PHMSA Research, Technical and Policy Perspectives

Working Group #3

Locating & Preventing Damage to Distribution Pipelines

Annmarie Robertson

Pipeline Research and Development Forum

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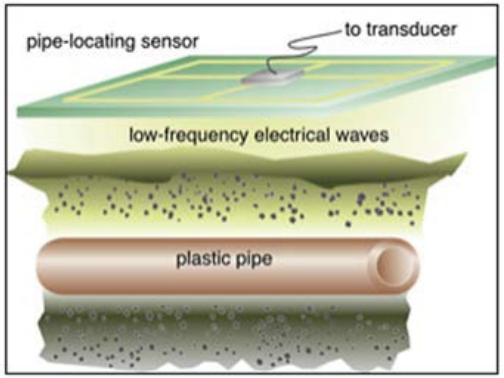
Locating & Preventing Damage to Distribution Pipelines

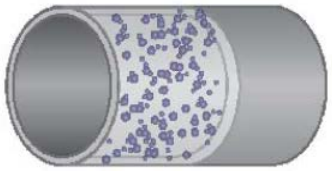
- Program Objective: Research in this area will develop tools to alert pipeline operators to unauthorized excavation damage, as well as develop techniques for mapping existing pipelines and locating plastic pipelines.
- PHMSA's Research Portfolio:
  - 25 Awarded Projects since 2002
  - $7M PHMSA + $6.3M Resource Sharing
  - 4 Commercialized Technologies in locating pipe or detecting excavation.
  - Anticipated further commercialization in detecting excavation and first time commercialization with intrinsically locatable plastic pipe.

(Info about R&D projects can be found at https://primis.phmsa.dot.gov/matrix/)

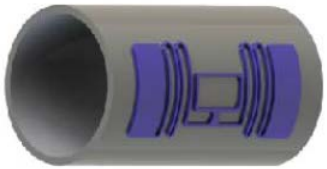
University R&D: Intrinsically Locatable Pipe

		Researcher	Project Title	PHMSA	Resource Share
1.	Active	University of Colorado Denver	Embedded Passive RF Tags towards Intrinsically Locatable Buried Plastic Materials	$303,240	$75,784
2.	Active	University of Tulsa	Electromagnetic Strategies for Locatable Plastic Pipe	$300,364	$74,359
3.	Closed	University of North Dakota	Application of Amorphous Metals for Plastic Pipeline Detection	$103,963	$25,000
4.	Closed	West Virginia University	Advancement in the Area of Intrinsically Locatable Plastic Materials	$302,849	$78,244
			Totals:	$1,010,416	$253,387

