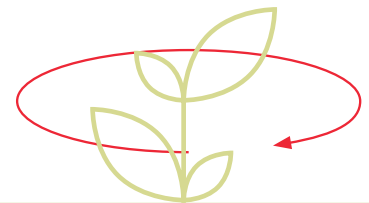
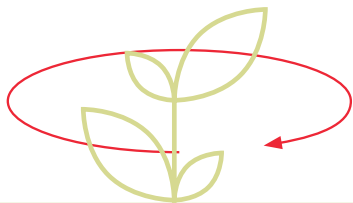




THE UNIVERSITY OF  
WINNIPEG

# Growing the Digital Agriculture Industry

Accelerating innovation with intelligent technologies





## New Possibilities

---

Advancements in technology, autonomous robotics and machine learning are revolutionizing the agriculture industry. The applications of these technologies for productivity, profitability and sustainability are immense. Intelligent technologies produce vast amounts of data to drive insights, decision-making, research and other value-added components. Insights derived from this data will increase crop yields, expedite crop breeding and optimize input application and other agricultural practices.

The technology that would enable these advancements requires large quantities of labeled data sets, which are far beyond the capability of individuals or even ordinary computers to generate and process. These data sets will be used to train deep neural networks (DNNs) for plant and weed classification. The automated generation and labeling of very large numbers of images of prairie crops and weeds is a fundamental component of this project.

Manitoba's natural resources and rich history in agriculture have given the industry a competitive advantage. Early adopters and those who have prepared to be able to leverage new innovations will be best prepared to succeed in the digital agriculture industry. Agriculture is one of the key sectors in Manitoba's economy and intelligent technologies present a significant opportunity for growth.

*“Most gardeners can survey their entire garden each day. They can pick every weed and snip every leaf that has rust on it. They can give precise attention to the individual plants. If we can do that on full-scale farms on the Canadian prairies, imagine how much more food we could grow, and how much more productive and sustainable we could be.”*

**Dr. Christopher Bidinosti**

Professor of Physics

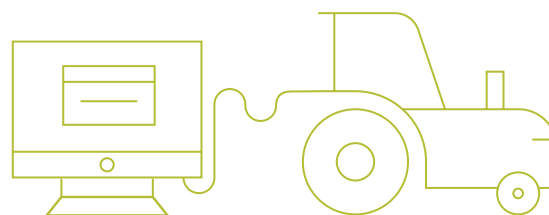
The University of Winnipeg



## Innovative Technology Partnership

---

The University of Winnipeg has taken the lead in Manitoba working on the application of high-performance computing (HPC) and machine learning (ML) for digital agriculture. UWinnipeg has partnered with EMILI to increase collaboration between industry and academia and grow the digital agriculture industry. UWinnipeg and EMILI are working together to develop innovative technologies and approaches in digital agriculture. Direct and frequent collaboration between industry and academia will increase the speed and accuracy of this project and its relevance to industry-identified needs.



### KEY ACTIVITIES

- Generate a database with hundreds of thousands of labelled images.
- Provide access to the data sets and machine learning models, develop deep neural networks (DNNs).
- Develop sensors and precision tools for ML applications, field test with industry partners.
- Convene a Manitoba Industry-Academia working group.
- Host and update an online Digital Agriculture Asset Map.
- Provide Work-Integrated Learning opportunities with partners.
- Host an annual Digital Agriculture conference.
- Develop Digital Agriculture integration plans with partners.
- Host CEO Tech Sessions and Industry-Academia collaboration events.

## About EMILI

---



ENTERPRISE MACHINE INTELLIGENCE  
& LEARNING INITIATIVE

The Enterprise Machine Intelligence and Learning Initiative (EMILI) is an industry-led, not-for-profit organization based in Winnipeg, Manitoba. EMILI was created to prepare and empower the Manitoba economy to leverage digital disruption for success with a specific focus on digital agriculture. EMILI will work with industry and academia to accelerate the adoption of intelligent technologies and to provide people with the skills and training required in a digital economy.

*“EMILI is pleased to partner with The University of Winnipeg on this machine learning project to grow the digital agriculture industry. The intersection of equipment, technology and crop science is at the core of a fundamental transition in Canadian agriculture. The adoption and integration of intelligent technologies will accelerate agriculture, increasing productivity, profitability and sustainability. The Canadian prairies are well-positioned to capitalize on these new innovations to power economic growth, enhance productivity, job creation and a global market advantage for the agri-food industry.”*

**Ray Bouchard**

Chair of the Board, EMILI



## Economic Impact

---

Innovations enabled by intelligent technologies, including machine learning, create new possibilities for advancement, productivity, sustainability and global competitive advantage. These innovations enable increased productivity by machines, software and autonomous implements. They enable humans to focus on more meaningful and uniquely human tasks.

People and businesses in Manitoba need to be supported and empowered to leverage these new opportunities for long-term success. EMILI will work industry and academia to ensure that people are empowered to succeed in the digital agriculture industry and that they are equipped with the right skills and tools to fulfill meaningful jobs and create new, impactful jobs in the digital agriculture industry.

EMILI will work to foster an intelligent technology ecosystem (ITE) that will have widespread benefits for the province. The development of an ITE will include innovative businesses, developed supply chains, highly-skilled people and relevant education and training institutions. An ITE will spur greater innovation in industry and academia, the development of new and expanded businesses, new well-paying jobs and the preservation of existing jobs.

## Investment in Manitoba

---

This 3-year project partnership between The University of Winnipeg and EMILI presents an unparalleled opportunity for Manitoba and the digital agriculture industry. This project is funded by Western Economic Diversification Canada, with significant contributions from the business community in Manitoba, a George Weston Seeding Food Innovation grant and The University of Winnipeg. In addition to the George Weston Grant, Mitacs is also a funding partner.

Direct outcomes of the project include the creation of a labelled data set image repository, creation of an industry-academia working group, work-integrated learning opportunities for students and HQP positions created as a result of digital agriculture tool integration.

This initiative is supported by:



Western Economic  
Diversification Canada

Diversification de l'économie  
de l'Ouest Canada

Canada



*“There’s been a revolutionary change in computing hardware that has made possible many real-world applications of machine learning. Digital agriculture is the next big industry that will benefit immensely from this technology. Our project’s first step, compiling accurate labelled data sets, is the foundational element to accelerating digital agriculture for the Canadian prairies.”*

**Dr. Christopher Henry**

Professor of Applied Computer Science  
The University of Winnipeg

