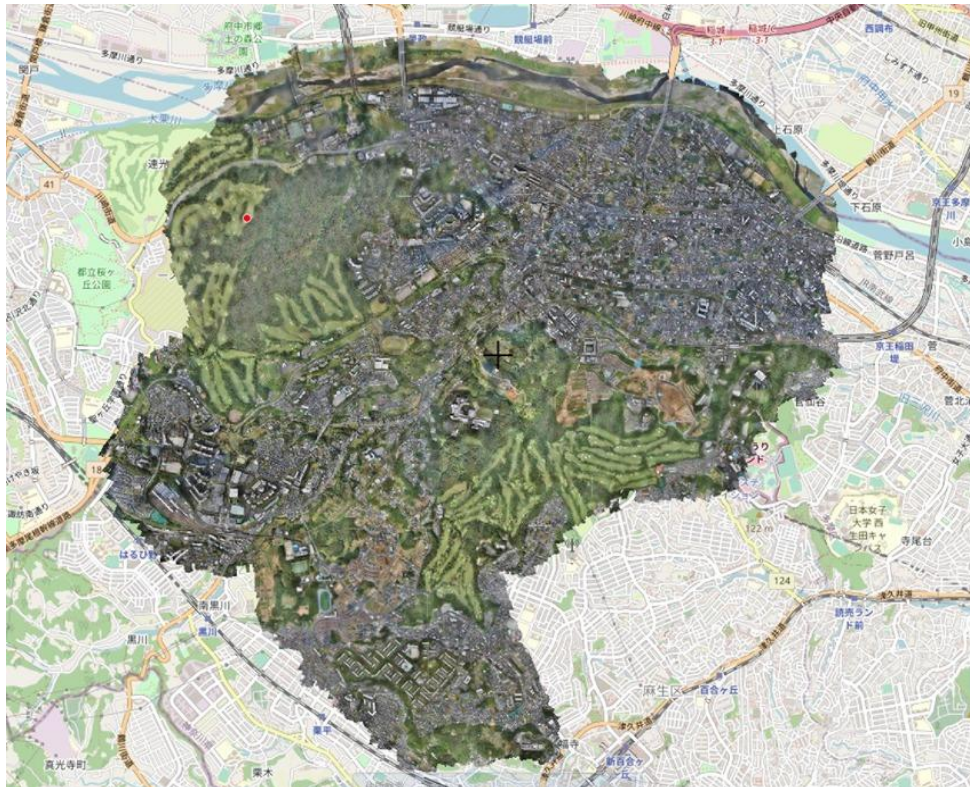


Preserving Inagi, the green city in the suburbs of Tokyo



The resulting from the drone flights



Team of Japan Flying Labs conducting field operations

OVERVIEW	
Flying Labs	Japan Flying Labs
Geographic area	Inagi City, Tokyo, Japan
Date range	September - October 2021
Sector program	EcoRobotics
Main SDGs	GOAL 11: Sustainable Cities and Communities GOAL 13: Climate Action

SCOPE	
Project stakeholders	Inagi municipal office, Tokyo
People impacted	Citizens in Inagi city
Number of people impacted	About 93,000 citizens of Inagi city (population 92,898 as of Nov 2021)
Challenge	In 2009, 56.7% of Inagi city was covered with vegetation. The city is within a 25 km radius from central Tokyo and this ratio of green coverage is unique in such an urban environment. However, recent urban developments were undergone in neighbouring cities and as a result, the green coverage started shrinking.
Scope	Inagi city aims to preserve and increase the green coverage. In 2012, Inagi municipal office established a green basic plan to achieve the vegetation coverage of about 50% of the city area by 2021. In order to assess and quantify the coverage, the city has worked with an aerial survey company to obtain aerial images by helicopter or plane. Recently, the city office became interested in drone technology to reduce the cost of otherwise expensive aerial surveys.
Outcome	<p>An orthomosaic was handed over to a company which analyzes the data. The city wants to know not only the percentage of green coverage in the city, but also the amount of carbon dioxide absorbed by the vegetation.</p> <p>One of the learnings resulting from this project concerned the timing of drone operations. The drone flights were conducted in autumn, so the trees already lost their foliage, making data analysis more challenging.</p>
Impact	Inagi city can obtain aerial images with drones “on-demand” and will be able to assess the change of green coverage at reasonable cost. Moreover, when a disaster happens, the latest orthomosaic can be used in the disaster relief operations, increasing the level of disaster preparedness in the area.
Next steps	We want to propose a seasonal drone flight to check change.

COMMUNITY ENGAGEMENT AND STAKEHOLDER SUPPORT	
Consent for data acquisition	The Inagi municipal officials obtained consent from communities and authorities, such as the police.

	We were asked to fly over public bathhouses which have outdoor baths before their business hours start (9 AM) to protect privacy.
Activities to engage with the community	Because of the new coronavirus outbreak, email exchanges with the municipal officials were the main form of communication and community engagement
Community groups engaged with	Mayor of Inagi and municipal officials
Community attendance	No
Community feedback	The company is still in the process of analysing data, so the results were not yet shared with the community
Stakeholder support	N/A

DATA ACQUISITION

Size of area	2280 ha (22.8 km ²)
Drone	eBee X, Aerobo Wing (AS-VT01)
Sensor(s)	RGB
Flight plan software	eMotion (for eBee X) and Aerobo Wing dedicated software
Flight height	150 meters above ground level
GSD (Accuracy)	4 cm/pix
Number of images acquired	9827 images by eBee X 959 images by Aerobo Wing
Number of flights	10 flights by eBee X 3 flights by Aerobo Wing
Time invested in data acquisition	3 days
Georeferencing	Onboard GPS

DATA PROCESSING & ANALYSIS

Processing software	Agisoft Metashape
Processing time	18 hours 26 minutes 28 secs
Data products	Orthomosaic, 3D point cloud and Digital Elevation Model
Analysis tools	Analysis is conducted by an external company
Analysis outputs	N/A
Final outputs shared with stakeholders	Raw data, orthomosaic, 3D point cloud and Digital Elevation Model
Data sharing	Google Drive, email, SD card