Investments Supporting New Product Development and Innovative Solutions in Manitoba

Over $600K Invested in Research Funding for Six New Innovation Proof-of-Concept Grants

Wednesday, March 1, 2023 – Winnipeg, Manitoba. Today Research Manitoba announces a total investment of $649,186.12 (over two years) in research funding to support six new ***Innovation Proof-of-Concept (IPoC) Grants***. Research Manitoba's investment will support Manitoba-based projects in the areas of; Biosciences (3 projects), Information and Communications Technology (2 projects), and Advanced Manufacturing (1 project) and leverage $50,000.00 (over two years).

The ***IPoC Grant*** aims to strengthen Manitoba-based research innovation and development projects, by filling a funding gap in the Manitoba innovation ecosystem.

"Our government is proud to support the Innovation Proof-of-Concept (IPoC) Grants, which will assist entrepreneurs with the design of new products and create innovative solutions right here in Manitoba. These Manitoba-Based projects from the fields of Biosciences, Information and Communications Technology, and Advanced Manufacturing will help in the creation of new local job opportunities and future economic growth", said Jeff Wharton, Minister of Economic Development. Investment and Trade.

Through *two* independent streams, this program provides funding, which is not otherwise accessible, to progress innovative research toward commercialization.

•IPoC Stream 1: Manitoba-Based Consortium of academic research and local companies to support collaboration that is addressing a company-specific discovery or innovation toward market usability. This stream allows academics to use their world-class knowledge, facilities, and highly qualified personnel to close the knowledge gaps identified during the industry partner's innovation development.

•IPoC Stream 2: Manitoba Post-Secondary Researchers support the advancement of discoveries or innovations within an academic setting, which may result in products or technologies, towards market usability. These projects engage post-secondary students, giving them skills and opportunities to contribute to innovative solutions.

"Funds from this program help support activities directly related to process validation and proof-of-concept development. This research funding fosters research innovation, economic development, and the commercialization of products, through the movement of innovations from ideas to market usability. We are pleased to support Manitoba researchers in pursuing innovative solutions to address problems and create new opportunities. Supporting Manitoba-made research and development is an important investment for our province", said Karen Dunlop, CEO, Research Manitoba.

Recipient for Stream 1: Manitoba-Based Consortium

1. **Academic Institution: University of Manitoba**
    - Industry Partners: Canukshuk Animal Science
    - Project Title: *Using AI to optimize drying schedules to convert freshwater fish wastes into high-value-added pet treats for global export markets*
    - Area: Information and Communications Technology
    - Research Manitoba: $100,000 over 2 years
    - Leveraged funds: $50,000 over 2 years

Canukshuk is developing an innovative true-net-zero manufacturing plant in Gimli, Manitoba that is food-grade certified that converts fish wastes and by-catch obtained from Lake Winnipeg freshwater fisheries into pet treats for international markets.

The recent 7 million investments into this innovation will see a shipment of product in early 2023. One component of this innovation that convert wastes into an exportable product is however still missing: a dryer optimizing tool.

The University of Manitoba will work with Canukshuk to develop the dryer optimization tool by selecting the neural network model, training the neural network using synthetic and measured process data, testing the tool, and update drying schedules. This tool will use machine learning to determine the optimal drying schedule based on input parameters that include fish piece sizes and distribution; fish species characteristics like fat content, moisture content, flesh, or organs; frozen or unfrozen; pasteurization time with temperature requirement; and maximum moisture content of the product for food preservation for a given shelf life.

Using AI to improve manufacturing is a major development worldwide and one that requires to work with companies that are proactive in investing in new technological approaches. Achieving reliable drying schedules for product consistency will allow to expand these plants across Manitoba." – Dr. Eric Bibeau, Primary Investigator

Recipients for Stream 2: Manitoba Post-Secondary Researchers

2. **Dustin Isleifson, Department of Electrical and Computer Engineering, Faculty of Engineering, University of Manitoba**
    - Project Title: *Low mass antennas and devices for satellite and drone remote sensing applications*
    - Area: Advanced Manufacturing
    - Research Manitoba: $99,700 over 2 years

We are proposing to create low mass antennas and components using additive manufacturing (3D printing). Antennas and other microwave circuits are key components on satellite and drone-based sensing platforms.

However, traditional methods of constructing these components rely on bulky, and potentially high mass, metallic structures.

Reducing mass would significantly decrease energy costs for satellite launches and extend battery life for drones, as the energy demands are tied directly to the need to move the vehicles. The goal of the project is to develop the capacity for efficiently building fully functional components that operate in the microwave spectrum using additive manufacturing processes.

Several candidate microwave devices, including waveguide and antenna components, will be designed, fabricated, tested, and verified for potential use in future space and drone missions. Highly qualified personnel will be trained here in Manitoba on these concepts.

