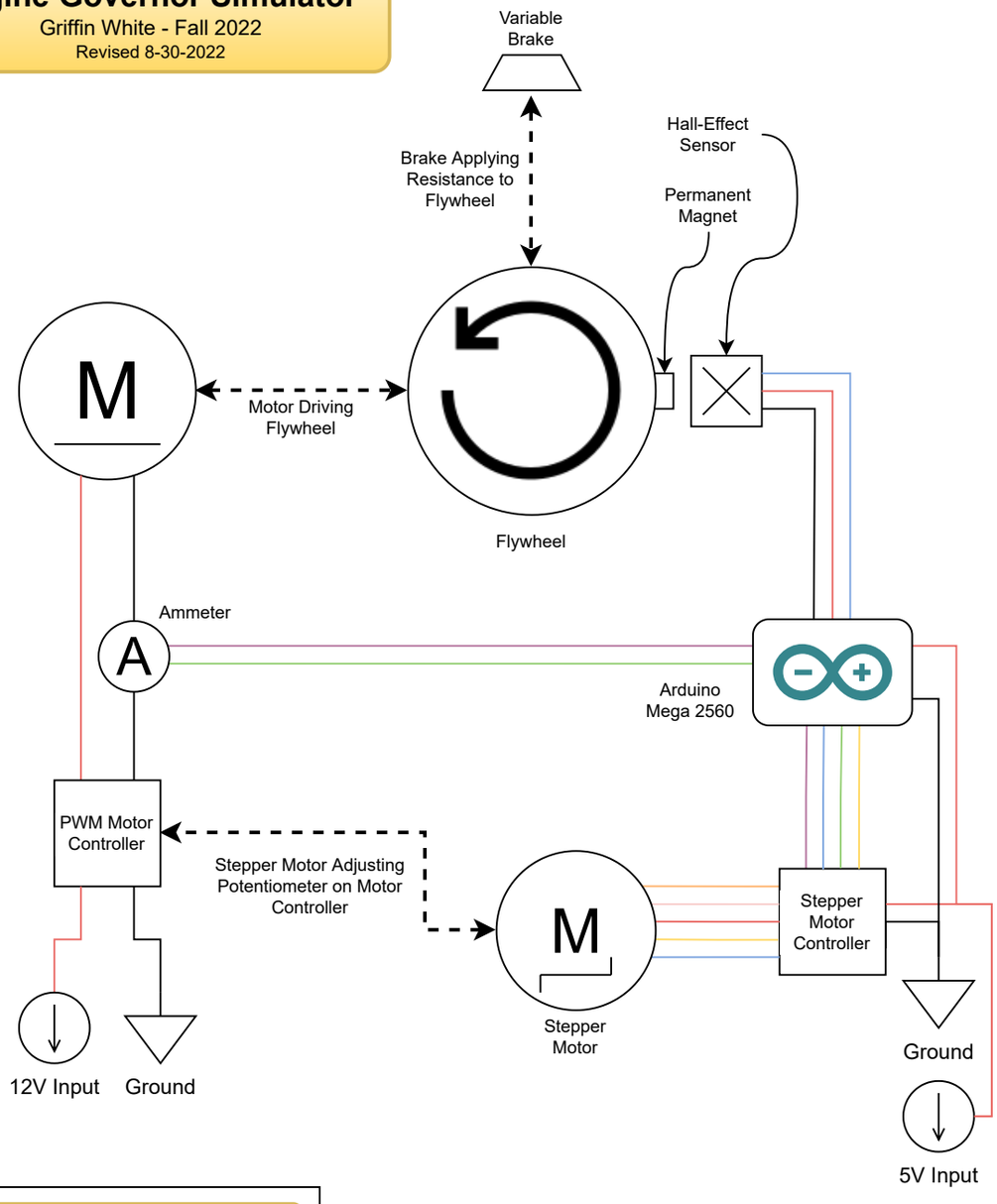
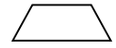
Engine Governor Simulator

Griffin White - Fall 2022

Revised 8-30-2022



Component Descriptions and Functions

Flywheel		The flywheel assembly rotates at a constant speed. It is spun by a DC motor.
Variable Brake		The brake applies a friction force to the flywheel, causing it to slow down.
DC Motor		The DC motor spins the flywheel. Its speed is controlled via a PWN motor controller.
PWM Motor Controller		The PMW motor controller regulates the duty cycle of the DC motor, thereby regulating its speed. Its potentiometer is controlled by the stepper motor.
Stepper Motor		The stepper motor controls the position of the PWM motor controller's potentiometer, thereby controlling the speed of the motor. It is controlled by the Arduino.
Hall-Effect Sensor		The hall-effect sensor produces a signal each time that a magnet passes by it. Using this signal, we can measure the RPM of the flywheel.
Arduino		The Arduino microcontroller monitors the flywheel RPM and adjusts the stepper motor as needed.

