



Ubisensing&AI



OpenAgSense: Trusted AI & Open Data Infrastructure for Canadian Agriculture

Innovation, Automation, and AI Acceleration (i3A) program
University of Calgary- Ubisensing AI Lab,

Sara Saeedi, PhD
Assistant Professor
Department of Electrical & Software Engineering,

The University of Calgary acknowledges the traditional territories of the peoples of Treaty 7 and the Métis Nation of Alberta.

Ubisensing AI: Innovation in Geospatial IoT Sensing and AI Solutions



Vision

A world where technology helps communities make **informed and equitable decisions for a sustainable future.**

Mission

Bring together **real-world data and local knowledge** to guide better choices, manage resources wisely, and support long-term growth.



Ubisensing AI Team Members



Dr. Sara Saeedi,
Lab Director
Assistant Professor, Electrical & Software Eng



Dr. Steve Liang
Lab Director
Professor, Geomatics Engineering



Kan Lao
Lab Tech Manager



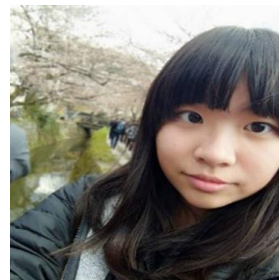
Dr. Sepehr Honarparvar
Postdoctoral Associate



Dr. Mingke (Erin) Li
Postdoctoral Associate



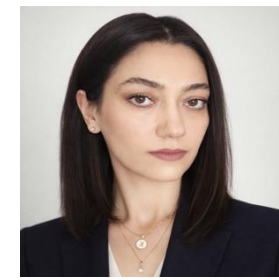
Nader Khoshroo
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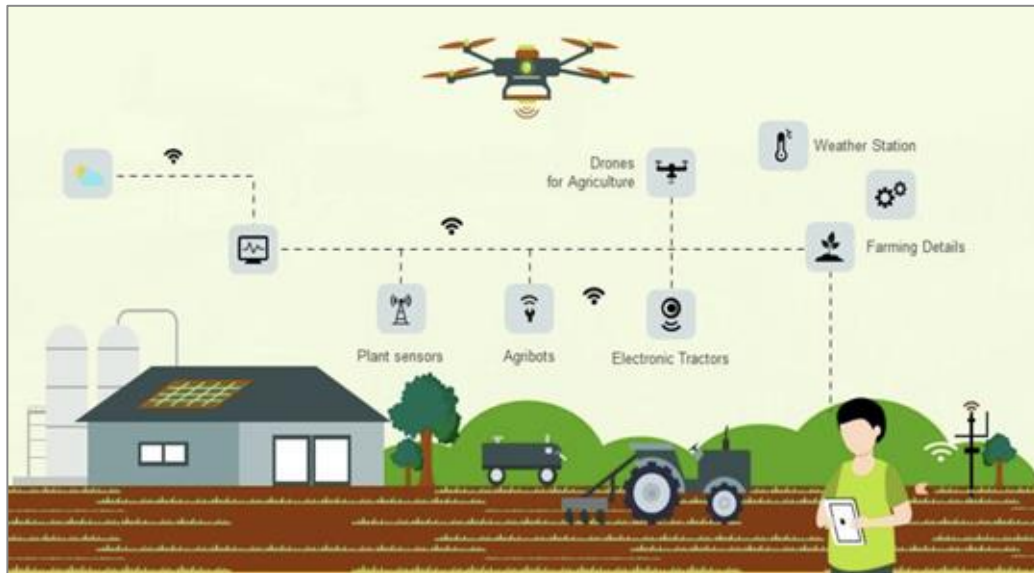


Mohammad Zaid Khan
M.Eng. Student



“A 25% adoption rate of precision farming by 2030 could result in annual yield increments of up to 300 million tones, a decrease in farming expenses by up to \$100 billion per year and a reduction in wastewater by up to 150 billion cubic meters per year.”

Bell Labs Consulting, 2023



Canada needs trusted agricultural AI — not fragmented tools



Climate volatility is accelerating.

Droughts, wildfires, and extreme weather are increasing risk across Canadian agriculture.



Critical environmental data remain underutilized.

Farm data exists — but fragmented and locked which prevents interoperability across machinery, sensors, and digital platforms.



Crowdsourced farmer & observations are untapped.

