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Tanzania  
Flying Labs

# Drones for Agriculture Course

August 20 - 22, 2018 - Zanzibar, Tanzania

## Objective

The goal of this 3 day training course is to educate participants in the basics of using multi-copter and fixed-wing drones and the various aerial imagery and products that can be produced for agriculture purposes. This is a hands-on course and learnings include how to plan and pilot fixed-wing drones in autonomous missions, how to process data and create data products and how to work with both RGB and Multispectral sensors.

## Training location

The training curriculum will be held in Zanzibar. The ideal training location that provides both good outdoor agriculture mapping areas as well as a venue for the theory training is the The Kizimbani Agricultural Training Institute (KATI). KATI is located approximately 45 minutes from Stone Town and transport from the hotel to KATI and back to the hotel will be organized and is included in the course fee.

## Equipment

Tanzania Flying Labs will have the following equipment available for the training

- senseFly eBee Plus fixed-wing drone, with accessories, for large-scale mapping
- DJI Phantom 4, with accessories, for smaller area mapping
- Processing laptop for dataset processing and drone control and monitoring

Participants should have the following personal equipment for the training

- A field laptop for each participant, on which senseFly eMotion and Pix4D Mapper is installed (installation files to be provided)
- Minimum system requirements: <http://bit.ly/pix4dmin>

## Participation

This training is limited to 12 participants, in order to provide personal hands-on training and access to drones for all participants.

# Agenda

DAY 1: Monday August 20, 2018 (9:00am to 5:30pm)	
Time	Activity
8:00am	Transport from hotel to training venue
9:00am	Introductions <ul style="list-style-type: none"> <li>• Personal introduction of trainers and participants</li> <li>• Overview of learning objectives and the training agenda</li> </ul>
9:30am	Concepts in Drone Mapping <ul style="list-style-type: none"> <li>• Aerial-based photogrammetry - 2D to 3D, and derived products</li> <li>• Acquisition of aerial imagery- planning, acquisition, processing</li> <li>• RGB and Multispectral sensors</li> </ul>
10:30am	Tea break
10:45am	Intro to Multi-Copter and Fixed-wing drones: senseFly eBee & DJI Phantom <ul style="list-style-type: none"> <li>• Hardware naming and preparation</li> <li>• Basic operations and safety checks</li> <li>• Installing laptop software</li> </ul>
11:45am	Introduction to eMotion3 and Pix4Dcapture <ul style="list-style-type: none"> <li>• Introduction to senseFly eMotion and Pix4Dcapture - installation, general layout, updater</li> <li>• Takeoff and landing preparation</li> <li>• Wind direction and its effect on planning</li> </ul>
1:00pm	Lunch break
2:30pm	Hands-on pilot training in the field <ul style="list-style-type: none"> <li>• Basic weather and environmental considerations               <ul style="list-style-type: none"> <li>◦ Wind strength and direction</li> <li>◦ Landing location selection (obstacles, airport vicinity)</li> </ul> </li> <li>• Working with checklists and Standard Operating Procedures               <ul style="list-style-type: none"> <li>◦ Preparation, Launch, Recovery</li> <li>◦ Incident Reporting and Airspace deconfliction</li> </ul> </li> <li>• Take-off and landing fixed-wing drones               <ul style="list-style-type: none"> <li>◦ Prepare takeoff area, landing area, wind direction</li> <li>◦ In-flight control buttons</li> <li>◦ Return to home and aborted landings</li> </ul> </li> </ul>
5:00	Debriefing and wrap-up, transport back to the hotel

