**OCN418 term project proposal**

**Thesis:**

It is common for people to drive with their windows open in Hawaii. However, is it really safe for people to drive with open windows in heavy traffic, especially on a jammed highway? Since exhausted gas may contained harmful gases such carbon monoxide and nitrogen oxide. As traffic on Oahu during the rush hour can be so much pain for all the commuters, it has the potential of polluting and causing small scale air quality variation in a relatively small timeframe.This proposed project intended to use self-developed sensor package to explore the relationship between temperature, humidity, exhausted carbon concentration, and traffic.

**Objective:**

1.) Conduct measurement in different traffic condition by driving through Pali highway at various time during the morning.

2.) Measuring temperature, humidity, carbon monoxide, carbon dioxide, and nitrogen oxide(?) under different traffic circumstances with inexpensive self-developed sensor package.

3.) Using box theory to calculate residence time of a car and correlate the result to quantify traffic condition.

4.) Using GIS tool to present visualization of comparison of different time, traffic conditions and different section of Pali. (This might be too much work for me…)

**Approach:**

This project consists of two parts: relationship between exhausted gas concentration and humidity and relationship between traffic and exhausted gas concentration. For both parts, measurement will be conducted while I drive through Pali highway in the morning. The reason of choosing Pali highway for measuring station is that Pali highway can be consider as a simple box model with only two opening. It is much less complicated than H1, which has many entrances and outlets. Most importantly, it can become misty corresponding to moisture and temperature. The condensation might affects exhausted gas concentration as water may shift the equilibrium. In order to compare exhausted gas concentration in different traffic condition and humidity setting, the measurement will be conducted at various different times in the morning. On one hand, for example, eight o’clock is considered the peak of the rush hour in the morning whereas most of the traffic will ease down around 9 o’clock. On the other hand, the Pali highway usually become misty with enough moisture in the early morning. After measurement, data will be processed with python and QGIS. The datasets from different measurements will be compared with others based on similar traffic timeframe or humidity.

**Budget:**

Raspberry PI

Bread Board

GPS Antenna - External Active Antenna - 3-5V 28dB 5 Meter SMA — $14.95

Adafruit BME680 - Temperature, Humidity, Pressure and Gas Sensor — $22.50

erAdafruit CCS811 Air Quality Sensor Breakout - VOC and eCO2 — $19.95