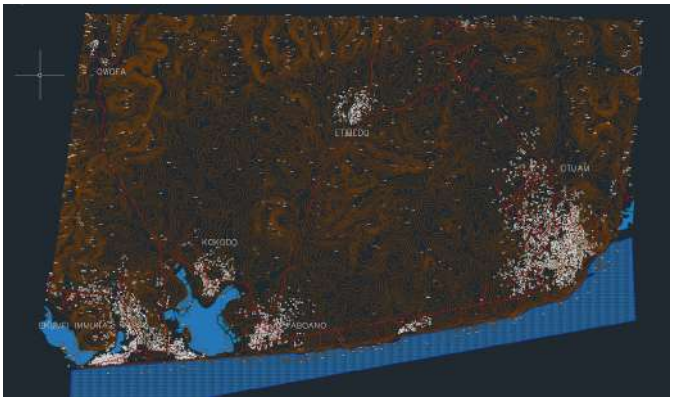
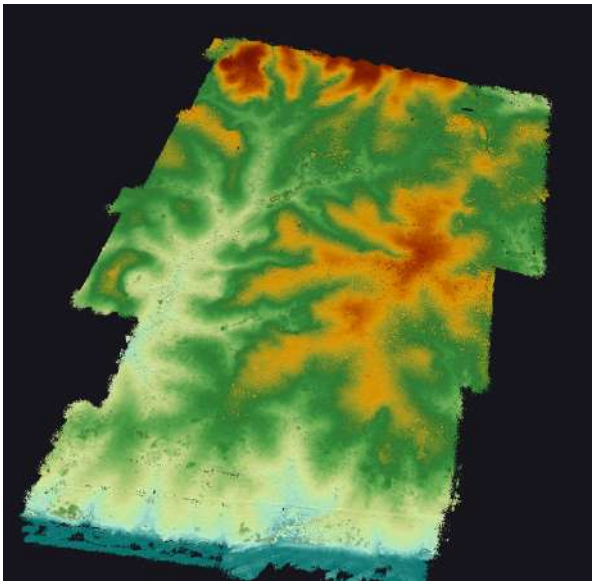
Aerial, LiDAR, and Aeromagnetic Survey for a Renewable Energy Project Site Identification

Team preparing the DJI M300 and the YS Mapper LiDAR scanner for LiDAR Scanning

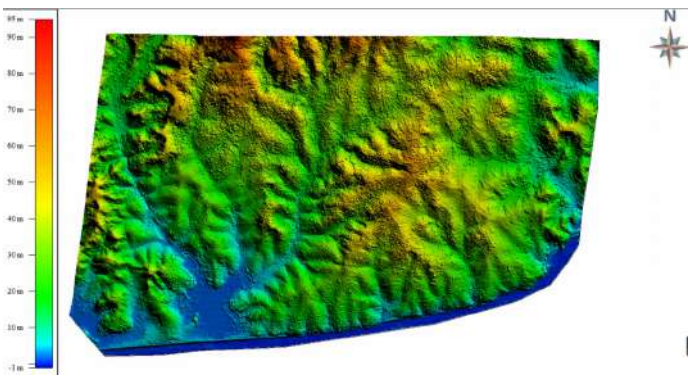
Observation of Ground Control on Constructed Concrete Pillar on Site



Digital Map (CAD) of Obotan Sites



Point Cloud of a section processed after processing



Digital Terrain Model for Obotan Site

OVERVIEW	
Flying Labs	Ghana Flying Labs
Geographic area	Atuapim/Nsuban and Obotan, Ghana
Date range	August to September 2023
Sector program	EcoRobotics
Main SDGs	GOAL 7: Affordable and Clean Energy GOAL 8: Decent Work and Economic Growth GOAL 9: Industry, Innovation and Infrastructure GOAL 13: Climate Action GOAL 17: Partnerships to achieve the Goals