**DAY 2: Tuesday August 21, 2018 (9:00am to 5:30pm)**

Time	Activity
8:00am	Transport from hotel to training venue
9:00am	Deep-dive part 1 on the senseFly eBee Plus and DJI Phantom 4 <ul style="list-style-type: none"> <li>• Security parameters</li> <li>• Basic flight planning for mapping</li> <li>• Exercise: basic flight plan</li> </ul>
10:15am	Social Good Drone Code of Conduct <ul style="list-style-type: none"> <li>• Introduction to the Drone Code of Conduct</li> <li>• Application in the field</li> </ul>
10:30am	Tea Break
11:00am	Deep-dive part 2 on the senseFly eBee Plus <ul style="list-style-type: none"> <li>• Complex flight planning for mapping</li> <li>• In-flight error management and battery management</li> <li>• Large Team Exercise A: Flight planning using eMotion and Pix4Dcapture software</li> </ul>
12:30pm	Lunch break
2:30pm	Hands-on pilot training <ul style="list-style-type: none"> <li>• Team exercise: Acquiring RGB data using DJI Phantom 4</li> <li>• Team exercise: Acquiring RGB data using eBee Plus</li> <li>• Team exercise. Acquiring multispectral data using eBee Plus</li> </ul>
4:30pm	Managing data <ul style="list-style-type: none"> <li>• Download and organize data</li> <li>• Prepare data for processing</li> </ul>
5:00pm	Debriefing and wrap-up, transport back to the hotel

**DAY 3: Wednesday August 22, 2018 (9:00am to 5:30pm)**

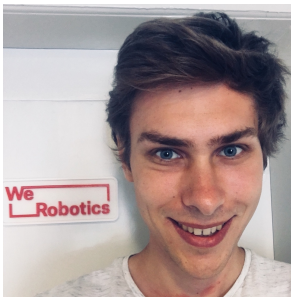
Time	Activity
8:00am	Transport from hotel to training venue
9:00am	Introduction to drone mapping in agriculture data products: <ul style="list-style-type: none"> <li>• Theoretical concepts of aerial imagery products</li> <li>• Types of outputs and products created: orthomosaics, VARI, NDVI, elevation models</li> </ul>
10:00am	Tea break
10:30am	Data download and processing <ul style="list-style-type: none"> <li>• Installation of Pix4Dfields software and importing of datasets</li> <li>• Setting the processing parameters</li> <li>• Team exercise: process one of the acquired datasets</li> </ul>
12:30pm	Lunch break
1:30pm	Data analysis <ul style="list-style-type: none"> <li>• Analysis of RGB data products</li> <li>• Analysis of VARI</li> <li>• Analysis of NDVI</li> </ul>
3:00pm	Data processing and results: <ul style="list-style-type: none"> <li>• Discovery of processed results of each team</li> <li>• Analysis of results of each team</li> </ul>
5:00pm	Debriefing and wrap-up, transport back to the hotel

## Lecturers



### **Main drone trainer: Yussuf Said Yussuf**

Yussuf is Tanzania Flying Labs Chief Pilot and Trainer. He founded the APPS CLUB in SUZA where students learn how to develop mobile applications for the Android platform. Yussuf holds a Bachelor of Science in Computer Science, and a Diploma of Computer Science from the State University of Zanzibar, and is a certified eBee drone trainer by senseFly Company.



### **Assistant drone trainer: Jean Plancke**

Yussuf is assisted by Jean Plancke, WeRobotics intern who is in charge of WeRobotics' training curriculums and who is an experienced drone pilot.



### **Data processing and analysis trainer: Samuel Eglington**

Samuel Eglington is one of Pix4D's top drone data agriculture experts and will share his valuable insights and expertise on creating and analyzing drone data products for agriculture. Samuel has an agriculture background and has already been involved in drone applications for agriculture before joining Pix4D, having worked most recently in spray drone technology and associated legislation in the UK.



### **Drones for Social Good expert: Sonja Betschart**

Sonja is the Co-Founder and Chief Entrepreneurship Officer of WeRobotics. She oversees the organization's activities in Africa and also leads WeRobotics global EcoRobotics and DevRobotics program tracks, addressing drone applications in Agriculture and Nature Conservation and Development. A veteran of the drone industry, she will share her insights as well as address the more general topics like the Drone Code of Conduct for Social Good.