Basic Control Logic

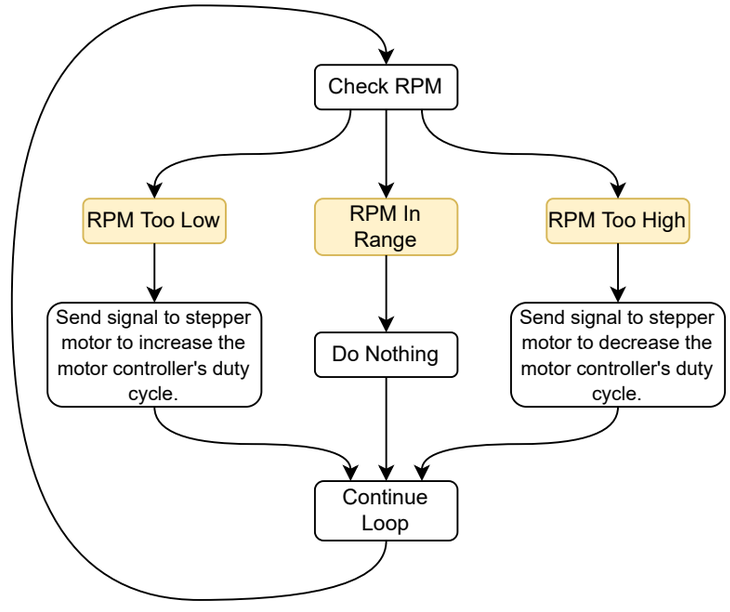
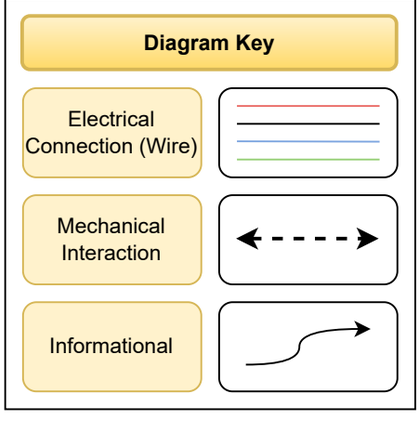


