*ECU ASSAIGNMENT: STAGE 2*

For my project the user will have to enter the vehicle speed and say if the car is accelerating, decelerating or stable. The sensor’s that I will use in my project are the Throttle Position Sensor, Crankshaft Sensor, Oxygen Sensor, Engine Coolant Sensor and M.A.P Sensor.

*Throttle Position Sensor:*

While accelerating the Throttle position Sensor the butterfly valve will open as it relates to the speed. So if the car is going 25km/h and is accelerating at a velocity of 2km/sec, then the butterfly valve will mimic this and open more and more. At a stable speed(coasting) at let’s say 90km/h when the acceleration is 0km/sec, the butterfly valve will remain open, it won’t be closing or opening more, it would just be stable. While decreasing the valve would again relate to the speed and as the speed decreases so will the valve limiting the amount of air being able to enter the engine. A sample calculation of this would be…

*Crankshaft Position Sensor:*

The Crankshaft sensor, again, is also dependant on speed. As the car accelerates it will increase its RPM, as the car is cruising at a constant speed its rpm will also be fairly stable but as the car deaccelerates its rpm will also decrease.

*Oxygen Sensor:*

The O2 sensor usually found at the exhaust of a car measures the amount of oxygen not combusted. This sensor will tell the ECU if the mixture is burning rich (excess fuel) or burning lean (excess oxygen). To try to minimize the environmental impacts the ECU tries to make the air/fuel mixture as close to 14.7:1 as possible. To calculate the amount of oxygen let the initial amount of fuel equal to 16. Then to find the delta O I take the change in speeds and divide it by 2. To get the final amount I add the two oxygen’s together. The amount of oxygen increases as the car is accelerating and decreases as it is decelerating.

*Engine Coolant Sensor:*

The Engine Coolant Sensor records the temperature of the antifreeze that cools the engine and reports it back to the ECU. This is related to the speed the car and the amount of time the car was travelling. So if the car travelled at a slow pace for a short time the engine wouldn’t be as hot as if it travelled at a high speed, and the hotter the engine gets the higher the temperature the sensor detects and sends a low voltage the ECU letting it know how hot the engine is. The results are used to determine the optimal amount of fuel to inject and the optimal time for combustion to occur. A sample of this could be 36 degrees, an estimation of a cars engines heat, multiplied by the speed their going at (faster the speed, the more the RPM, the more combustion taking place generating more heat)divided by the time they were travelling(in minutes).

*M.A.P. Sensor:*

The M.A.P sensor calculates the pressure of the air that enters into the engine. This shouldn’t change if the car is deaccelerating, coasting or accelerating. The higher the pressure the more pressure is created by the M.A.P. sensor and is then sent to the ECU to be calculated with the Coolant temperature results and the engine speed sensors results to calculate the optimal amount of fuel to be added into the engine.

The rational for choosing these 5 sensors, are that they are all interrelated. The Throttle Position Sensor intakes the oxygen for the M.A.P. Sensor checks the volume (amount) of air that is in taken. This in turn affects the Oxygen Sensor which determines if the mixture is too rich or too lean and reports this back to the ECU after combustion which affects the Engine Coolant Sensor as many combustions occur the engine gets really hot and the Engine Coolant Sensors job is to cool it down. Seeing as they are all interrelated and are extremely important for the ECU and the engine to run efficiently and smoothly, they were the logical choice for this project.