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3D Mapping with an Unmanned Aerial Vehicle

Johnny Greaser

Micah D. Lehman

Geoffrey D. McClary

Kyle E. Miller

3D MAPPING WITH AN UNMANNED AERIAL VEHICLE

Johnny Greaser, Geoff McClary, Michal Lehman, Kyle Miller

Problem:

Remote airstrips in Ecuador are not regularly maintained and often can become overgrown with vegetation or have unexpected obstacles located on the runway that would present a serious hazard to arriving aircraft.

Solution:

Our partner, ITEC, asked the Collaboratory to develop an imaging system that could be put on an unmanned aerial vehicle (UAV) to scan the airstrip for obstructions and be able to generate a 3D image of the runway.
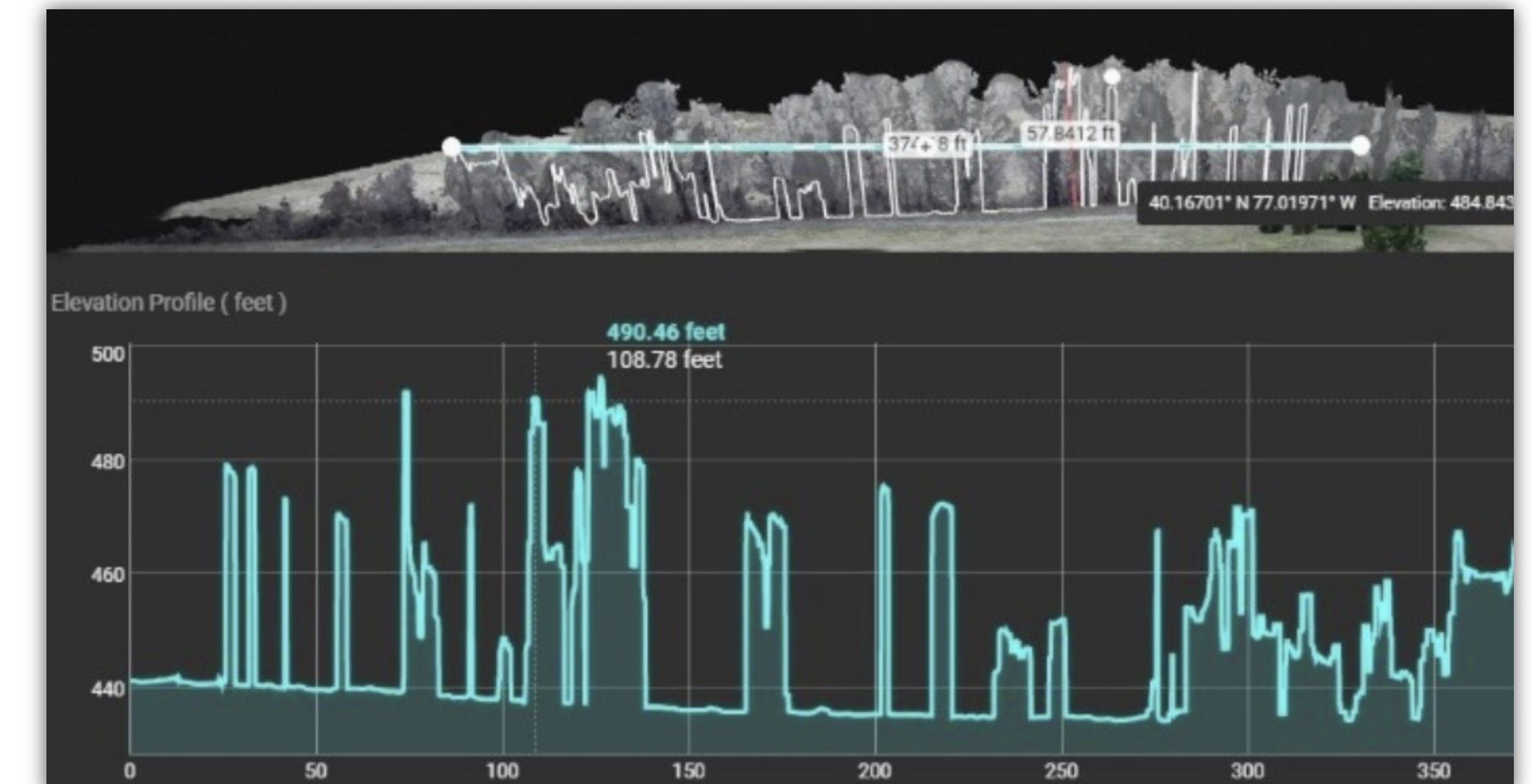
Deliverable:

Our physical deliverable will be to develop a step-by-step user guide for the software and system, as well as a guide for relating 3D mapping to approach plates (example at right), which are a pilot's tool to safely approach and land an aircraft.

Semester Goals:

· Further test mapping software

· Choose the best 3D mapping software to use

· Research how to generate approach plates from 3D maps

Future Work:

Develop an experimental approach plate from data collected from test flights.

Travel to Ecuador in January 2021 to collect data from air strips and test system.

Mapping Process:

To create a map, we send the drone on an autonomous flight and it takes pictures of the desired area as it flies in a grid pattern. We are using DroneDeploy and Pix4D software tools which use a technique called Photogrammetry to use these 2D, aerial pictures to create a 3D model.