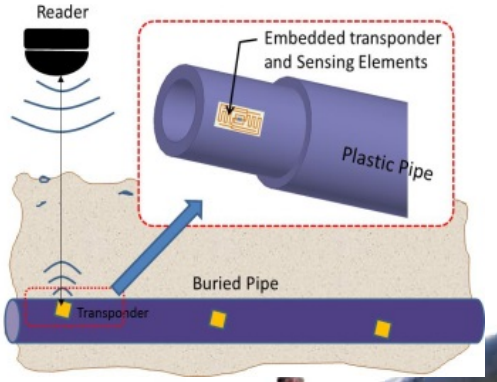




Capsule-Based

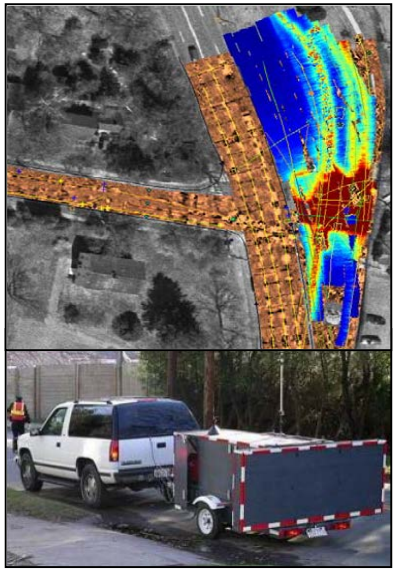


RF-Based

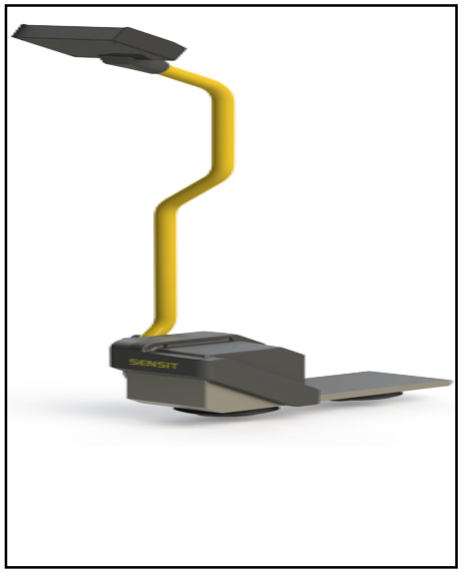


Notable Outputs/Impacts

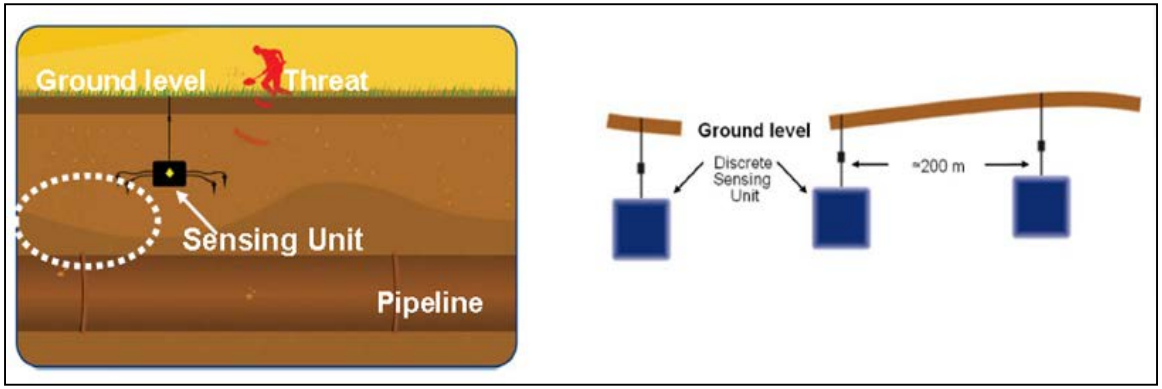
Successful deployment of digging triggers on backhoes & integration into the VA Pilot Program



Commercial improvements to ground probing radar for sub-surface mapping



Handheld acoustic asset locator in detecting buried metallic and non-metallic pipes (PE and sewer pipes)



Commercial improvements to encroachment monitoring systems.

Notable Research

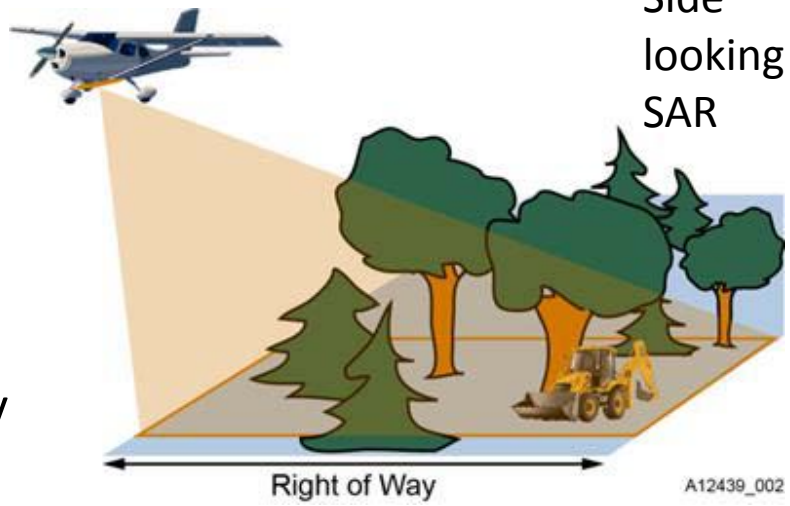
Pipeline Damage Prevention Radar

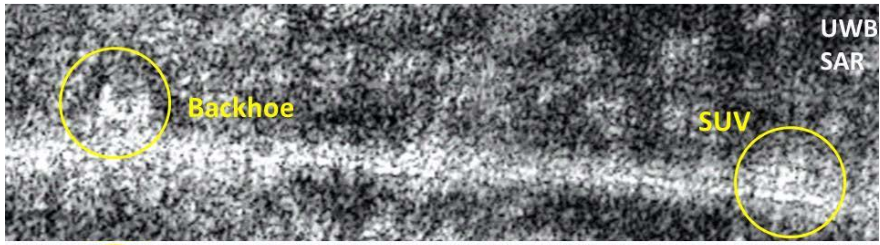
Main Objective: This project conducted proof of concept demonstrations of airborne Synthetic Aperture Radar (SAR) to reliably detect excavation damage threats in areas where the pipeline routes may be obscured by dense brush, forest canopy, low cloud cover, smoke, fog, haze, precipitation or low light

Results: Dec 31, 2017

PHMSA: $760,196

NOTE: Although targeting pipelines in rural areas from fixed wing, SAR project results support drone deployment urban areas. PHMSA establishing market transfer status.