SCOPE	
Project stakeholders	Nuclear Power Ghana (NPG)
People impacted	The people of Atuapim/ Nsuban and Obotan
Number of people impacted	Approximately 100,000 people
Problem statement	To address the continued impacts of climate change on sustainable energy provision and access and shrinking livelihoods, a thorough analysis was conducted to identify the optimal terrain for the construction of the Nuclear Power Plant. The selection of a nuclear power plant location has been a challenge, mostly because of factors such as geological stability, proximity to water sources and environmental impact. Achieving optimal selection requires a comprehensive assessment that considers safety, sustainability, and regulatory compliance. Developing a robust methodology integrating technical, environmental, and socio-economic criteria is crucial for making informed decisions in establishing a nuclear plant.
Project objectives	Perform an aerial survey which includes but not limited to the establishment of Geodetic Control Network, Aeromagnetic Survey and Light Detection and Ranging (LiDAR) and/or Photogrammetry survey on the proposed Ghana's Nuclear Power Project site at Atuapim/Nsuban and Obotan.
Scope	• Collect all relevant data on previous land surveys.

	• Establish a Geodetic Control Framework of precise coordinates in International Terrestrial Reference Frame (ITRF), 2014/ UTM Zone 30N. • Computation of transformation parameters from the ITRF/UTM Zone 30N to the local coordinate system. • Aerial data Survey (RGB and LiDAR). • Aeromagnetic Survey at Atuapim/Nsuban and Obotan. • Generation of GIS layers such as relief, hydrography, vegetation, transportation in a vector format (.shp) • Production of Topographical map.
Outcome	The successful execution of this project resulted in the production of an Orthomosaic, Digital Terrain Model (DTM), Digital Surface Model (DSM), Digital Map, Control Points and Point Clouds of the sites surveyed. This will assist Nuclear Power Ghana and all other stakeholders in their feasibility studies, engineering design and other uses.
Impact	This project will result in job creation for the locals, as a nuclear power project requires a workforce for construction, operation and maintenance. The project will also provide clean energy for communities, contributing towards global sustainable energy and climate resilience.
Challenges	• Rain during some days of the week interrupted data collection. • Lack of access to some parts of the site for the Atuapim/Nsuban site.
Next steps	Reaching a consensus on which of the two areas of interest is most suitable for construction of the nuclear plant between the NPG and the government.

COMMUNITY ENGAGEMENT AND STAKEHOLDER SUPPORT	
Consent for data acquisition	The Chiefs and Traditional Council of the various locations were informed about the importance of the project and how it was going to be carried out.

Community engagement activities	The Chiefs and Traditional Council of Atuapim/Nsuban and Obotan informed their people about the project.
Community groups engaged with	The Chiefs and Traditional Council of Atuapim/Nsuban and Obotan.
Community attendance	100 people
Community feedback	All community leaders were pleased with the opportunities that the initiative had to offer its members.
Stakeholder support	With the data outputs, the stakeholders were informed on the more suitable site for constructing the power plant based on the DTM and geophysical data collected from the aeromagnetic survey.

DATA ACQUISITION	
Size of area	75 sq. km2 or 7500 hectares
Drone	DJI M300, Wingtra One
Sensor(s)	YellowScan Mapper, RGB Sony RX1R II
Flight plan software	Drone Deploy
Flight height	200 and 250 meters above ground
GSD (Accuracy)	3.7cm/pix
Number of images acquired	24273
Number of flights	42
Time invested in data acquisition	12 days
Georeferencing	A PPK enabled drone and a multi frequency GPS were used.

DATA PROCESSING & ANALYSIS	
Processing software	Trimble Business Center, Trimble Applanix Pospac software, WingtraHub post processing software, Agisoft Metasahpe, Global Mapper software, and YellowScan Cloudstation.
Processing time	6 weeks (8 hours per day) approximately 20160 minutes
Data products	• Orthomosaic created with Agisoft Metashape • Digital Map created with AutoCAD Civil 3D • DTM & DSM created with Agisoft Metashape • Contours • Pointcloud created with Global Mapper • Coordinate List for Ground Controls created with Trimble Business Center
Analysis tools	ArcGis and QGIS, AutoCAD Civil 3D
Analysis outputs	• Digital Terrain Model • Digital Surface Model • Digital map
Final outputs shared with stakeholders	RGB Orthomosaic Digital Map DTM & DSM Contours Pointcloud Coordinate List for Ground Controls Survey Report
Data sharing	External hard drive