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Environmental Gaseous Sensing Using Sniffer Drone for Urban Development Control

INTRODUCTION

- The development control function seeks to manage and regulate property development to ensure that all development takes place at an appropriate time and place and in such a manner that it conforms to a pre determined set of policies or standards.
- The development control impose for industrial area are consist of development guidance for industrial development including the buffer zone implementation.
- Buffer zone is to preserve quality of life/minimize environmental conflicts arising from land use incompatibility.
- Small drone equipped with automated sensing payloads are emerging as a valuable tool for environment monitoring including sniffers.

- Klang Industrial Area is surrounded by massive development in Klang City.
- The distance 0.1km – 0.5km to settlement areas (traditional settlements and well planned housing areas)
- The test area of Klang Industrial Area is located between 02^o52N to 02^o59N latitudes and 101^o16E to 101^o23E longitudes – 66.64 acres.
- This heavy industries area consist of electrical and oil and gas manufacturing.

| Element	Description
Drone Features	DJI Matrice 100. QuadCopter, 5km control range, HD video downlink, 1kg payload capacity, 20 min flight time with Sniffer4D installed.
Sensor	CO2 module, 0 – 5,000ppm High-resolution O3+NO2 module; Wide-range CxHx (CH4) module; High-res CO module; High-res SO2 module;
Processing Software	Sniffer4D Mapper
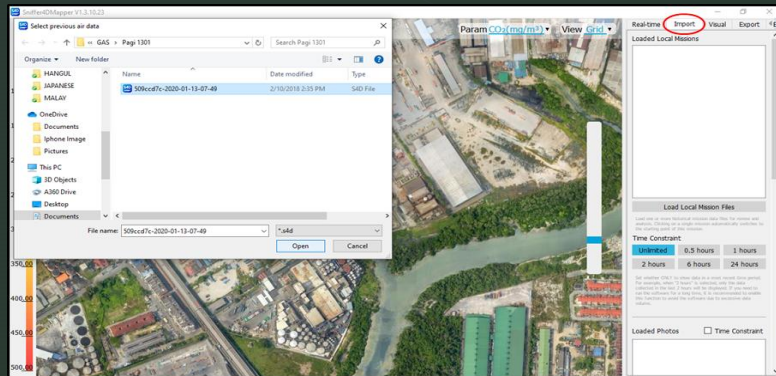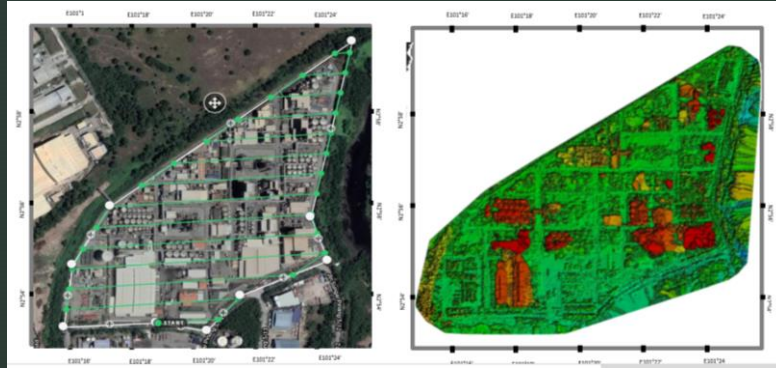
- The fieldwork was carried out on last sept 2020.
- Flight track at 100 meters height was set in early morning (accurate gaseous emitted from industries activities)