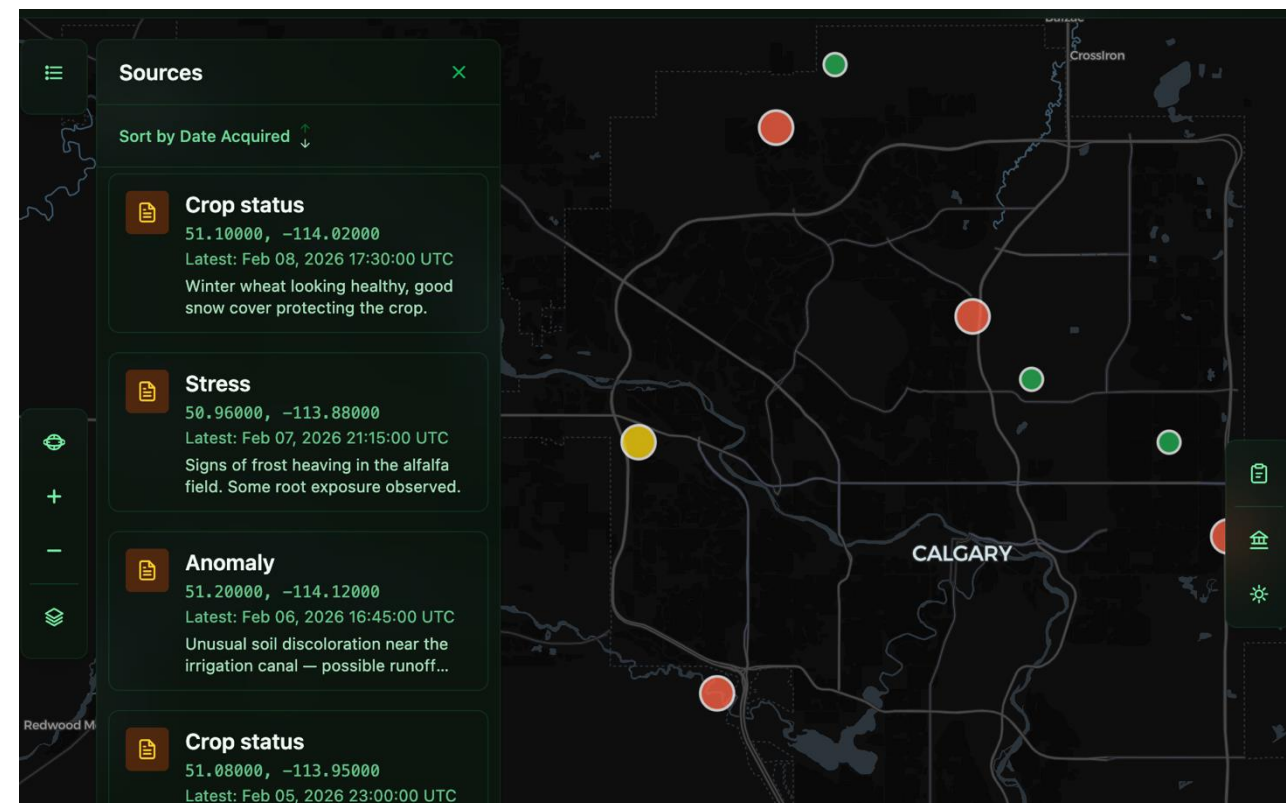
Farmers are smart sensors, but their knowledge is rarely integrated with scientific data.

What we need is a **trusted, open data infrastructure that integrates sensors, satellites, and farmer knowledge into AI-ready intelligence.**