Through this program, we will create partnerships and develop innovative ways to build capacity in Canadian industry, and, in Manitoban companies, for cutting-edge space and drone component design and fabrication. We envision using these low mass devices in upcoming space missions, such as Cubesats, and on drone platforms that will be used in Arctic remote sensing applications.

"*We propose to create innovative low mass antennas and components using additive manufacturing (3D printing). Antennas and microwave circuits are key components on satellite and drone-based sensing platforms; however, traditional construction methods rely on bulky, and potentially high mass, metallic parts. Reducing mass can significantly decrease energy costs for satellite launches and extend battery life for drones, as energy demands are tied directly to the vehicle movement. The funding provided through this grant will allow us to develop, fabricate, and test prototype devices at the University of Manitoba. Highly-qualified personnel will be trained here in Manitoba on these concepts.Through this program, we will create partnerships and build capacity in Canadian research and development, industry, and in Manitoban companies, for cutting-edge space and drone component design and fabrication. We envision using these low mass devices in upcoming space missions, such as Cubesats, and on drone platforms that will be used in Arctic remote sensing applications*." – Dr. Dustin Isleifson

3. **Cheryl Glazebrook, Faculty of Kinesiology and Recreation Management, University of Manitoba**
    - Project Title: *VStim: A Novel Wearable Vibration Wristband for Post-Stroke Rehabilitation*
    - Area: Bioscience
    - Research Manitoba: $99,486.12 over 2 years

Current evidence shows that applying vibration with specific characteristics over the wrist tendons improves upper limb movements in individuals who have suffered astroke. Application of the current technology is limited because it is expensive and not portable. VStim is the first wearable rehabilitation device that uses wrist mechanical vibration with the goal of improving lost limb function post-stroke.

VStim is an affordable and accessible device that can be applied by patients independently. The 1004910 Manitoba Inc., who markets VStim, showed in their initial market validation that occupational and physiotherapists were interested in the function of VStim and are eager to try it with their patients.

A research-grade prototype was developed and used to explore the effects of VStim on upper-limb movements of healthy individuals.

However, this prototype is not integrated with VStim's novel measurement method for controlling vibration characteristics. The current project will address prototype development and validation of a user-experience prototype that will be ready for larger clinical trials.

In addition to developing and validating the user experience prototype, the relevant health regulation approvals for VStim will be acquired. The immediate future step will be to develop the go-to-market strategy to bring VStim to market.

"The VStim wristband is the first wearable rehabilitation device that uses targeted mechanical vibration with the goal of improving lost upper limb function post-stroke. RM's Innovation Proof of Concept grant will fund the development of a user-experience prototype, a critical next step that will allow VStim to move from the research lab into clinics and eventually to the Manitoba and Canadian market. The funding to develop a user-experience prototype is a key step for both VStim the company and the Perceptual-Motor Integration Lab's research as the development of a user-experience prototype will make it possible to conduct clinical research in the community where Manitobans can access the newest rehabilitation technologies. For Manitoba, the development of the VStim wristband will grow our economy by establishing VStim as a profitable Manitoban MedTech start-up. In the context of healthcare, VStim will provide new affordable and accessible rehabilitation technology for Manitobans in both urban and rural areas, which has the potential to improve the quality of care and reduce load of the post-stroke rehabilitation system." – Dr. Cheryl Glazebrook

4. **Ian Jeffrey, Department of Electrical and Computer Engineering, Faculty of Engineering, University of Manitoba**
    - Project Title: *A Clinical-Trial-Ready Proof-of-Concept Microwave Imaging System for Stroke Detection, Classification, and Assessment*
    - Area: Bioscience
    - Research Manitoba: $100,000 over 2 years

We propose to develop a microwave imaging (MWI) system for detecting and classifying stroke in real time. Stroke occurs when blood flow to a region of the brain stops, either through blockage (ischemic stroke) or rupture (hemorrhagic stroke). More than 800,000 Canadians have suffered a stroke, which is the third highest cause of disability and death in Canada.

To treat a stroke, it is necessary to determine whether the stroke is ischemic, in which case thrombolysis (blockage) can be applied, or hemorrhagic (bleeding), in which case thrombolysis must be avoided. These two classes of stroke can be distinguished by the regional excess or lack of blood in the brain, which in turn can be detected using medical imaging. MRI and CT are standards of care for the detection and assessment of stroke but are not ideal when attempting early classification of stroke during emergency transit, or when assessing post-stroke recovery through regular follow-up imaging.

A low-cost MWI system designed to detect the accumulation of blood in the brain will provide a practical means of early stroke classification that is deployable in emergency vehicles and can be safely used for continuous recovery monitoring.

