LiDAR Technology

September 3, 2020

Lidar, which stands for **Light Detection and Ranging, is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth.** These light pulses, combined with other data recorded by the airborne system, generate precise, three-dimensional information about the shape of the Earth and its surface characteristics.

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A lidar instrument principally consists of a **laser, a scanner, and a specialized GPS receiver.** Airplanes and helicopters are the most commonly used platforms for acquiring lidar data over broad areas. Two types of lidar are topographic and bathymetric. **Topographic lidar typically uses a near-infrared laser to map the land, while bathymetric lidar uses water-penetrating green light to also measure seafloor and riverbed elevations.** Lidar systems allow scientists and mapping professionals to examine both natural and manmade environments with accuracy, precision, and flexibility.

Uses of LiDAR Technology

- **Oceanography:** Other than locating objects, LiDAR is also used for calculating phytoplankton fluorescence and biomass in the ocean surface, which otherwise is very challenging.
- **Digital Elevation or Terrain Model:** Terrain elevations play a crucial role during the construction of roads, large buildings and bridges.
- **Agriculture and Archeology:** Typical applications of LiDAR technology in the agriculture sector include analysis of yield rates, crop scouting and seed dispersions.

- **Astronomy:** LiDAR is also capable of mapping the surfaces of celestial bodies – it was used to generate a precise global topographic survey of Mars in 2001.
- **Atmosphere:** LiDAR can be used to study atmospheric gases, aerosols, and clouds. Molecular scattering decreases with increasing wavelength, allowing the system to build a 'density map'.
- **Autonomous vehicles:** LiDAR sensors determine the exact position of obstacles in the surrounding environment, generating data that will steer vehicles in the right direction to avoid making an impact.
- **Green Energy:** Scanning wind before it hits the wind turbine can help to maximise efficiency. LiDAR attached to the turbine itself is used to calculate the direction and strength of wind, and if necessary will change the direction of the blade in order to generate more power.