

Quarterly Report 2– Public Page

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Contract Number: 693JK31910017POTA

Prepared for: U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (DOT/PHMSA)

Project Title: Improving Subsurface Non-metallic Utility Locating Using Self-Aligning Robotic Ground Penetrating Radar

Prepared by: ULC Robotics

Contact Information: Aalap Shah, ashah@ulcrobotics.com, 631-667-9200

For quarterly period ending: March 31, 2020

Project Goals:

The goal of the project is to develop a semi-autonomous robotic platform that uses conventional GPR but non-conventional scanning methods to enhance the probability of detection, enhance data quality, and automate the classification of detected targets. At the end of the project, a pre-commercial system will be demonstrated, and performance improvements will be determined.

Work Performed:

Numerical modeling was completed for underground wave propagation simulation. The GPR system was purchased and configured. A manual cart for early testing of the GPR was designed and fabricated. Testing was performed at ULC's test site to evaluate antenna configurations using the manual cart. Collision avoidance sensors were selected and tested. Trial localization sensors were obtained, and testing was performed.

Results and Conclusions:

- Numerical simulation results show some agreement with test data
- Testing in the field demonstrated that adopting multi-view antennas can provide for better utility detection
- Collision avoidance sensor initial testing results show some promise in protecting the robot, people, and property during automated surveys

Plans for Future Activity:

- Refine the numerical model to obtain higher fidelity
- Perform additional testing of GPR at ULC's test site to obtain more test data
- Complete design and selection of the robotic platform
- Develop algorithms for object detection and classification using GPR sensor data