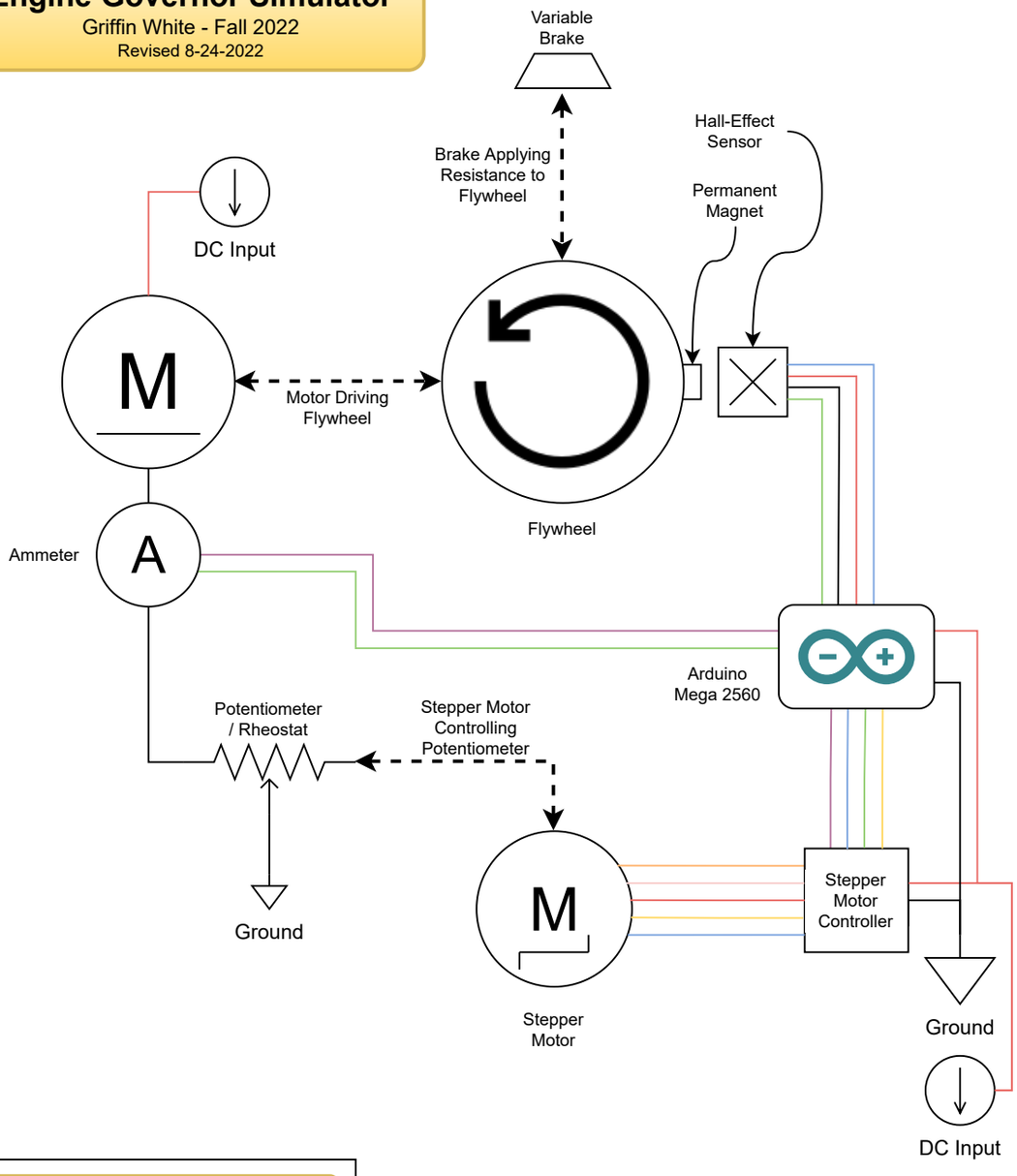
Diagram Key



Engine Governor Simulator

Griffin White - Fall 2022

Revised 8-24-2022



Component Descriptions and Functions

Flywheel	The flywheel assembly rotates at a constant speed. It is spun by a DC motor.
Variable Brake	The brake applies a friction force to the flywheel, causing it to slow down.
DC Motor	The DC motor spins the flywheel. Its speed is controlled via a potentiometer.
Potentiometer / Rheostat	The potentiometer regulates the amount of current supplied to the DC motor, thereby regulating its speed. It is controlled by the stepper motor.
Stepper Motor	The stepper motor precisely controls the position of the potentiometer, thereby controlling the speed of the motor. It is controlled by the Arduino.
Hall-Effect Sensor	The hall-effect sensor produces a signal each time that a magnet passes by it. Using this signal, we can measure the RPM of the flywheel.
Arduino	The Arduino microcontroller monitors the flywheel RPM and adjusts the stepper motor as needed.

