

Internet of Things for Air Quality Monitoring in Mauritius

Introduction

In a survey conducted by the World Health Organisation (WHO) in 2014, it was estimated that about three million deaths are caused by air pollution. The project aims at investigating the impact of traffic jams on the ambient air quality in Mauritius. The proposed system will use Internet of Things (IoT) devices equipped with sensors to capture the level of pollutant in the air at various locations around the island.

Proposed system

Monitoring stations and Sensors

The monitoring devices consists of a Raspberry Pi 3 and an Arduino board. The sensors required are Ozone (O_3), Carbon Monoxide (CO), Oxides of Nitrogen (NO_x), Particulate Matter ($PM_{2.5}$ and PM_{10}), temperature, atmospheric pressure and relative humidity. The sensor data along with information such as the identifier of the monitoring system, timestamp for the data captured, GPS coordinates of the sensing location are captured at regular interval during the data and stored.

Sensors

The sensors selected are Grove sensors. The Grove sensors can be easily attached to the board via the two Grove interfaces provided and no soldering is required. Because no soldering is required, the maintenance of the of the air monitor system easy. The Grove sensors used in the system are the Multi-channel gas sensor which can detect gases such as Carbon Monoxide (CO) and Nitrogen Dioxide (NO_2), and the Dust particle sensor which is used to monitor Particulate Matter ($PM_{2.5}$). The Ozone(O_3) and Temperature/Pressure/Humidity sensor are ControlEverything (<https://learn.controleverything.com/>) sensors. These sensors are attached to the Arduino board via a shield and they also do not require any soldering to be installed.

Data Collection

The data collected is uploaded to the Azure platform using NodeJS, C# or Python. In 2016, we obtained a grant of \$20,000 for the Air Quality Monitoring project from Microsoft in the form of access to the Azure platform for 12 months. This grant has enabled us to use the services available on Azure to store the data collected and analyse them using Microsoft's Stream Analytics Service. The sensor data captured can also be accessed via Power-Bi reports and Dashboard and analysed using Statistical Software such as R or MATLAB.