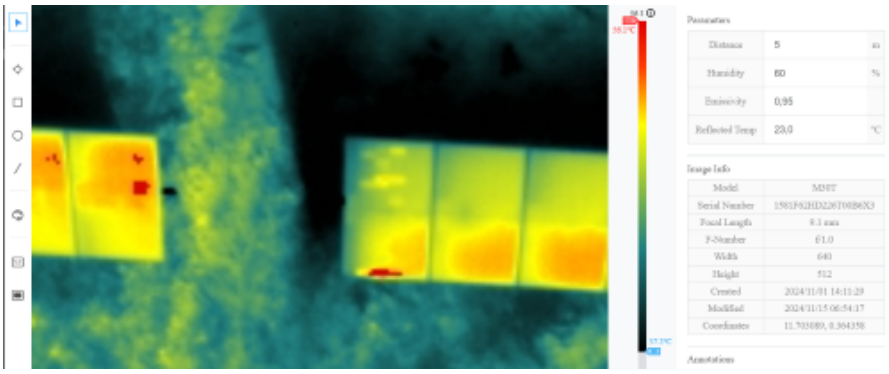
Burkina Faso Flying Labs Collaborates With Namibia Flying Labs For Thermographic Inspection of a Solar Power Plant

Solar power plant

The team at work



Analysis of the thermographic images

OVERVIEW	
Flying Labs	Burkina Faso Flying Labs
Geographic area	Tenkodogo, Burkina Faso
Date range	November 2024
Sector program	DevRobotics
Main SDGs	GOAL 7: Affordable and Clean Energy GOAL 9: Industry, Innovation and Infrastructure

SCOPE	
Project stakeholders	Elsewedy Electric, Namibia Flying Labs
People impacted	Stakeholders of the renewable energy sector in Burkina Faso and the Burkinabe population in general.
Number of people impacted	Around 200,000 households supplied by a 20 megawatt photovoltaic power plant.
Problem statement	In recent years, Burkina Faso's energy policy has focused on developing renewable energy production capacity, through the

	installation and operation of photovoltaic power plants. By 2023, renewable energies will account for 21.93% of national energy production, compared with just 09% in 2015. This strategic choice reflects the desire of current policies to make the country self-sufficient in terms of energy and to increase household access to electricity. To ensure the success of this shift, it is essential for stakeholders to adopt effective yet affordable preventive maintenance practices, so as to guarantee the durability of photovoltaic power plants and prevent energy losses. Thermal and visual inspection operations by drone have proven to be effective in the early detection of defects in photovoltaic modules, but analysis of the local ecosystem reveals a technical knowledge gap in this area. Burkina Faso Flying Labs has received several requests to carry out thermographic inspections, and has seen the need to develop local expertise in this field.
Project objectives	Through this pilot project, Burkina Faso Flying Labs intended to : ● Demonstrate the potential of drone technology as a tool for inspecting photovoltaic power plants. ● Contribute to building the capacity of local actors to use the techniques employed in the pilot project. ● Encourage stakeholders to adopt the techniques used in this pilot project.
Scope	Thanks to technical support from Namibia Flying Labs, Burkina Faso Flying Labs was able to carry out a drone inspection of a twenty megawatt photovoltaic power plant. The data collected was then analyzed on the basis of the thermal patterns presented by the photovoltaic modules, to determine the likely causes of the anomalies detected. Finally, this study was documented to demonstrate the benefits of implementing thermographic inspections in the maintenance plan for solar assets, in order to influence the implementation of these techniques by actors in the renewable energy sector in Burkina Faso.
Outcome	The inspection report produced following the exercise highlighted all the anomalies affecting the photovoltaic plant, categorized according to level of severity. By way of illustration, strings of modules producing no energy were detected, and this data will help avoid significant economic losses. Others, on the other hand, present a significant safety risk for technicians (e.g. a module with broken protective glass). Using this decision-support

	tool, the customer is able to plan maintenance according to priorities. Following this collaboration, the customer decided to request regular thermographic inspections to monitor the evolution of the assets. The Burkina Faso Flying team also benefited from knowledge transfer from Namibia Flying Labs, thanks to this proof of concept.
Impact	This pilot project will contribute to the emergence of local expertise in drone inspection of photovoltaic power plants, facilitated by Burkina Faso Flying Labs. The adoption of this technology by local players will contribute in the long term to optimizing the sustainability of photovoltaic power plants, preventing economic and energy losses while reducing safety risks. Additionally, this project aims to help increase community access to clean energy.
Challenges	The challenge encountered in implementing the pilot project is a technical one, relating in particular to the interpretation of thermal patterns, and hence the identification of the probable causes of defects observed in photovoltaic modules. This is due to a change in the scope of the project, which initially focused on detecting faulty PV modules. Discussions with the Namibia Flying Labs team and a literature review helped to overcome this challenge.
Next steps	Following this proof of concept, we have planned a meeting with the Ministry of Energy to present the results. Burkina Faso Flying Labs will also be drawing up a guide for the thermographic inspection of photovoltaic power plants, for use by the Flying Labs Network.

COMMUNITY ENGAGEMENT AND STAKEHOLDER SUPPORT	
Consent for data acquisition	Burkina Faso Flying Labs requested a flight authorization letter from the customer, signed and dated by the site manager.
Community engagement activities	The flight operations took place in a private area, away from residential areas. The Burkina Faso Flying Labs team had a brief meeting with the gendarmerie (military group at the plant). This meeting took place on November 01, 2024, and the team was able to share mission objectives, flight plan details and the

	duration of the operation. Administrative documents such as the remote pilot's license, the flight permit and the organization's articles of association were also handed over.
Community groups engaged with	Territorial squad of local gendarmerie.
Community attendance	The meeting took place with the military detachment in charge of monitoring the plant, and was attended by around ten people.
Community feedback	No specific recommendations were made.
Stakeholder support	The inspection report includes the location of any photovoltaic modules found to be faulty, and details of the probable causes of these anomalies. As such, the report contains actionable data for the customer's decision-making.

DATA ACQUISITION	
Size of area	50 ha / 0.5 km^2
Drone	DJI Matrice 30T
Sensor(s)	DJI Matrice 30T thermal, Wide and Zoom Camera
Flight plan software	DJI Pilot 2
Flight height	25 m Above Ground Level
GSD (Accuracy)	3.3 cm/pixel
Number of images acquired	Around 2000 photos
Number of flights	9 Flights
Time invested in data acquisition	7 hours
Georeferencing	No

DATA PROCESSING & ANALYSIS	
Processing software	ESRI Drone2Map
Processing time	Around 8h
Data products	Thermal and RGB orthomosaics, RAW photos
Analysis tools	DJI Thermal Analysis Tool
Analysis outputs	List of defective Photovoltaic modules
Final outputs shared with stakeholders	Inspection report including a list of defective modules, the cause of the defect, recommendations on corrective actions that can be undertaken, priority of these actions.
Data sharing	Google Drive