Basic Control Logic

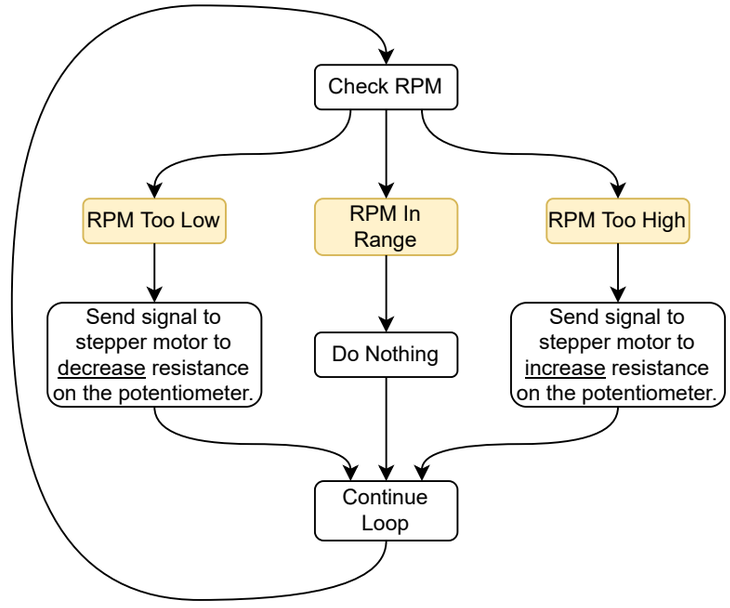
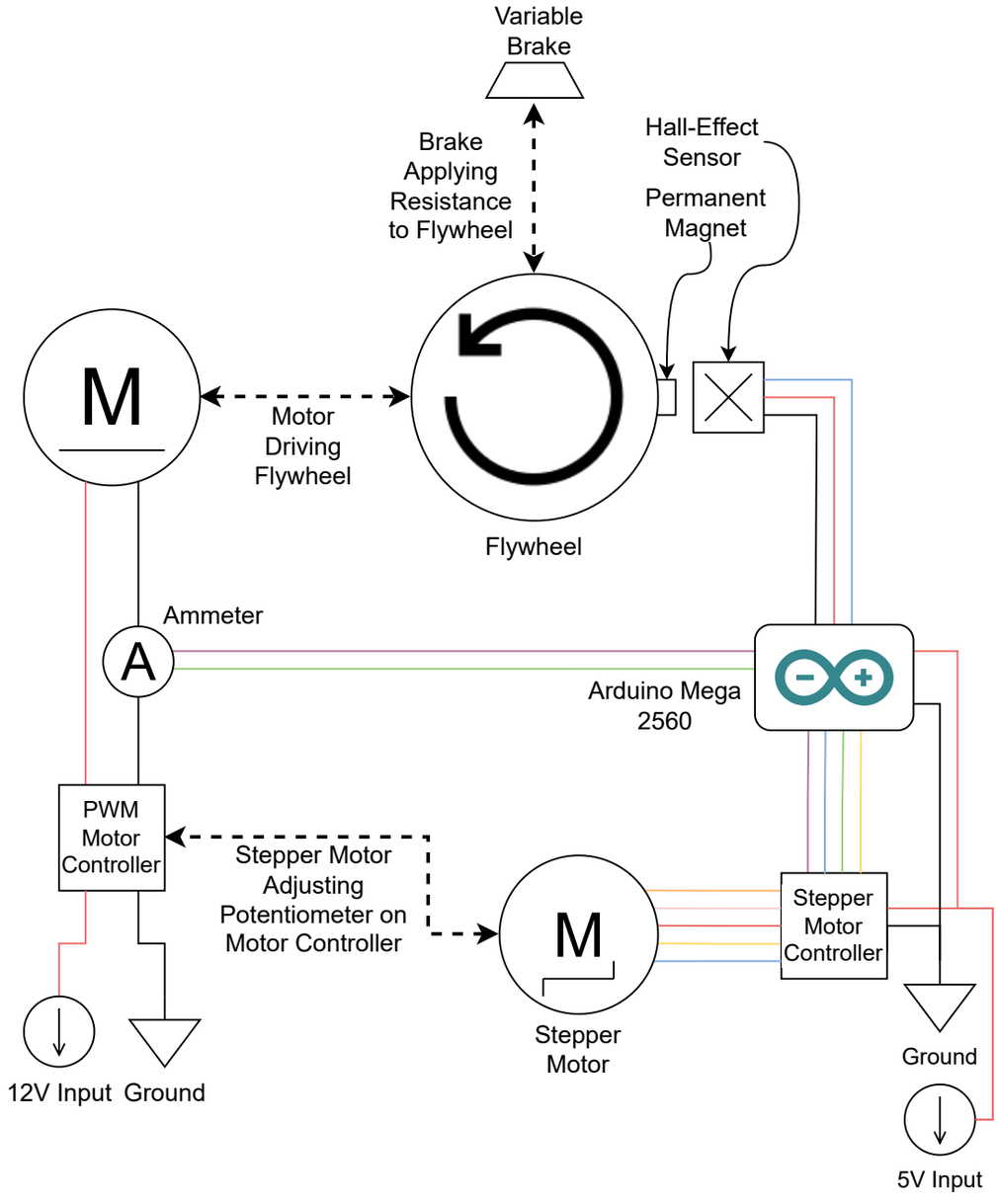


Diagram Key

- Electrical Connection (Wire)
- Mechanical Interaction
- Informational


Variable
Brake
Brake
Applying
Resistance
to Flywheel
Hall-Effect
Sensor
Permanent
Magnet
M
Motor
Driving
Flywheel
Flywheel
Ammeter
A
Arduino Mega
2560
PWM
Motor
Controller
Stepper Motor
Adjusting
Potentiometer on
Motor Controller
M
Stepper
Motor
Stepper
Motor
Controller
12V Input
Ground
Ground
5V Input