

# What are the effects of current climate change mitigation policies on the local environment?

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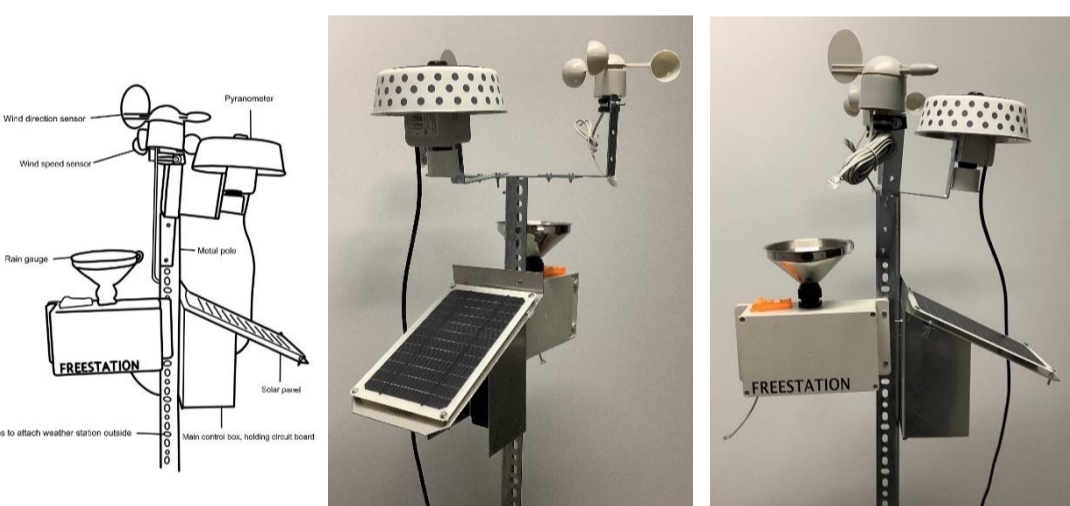
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## Overview

We will develop a long-term environmental monitoring station in our local area, thereby becoming part of a global community of climate researchers working with [FreeStation.org](http://FreeStation.org). The apparatus is being constructed and installed by our team in collaboration with King's College London, designers of the FreeStation system. Data collected on rainfall, wind, river flow, soil and air quality will be processed regularly and analysed for greater understanding and in order to explore our target question, which is focused on the effect of urban weather/climate and pollution mitigation policies on the local environment.

## Aims

This project aims to successfully build a complete environmental monitoring station, placed outside, that will collect data from a variety of sensors attached in a given time. We will then analyse the results from the device and use our found data to understand the effects of current climate change mitigation policies by seeing what impact they make to their surrounding area. Using the data we will recognise which policies are most effective and impactful to the climate.



## Background information

The weather station, placed outside, has 4 main sensors attached to it, which will monitor and collect data. There is a pyranometer, which converts the global solar radiation into a measurable electrical signal. Wind speed is measured using an anemometer and the average speed is proportional to the number of turns in a given time. Wind direction is measured similarly, by a vane consisting of a vertical flat plate at one end with its edge to the wind and a balanced weight at the other end that acts as a pointer. Rainfall is measured using a rain gauge, and the average volume of rain is calculated. The station will gain the required energy from both a solar panel and, for when it is not sunny, an attached battery.

All of the sensors connect to a main circuit board, located under the solar panel, and attached is a photon with uploaded firmware. The photon collects the data and then stores it onto an SD card. The SD card will be accessed and the data uploaded to the FreeStation website at regular intervals. The data will be analysed and compared to see the key patterns and trends at different times.

## Methodology

The EduStation is a small particle photon microcontroller that by default, reads instruments every 10 minutes, averages every hour and (when connected to a hotspot) sends to [www.freestation.org](http://www.freestation.org) where the data may be retrieved. Components with male headers are connected via female headers on the FreeStation PCB. We soldered female header, particle photon, resistor, RJ45 connector (sensor 1), the reset button, 2N3904 transistor, female barrel power jack, settings switch and the BME280 sensor to a main circuit board. Pyranometer: We secured the photodiode assembly and FreeStation to the pyranometer and secured it in a dog bowl to make the solar radiation sensor. Temperature Humidity sensor: We soldered different components onto a FreeStation and secured it in an enclosure, attaching an end cap onto the enclosure. Rain gauge: We attached a funnel, a box and a spirit level into an enclosure. Wind speed and direction: We attached an anemometer and a vane onto brace bolts which we directly added to the weather station. We then installed the firmware and set up a phone as a WIFI hotspot. The FreeStation will look for this network and connect (green LED) via mobile data, collect data (blue LED next to D7 lights up) and send the data (yellow LED) before going back to sleep (LED off).

## Predicted results

We predict that our results will show the effects of mild climate change (for example, mostly reliable rain patterns, small increase in the average temperature and humidity). We hope that we will also be able to see the effects of mitigation policies implemented by the government, such as the Ultra Low Emission Zones which were introduced across London. Additionally, we predict that we will be able to see the effects of school gatherings such as sports matches as many people travel by car, and also the arrival and departure of the school coaches. This could temporarily increase the temperature, and as it could cause a minor fluctuation in the pollution levels, we think that it will not create a larger effect than this.

## Conclusion

In conclusion we are creating a long-term monitoring system which is connected to a global community of climate researchers, we have been fortunate enough to receive assistance in our research from Professor Mulligan. We aim to understand the effects of the current climate change mitigation policies on the local environment. Once our project is complete we will analyse the data which the four primary sensors will collect and contribute to the global database (FreeStation). We plan on observing the changes in activity in our local area and the effect it will have on the local environment. We predict factors such as an increase in cars (due to local events) may affect the data. We hope that our weather station will make a difference in recognising which policies are most effective and impactful to the climate.

## Next steps

We will set up the weather station outside on a wooden pole as we have completed the construction phase. We will need to discuss the most functional area to measure and collect data from, that will give us accurate and reliable results. Once done we will start analysing the data, to see if our prediction is correct and what conclusions we can form from it.