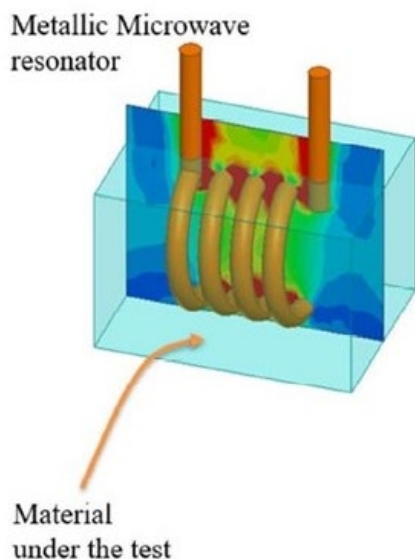


## Microwave Sensing Technology for Hydrocarbon Monitoring in Water Resources

This project aims to address the critical need for real-time water quality monitoring, particularly in the context of hydrocarbon detection in water resources. Currently, most water monitoring methods rely on periodic sampling, which is time-consuming, labor-intensive, and may not provide timely data on water quality variations. To overcome these limitations, this project proposes the development of a novel microwave-based sensing system capable of real-time, label-free, and low-cost monitoring of water quality.



### RECIPIENT:

University of  
Alberta – Professor  
Tong Yu



### PARTNERS:

NSERC, Town of  
Devon



### TOTAL BUDGET:

\$412,800



### AI FUNDING:

\$190,000



### PROJECT DATES:

JAN 2024 –  
DEC 2025



### PROJECT TRL:

Start: 3  
End: 6

## APPLICATION

This integrated system will facilitate the rapid and accurate detection of hydrocarbon presence in water resources without the need for disposables or extensive recovery processes. The real-time monitoring capabilities will allow for prompt action upon the detection of water quality variations, thereby optimizing more sophisticated and targeted sampling and assessment strategies. The envisioned sensing system will operate autonomously, reducing the need for human involvement and minimizing technical labor hours.



# ALBERTA INNOVATES CLEAN RESOURCES

## ENVIRONMENTAL INNOVATION

### WATER INNOVATION PROGRAM

## PROJECT GOALS

- Build a cross-disciplinary team and enable cross-disciplinary training.
- Create a standard mix of hydrocarbons for study.
- Understand the microwave features of hydrocarbon standard mix.
- Design the hydrocarbon sensing element.
- Test and optimize the hydrocarbon sensor with the standard mix.
- Test and optimize the hydrocarbon sensor with real water matrices.
- Address interference issues and recalibrate the hydrocarbon sensor.
- Design and implement integrated sensing circuitry.

## BENEFITS TO ALBERTA

The successful development and implementation of the microwave sensing system will significantly enhance water quality monitoring capabilities, benefiting industries, municipalities, and environmental agencies involved in water resource management. Secondly, the real-time monitoring feature will enable the early detection of hydrocarbon contaminants, contributing to rapid response protocols in case of spills or pollution incidents.



**3 Publications**



**2 Students  
Trained**

## CURRENT STATUS

**JAN 2024**

Project was executed in January 2024 and Year 1 activities are underway.