

# Smart Submersible Pump Control System Built on the Arduino Microcontroller

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**Abstract:** The safety of our drinking water is a major concern in the modern day. It might be a major issue on a worldwide scale. Because, as we've already said, water might spark a third global war. So, we need to start planning for water conservation now. One issue that many of us have with our house water tanks is the difficulty in controlling the water level in the above tank, which leads to rising water waste. The value of water, however, is obvious to everyone. A circuit including many electronic components, known as a "Arduino based Smart Submersible Pump Controller," may manage this issue. Because water is a good electrical conductor, an Arduino-based smart submersible pump controller may run on this principle. Thus, a circuit may be opened or closed using water. The controller's many circuits respond to changes in the water level by sending out distinct signals. In response to human needs, these signals activate or deactivate the motor pump.

**Keywords:** Basic water level indicator, alarm, microcontroller, smart pump, and Arduino.

## 1. Introduction

An estimated 104 billion cubic kilometers of water exists on our planet, which is sufficient to cover it with a layer of 3 kilometers deep. The water on Earth is mostly salty, making up around 95% of the total, making it unfit for human consumption. The polar ice caps contain around 4% of the world's fresh water, while the rivers, lakes, and streams that are fit for human use account for the other 1%. Studies show that the average Indian consumes 135 liters of water per day. This consumption is projected to rise by 40% by 2025. This emphasizes how important it is to safeguard our water source.

In this circuit, an intelligent submersible controller based on Arduino is used. Not only does the circuit display the water level, but it also activates the motor when the level falls below a certain threshold. When the fuel tank is full, an automated circuit cuts power to the engine. The present water level and other important parameters are shown on a 16×2 LCD panel. Just like the source tank, the sump tank has its water level monitored by the circuit. By shutting it off when the sump tank level drops too low, this feature prevents the engine from being dry-run. There will be a buzzer noise if the level of the sump tank becomes too low or if the sensors identify a problem.

### 1.1 Advantages and Features

A Smart Submersible Pump Controller is a device that manages water levels on a variety of systems such as water tanks, pumps and swimming pools. The basic function of a water level controller is to regulate water flow and optimize system performance. These devices have four main advantages.

#### Saves Power

Using a smart submersible controller saves power. This is because water levels are controlled automatically, which limits the amount of electricity used. As a result, less water and power are used to regulate a water supply. In an age where energy conservation is of utmost importance, using one of these devices is very beneficial.

#### Saves Money

Since a smart submersible controller conserves power, it saves money, as well. Basically, water regulation is optimized through these devices, which means that wasted electricity and wasted water is kept at a minimum. That saves a substantial amount of money over time.

#### Works Automatically

Another big advantage is that this device works it-self. Thanks to timer switches, there is no need to operate them manually. This means that the frustrations involved with monitoring something like a water tank is minimized, and the water levels will be where they should be.

### **Maximizes Water**

Additionally, water usage can be maximized with a smart submersible controller. Often, submersible pumps get more use during the middle of the day. A smart submersible controller is helpful because it automatically provides more water during the middle of the day and less water at night. As a result, water remains at its appropriate level at all times.

### **1.2 Applications**

This Smart Submersible Pump Controller can be used in Hotels, Factories, Homes, Apartments, Commercial complexes, Drainage, etc. It can be fixed for single phase motor, three phase motors, and Fuel level indicator in vehicles. This is also used in the huge container companies on the tank walls.