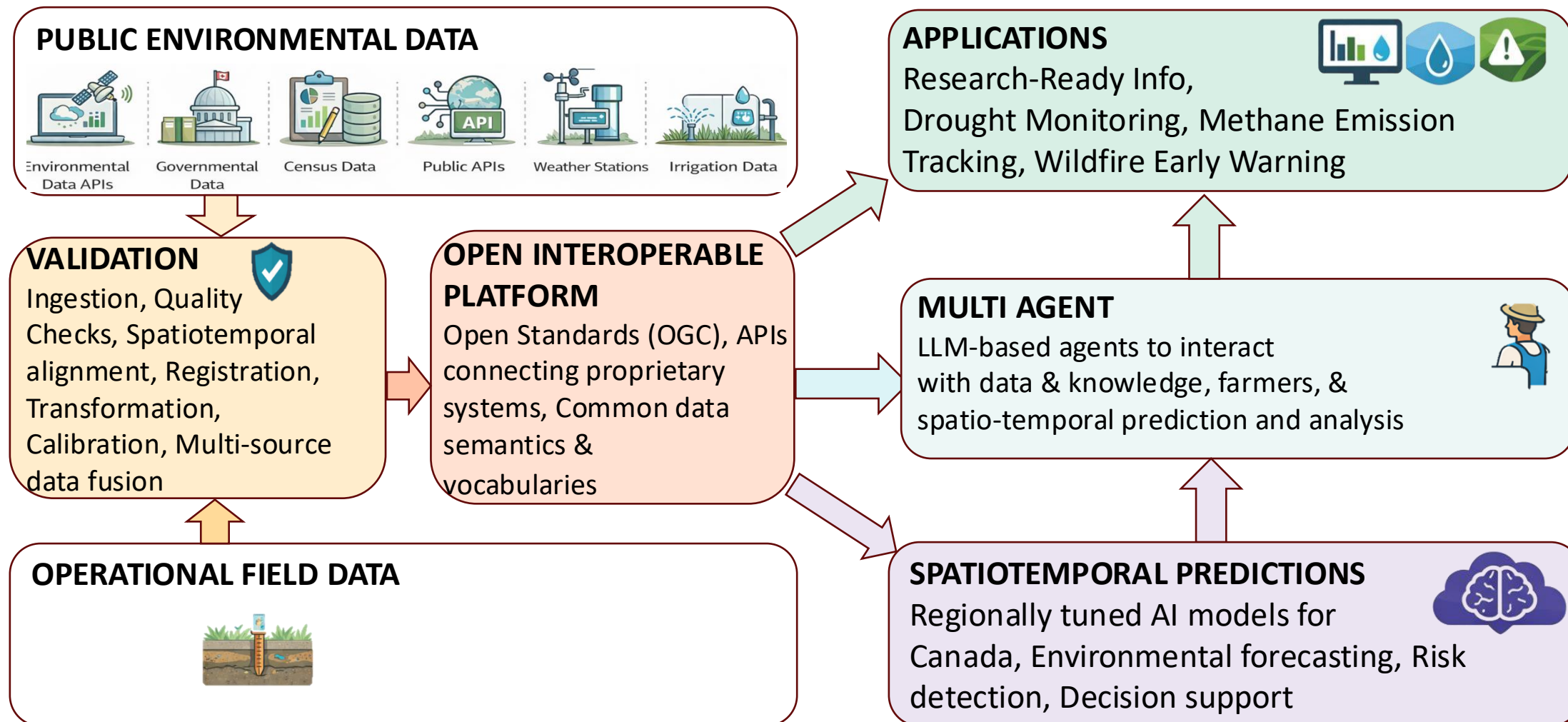
Our Approach: Building Trusted Agricultural AI Infrastructure

OpenAgSmart:

A spatio-temporal cloud-native, open-source, multi-agent AI platform to integrates IoT sensors + satellite + farmer observations



Our Approach: Building Trusted Agricultural AI Infrastructure



OpenAgSense and what makes it different

Farmer trust as infrastructure

- Trust is not policy add-on. It's a technical feature that allows national platform scales.
- Permission-based data sharing
- Transparent governance
- AI only runs on validated layers
- FAIR-aligned architecture

