

# Specifications

- The first specification that will be included for the automated hydroponics system is a power supply power brick that will convert 120 V 60 Hz AC to 3.3 volts to a Raspberry Pi Pico 5.
- Since the hydroponics system will consist of a water pump that is responsible for circulating nutrient rich water throughout the system, it's power supply will need to be directly connected to the 120 volt wall outlet.
- For simplicity the pumps power wire and the Raspberry Pi Pico USB power supply will run through the same power brick that is connected to the outlet. Based off the size of the LCD screen chosen for the project, it will get its power from either the Raspberry Pi Pico or through the power supply power brick.
- If the LCD screen is too large it will draw too much current from the Raspberry Pi Pico. For example, if a 3.5" TFT LCD screen is used it will draw between 250mA and 1 Amp which is too much for a Raspberry Pi Pico.
- The LCD display will present real-time sensor data, including EC levels, temperature, and system status, refreshing at 1-second intervals.
- The LED grow light system will operate at 12V DC with a MOSFET-based driver capable of switching at 20 kHz PWM frequency to allow smooth dimming.
- The LED intensity will be adjustable from 10% to 100% brightness with increments of 5%, allowing controlled light exposure.

## **ECE 401 Senior Project**

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- The flow rate will be adjustable between 10 mL/min to 200 mL/min with an accuracy of  $\pm 5\%$ .
- The system will activate the pump in response to EC sensor feedback, adjusting the flow rate dynamically to maintain nutrient concentration.