251 Lab Project Spring 2023

Water Level Detector

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This project involves designing and building a water level indicator and pump controller circuit. The circuit is intended to monitor the water level in a tank and control the pump to maintain the desired level. The project is divided into three milestones, each involving the development of different circuit blocks.

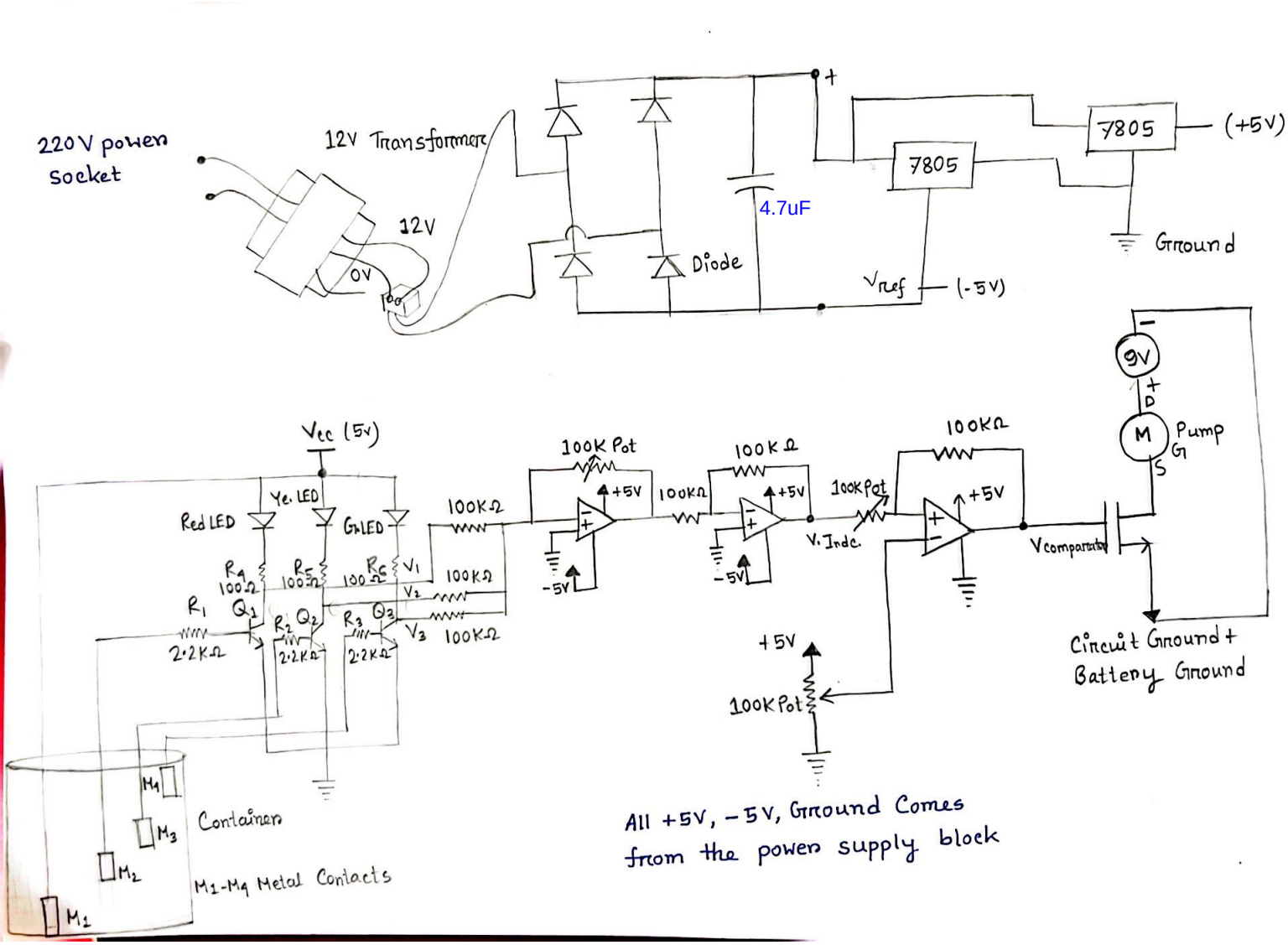
This project provides a practical application of electronic circuit design principles and helps to develop skills in building and troubleshooting electronic circuits.

Problems while implementing the project:

① Troubleshooting circuit errors can be time consuming and confusing.

② We had to adjust potentiometer several times, as it was showing inaccurate readings.

③ Defective components



Learnings and procedure:

① Circuit design and trouble shooting:

We have to carefully set each components to correct nodes. Through this lab we are now more comfortable with circuits.

② We got to learn how each component works and how to use them to design circuits.

③ We have gathered teamwork and successfully built the project.

Calculation:

$$P = \frac{R_2}{R_1} \Rightarrow P = \frac{100\ k\Omega}{45\ k\Omega}$$

$$= 2.25$$

$$V_T = 2.35\ V$$

$$V_H = V_T\left(1 + \frac{1}{P}\right)$$

$$= 2.35\left(1 + \frac{1}{2.25}\right)$$

$$\approx 3.3\ V$$

$$V_L = V_T\left(1 + \frac{1}{P}\right) - \frac{5}{P}$$

$$= 2.35\left(1 + \frac{1}{2.25}\right) - \frac{5}{P}$$

$$\approx 1.15\ V$$

Discussion:

The final result is a fully functional water level indicator and pump controller system that can help automate the water level management in water tanks or reservoirs.

The level Indicator Block uses three metal contacts at three levels of a water tank to detect water level and displays it on an indicator block with three LEDs (Red, Yellow, Green). The comparator block compares the water level with reference level and generates a signal that controls the Pump Controller Block. The Pump Controller Block uses a MOSFET as a switch to turn on the Pump on or off based on the signal received from the comparator Block. The level Detection Block uses a simple circuit to indicate water level using LED lights. Each LED represents different water level and a good visual aid to understand the water level.

Overall this project demonstrates how simple electronic circuits can be used to automate and improve the efficiency of water

management systems. The system can be used in a variety of settings, including residential and commercial water tanks, which can automate the process and can help prevent overflow. This project has helped us gain practical experience in designing and implementing electronic circuits.