

2019 UDOT RESEARCH PROBLEM STATEMENT

*** Problem statement deadline is Feb. 6, 2019. Submit statements to UTRAC@utah.gov. ***

Title: Using Virtual and Augmented Reality for Maintenance Inspection Activities

No. (Office Use): 19.02.05

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Select ONE Subject Area Materials/Pavements Maintenance Traffic Mgmt/Safety Structures/Geotech
 Planning Perf Mgmt/Data Analytics Public Transportation Other

1. Describe the problem to be addressed:

Virtual reality (VR) is the computer-generated 3D environment that one can interact with. Augmented reality (AR) is to enhance the physical world with sensors, video, graphics and other technology. The past several years have witnessed the use of VR and AR technology that can be beneficial to the construction inspection, logistics, and facility management. In this project, we will be exploring the applicability of VR and AR in the transportation maintenance management. One potential application is the asset monitoring and asset inspection. VR and AR enhancements can provide visibility and allow engineers to experience situations without physically being there. AR sensors can potentially provide a digitized view of what's wrong and help engineers understand the stats of assets. The requirement for a physical inspection can thus be reduced or even eliminated. With such technology, asset conditions can be fully understood so the engineers can take corrective maintenance actions and may not need to take multiple trips to inspect, repair and maintain assets.

2. Write the project objective (25 words or less):

The objective of this project is to build a framework for examining the applicability of AR and VR technologies in maintenance activities. The project will specifically identify the type of assets for conducting such adoption and will provide detailed evaluation on data collection, digitization, and assessment result.

3. Explain why this research is important:

(In response, consider addressing specific UDOT goals, applicability in Utah or other states, etc.)

Innovation has always been the emphasis area for UDOT. And proactive preserving the infrastructure is one of the strategic goals. The proposed research ties directly to both aspects to enable UDOT at the forefront for assessing the adoptability of VR and AR technologies.

4. List the major tasks:

1. Identify several candidate assets for examining AR and VR applicability
2. Procure AR and VR equipments/sensors
3. Digitalize assets profile
4. Build a work flow evaluation on the applicability of AR and VR for maintenance activities

5. List the expected deliverables (reports, manual, specification, design method, training, etc.):

1. Detailed instruction and evaluation report on the applicability of AR and VR for maintenance activities

6. Describe how the research results will be implemented:

(In response, consider addressing UDOT leader support, process or standard improvement, etc.)

The research results will help examining the potential application of AR and VR for asset monitoring and inspection. The result has the potential to significantly improve the efficiency maintenance activities and streamline the process.

7. Requested from UDOT: \$50,000	Other/Matching Funds: \$50,000	Total
Cost: \$100,000		
(or UTA for Public Transportation)		

8. Outline the proposed schedule, including start and major event dates:

- The schedule assumes a September 2019 start date and a 12- month research plan, with final report delivery in October 2020.
- Task 1: Identify assets for VR and AR applicability assessment and sensor evaluations – two month (October – November, 2019).
 - Task 2: Stakeholder Outreach – 3 meetings over 12 months:
 - i) Project kickoff and finalize on the scope (September 2019);
 - ii) Presentation of preliminary findings (February 2020);
 - ii) Presentation of final research products (September 2020);
 - Task 3: AR and VR sensor procurement and testing – 2 months (October - November 2019)
 - Task 4: Digitalizing assets and data collection – 5 month (January 2020 – May 2020)
 - Task 5: Assessment and analysis -- 3 months (June 2019-August 2020)
 - Task 6: Final Report – 2 month (October 2020)