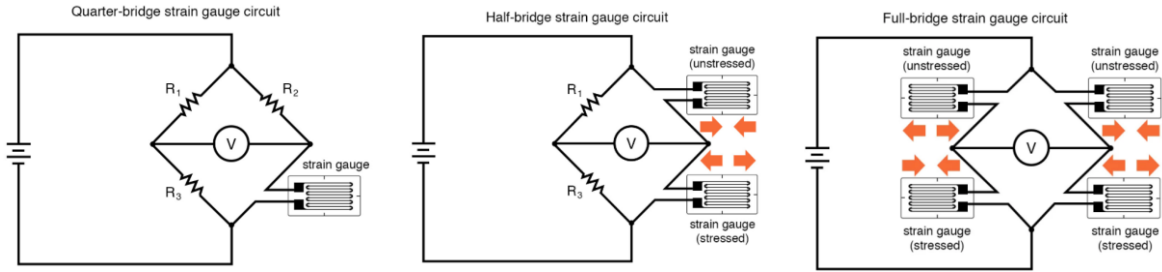


CE 432 Robotics II HW3

Sensors and Actuators

1. The following figure shows the Wheatstone Bridge and strain gauges forming a quarter bridge, a half bridge, and a full bridge. Explain why (use equations) the full bridge is the most sensitive one to resistance variations. (10 points)



2. Use your Arduino UNO kit, create a sketch that can measure distance using the HC-SR04 ultrasonic module without using the SR04.h library (refer to the sketch showed in the slides). (Demonstrate it to me in class for the credit). (20 points)

3. Use a MPU6050, an Arduino Nano, and a buzzer to create a vibration detector (for the Z direction only). When the vibration is higher than a certain threshold, the buzzer will be triggered. (The system can be tested on a table, someone knock the table to trigger the buzzer). Demonstrate it to me in class for the credit. (30 points)

4. Use the joystick of the Arduino Elegoo kit to control the speed and rotating direction of the NEMA stepper motor. Use both wire connections and wireless connections between the joystick and the NEMA motor. (wireless modules can be the HC05 Bluetooth module). (40 points)