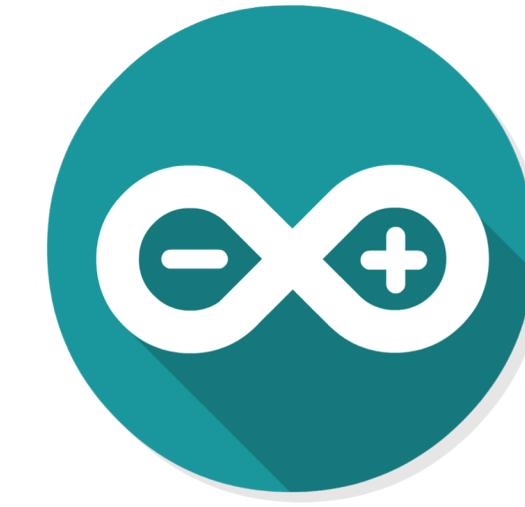




# Automatic Generator Battery Backup Controller

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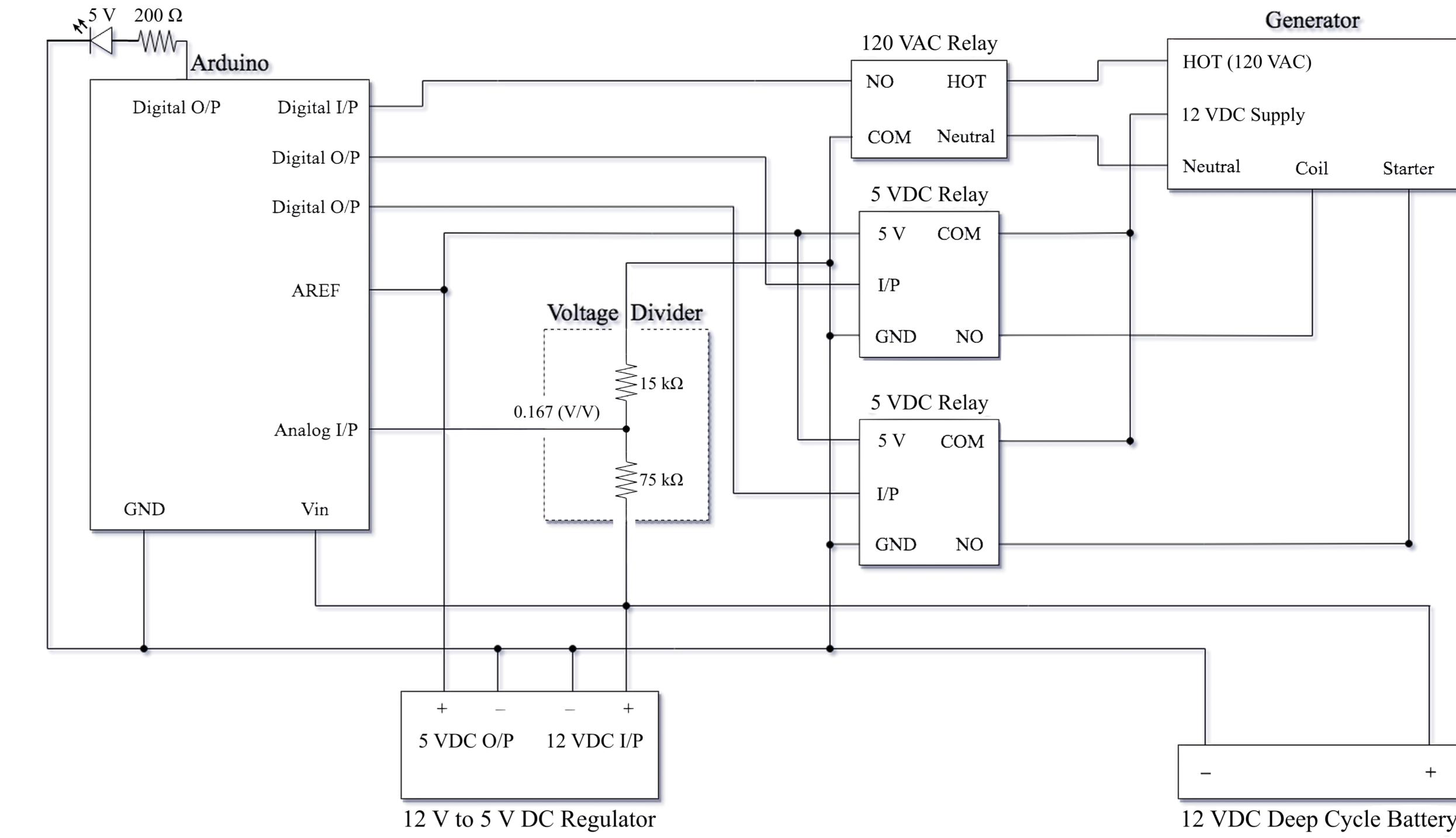
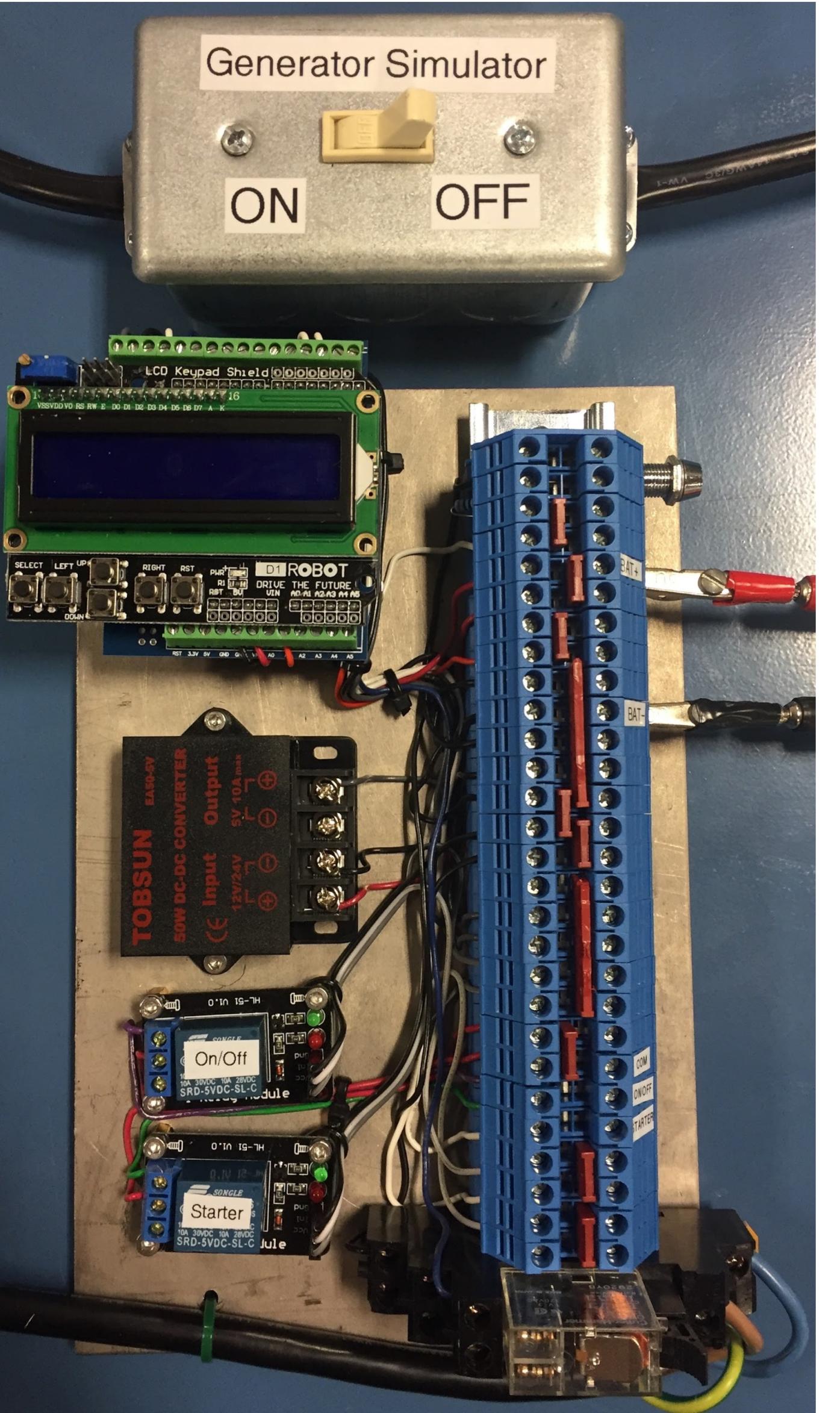
**Advisor:** Dr. Michael A. Baswell



