

## Environmental Research, Technology Demonstration and Conference Project

<b>ECF Project:</b>	ECF 2020-111
<b>Project Title:</b>	Detection of methane fugitive emissions from landfills using drone based hyperspectral remote sensing
<b>Principal Investigator:</b>	Dr Yao Wei, Department of Land surveying and Geo-Informatics, The Hong Kong Polytechnic University
<b>Total Approved Grant:</b>	\$499,200
<b>Duration:</b>	1/7/2021 to 31/7/2023
<b>Project Status/Remarks:</b>	Completed
<b>Project Scope:</b>	The current practice of measurements and estimations of landfill gas generation is usually limited to applying ground-based local sampling on site or biogas generation model as a function of waste-in-place. As a result, only a very small portion of the emission can be checked with low accuracy (considerable underestimation). Thus, there is urgent need for a wall-to-wall top-down detection and monitoring method with aerial remote sensing capacity to spot out the methane leakage and quantify the city-wide emission budget. The research team is going to develop a UAV-based hyperspectral remote sensing technology for methane detection and monitoring from landfills, i.e. development of a drone-based hyperspectral remote sensing technology for methane detection from landfill emissions using deep learning and aerotriangulation.
<b>Summary of the Findings/Outcomes:</b>	On the evening of the rapid development of artificial intelligence and sensor networks, our research team base in Hong Kong challenged a world class question: How to develop and improve small area Methane Monitor model. It is the first time to try to use hyperspectral image to precisely monitor landfills in Hong Kong in a spatially-temporally continuous way. By analyzing data from WENT without need of data from the Hong Kong Observatory, we combine large eddy models, hyperspectral satellite images, and computational intelligence to explore Methane leakage from the WENT. We found that our methane monitoring model of the WENT had been initially completed to solve the problem of inaccurate models for detecting methane in small areas of Hong Kong. Our model is also conducive to deepening the understanding of Hong Kong heat island effect, carbon budget, and provide technical support for the monitoring of methane leakage from Hong Kong gas pipelines and offshore oil fields in the future, finally contribute the wisdom of Hong Kong Polytechnic University to the completion of the HKSAR Government's "2050 carbon Emission" commitment.