the relay module, turning off the pump.
3. **Status Display:** The LCD display shows "Water Level: Low" and "Pump Status: On" when the pump is operating, and "Water Level: High" The liquid crystal display display indicates "Water level: Low" and "Pump reputation: On" when the pump is running, and "Water stage: high" and "Pump reputation: Off" whilst the tank is complete.
4. **Visual and Audio Alerts:** The green LED lighting up and the buzzer sounds when the pump begins and the buzzer sounds whilst the pump stops.

#### VI. RESULTS



Photos of our project operating successfully

The automated water pump gadget was efficiently applied and examined. The outcomes demonstrate the following:

- **Accuracy:** The go with the flow sensor reliably detected the water stages, ensuring the pump operated handiest when vital.
- **Efficiency:** The Arduino Nano processed sensor statistics and controlled the pump with minimum postpone, presenting green water control.
- **User Interface:** The liquid crystal display supplied real-time popularity updates, making it smooth for users to display the gadget. The LEDs and buzzer supplied extra comments on the pump repute, improving person revel in.

## VII. DETAILED OBSERVATIONS

- The float sensor's detection was particular, allowing well timed activation and deactivation of the pump.
- The relay module efficiently managed the pump, ensuring secure and dependable operation.
- The lcd show turned into clean and readable, providing vital statistics at a glance.
- The audio and visible alerts were powerful in notifying users of changes inside the pump reputation.

## VIII. FUTURE SCOPE

The challenge has tremendous capability for further enhancements and broader applications. destiny upgrades should include:

1. **Remote Monitoring and Control:** Integrating the machine with IoT platforms could allow customers to monitor and control the water pump remotely using smartphones or different gadgets. this will offer extra flexibility and comfort.
2. **Multiple Tank Management:** Increasing the gadget to manage a couple of tanks and pumps simultaneously could boom its applicability in larger installations, consisting of farms or business settings.
3. **Energy Efficiency:** Incorporating solar panels to strength the system could enhance energy performance and sustainability, making the system more environmentally friendly.
4. **Advanced Sensors:** Sensors: using superior sensors to degree additional parameters like water satisfactory and temperature should provide more comprehensive tracking and manage.

## IX. CONCLUSION

The automatic water pump using Arduino Nano effectively automates water metering and water pumping. It minimizes manual intervention, improves water management and provides instant status updates on the LCD screen. The success of this project shows that it has potential in many applications and suggests opportunities for future development. The system is a useful tool for managing daily water needs, promoting sustainability and efficiency.

## XI. REFERENCES

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