

## LiDAR (Light Detection and Ranging)

A remote sensing technology that uses laser light to measure distances and create high-resolution 3D maps of objects and environments.

### How LiDAR Works:

1. **Emission** – A LiDAR sensor emits laser pulses toward a target.
2. **Reflection** – The laser pulses hit an object and bounce back to the sensor.
3. **Time Measurement** – The system calculates the time taken for the laser pulse to return.
4. **Distance Calculation** – Using the speed of light, the system determines the distance between the sensor and the object.
5. **3D Mapping** – By scanning in multiple directions, LiDAR creates a detailed 3D representation of the environment.

### Types of LiDAR:

- **Airborne LiDAR** – Mounted on drones, planes, or helicopters to scan large areas.
- **Terrestrial LiDAR** – Used on the ground for mapping landscapes, buildings, and objects.
- **Mobile LiDAR** – Installed on vehicles for real-time mapping (e.g., self-driving cars).

### Applications of LiDAR:

- **Autonomous Vehicles** – Helps self-driving cars detect obstacles and navigate safely.
- **Topography & Mapping** – Used in geographic studies, urban planning, and archaeology.
- **Forestry & Agriculture** – Helps analyze vegetation density and crop health.
- **Environmental Monitoring** – Detects changes in landscapes, coastlines, and climate-related factors.

LiDAR (Light Detection and Ranging) has played a significant role in searches for unmarked graves at former residential school sites. It is used alongside ground-penetrating radar (GPR) and other archaeological methods to identify potential burial sites without disturbing the ground.

### How LiDAR Helps in Residential School Searches:

1. **Mapping the Terrain** – LiDAR creates high-resolution 3D maps of the landscape, helping researchers identify changes in the ground that could indicate past disturbances, such as burial sites.
2. **Detecting Ground Depressions** – Over time, unmarked graves may cause subtle depressions in the land. LiDAR can detect these even if they are hidden by vegetation.

3. **Historical Comparisons** – By comparing LiDAR scans with historical maps, aerial photos, and survivor testimonies, researchers can focus on key areas for further investigation.
4. **Non-Invasive Surveying** – Unlike excavation, LiDAR allows researchers to analyze large areas without disturbing the soil, respecting cultural and ethical considerations.

### **Limitations of LiDAR in These Searches:**

- LiDAR cannot see underground; it only detects surface features.
- It works best in areas with minimal modern development or dense tree cover.
- Ground-penetrating radar (GPR) is usually needed to confirm possible burial sites.