Integrated Remote Sensing & Visualization (IRSV) - Applications for Bridge Management

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SOUTHEAST BRIDGE PRESERVATION PARTNERSHIP

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Outline of Presentation

- Commercial Remote Sensing (CRS) as Bridge Health Sensors
- IRSV Project Overview
- Focus on Automation and Simplicity
Commercial Remote Sensing (CRS) for Bridge Health Monitoring

- CRS refers to imaging from a distance using nonintrusive sensors such as aerial or terrestrial photography, LiDAR, RADAR, Passive Infrared, etc.

- For bridge health monitoring, CRS is proposed as a periodic inspection tool that is rapid and cost-effective.

- Commercial satellites, airborne large format and medium format optical photos do not have the resolution (< 6 inch) or cost-effectiveness for bridge Health Monitoring.
Overview of CRS/IRSV Project

- **Project Goals:**
  - 1) to introduce Commercial Remote Sensing technology applications to bridge management and preservation
  - 2) to develop quantifiable method for measuring bridge sustainability
  - 3) to demonstrate applications to industry-wide audience

- **Research objective:** to develop an Integrated Remote Sensing and Visualization (IRSV) system that uses CRS for bridge monitoring and assessment

- **Output** – cost-effective decision tool for application by bridge managers in determining structural health
Focus on Two Technologies:

- Three-dimensional LiDAR Scans of Bridge Superstructure
- Spatially Integrated, Small Format Aerial Photography (SI-SFAP) of Decks
3D Terrestrial LiDAR

- LiDAR - Light Detection and Ranging System.
- Laser scan images obtained before and after (temporal) - used to detect damages or displacements.
LiDAR-Based Bridge Evaluation Applications

- Bridge Clearance Determination
- Bridge Surface Defect Quantification
- Bridge Displacement Measurement / Joint movement
- Blast Impact Monitoring
- Static Load Tests / Deflection Measurements
Static Bridge Load Tests using LiDAR
Spatially-Integrated Small Format Aerial Photography

- Cessna C210L
- Cannon 5D DSLR camera
- Approx. 1000ft altitude at approx. 100 MPH
- Orthogonal rectification not needed
Large Format vs. Small Format Aerial Photography

Large Format (9 in. camera aperture) vs. Small Format (35 mm camera)
SFAP Bridge Evaluation Applications

- Construction Documentation
- Bridge Deck Crack Monitoring
- Bridge Deck Joint Movement Monitoring
- Bridge Environmental hardware/ “Furniture”
- Bridge Inventory
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Questions

Thank you!

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