- Sniffer4D sensor captured the concentration of *Carbon dioxide (CO^2)* and *Hydrocarbon (C$_x$H$_y$)*.
- The georeferenced images from the drone was further mosaic in Sniffer4D mapper Version 1.3.10.23 and Pix4D Mapper
- The rectification of data rely on the drone system with further rectify with the coordinate reference system of EPSG:3380
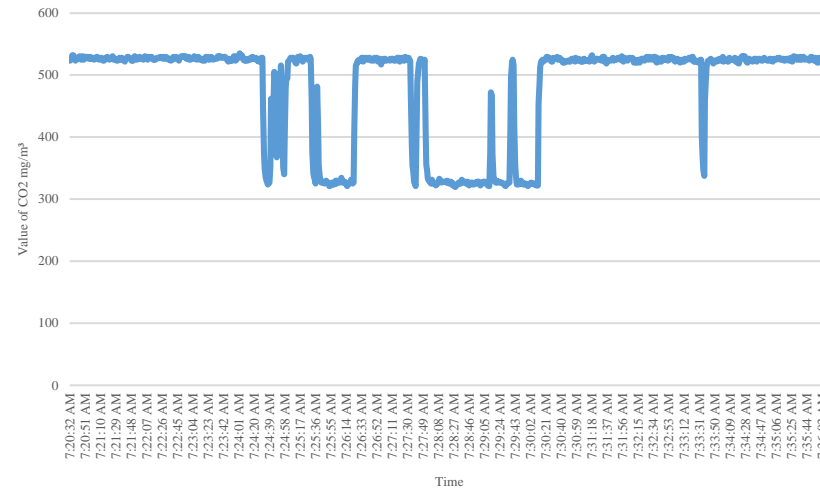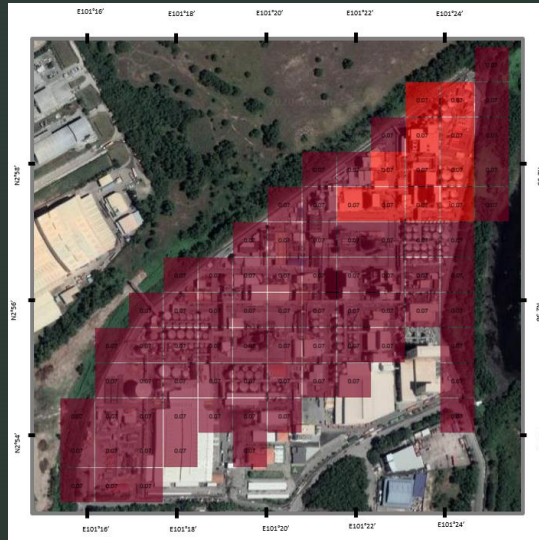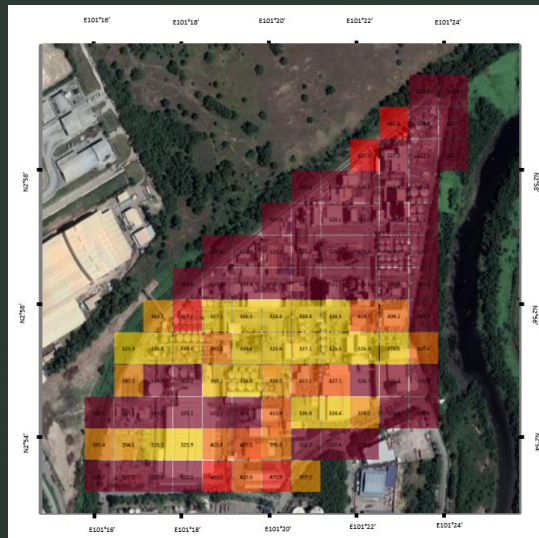
The range of CO_2 of case study area for 100m is 267.018 ppm respectively, which is below 1,000 ppm

Carbon dioxide (CO_2) by

Sniffer4D drone at Pulau Indah at

100m Altitude

the industry site shows that the average of hydrocarbon is 0.078% which equivalent to 780 ppm

Carbon dioxide (CO_2) by

Sniffer4D drone at Pulau Indah at

100m Altitude

- The study area is in normal range of outdoor CO_2 but the concentration value maybe in future will reach the hazardous level.

- The overall **r**esult shows that the value of CO_2 is between average 291.928 ppm - 290.890 ppm and it is still below the hazardous level for CO_2.

- The value of the hydrocarbon are 650 ppm – 700 ppm shows the highest value compare to CO_2.

CONCLUSION

- The development control on the buffer zone for industrial area was tested through the risk of environmental gaseous that emitted by heavy industries.
- The finding shows that the existing buffer is too close to the nearest settlement (0.1km -0.5km)
- The sniffer drone tested the concentration of CO_2 and (C_xH_y) are in normal range except for (C_xH_y) that closely alerted.
- The government should find a precaution steps in order to ensure compatibility of land uses and same time on human safety.
- UAV – sniffer is reliable – tools for environmental pollution monitoring and development control.