CGCA-EHB Innovation Challenge

Advanced Technology for Energy Harvesting in Biomedical (EHB) Device Applications

Summary Wearable and implantable medical electronic (IMEs) devices have attracted attention due to their essential role in improving the quality of life for various healthy individuals and patients. Some examples of these applications are human energy harvesting, human motion detection, artificial nerves, human-machine interaction and customized health-monitoring sensors. These devices need to be highly biocompatible, resilient and efficient. Thanks to the progress in electronic devices, the power required for driving these devices are being reduced which provides the opportunity to avoid the use of traditional battery and making them smaller and self-powered with a continuous power source. Therefore, harvesting biomechanical energies from human motions (such as muscle relaxation and contraction, body movement, blood circulation, lung motion, and cardiac motion) are viable options to power these tiny bio-medical devices.

Vision To create a multidisciplinary global network of experts in the field of energy harvesting for biomedical (EHB) applications.

Objectives The Connaught Global Challenge Award for Energy Harvesting in Biomedical (CGCA - EHB) device applications aims to catalyze ideation around the development and implementation of "advanced technology for EHB device applications" by:

1. Drawing attention to EHB needs
2. Developing promising concepts and functional designs
3. Providing EHB Innovation Training & short courses
4. Developing comprehensive bio-engineering test procedures for EHB
5. Establishing new international collaborations
6. Expanding the knowledge of nanoscale EHB

Call for Proposal The CGCA-EHB Innovation Challenge is intended to support innovative translational research projects that broadly integrate or transcend disciplines to develop knowledge in the **advanced technology for energy harvesting in biomedical device applications**. Proposals submitted to this program will be reviewed by a multidisciplinary peer review committee. The challenge includes opportunities for teams to share their concepts and detail design, technology demonstration and proof of concept through Video Pitch, Posters, and Presentations.

Sectors of Focus This call invites proposals for any research projects in relevance to harvesting energy from biomechanical motions to power wearable and implantable medical electronic systems. Areas of applications may lie in, but are not limited to, the following technologies:

- **Energy harvesters (Piezoelectric, etc.).**
- **Nano-generators.**
- **Nano-sensors.**

Researchers are expected to investigate the technology in a combinatorial study including a few aspects such as: conceptual design and optimization, material selections, lifecycle, biological safety, regulatory affairs, performance evaluation, power management, commercialization, methods, processes, frameworks, etc. of these applications.

Eligibility

Teams: 3-4 Undergraduate students; 2-3 Graduate students; or 2-4 mix of Undergraduate /Graduate students.

One person must be designated towards the administration of this grant. This person, the "applicant" is responsible for completing and submitting the full application on behalf of the team. The applicant and co-applicants must be University of Toronto students or its affiliated researchers.

Each team must consist of a Supervisor/Mentor who could be a University of Toronto Faculty, Post-Doctoral Fellow, Research Associate, etc.

Equity, diversity and inclusion policies in the teams need to be considered and adhered to wherever possible.

Application Process

This program is dedicated to promoting and maintaining a diversified base of high-quality research capability in the field of EHB device applications at the University of Toronto. The submitted proposals will be rated by a peer review committee to identify those most relevant to the objectives of the CGCA program and address the selection criteria listed below, (please follow the attached template).

Selection Criteria: Submissions will be assessed based on the following criteria:

a) Merit of the proposed research

- Quality of the proposal:
  - The background, problem statement, aim, feasibility and anticipated outcomes.
- Methods and approaches:
  - Appropriateness of the proposed methods and approaches.
  - Appropriate incorporation of sex, gender and diversity in the research team.
- Feasibility:
  - Availability of resources/equipment required.
  - Appropriateness and justification of the budget in relation to the proposed activities.
  - Appropriateness of the environment (academic institution and/or other organizations) to enable the conduct and success of the proposed activities.

b) The current state of the problem

- The clarity of what has been done about the proposed project by applicants so far.
- A brief technology readiness assessment of the project's current state.[1]

c) Anticipated outcomes

- Impact:
  - Potential outcomes of the proposed research proposal and their influence and impact on various stakeholders.
- Knowledge mobilization and dissemination:
  - Quality and appropriateness of knowledge mobilization plans, including effective dissemination, exchange and engagement with stakeholders within and/or beyond the research community, where applicable.

d) Record of the applicants

[1] *Please refer to https://www.ic.gc.ca/eic/site/080.nsf/eng/00002.html for more information.*

- Expertise and experience:
    - Appropriate expertise to undertake the proposed research, including complementary and interdisciplinary knowledge, expertise and experience.
    - Experience and track record of the investigator(s)—importance, originality, quality and impact of past research/education.

Awards: The Advisory Committee will review, assess and select the five best ventures in accordance to the aforementioned criteria and fund them for further development in accordance to the Funding & Opportunities guidelines mentioned below.

Funding & Opportunities

The selected five best proposals shall be supported financially up to $5000 CDN to generate proof of concept models for Subject Matter Expert's review.

Moreover, additional select few teams will be invited to participate and present their ideas in a competition at the CGCA-EHB symposium in June 2022. They will also be invited to attend the professional development workshops and short courses offered by the program.

Deadline

The project proposal submission deadline: **On or before 11:59 PM on October 17, 2021.**

Contact Information

For questions, concerns, or for submitting the proposals, please contact IMDI (imdi@mie.utoronto.ca) with the subject line **EHB - < "Your Query">**