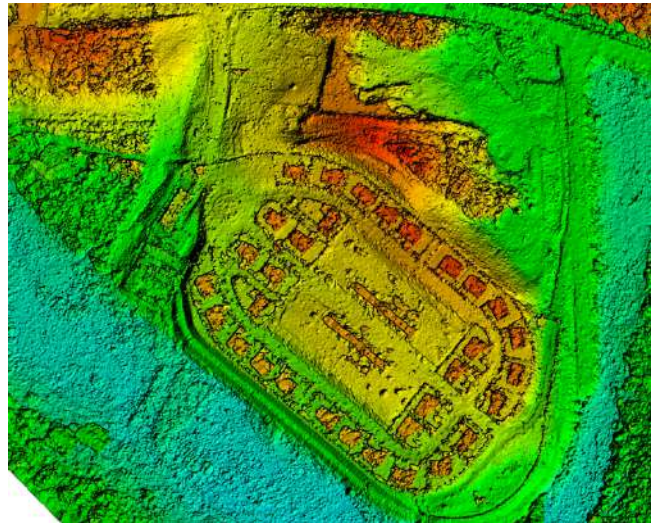


Drone Mapping for Safety and Crowd Management in Fan Zone Areas during Soccer Competitions



Orthophoto of the Fan Zone



DSM of the area of the Fan Zone

OVERVIEW	
Flying Labs	Côte d'Ivoire Flying Labs
Geographic area	Korhogo, Côte d'Ivoire
Date range	January 2024
Sector program	DevRobotics ,
Main SDGs	GOAL 8: Decent Work and Economic Growth GOAL 9: Industry, Innovation and Infrastructure

SCOPE	
Project stakeholders	COCAN (Comité d'organisation de la Can), District d'Abidjan
People impacted	Football fans in and around the Fan Zone
Number of people impacted	10,000
Problem statement	This use case describes the application of drone mapping technology to enhance safety and crowd management in Fan Zone areas during large-scale soccer competitions. Fan Zones, being congregational spaces for fans to watch matches and participate in event-related activities, require meticulous planning and real-time monitoring to ensure public safety and a positive fan experience.

Project objectives	<p>To utilize drone mapping technology to provide real-time, aerial insights for effective crowd management, safety monitoring, and emergency response coordination in Fan Zone areas during soccer competitions.</p>
Scope	<ul style="list-style-type: none"> ● Pre-event mapping of Fan Zone areas to establish baseline layouts and identify critical points (e.g., entrances, exits, medical stations). ● Scheduling of drone flights before, during, and after events to monitor crowd movements, identifying potential hazards, and gathering data for post-event analysis. ● Coordination with local authorities, including law enforcement and emergency services, for integrated response efforts. ● Processing the data to obtain 2D Maps.
Outcome	<p>This project successfully led to;</p> <ul style="list-style-type: none"> ● A reduction in accidents, injuries, and security breaches thanks to proactive crowd management and the ability to quickly address potential threats. ● Strengthened relationships between event organizers, local authorities, emergency services, and the community, fostering a collaborative approach to public safety. ● Access to detailed data analytics for post-event review, helping organizers understand crowd behavior and make informed decisions for future events.
Impact	<ul style="list-style-type: none"> ● Drones offer rapid assessment capabilities for emergency situations, helping to streamline and target response efforts, potentially saving lives and reducing the severity of incidents. ● With aerial data, organizers can manage crowd movements more effectively, reducing bottlenecks and improving the overall attendee experience.
Challenges	<ul style="list-style-type: none"> ● Ensuring drone operations do not interfere with the enjoyment of the event by attendees. ● Addressing privacy concerns related to the use of drones for surveillance. ● The need for contingency plans in case of drone malfunction or adverse weather conditions.

Next steps	<ul style="list-style-type: none"> • The project can highlight areas for improvement in drone technology, operator training, and data analysis, driving continuous improvement in these areas. • Exploring opportunities to expand the use of drone mapping technology to other events or operational areas, considering different types of gatherings or public spaces. • Consider scaling the technology to incorporate additional functionalities, such as thermal imaging for nighttime operations or AI-based analytics for crowd behavior prediction.
-------------------	--

COMMUNITY ENGAGEMENT AND STAKEHOLDER SUPPORT

Consent for data acquisition	Authorization from event organizers affiliate to the government
Community engagement activities	Official meeting in December 22nd at event organizers' office Flight demo in the same site 3 rd January
Community groups engaged with	Government officials, representative of community-based organization, and event organizers
Community attendance	Between 10 - 20 people
Community feedback	Good feedback in general. They wanted to assist to a demo
Stakeholder support	Meeting and work sessions

DATA ACQUISITION

Size of area	0.36km ² /36 ha
Drone	DJI MAVIC 3 E
Sensor(s)	M3T_4.4_4000x3000 (RGB)
Flight plan software	PIX4Dmapper
Flight height	120 m
GSD (Accuracy)	4.71 cm/pix
Number of images acquired	202
Number of flights	13 min
Time invested in data acquisition	25 minutes

Georeferencing	Onboard GPS
-----------------------	-------------

DATA PROCESSING & ANALYSIS	
Processing software	PIX4Dmapper
Processing time	13 min
Data products	DTM, Orthophoto
Analysis tools	QGIS
Analysis outputs	DTM, Orthophoto
Final outputs shared with stakeholders	MAP and Raw data
Data sharing	Google Drive and E-mail