RP 311 – *Combining In-situ and Remote Sensing Based Monitoring for Landslides*

- Project Description:

Like many State DOTs across the US, ITD faces challenges with respect to monitoring landslide movement and associated highway impacts. Installing, maintaining, and collecting data from in-situ landslide monitoring instruments can be environmentally sensitive, expensive, time consuming, and often does not provide a complete picture of the extent or magnitude of movement. In-situ instrumentation, however, is important for measuring phenomena that cannot be measured via other methods such as pore-water pressure and the variability of movement at depth. Because of their value, cost, and limited spatial data, it is important to understand how in-situ instruments can be combined with more cost-effective and timely remote sensing methods to improve the efficiency and accuracy of landslide monitoring.

This research will explore the use of remote sensing data (e.g., photogrammetry, LiDAR, multispectral, thermal, etc.) with existing in-situ subsurface monitoring systems installed in landslides to develop a more efficient methodology for remotely characterizing landslides and their movement. The result will be a state-of-the-art approach leveraging remote sensing for monitoring the extent of landslide movement and aid in siting the future placement of instrumentation for in-situ monitoring of landslides both active and inactive. Existing in-situ instrumentation will be used to calibrate and provide quality management of the remote sensing change detection data and analysis.

- The objectives of this project are:
    1. Compare in-situ landslide movement measurements with remote sensing-based measurements.
    2. Develop realistic accuracy estimates for remote sensing-based change detection.
    3. Create a list of remote sensing tools and their applications for a given landslide scenario.
    4. Research and summarize best practices and recommendations for using remote sensing tools alongside in-situ instrumentation to reduce costs and improve public safety.
    5. Develop a list of minimum processing and quality criteria for various data types (e.g., publicly available LIDAR, UAS photogrammetry, UAS LIDAR, and thermal imagery) for the purpose of remote monitoring of landslide movement and characterization.

- Estimated Completion Date: November 8, 2024
- Budget: $60,000
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