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Report III

Introduction

In the modern world of land surveying, the question may be asked whether to use drone software or a handheld GPS to determine the elevation of a parcel of land. The purpose of this project was to determine the accuracy differences in elevation between handheld GPS and the coordinates received from a DJI Phantom 3 flyover. Points were recorded using our handheld GPS units and compared to the ones obtained from the drone data in Lab 8. The team hypothesized that the information gathered utilizing the Garmin GPSMAP 78 would be more accurate than that gathered by the DJI Phantom 3.

Location

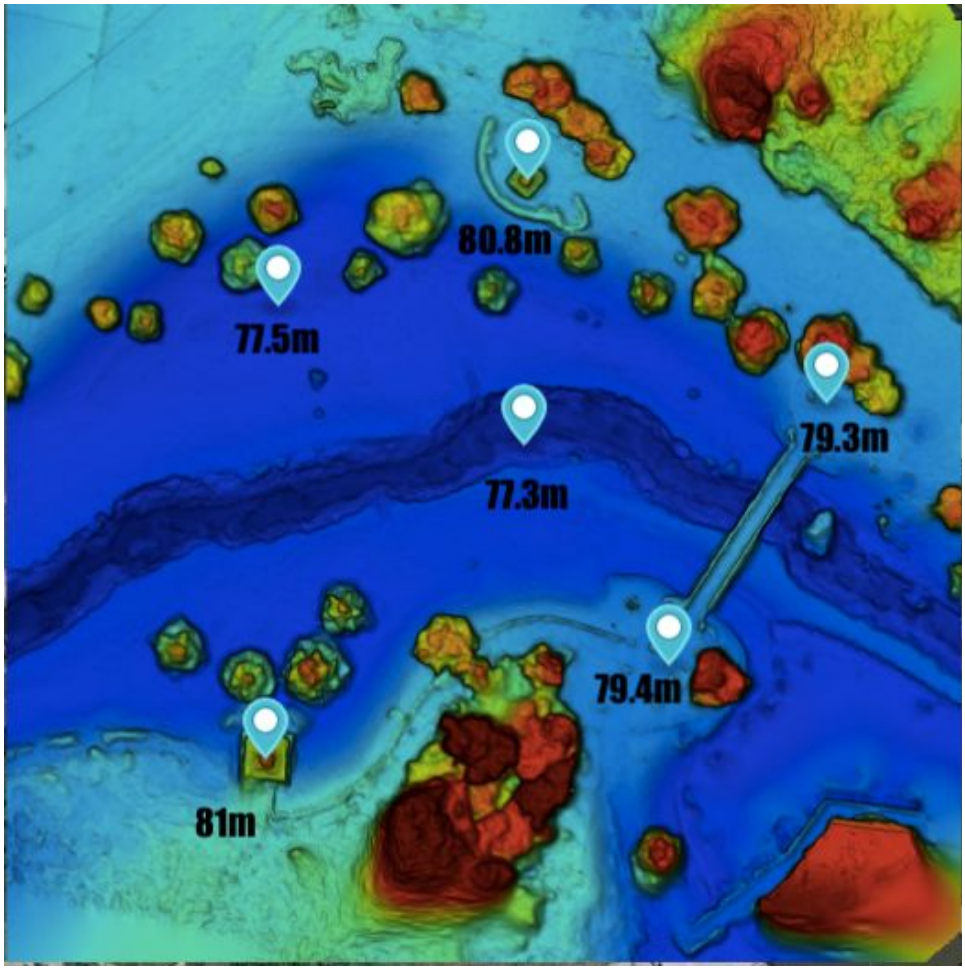
This project was completed at Wolf Pen Creek Park, in College Station, TX. The park measures approximately 63.83 acres, making it one of the largest in the city. It offers a variety of outdoor recreation activities such as walking, fishing, festivals and many others. The focus is on the area north west of the Wolf Pen Creek Amphitheater located between the streets of Holleman Dr. and Wolf Pen Creek trail. The exact coordinate of the location is: 30.618617, -96.305044. The location is a grassy area with trees, and a small creek cutting right through the center, with some elevation changes throughout.

