NEWS ANNOUNCEMENT
For Immediate Release

Innovative Solutions and Products Created in Manitoba

$1.1 Million in Research Funding for Ten New Innovation Proof-of-Concept Grants

Thursday, November 10, 2022 – Winnipeg, Manitoba. Today Research Manitoba announces a total investment of $1,116,870.00 in research funding to support ten new ***Innovation Proof-of-Concept (IPoC) Grants***. Research Manitoba's investment will leverage $623,200.00 and will support Manitoba-based projects in the areas of; Biosciences (4 projects), Information and Communications Technology (1 project), Advanced Manufacturing (2 projects), and Infrastructure and Transportation Industries and Technologies (3 projects).

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 Manitoba-based innovation projects, which will strengthen the development in the fastest growing sector in our province," said Cliff Cullen, Minister of Economic Development, Investment and Trade. "These IPoC projects will help push Manitoba forward as an industry leader in Biosciences, Information and Communication Technology, Advanced Manufacturing, and Infrastructure and Transportation Industries and Technologies. These industries are crucial in creating new jobs and bringing additional trade into the province."

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 researchers 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.

"Congratulations to all the recent Innovation Proof-of-Concept recipients," said Karen Dunlop CEO, of Research Manitoba. "The IPoC projects funded demonstrate the diversity of innovation, talent, and collaboration in Manitoba. We are proud to promote research and development of innovative ideas essential for economic development."

Recipients for STREAM 1: Manitoba-Based Consortium

1. **Academic Institution: University of Winnipeg**
   - Industry Partners: **R-Tech Industries Ltd., Northstar Robotics, EMILI**
   - Project Title: *Agriculture re-envisioned – breaking through the proximal data bottleneck*
   - Area: Information and Communications Technology
   - Research Manitoba: $150,000, over two years
   - Leveraged funds: $412, 500

Real-time, automated methods of in-field data collection are needed to increase productivity and sustainability in production agriculture, expedite plant breeding and research, and further the uptake of organic farming. The project team, in partnership with Enterprise Machine Intelligence and Learning Initiative (EMILI), is developing a self-propelled, GPS-guided data rover for the rapid collection of plant images and environmental data in test plots, and organic farms across a full-scale commercial farm. Large volumes of high-quality, in-field data are crucial for the development of crop scouting technology that will identify weeds amongst crops, characterize plant health and yield, or detect disease. This project is the next innovative leap by the TerraByte research group and its collaborators.

"This is a great investment in an important project for digital agriculture in Manitoba and across the prairies. This work contributes to our collective digital agriculture expertise and ability to autonomously collect real-time in-field data," said Jacqueline Keena, Managing Director, EMILI. "The project's unique focus on prairie crops provides great value to the industry right here in Manitoba and I am looking forward to testing and validating this technology at Innovation Farms."

"Digital agriculture is coming, and with it the large-scale use of robotics and computers to quickly generate, digest, and act upon massive amounts of data. The rover we are developing is a critical first step toward this goal, allowing us to collect both the quantity and quality of crop image data needed to drive innovation," said Christopher Bidinosti, Professor in the Department of Physics, University of Winnipeg. "Our project is an exciting new frontier in the long and venerable tradition of agriculture implementation development in Manitoba."

"The Rover platform is intended to leverage scarce labor resources while improving both the quality and quantity of digital data collection that is critical to the decision-making process in modern crop production systems," said Rob McClement, Owner, R-Tech Industries Ltd.

2. **Academic Institution: University of Manitoba**
   - Industry Partner: **Orthopedic Innovation Centre**
   - Project Title: *Antibiotic materials for additive manufacturing of patient-specific medical devices*
   - Area: Advanced Manufacturing
   - Research Manitoba: $147,700, over two years
   - Leveraged funds: $210,700

Developing an infection after surgery that involves a medical implant can have devastating consequences for patients. In partnership with the Orthopedic Innovation Centre (OIC), the project team will advance the development of a technology that blends 3D printing with antibiotics to create customized implants with the potential to solve these infections. As a result, the technology will enable rapid, in-hospital manufacturing of medical implants that are tailored to a patient's needs.

