# Generate Digital Elevation Models Using Laser Altimetry (LIDAR) Data

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## Introduction

**Capable of acheiving decimeter-level accuracy, laser altimeters are quickly becoming an indispensible tool for generating high-resolution topographic maps. Laser altimetry (LIDAR) data is collected by flying a laser over the area to be mapped. The laser is shot at the earth and the elapsed time to the first and last return pulse is measured. The LIDAR system uses the elapsed time, GPS location, and other positioning information to create a set of 3-dimensional points of the surface below.**

## 1 Data Processing

**The desired data set would contain only data points on the ground surface, however, the generated data points contain both points on the terrain surface and on objects above the ground, such as vegetation or buildings. Extensive processing of all data points is prohibitive for files that are often many gigabytes in size. Images formed by gridding the raw LIDAR data are useful for data reduction while maintaining important statistics about the data. These images can be processed in addition to the raw data to determine the ground surface, vegetation, and manmade features. To accurately differentiate these features it is imperative to create a good statistical model of each component. This information can be used to filter the original data points and gridded products. Finally, a Digital Elevation Model (DEM) is created, which is a floating-point image containing the elevation at each pixel.**

## 2 Project Plan

**I plan to analyze and statistically model images generated by gridding raw lidar data. Based on these models I will filter the images to differentiate ground and non-ground features. Then, I will create a Digital Elevation Model of the terrain surface. Finally, I will compare the DEM results to the result from a current ad-hoc algorithm that uses a large degree of user iteraction.**

## References


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