**Objective:** To create a cheaper hardware version of an automatic generator backup controller for an external battery than what already exists on the open market. The hardware controller will automatically start and stop the generator based on the current battery's voltage level. The generator should charge the battery when the voltage drops below a user-defined value. The generator will turn off when the battery is sufficiently charged.

**Design:** The battery backup controller incorporates a modular design. The system consists of two 5V DC relays, one 120V AC relay, one LCD display, one LED, three resistors, twenty-eight terminals, one DC to DC converter/regulator, and one Arduino Uno microcontroller. All components were connected and mounted with copper wiring, relay sockets, one DIN rail, and an aluminum plate.

**Operation:** When the system is turned on, the LCD displays the main menu with a live external battery voltage reading along with the system's automation status. The up and down buttons toggle the automation of the system. The left and right buttons scroll through the parameter selection menu. Minimum & maximum voltage thresholds, delay time, and starter time can be customized by the user and set with the select button. When the external battery voltage reaches the minimum threshold, the system attempts to start the generator. The system turns off the generator when the battery is fully charged. If there is inactivity for 10 or more seconds, the LCD's display turns off.



**Results:** The final product is a fully functional Arduino-controlled automatic generator controller for an external backup battery. Our product can help those who depend on solar power, especially those in developing nations. Since it is modular, it can be easily repaired and modified. It eliminates the need to manually start and stop a generator, making the generator more convenient and efficient.