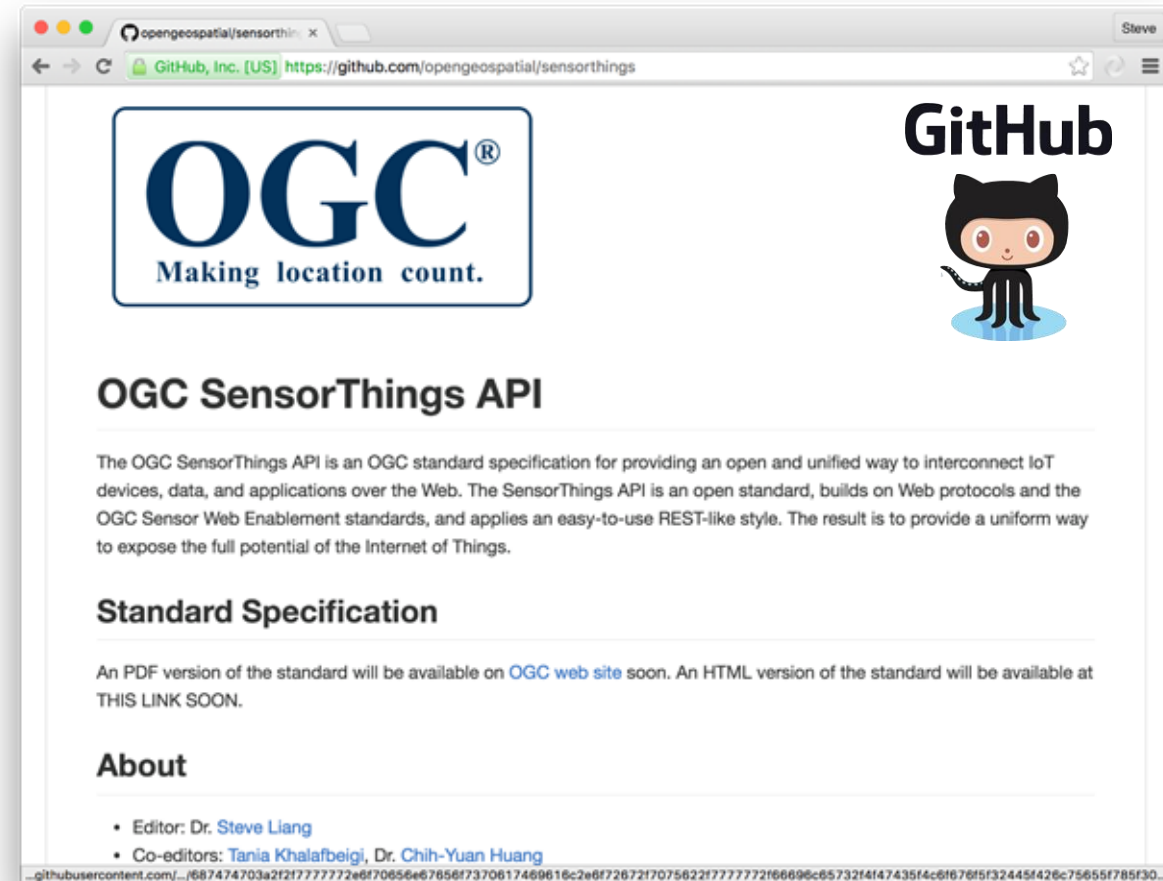


OpenAgSense and what makes it different

Open Standards = National Sovereignty

Built on open international geospatial standards

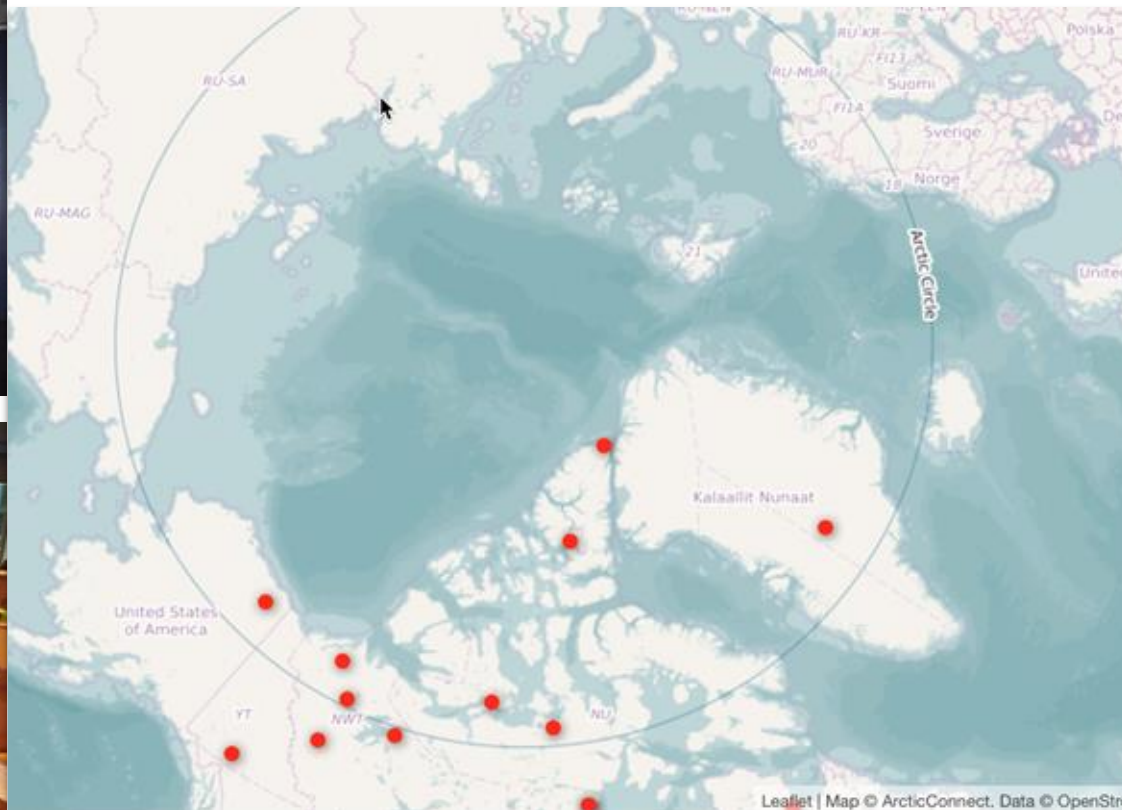
- Why this matters:
 - Breaks vendor lock-in
 - Enables federal interoperability
 - Future-proofs infrastructure
 - **National intelligence cannot be built on proprietary APIs.**