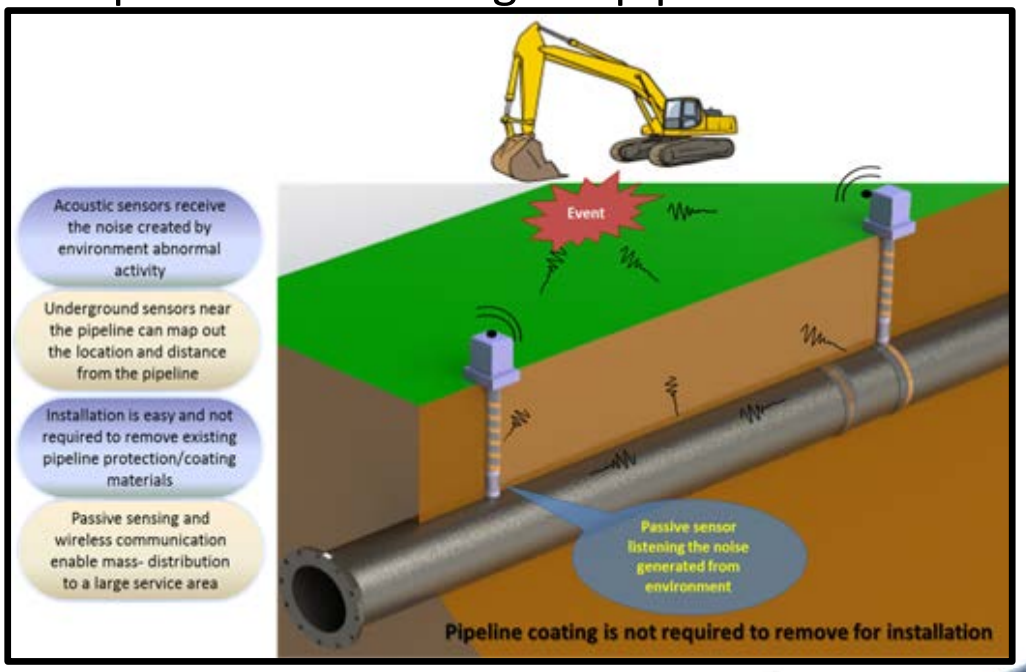




Ongoing Research

Combined Vibration, Ground Movement, and Pipe Current Detector

Main Objective: This project will demonstrate the feasibility of a pipeline right-of-way (ROW) defense system based on stationary sensors mounted on, or adjacent to, the pipeline. The sensor data from multiple locations along the pipe will be wirelessly forwarded to a central location for further analysis. Analytics residing at a central location will correlate the data from multiple sensors to alert operators to events of interest occurring in the ROW with minimal latency.



Results: Sept 30, 2018

PHMSA: $299,030

Technology Transfer Anticipated!

New/Ongoing Research

Improved Tools to Locate Buried Pipelines in a Congested Underground

Main Objective: This project will mitigate third-party pipeline damage and crossbores at the earliest stages through the development and commercialization of a geospatial probe to map existing buried utilities through insertion into live gas pipelines. This probe will be capable of mapping live underground pipes 3-dimensionally and provide accurate locations of utilities. Additionally, a cloud-based data collection system will be created in order to effortlessly collect and store data, so it is easily accessible to the utilities.

