

NYSEARCH Spotlight

Dedicated to serving its utility member companies with focus on natural gas RD&D, technology development & commercialization, and joint industry collaboration

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A year in review

2021 NYSEARCH activity highlights

Field test of optimized mercaptans sensor completed with PG&E

A December field test confirmed the GC/DMS sensor operation following optimization

December 2021 NYSEARCH Meeting

A deeper dive into a robotic platform to identify degradation in non-conforming Driscopipe® 8000



Reflecting on NYSEARCH achievements in 2021



Completion of Energy Harvesting module for EXP series of robotic inspection platforms (M2016-009); pre-commercial release in 2021 and commercial release expected in 2022



Completion of Natural Gas Dispersion Study (M2021-001) white paper and release of results to NFPA to aid in standards and guidance on placement of Residential Methane Detectors



Completion of several field tests showing that submerged devices along with drones can identify and detect leaks from underwater facilities (M2021-002)



Completion of residential appliance testing to determine safe threshold levels for siloxanes as a by-product of RNG (M2020-008)



Completion of 2021 NYSEARCH Strategic Plan and subsequent program planning activities



Conduct of several technology transfer and results-oriented workshops for members and regulators



Member company deployments of Augmented Reality training applications through NYSEARCH's HoloLens program (M2018-006)



Field test completed at PG&E for Mercaptans Sensor with non-radioactive ionizer

A field test of the PHMSA co-funded mercaptans sensor development program was completed in northern California in December 2021. PG&E hosted the field test with the contractor, UC Davis, and NYSEARCH staff to test the optimized mercaptans sensor with UV as the non-radioactive ionization source. The objective of this program is to complete development and re-design of a mercaptans sensor using GC/DMS (Gas Chromatography, Differential Mass Spectroscopy) technology and a non-radioactive ionizer. The image below shows a layout of the design of the refined sensor. In the coming months, long-term field testing of several pre-commercial mercaptan sensing systems with the non-radioactive ionizer will be completed to demonstrate commercial readiness.



This field test confirmed the operation of the GC/DMS sensor following refinements of each subcomponent and with UV installed as the non-radioactive ionization source of the DMS detector.

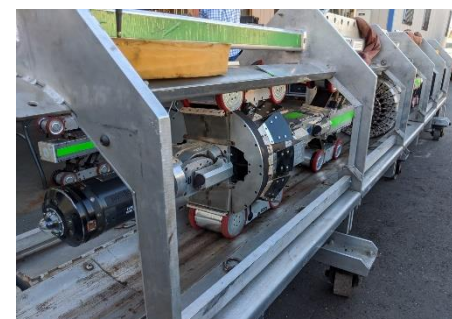
The sensor results

were validated against a liquid-cell GC device for mercaptans THT and TBM found throughout the PG&E distribution system. The testing results from laboratory and the field showed that the GC/DMS sensor can consistently and reliably measure THT and TBM concentrations.

Automation of Explorer robot to be demonstrated at commercial job in early 2022

The Explorer (EXP) suite of robots provide a solution to internally inspect unpiggable natural gas pipelines without disrupting service to customers. They are untethered, remotely controlled self-powered robots for visual and in-line inspection of natural gas pipeline conditions. These robots can navigate a wide range of features in pipes including vertical segments, radius bends, and seam welds. Following the successful commercialization of the EXP line of inspection platforms, NYSEARCH and Invodane Engineering identified the need to automate inspection features of the robots to reduce operational complexity during live deployment and increase robustness of the robot during the inspections.

In late 2021, the Explorer program accomplished full automation with successful testing of all features and processes in laboratory. Intero, the international pipeline inspection and integrity company who acquired Pipetel in 2021, is now targeting a commercialized inspection in early 2022 with all automated components and processes in place.



The potential of robotic inspection of small diameter plastic pipe: a report from NYSEARCH December 2021 meeting



At NYSEARCH meetings, alongside receiving updates and status reports on active projects, industry needs are evaluated, and innovative solutions are explored with the committee. A need to identify degradation in small diameter plastic pipe was brought to NYSEARCH, beginning the search for expertise to develop a technology to fill that gap. Driscopipe® 8000, a type of plastic pipe, is known to the gas industry to be susceptible to degradation in excessive heat condition. A robotic platform with integrated sensors to detect degradation internally of plastic pipe was proposed as a potential solution.

The research is being executed by Invodane Engineering and Iowa State University (ISU). A feasibility study is near complete, initial designs are being rendered, and prototypes will be built for testing. The feasibility study identified several concepts for propulsion of the robot while inside the PE pipe and wireless communication with the robot during operation. The main challenges to the project are the small diameters of the pipeline, wireless communication pathways, and power availability. From the pool of concepts, a handful were selected to be further engineered into preliminary designs. In addition to the robotic platform, various sensing technologies are being examined to provide pipeline specifications evaluation. Three technologies: 1) microwave, 2) ultrasound (dry coupling), and 3) terahertz (THz) have been identified to meet specifications of the miniaturized robot. To date, all three sensing technologies are showing promise in application for small diameter PE pipeline.

A robotic platform for small diameter PE pipe inspection would greatly enhance pipeline integrity programs and provide integral data to establish remediation plans of the distribution system.

The table below presents Final Reports released to NYSEARCH funders in the last six months:

Project Number	Project Name	Month Issued/Project Manager
M2017-006 PhI	Pipeline Cleaning Tool for Liquids with Flow	July 2021 – Suzanne Hartwell
M2016-004 PhIII	Alternate Crack Sensor	July 2021 – Suzanne Hartwell
M2018-008 PhII	Expansion of NYSEARCH RANGE™ Model & Study of Siloxane Concentration Limits	August 2021 – Jagruti Mehta
M2021-001	Study of Natural Gas Dispersion with Blended Hydrogen in Residential Structures	January 2022 – Jagruti Mehta