"3D printing is an exciting technology that is already being used in some areas of medicine. Combining 3D printing with infection-fighting antibiotics is a further innovation with big potential, and we aim to demonstrate this," said Trevor Gascoyne, President, and CEO, of the Orthopedic Innovation Centre.

Recipients for STREAM 2: Manitoba Post-Secondary Researchers

3. **Dr. Aftab Mufti, Department of Civil Engineering, Faculty of Engineering, University of Manitoba**
   - Project Title: *Developing software based on the empirical evidence to rationalize design provisions ofthe Canadian Highway Bridge Design Code (CHBDC) of reinforced concrete deck slabs*
   - Area: Infrastructure and Transportation Industries and Technologies
   - Research Manitoba: $100,000, over two years

A major advancement in the technology of reinforced bridge deck designs is the creation of a theoretical basis for empirical evidence and the development of computational software to ensure precision in the design of reinforced concrete deck slabs (RCDS). This project will enable consulting engineers to use this analytical method to design more efficiently, and accurately determine design options for specific conditions and parameters, thereby increasing safety, reliability, and the economics of bridge design using RCDS.

4. **Dr. Aftab Mufti, Department of Civil Engineering, Faculty of Engineering, University of Manitoba**
   - Project Title: *Pi Bracket Crack Sensor (PiBCS) for crack detection monitoring near stiffeners in Bridge Girders*
   - Area: Infrastructure and Transportation Industries and Technologies
   - Research Manitoba: $100,000, over two years

Structural Health Monitoring (SHM) is a process of attaching sensors to a structure, collecting data at a central monitoring site, and analyzing the data to assess the capacity of a structure. Development and commercialization of the Pi Bracket Crack Sensor as part of the SHM process will minimize the area where cracks cannot be detected, increase the service life of bridges, and maintain safety. Successful commercialization of this product provides the sector with a solution for crack detection in an area of bridge girders that is particularly susceptible to fatigue, near girder stiffeners.

"*If you look at history, innovation comes from courageous thinking and studying past discoveries. Our yearning to train young minds to innovate safe and sustainable bridges has led to a new generation of experts in this field and pioneering discoveries. The funds awarded by Research Manitoba have made this possible," said Dr. Aftab Mufti, Professor Emeritus, Department of Civil Engineering, University of Manitoba and four-time recipient of the IPoC Grant.*

5. **Anuraag Shrivastav, Department of Biology, Faculty of Science, University of Winnipeg**
   - Project Title: *Performance Evaluation of Novel NMT-IHC Tests as Predictive and Prognostic Tests for Breast Cancer*
   - Area: Bioscience
   - Research Manitoba: $100,000, over two years

Breast Cancer is the second leading cause of death from cancer in Canadian women. It is estimated that 27,400 Canadian women were diagnosed with breast cancer in 2020, and 5,100 died of the disease. On average, 75 Canadian women will be diagnosed with breast cancer every day, and 14 will die of the disease. This project will support the development of breast cancer diagnostics to predict recurrence and improve the detection, and treatment of breast cancer.

6. **Lucy Marzban, College of Pharmacy, Rady Faculty of Health Sciences, University of Manitoba**
   - Project Title: *Development and validation of a novel clinical laboratory test for assessment of pancreatic* amyloid formation in diabetic patients
   - Area: Bioscience
   - Research Manitoba: $99,800, over two years

Type 2 diabetes (T2D; adult onset) is progressively increasing in Manitoba and worldwide. Loss of insulin-producing beta cells in the pancreas is a key defect in T2D that leads to elevated blood glucose. The formation of toxic protein aggregates named islet amyloid is an important factor contributing to a beta-cell loss in T2D. Treatment strategies to prevent amyloid formation, however, are currently limited by challenges in the assessment of amyloid in patients due to a lack of diagnostic tests. In this project, the team will use a novel biomarker strategy to develop the first diagnostic laboratory test for the assessment of amyloid formation in patients. Detection of amyloid at early stages with this sensitive, specific, and cost-effective blood test will allow timely and effective treatments to prevent beta-cell damage caused by amyloid thereby preserving beta cells in patients with T2D.

