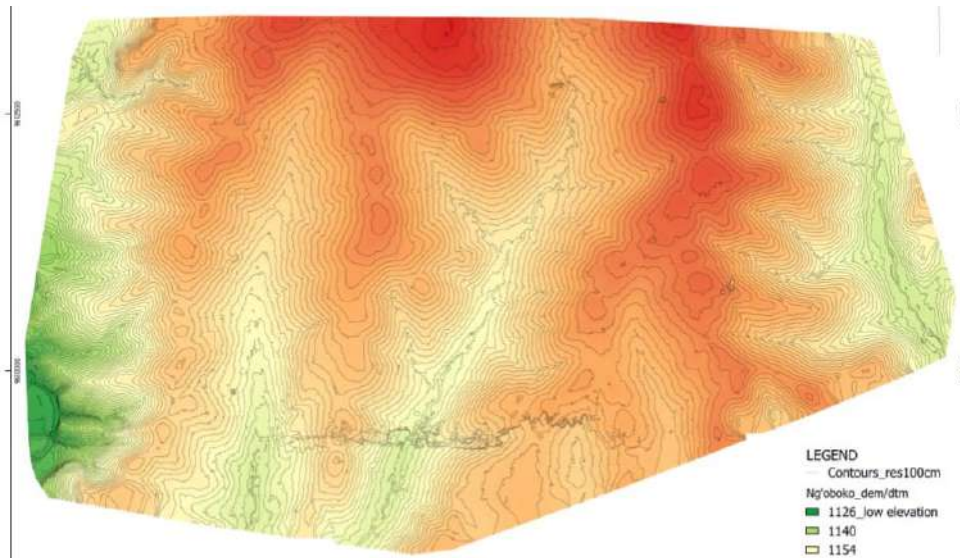


The use of drones for land survey and mapping to improve livestock grazing and farming



Digital Elevation Model of Ng'hoboko Village



Citizens of Ng'hoboko Village assisting Tanzania Flying Labs and each other to identify their farms



Surveyed farm boundaries on top of an orthomosaic

OVERVIEW

Flying Labs	Tanzania Flying Labs
Geographic area	Meatu District in Simiyu Region (Tanzania)
Date	September 2018 - May 2019
Sector program	DevRobotics
Main SDGs	GOAL 11: Sustainable Cities and Communities

SCOPE

Stakeholders (clients)	Meatu District Council Meatu District Communities (farmers and herders)
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Challenge	To undergo a new land planning initiative, the Meatu District Council needed up-to-date maps of villages to be able to understand current land use patterns. Traditional surveying methods require direct access to properties, sometimes in difficult terrain and a specialised equipment, often too expensive or unavailable in small villages, therefore reliable land use plans of the Ng'hoboko and neighbouring villages were not yet available. Nowadays many Tanzanian herders migrate in search of greener pastures, which sometimes forces them to invade protected areas and neighbouring regions. This, topped with lack of land ownership certificates, causes disputes between farmers and herders.
Scope	Understand how drone data can add value to existing methods of data collection and management by mapping village farms to create a cadastral map. Determine the cost of drone data collection and what additional value drone data can contribute. Determine where the challenges lie, both in acquiring drone data for land management applications and in combining it with other data sources to see if drones can be used to support the CCRO issuance process and to improve livestock grazing and farming outputs.
Outcome	Phase 1: drone data acquisition, creation of data products (maps) and first analysis of drone data Phase 2: Combining the drone data with other existing data sources and its integration of the into existing tools for land and resource rights. Once a farm has been surveyed, the owners are issued with "certificates of customary right of occupancy (CCRO)" or traditional title deeds.
Next steps	Development of land use plans for agriculture and registration of certificates in other villages.

DATA ACQUISITION	
Size of area	12 000 ha (120 km ²)
Drone	senseFly eBee Plus
Sensor(s)	RGB / SODA
Flight plan software	eMotion
Flight height	425m above ground level
GSD (Accuracy)	10cm/pix
Number of images acquired	9155
Number of flights	51
Time invested in data acquisition	5 days (nearly 29h of flight time)
Georeferencing	Onboard GPS

DATA PROCESSING & ANALYSIS	
Processing software	Pix4Dmapper
Processing time	110h
Data products	Orthomosaic, DSM, DTM
Analysis tools	QGIS
Analysis outputs	Online map showing farms boundaries on top of an orthomosaic
Final outputs shared with stakeholders	Hard and soft copies of the orthomosaic, DSMs, DTMs, ArcGIS Online map: https://werobotics.maps.arcgis.com/apps/MapSeries/index.html?appid=073faca9c0eb46d293e76d2d86493eee
Data sharing	ArcGIS Online