The SensorThings API was mainly developed by a group of researchers in our Lab, University of Calgary

OpenAgSense and what makes it different

Crowdsourcing: Farmers as the most valuable sensors



OpenAgSense and what makes it different

Drought Prediction module

Prairie droughts directly threaten:

- Crop yields
- Irrigation reliability
- Water governance

Cross-provincial drought modeling

- Geographically representative datasets
- National-scale AI training
- Evidence-based water governance



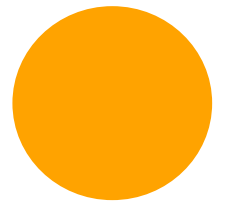
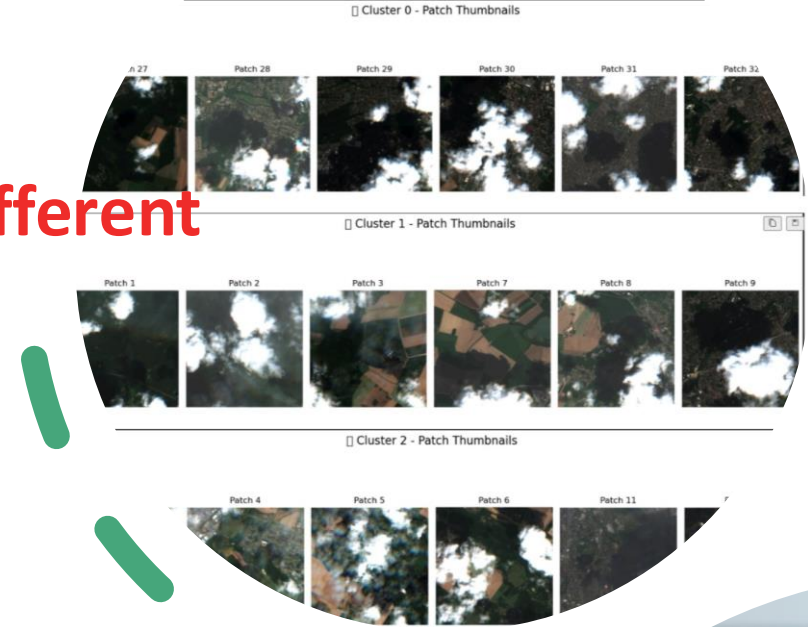
OpenAgSense and what makes it different

What Our System Delivers:

- Early drought detection
- Near-real-time soil moisture deficit tracking
- Regionally tuned AI models for Alberta conditions
- Integration of subsurface sensors + satellite imagery

Will be tested At:

- W.A. Ranches (19,000-acre living lab)



Why this matters for Canada?



Food & Water Security

Smarter irrigation and drought response.



National AI Readiness

High-quality, explainable agricultural datasets.



Rural Digital Infrastructure

Fair design for remote areas and underrepresented farmers.



Research & Policy Intelligence

Supports provinces, irrigation districts, and researchers with trusted data.

Our team try to builds a common digital infrastructure for agriculture — enabling trusted data sharing, accelerating research, and supporting climate-resilient farming across Canada.

Path Forward



To scale nationally, we seek:

- Partnership for pilot expansion
- Integration with federal datasets
- Support for national interoperability standards
- Co-development of policy-aligned AI tools

Thank You for Your Attention!

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UNIVERSITY OF
CALGARY

Multi Agent-architecture (AI)