"*Our research group has previously applied electromagnetic imaging technology to breast cancer detection/monitoring and agricultural grain storage monitoring. Research Manitoba Innovation Proof-of-Concept funding is enabling us to leverage our past experience developing this imaging technology by applying it to stroke detection and classification. Microwave imaging is a low-cost and portable imaging modality that, with appropriate development, can determine if a stroke is due to bleeding (hemorrhagic) or from a clot (ischemic). Treatment for stroke should be started as soon as possible, and a low-cost, rapid way of determining the type of stroke is needed. Research Manitoba's Innovation Proof-of-Concept funding will allow us to develop a prototype microwave stroke imaging system that not only allows for imaging/classification of stroke, but also provides a measure of confidence in the resulting image/classification. A low-cost microwave imaging device capable of accurately and efficiently detecting stroke type has the potential to impact the medical sector as a major benefit to the health and well-being of all people. More specifically to Manitoba, we hope to repeat our past success in using innovation to grow tech-based industry. Our long-term goals seek to continue growing Manitoba's economy through technological innovation leading to the growth of successful companies. We believe in contributing to our province's success, while creating opportunities here in Manitoba*." – Dr. Ian Jeffrey

5. **Karen Kabel and Tracy Brant, Red River College**
    - Project Title: *Automatic Speech Project for Indigenous Reconciliation & Education (ASPIRE)*
    - Area: Information and Communications Technology
    - Research Manitoba: $150,000 over 2 years

With Indigenous leadership and community members as integral project team members, this ICT-based project establishes the foundation for an Ojibwe language Automatic Speech Recognition (ASR) system. ASR systems automatically transcribe audio to written text. Driven by a commitment to Reconciliation, this project collates as much Ojibwe speech and text data as possible and processes it into a common format.

This will establish a formalized corpus designed to be easily accessible by the research community and easily integrated, programmatically, with speech and language software tools. This work prepares for creating and evaluating a baseline Ojibwe ASR system, using open-source code, such as the Kaldi ASR toolkit, as well as methods recently developed at the University of Edinburgh. This will provide a branching/reference point for subsequent ASR research by the wider community. It will also facilitate experimenting with approaches towards improving performance for other low-resourced Indigenous languages. Research methodologies that emerge from Indigenous worldviews, epistemologies and ontology will be utilized throughout the life of the project. The Ojibwe ASR system will provide a technological avenue to redress some of the impacts of language colonization in Canada. Particularly for education and health applications, it will enhance cross-cultural communication.

"The Research Manitoba Innovation Proof-of-Concept funding enables innovation incorporating the seven sacred teachings of humility, trust, respect, truth, love, wisdom, and courage by working with the Indigenous Elders, Knowledge Keepers, and Communities to increase awareness, and revitalize Ojibwe culture and language for Manitobans. RRC Polytech's School of Indigenous Education and Applied Computer Education are partnering together to preserve and promote the Ojibwe language using technology, Artificial Intelligence and the Ojibwe Language." - The ASPIRE Team

6. **Frederick Zeiler, Department of Surgery (Medicine), Rady Faculty of Health Sciences, University of Manitoba**
    - Project Title: *Computer Vision for Continuous Data Extraction and Digitization in Health Care*
    - Area: Bioscience
    - Research Manitoba: $100,000 over 2 years

Most medical treatment information is collected manually from bedside monitoring and medication administration devices, due to lack of digital compatibility and/or hardware restrictions. This poses a significant limitation as the frequency and amount of data gathered is restricted to human involvement, exposing patients to risk based on errors in data transcription. Similarly, as treatment becomes personalized and reliant on continuous data streams, limitations present with manual data collection will grow and become a significant barrier to future medical advancement. Thus, a system that can help collect medical information and export it into a digital format autonomously would be of benefit.

Pertinent information is often attainable on device monitor displays, and there currently exists the technology to develop an image text-to-digital format conversion system. Using optical character recognition technologies, image manipulation, a camera, and computer; we will develop and test such a system. A complete system that converts treatment information from medical device screens into digital format will be designed and made available in a user-friendly software. With this, medical information can be collected without the involvement of human personnel, reducing medical errors and risks to patients, and improving health information digitization in clinical settings of all types.

"With ongoing improvements in our technology and leveraging machine learning for bedside data digitization, the hope is to reduce workload burden of healthcare workers, increase the time such professionals have to care for patients, increase the rate of data capture for patients and reduce medical errors related to manual transcription of data using pen/pencil. The funding from Research Manitoba will facilitate ongoing novel device development, optimization and testing within a simulated environment. All of which will lead to the technology being closer for live-time use within clinical care settings and better position it for potential external investment from the private/public sectors." – Dr. Frederick Zeiler

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Research Manitoba:
Research Manitoba promotes, supports, and coordinates the funding of research excellence and innovation in health, natural and social sciences, engineering, and the humanities in Manitoba. Research Manitoba supports local talent development by providing research support to early career researchers and graduate students, along with fostering strategic partnerships to strengthen research and innovation in Manitoba.

To learn more about the IPoC Grant Program:
- ✓ Visit our website at: Innovation Proof-of-Concept (IPoC) Grant Program, or,
- ✓ Email: helpdesk@researchmb.ca