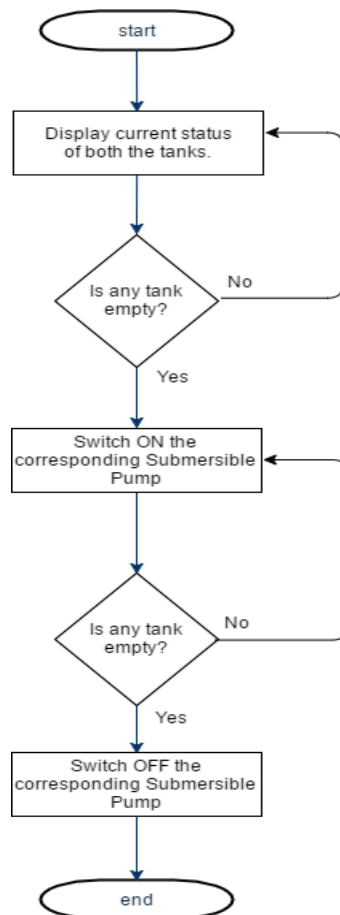
## **2. Technical Aspects**

### **2.1 Process of Manufacture**

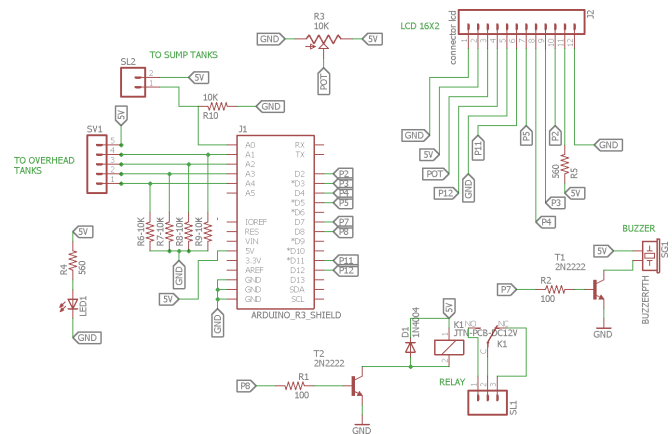
The Arduino based Smart Submersible Pump Controller's basic feature is used to measure the level of overhead tanks and sump tanks. The sensor assembly consists of four aluminum wires arranged at 1/4, 1/2, 3/4 and full levels in the tank. The dry ends of these wires are connected to analog input pins A1 (1/4th), A2 (1/2th), A3 (3/4th) and A4 (full) of the Arduino respectively. A fifth wire is positioned at the bottom of the tank. Resistors R6 to R9 are pull down resistors. The dry end of this wire is connected to +5V DC. When the water touches a particular probe, electrical connection is established between that probe and the +5V probe because water has slight conductivity. As a result current flows through that probe and this current is converted into a proportional voltage by the pull down resistor. Arduino reads the voltage dropped across each pull down resistor for sensing the level of water in the tank. Same method is used for measuring the level of water in the sump tank.

Digital pin 7 of the Arduino controls the buzzer and digital pin 8 controls the motor. Transistor T1 drives the buzzer and resistor R2 limits the base current of T1. Transistor T2 drives the relay. Resistor R1 limits the base current of T2. D1 is a freewheeling diode. POT R3 is used to adjust the contrast of the LCD. Resistor R5 limits the current through the back light LED. Resistor R4 limits the current through the power ON LED.

### **Flowchart**



The flow chart is described for this project. Initially, LCD will display the current level status of the overhead tank. There are five different levels specified for the overhead tank. These levels are low, 1/4, 1/2, 3/4 and full. If the overhead tank is empty then Arduino switch on submersible with the help of relay. If the overhead tank is full, then the water pump will be automatically stopped with the help of relay as well as displayed on the LCD. And if the sump tank is empty then the circuit will display low level on LCD and switch on the buzzer i.e. beep....beep sound.



### 3. Results

Consistent with expectations, the experimental model was constructed based on the circuit schematic. When the overhead tanks are ready to run empty, the submersible pump will turn on, and when they are close to overflow, it will turn off.

### 4. Conclusions

- This system is very beneficial in rural as well as urban areas.
- It helps in the efficient utilization of available water sources.
- If used on a large scale, it can provide a major contribution in the conservation of water for us and the future generations.

In these days, when Earth's reserve of consumable water is decreasing every moment, every drop has its value. Smart Submersible Controller is a simple yet effective way to prevent wastage of water. Its simplicity in design and reliable components make it an ideal piece of technology for the common man.

### 5. Future Works

I started this project with the express purpose of creating a simple, adjustable gadget that can reduce our water waste at a lower cost. This method has been executed by me with great success. This application, developed using Arduino, has great promise. An exact water level may be rendered by level sensors, and the system can be managed via an Android app or a smartphone.

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