7. **Carl Ho and David Swatek, Department of Electrical and Computer Engineering, Faculty of Engineering, University of Manitoba**
   - Project Title: *A Bi-directional Wireless Charging System for Self-Driving Electric Vehicles*
   - Area: Infrastructure and Transportation Industries and Technologies
   - Research Manitoba: $100,000, over two years

Wireless power transmission is a rapidly emerging technology that enables the automatic and contactless charging of an electric vehicle whenever it stops over a designated charging area. In this way, it provides convenient and seamless on-route charging, reducing "range anxiety" and ultimately enabling fully autonomous self-driving vehicles. The current research project will design and demonstrate a prototype bi-directional, wireless, electric vehicle charging system capable of sourcing power from the grid and returning power to the grid. Electric vehicles equipped with bi-directional charging capability become energy storage elements that can be drawn upon to improve power quality and avoid blackouts. This work is being done in collaboration with Manitoba Hydro and will be useful in planning a future decentralized and decarbonized distribution grid. The results will also benefit the electric vehicle industry by providing advanced battery charging systems.

8. **Can-Ming Hu, Department of Physics and Astronomy, Faculty of Science, University of Manitoba**
   - Project Title: *Real-time monitoring of stored grain for insect pest infestations*
   - Area: Advanced Manufacturing
   - Research Manitoba: $100,000

Global food insecurity has risen since 2018, leading to 828 million people going to bed hungry every night. Meanwhile, between 1.4% and 5.9% of the world's harvested grains are lost due to insect infestation. It urges creative ways to reduce such waste to prevent the widespread destruction of livelihoods. The most commonly used technology for monitoring stored grain is insect traps, which require manual inspections and are labor-intensive and time-consuming. To surmount these shortcomings, this project aims to develop a microwave sensor for remote real-time monitoring of grain bins for insects. The research is based on interdisciplinary collaborations between the groups of Dr. Can-Ming Hu at the Faculty of Science, Dr. Digvir S. Jayas and Dr. Fuji Jian at the Faculty of Engineering of the University of Manitoba, and Dr. Paul Fields at Agriculture and Agri-Food Canada. It is envisaged that the commercialization of this portable and cost-effective insect sensor to the market can improve integrated pest management and help combat food insecurity.

9. **Sabine Kuss, Department of Chemistry, Faculty of Science, University of Manitoba**
   - Project Title: *Development of an Electrochemical Antibiotic Susceptibility Sensor*
   - Area: Bioscience
   - Research Manitoba: $100,000

Antimicrobial resistance is a growing problem that severely increases the number of deaths from bacterial infections. This research project presents an innovative and interdisciplinary approach to recognizing and quantifying antimicrobial resistance in bacteria by electrochemistry by detecting the direct uptake and export of antibiotics by/from living bacteria. Electroanalytical techniques are cost-efficient, sensitive, and able to detect antibiotics in blood, urine, and saliva. The overall goal of this research is the development of a point-of-care biosensor to identify drug susceptibility in patient samples within minutes, or even seconds. This technology will advance clinical treatment from the current trial-and-error approach to the prescription of evidence-based personalized drug regimens.

10. Jeffrey Leiter, Faculty of Kinesiology and Recreation Management, University of Manitoba
    - Project Title: *Using EMG and lower limb kinematics to develop a Skating App*
    - Area: Bioscience
    - Research Manitoba: $119,370

Hockey development should focus on optimizing performance and maximizing the protection of the athlete. Groin injuries account for 10% of all hockey injuries. Since 1.4 million players are registered in hockey worldwide, approximately 140,000 players will have groin injuries this season. Improper skating mechanics, specifically lower limb movements, are not only the likely cause of this injury but also a limiting factor for performance. This project will study muscle activity and lower limb movements during an on-ice sprint to develop a Skating App that will reduce groin injury (protection) and enhance skating speed (performance).

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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 strategicpartnerships to strengthen research and innovation in Manitoba.

To learn more about the IPoC Program:

- Visit our website at: Innovation Proof-of-Concept (IPoC) Program, or,
- Email: helpdesk@researchmb.ca