

DC Motor Control Design Choices

Hardware Design

1. **Motor speed control using PWM:** I utilized an nmos mosfet to control high motor power. The power flow via the mosfet is controlled by a PWM signal provided to the nmos gate pin from the arduino nano. The rapid on/off action results in controlled speed.
2. **Capacitor across push button** serves to debounce the button by smoothing out the transients caused when a button is pressed or released.
3. **Overcurrent measurement:** motor current is measured using a shunt resistor placed in series with the motor current path. The resistor should be a high power, very low resistance. Voltage across the resistor is measured using the ADC. Then the firmware utilizes ohms law (known voltage and resistance) to calculate the current.

Software Design

1. **MotorController class:** handles all functionality related to controlling the motor.
2. **Polling button state:** functionality is relatively simple, hence polling the button state is more than sufficient rather than utilizing interrupts.