Build a Universal Flex Fuel Sensor Translator

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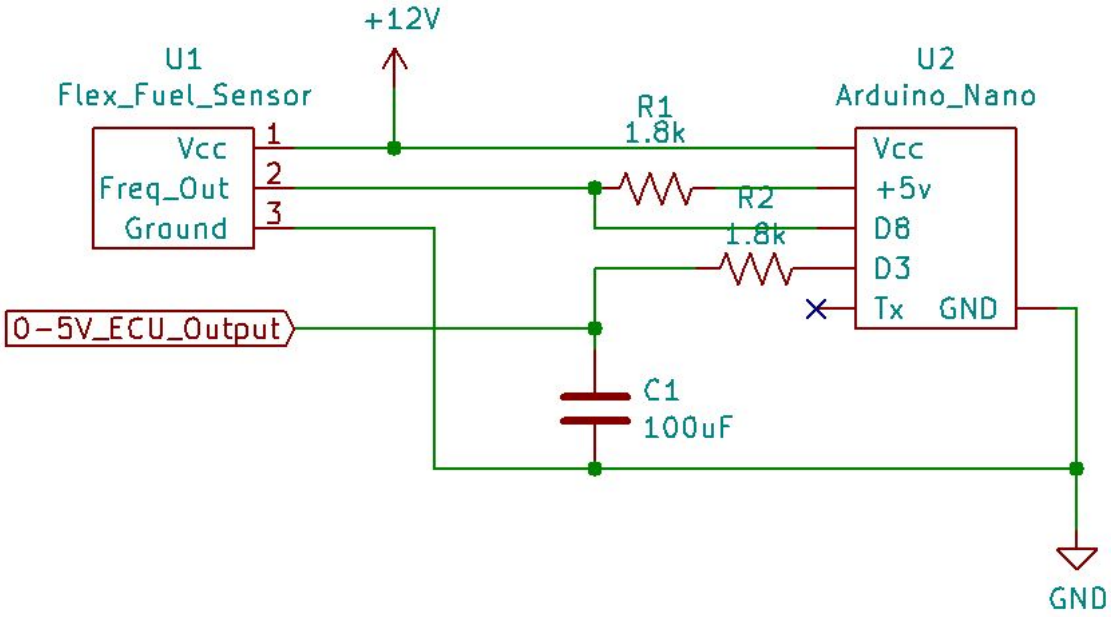
Test Case: 2015 Scion FR-S

Ingredients

- 1.8k Resistor (x2)
- 100uF Capacitor
- Arduino Nano - without pins
- Continental Flex Fuel Sensor
- Wire (x4 - different colors)
- DMM
- 3 Bowls filled with:
    - E0
    - E85
    - E100

Before Assembly

plan where the translator and continental flex fuel sensor will be located in the vehicle to ensure enough wire length is provided. Do not forget that the +12V line will need to connect to the battery and the ECU output will need to span into the cabin and plug into the ECU, (unless you are adapting an O2 sensor connection, as was done with the FR-S). Carefully combine ingredients in accordance with the below schematic.



It is strongly advised to increase the capacity of your vehicle's injectors when running E-85, as your motor will need about 30% more fuel. The FR-S is running 700CC injectors as it is turbocharged and tuned to make 400 whp.

The Arduino Nano is capable of the below output ranges:

- 0.0V - 5.0V
- 5.0V - 0.0V
- 0.5V - 4.5V
- 0.5V - 4.5V

A 0.5V - 5V range is recommended for ease of debugging, as 0V means the Arduino Nano is not outputting a signal.

Description	Calibration	Conversion Formula
Ethanol Content (%)	50 Hertz = 0% ethanol 150 Hertz = 100% ethanol	ethanol % = [Frequency (Hz) - 50]
Fuel Temperature (degC)	1 millisecond pulsewidth = -40 degC 5 milliseconds pulsewidth = 125 degC	degC = [41.25 * Pulsewidth (ms)] - 81.25

**Note: If the sensor's output is 180Hz - 190Hz the fuel is contaminated (most likely with water)

Sensor Testing:

1. Pour the E0, E85 and E100 in three separate bowls
2. Connect the Continental Flex Fuel Sensor to power
3. Swish the Sensor in E0 and measure the Hz output with a DMM
    a. 50 Hz expected
4. Swish the Sensor in E85 and measure the Hz output with a DMM
    a. 101 Hz - 133 Hz expected (51% - 83%)
5. Swish the Sensor in E100 and measure the Hz output with a DMM
    a. 150 Hz expected
6. Once it is verified that the Continental Flex Fuel Sensor is functioning as expected, the code can be tested.

Translator Testing:

1. Adjust the E85 variable, on line 14 of the code, in accordance with the Hz output measured while testing the Sensor in E85.
2. Upload the Code to the Arduino Nano
3. Connect the Arduino Nano to both the Sensor and Power
4. Swish the Sensor in E0 and measure the V output with a DMM
    a. 0.5V expected
5. Swish the Sensor in E0 and measure the V output with a DMM
    a. 2.54V - 3.82V expected
6. Swish the Sensor in E0 and measure the V output with a DMM
    a. 5.0V expected
7. Ensure that the V output for E85 matches the expected value, using the following calculation:
    a. 0.5 + ((the E85 Hz output - 50) * 0.04)

Once all tests have passed the sensor and translator is installed: the car can be tuned to accept this new input.