Digital Surface Model:

Shows elevation using a "thermal" scale where the red spots are higher in elevation and the blue spots are lower in elevation. This information is helpful for seeing the height of tree lines along the runways.
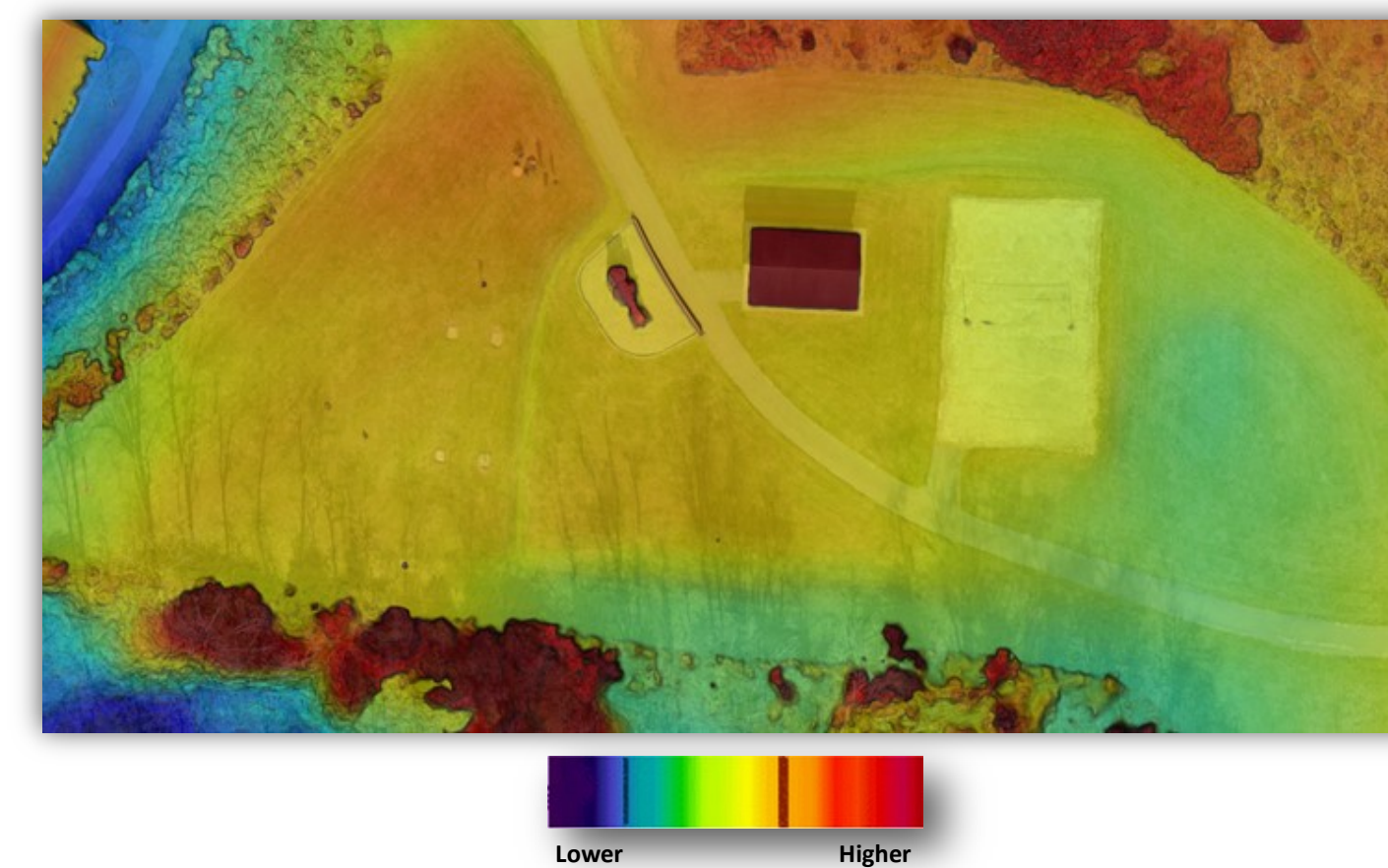
Orthomosaic Model:

Creates a 3D model that can be manipulated to reveal different angles as well as providing data, such as the volume of an object or the surface area of an object.

Mission:

We believe the Falcon UAV project will help aviators reach remote airports in Ecuador safely, transporting supplies and people in an effort to support workers and hard-to-reach communities with increased safety.

Partner:

The Falcon UAV team is partnering with Indigenous Training & Equipping (ITEC), which was founded by Steve Saint, son of martyred missionary pilot Nate Saint. ITEC seeks to aid missionaries and indigenous peoples by developing appropriate technologies and training.
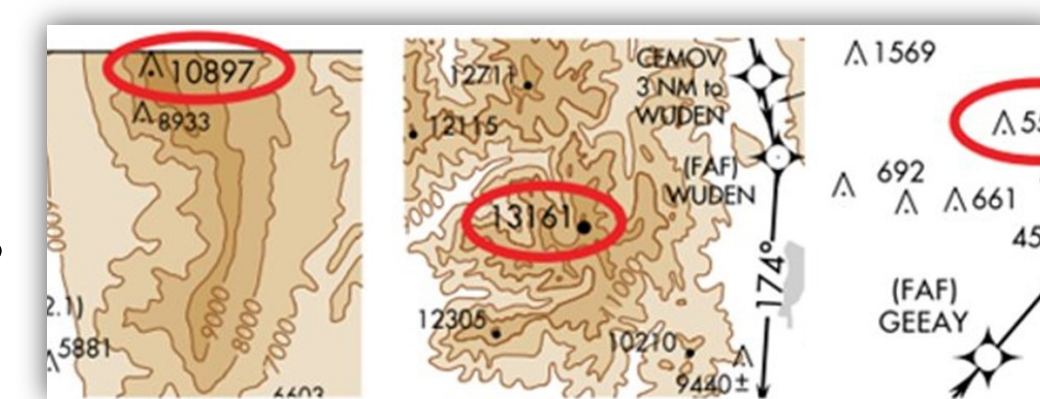
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