Results: Oct 31, 2020

PHMSA: $502,000

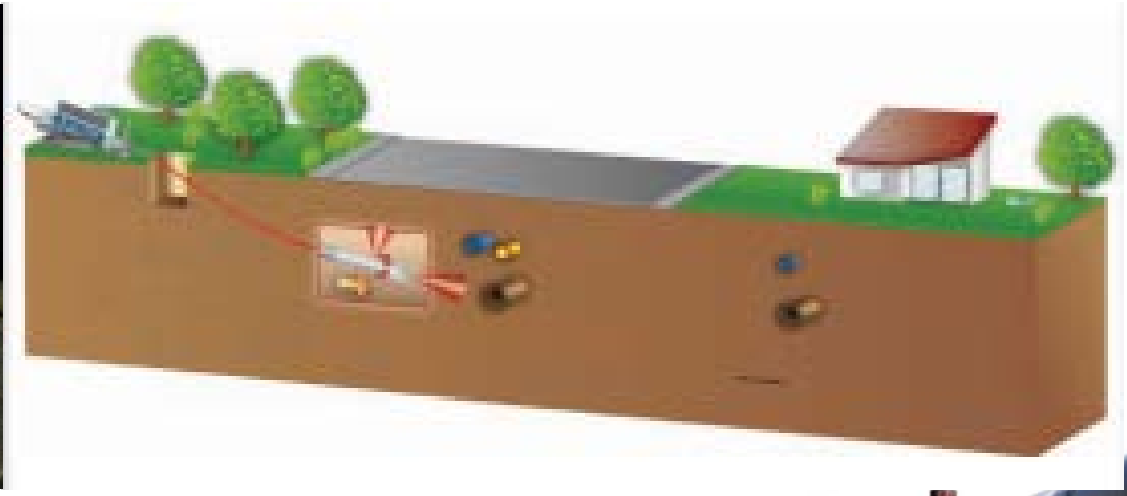
New/Ongoing Research

Obstacle Detection for Horizontal Directional Drilling

Main Objective: This project will conduct multiple filed demonstrations and final development in order to commercialize a field proven, obstacle location technology for use in horizontal directional drilling (HDD) applications**.** ORFEUS (Optimized Radar to Find Every Utility in the Street) is an effort aimed at developing a safe, cost effective “look-ahead” obstacle detection system for HDD equipment.

Results: March 1, 2021

PHMSA: $993,970



Related Work: PHMSA DP Technology Study

- PIPES Act of 2016:
  - Required PHMSA to submit study
  - Results must include recommendations, that include the consideration of technical, operational, and economic feasibility, on how to incorporate into existing damage prevention programs technological improvements and practices that help prevent excavation damage.
  - Must be developed with stakeholder input

Study Requirements

(1) an identification of any methods to improve existing damage prevention programs through location and mapping practices or technologies in an effort to reduce releases caused by excavation;

(2) an analysis of how increased use of global positioning system digital mapping technologies, predictive analytic tools, public awareness initiatives including one-call initiatives, the use of mobile devices, and other advanced technologies could supplement existing one-call notification and damage prevention programs to reduce the frequency and severity of incidents caused by excavation damage;

(3) an identification of any methods to improve excavation practices or technologies in an effort to reduce pipeline damage;

(4) an analysis of the feasibility of a national data repository for pipeline excavation accident data that creates standardized data models for storing and sharing pipeline accident information; and

(5) an identification of opportunities for stakeholder engagement in preventing excavation damage.

Study Recommendations

Study published August 2. Link to studies and reports below:

REPORT
APPENDICES

- Develop collaboration/communication tools that foster better communication between the excavator and pipeline operator throughout the excavation process.
- Evaluate and implement predictive analytic tools, which use data to identify and proactively address high-risk excavations.
- Improve and implement GPS/GIS technologies in accurately locating and documenting the location of underground facilities.
- Consider requiring operator damage data reporting.
- Promote universal participation in the one-call process.

Recommendations, cont.

- Consider the development of national standards for certain state one-call requirements.
- Strengthen state damage prevention enforcement programs.
- Pursue improvements in locating processes and technologies and right-of-way monitoring technologies.
- Promote the continued identification and implementation of the Common Ground Alliance (CGA) and other damage prevention best practices, and the education of stakeholders toward the benefits thereof.

Thank You!/RD&T Program Contacts

Kenneth Lee
Director – Engineering & Research
Department of Transportation
Pipeline & Hazardous Materials Safety Administration
Office of Pipeline Safety
P(202) 366-2694
Email kenneth.lee@dot.gov

Robert Smith
Department of Transportation
Pipeline & Hazardous Materials Safety Administration
Office of Pipeline Safety
P(919) 238-4759
Email robert.w.smith@dot.gov
LinkedIn https://www.linkedin.com/in/robert-smith-935aa033

Joshua Arnold
Department of Transportation
Pipeline & Hazardous Materials Safety Administration
Office of Pipeline Safety
P(202) 366-6085
Email joshua.arnold@dot.gov

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