

## Worksheet No. XX: Experiment - Methane Gas Sensor

### Background Reading

Background information on gas sensors. Keep it short and simple - 1 to 2 pages with plenty of pictures. The main points to cover: (1) gas sensors are electronic devices whose resistance varies based on the concentration of the given gas in the air, (2) this process works by adsorption/desorption of the gas molecules onto the metal which comprises the active section of the device. The main idea to give to the students is that the gas sensor must be heated in cycles to activate absorption/desorption of gas molecules, and that they must measure the device resistance only at certain times to calculate the gas concentration. We may also want to touch on the idea that different load resistor values will change the sensitivity of the device. We will give them the times and resistance to ppm conversion equation.

### Equipment Required

- 3 Gas sensors (in case they are broken) and mounts
- Arduino and Laptop
- Soldering Equipment
- Resistors
- Potentiometer
- LEDs (to test timing)
- Methane Gas OR Butane at known concentration (lighter)
- Air-tight syringes and enclosures for measuring gas concentrations (calibration)

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Outline process for setting up timing of digital output pins on Arduino, and suggest they practice with the LEDs. Outline connection setup for methane sensor to Arduino and let them experiment with different load resistor values and their calibration containers.

Commented [1]: CO2 and Methane sensor operation -> <https://playground.arduino.cc/Main/MQGasSensors>

Commented [2]: The methane sensors senses butane as well

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