

# 1 Introduction

## 1.1 Developing a Reasonable Question

As defined in your prospectus, we need to ensure our research question aligns with our methods – and our analysis procedures, which is often a statistical test.

## 1.2 Testing Methods

One effective way to do this is to collect preliminary data to ensure we will get reasonable results.

## 1.3 Creating Reliable Data Sources

# 2 Deploying the Pis

We did not have the capacity to create a robust case for our Pis that might allow them to be deployed without exposure to the elements.

Thus, here are some suggestions:

- Put the Pi and breadboard in a plastic sandwich bag and/or tupperware container. Make holes for the power input and the CAN PM sensor cable.
- Put the sensor at where there is good air flow outside a window that you can provide power to the Pi. Or better yet, find a location outside where a power socket is available. Note: the cable switch is not water proof, so be to protect the on/off switch; maybe put in a plastic bag too?
- Hopefully, the Pi still connects to your WiFi. If not, we'll have to come up with a method to launch the program on boot up. Work with Kyle if you have this issue, briefly we will
- Edit the rc.local file to include the path of your script that you want to run. Make sure to include an ampersand "&" at the end of the path command, **this is REALLY important**. Otherwise, if the python script doesn't inherently end, and runs in a loop, the RasPi will never finish booting up "technically." When this happens, you won't be able to input any commands into the CLI. You **WILL** have to reformat the SD card and start all over. The rc.local file is located at /etc/rc.local in nearly every Linux distribution. YES, the Pi's OS is Linux.
- Modify the Pi Configuration Utility and change the Boot option to: "Boot To CLI". That way, the next boot, it boots to the command line interface and runs the python script and if the program is a loop it'll keep running the script until you exit it.
- We suggest you collect several days of data – ideally 7 days, but much will depend on how easily we can build the kits and get them to cooperate.

- We suggest you stop the program everyday, rename the Air\_Quality.csv file with a new name (e.g. with the date in front, e.g. 201022\_Air\_Quality.csv), then restart it. This way we won't create a large csv file that might be hard for the Pi to deal with.

## 3 Collecting the data

Once the data have been collected, you can extract the data from the SD card and copy to r for processing, the name of the file is Air\_Quality.csv.

### 3.1 LED Stays On Continuously

I had this in my first deployment I had trouble after 12 hours, where the Pi would take forever to finish the sampling (LED on for 3-5 min) and then the program seemed to crash.

I rebooted the Pi and then saved the Air\_Quality.csv file into a new file, e.g. Air\_Quality1.csv and then started the program again. However, I think it might be worth changing the frequency to see if that solves the problem. Yesterday, I changed the sleep time from 58 (line 121) to 298. These are in seconds, so then we get a reading every 5 min instead of every min. Ever minute is probably overkill anyway!