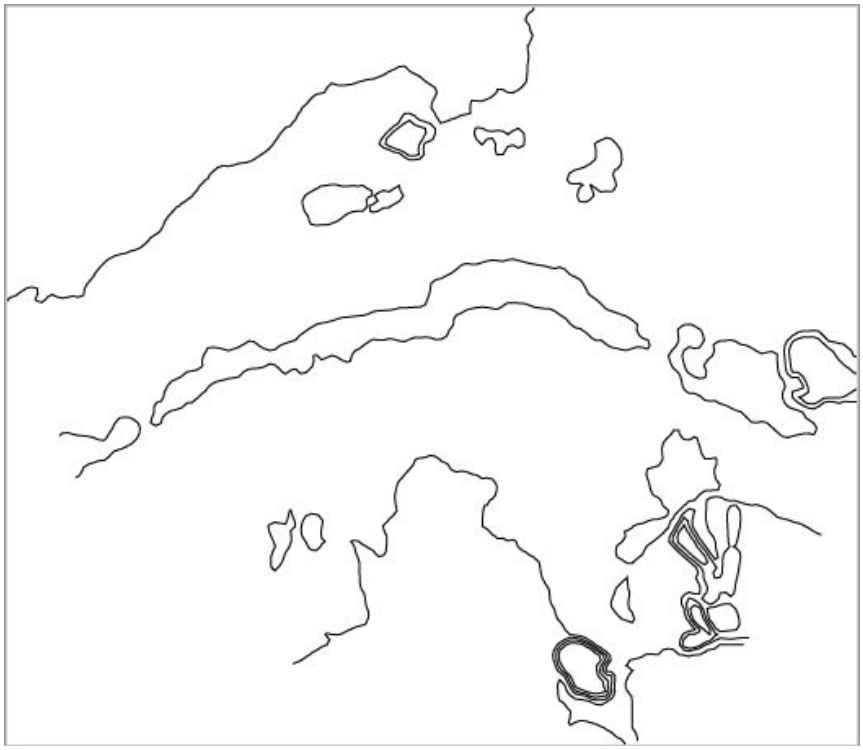
Image and Aerial Survey processing:

The DJI Phantom 3 was used during this project, in order to compare the accuracy of stand alone GPS to remote sensing. The DJI Phantom 3 is a remote drone with various capabilities, including built in GPS, image capturing and automatic flight path capabilities. The GPS location given in each photo was used in further analysis on the survey, ground points, and the exact layout of the park.

For the image processing of the aerial flight photos taken by the DJI Phantom 3, DroneDeploy was used to create a visual of the study area. Using structure from motion, or SFM technology, this was to create a 3d point cloud which gives a structured 3d visual of the photos taken. Metadata stored in each individual photograph was used to find the exact locations, and

GPS coordinates of the ground control points placed prior to flight and land survey. The control points on the ground and the points obtained by the drone were compared in order to determine the accuracy of each method in finding elevation.





Drone Surveying vs. Rover

There are a lot of different reason for surveying today, and different methods that produce similar results. Drone surveying is one of the newer methods and many questions need to be answered on the advantages and drawbacks to using this method compared to rover-based methods. Some of the major advantages to drone surveying include the ease and swiftness of acquiring points, the venture reduced to a one time and lower cost, and minimizing the risk to workers when surveying in dangerous terrains. This method also allows the user more versatility when using the data, making it easier to make heat maps, topographic maps, or contour maps, and identify elements other than just elevation and coordinates, e.g. vegetation or buildings.

This method does have some drawbacks though: it generally takes a longer time to process the data from the drone imagery. It also requires workers to be more trained, and that they are FAA certified with a Part 107 pilots license to legally operate in order to pilot the

drones. But ultimately, it comes to the question of accuracy, is the drone comparable in terms of accuracy to justify the switch from rover based handheld methods, or is the technology not quite ready to fit industry standards?

Collected Data

Control Point Coordinates (Rover)

Lat: 30.618786 **Lon:** -96.304146
Elev: 79.9m above sea level
Lat: 30.618454 **Lon:** -96.304398
Elev: 79.6m above sea level
Lat: 30.619062 **Lon:** -96.304581
Elev: 81.3m above sea level
Lat: 30.618725 **Lon:** -96.304649
Elev: 77.8m above sea level
Lat: 30.618883 **Lon:** -96.304932
Elev: 77.6m above sea level
Lat: 30.618343 **Lon:** -96.304955
Elev: 81.2m above sea level
Lat: 30.618587 **Lon:** -96.305878
Elev: 80.0m above sea level

Control Point Coordinates (Drone)

Lat: 30.618786 **Lon:** -96.304146
Elev: 79.3m above sea level
Lat: 30.618454 **Lon:** -96.304398
Elev: 79.4m above sea level
Lat: 30.619062 **Lon:** -96.304581
Elev: 80.8m above sea level
Lat: 30.618725 **Lon:** -96.304649
Elev: 77.8m above sea level
Lat: 30.618883 **Lon:** -96.304932
Elev: 77.3m above sea level
Lat: 30.618343 **Lon:** -96.304955
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