



9th Annual MDDC Awards for Excellence in Biomedical Engineering Student Design & Innovation

Biomedical Engineering Design & Innovation Awards:

Principal Award (\$5,000)

Innovation Award (\$2,500)

Distinction Award (\$1,500)

Special Award for Need-Oriented Innovation in Medical Technology Award:

Need-Oriented Innovation (\$10,000)

The MDDC Medical Device Development Centre of British Columbia ('the MDDC') is pleased to announce the renewed endowment of three MDDC Student Awards to encourage and recognize student innovators in technologies relating to medicine and health care, including medical devices, systems, software, apps, and assistive technologies.

This year, the MDDC is announcing a "Special Award for Need-Oriented Innovation in Medical Technology" category for this year's competition. The categories for the special "need-orientated" award are:

- Cuffless blood pressure monitor
- Alert system for personal distress
- Robotic system for reducing staff injuries
- Improving efficiencies of health care workers to reduce costs.

Additional details for the Need-Orientated Innovation are provided at the end of this document and can also be found on www.mddc.org

Entrants for the "Need Orientated Award" (\$10,000) are also eligible the "Design & Innovation Awards" of Principal Award (\$5,000), Innovation Award (\$2,500), Distinction Award (\$1,500).

Awards will be given to innovative design projects developed by undergraduate, graduate students including medical interns or residents, enrolled in engineering, technology, or medical related programs at BC post-secondary institutions (including, but not limited to, UBC, SFU, UVic, UBC Okanagan, BCIT and Emily Carr Institute). Projects that are capstone projects for final-year students are eligible, as are projects that were carried out by undergraduate and graduate students in 2022-

2023 as well as projects from earlier years such as those projects from the 2021-2022 period. Self-initiated projects carried out by students are also eligible.

Students may be considered individually or as a team, and an individual student may be an applicant in more than one application for an award. Teams may be multi-disciplinary and may be across different institutional departments or educational institutions.

Important dates:

Award applications deadline **midnight Sunday April 2nd, 2023**

Finalists will be notified on or before **Monday April 10th, 2023**

Finalists will demonstrate their project/prototypes on **Saturday May 6th, 2023**

Award applications will be accepted until **midnight Sunday April 2nd, 2023**.

Finalist will be selected by an independent Selection Committee established by the Board of Directors of the MDDC. Finalists will be selected on or before **April 10th, 2023**. Finalists will present their projects to the Selection Committee on **May 6th, 2023**, at a special event sponsored by the MDDC board.

Five criteria will be applied by the Selection Committee in evaluating projects:

- 1) Need being addressed in the project (e.g. biomedical, human, healthcare)**
- 2) Level of student achievement in creating the innovation**
- 3) Uniqueness and originality (competitive analysis, google search results, analysis of patentability are all encouraged)**
- 4) Design evaluation process and stage of development of the project (prototypes are encouraged but detailed designs are acceptable, showing the design process and any end-user feedback is encouraged)**
- 5) Projected biomedical, economic and social impacts, including likelihood of successful commercialization*.**

There is an application form provided on www.mddc.org

A written application with two-page (maximum) project summary addressing the above 5 evaluation criteria must be submitted. Applicants should also include a 3-5 minute video providing a brief introduction, highlights of your project objectives and goals, as well as the problem it solves, and if possible a brief demonstration of your concept.

Videos should be uploaded to YouTube, Vimeo or a similar service with a private or public link submitted. Videos can also be shared via Dropbox, Google Drive or similar.

The MDDC is a non-profit British Columbia society whose mandate is to advance the collaborative development, evaluation and commercialization of need-oriented medical technology. Over its more than 25-year history of successful, self-funded operation it has achieved an enviable track record of fulfilling this mandate. Further information about Medical Device Development Centre of British Columbia (MDDC) can be found by visiting www.mddc.org

In sponsoring these awards for innovation, the MDDC's specific goal is to discover and honour B.C.'s best and brightest young innovators in the field of medical technologies and biomedical engineering, and to encourage them to pursue their innovations in a rewarding and fulfilling field and career.

Terms and Conditions:

1. These Awards are intended to appeal primarily to students enrolled in: electrical and computer engineering, engineering physics, engineering science, mechanical engineering, biomedical engineering, or health care/medical programs at BC post-secondary institutions (including, but not limited to, UBC, UBC Okanagan, SFU, UVic, BCIT, and Emily Carr Institute).
2. Multi-disciplinary teams across multiple faculties or even institutions are encouraged
3. Students can be either undergraduate, graduate, or post-graduate students
4. Projects that are capstone projects for final-year students are eligible, as are projects carried out by students in earlier years. Self-initiated projects carried out by such students are also eligible for consideration. Multi-disciplinary teams are eligible and encouraged.
5. These Awards (certificates and cash prizes) are made to students directly and are not given to educational institutions or to any entities that may be project sponsors. The MDDC does not wish to receive any intellectual property rights in connection with the Awards and specifically disclaims any interest in any intellectual property rights.
6. **Applications for Awards must be received by midnight Sunday April 2nd, 2023** and must relate to a prototype suitable for demonstration **Saturday May 6th, 2023**. Students should submit a brief project summary (two pages maximum, appended to the application form) that addresses the five evaluation criteria outlined above. Also, the students should submit a 3-5 min video. Videos should be uploaded to YouTube, Vimeo or a similar service with a private or public link submitted. Videos can also be shared via Dropbox, Google Drive or similar. No other special documentation is required. For its evaluations, the Selection Committee will rely on the two-page summary, and the video to identify the finalists. The selected finalists will be evaluated on the project documentation, demonstration of project by students, and interaction with students.
7. **Finalists will be notified on or before Monday April 10th, 2023, with an invitation to demonstrate their projects to the Selection Committee on Saturday May 6th, 2023.** Award decisions will be made immediately after project demonstrations. The Selection Committee reserves the right to make no Award in one or more categories. Decisions of the Selection Committee, upon approval by the MDDC Board of Directors, are final and cannot be appealed.
8. Acceptance of an Award by a selected winner constitutes the winner's consent for the MDDC to use the winner's name, photo and some project information in publicity regarding the MDDC and the Award program. Any confidential information identified by the team will not be disclosed publicly.

For further information, or to obtain an application form, or to submit an application, contact: awards@mddc.org

Special Award for Need-Oriented Innovation in Medical Technology

The MDDC awards competition welcomes all submissions according to the criteria given on the website. In addition, for the 2022-2023 year, the MDDC has established this special award, with a \$10,000 no-strings cash prize, for an innovation that meets an identified and unmet need in health and wellness. "No strings" means that all intellectual property and rights will remain with the entrants. Entrants will be expected to demonstrate a working prototype at the time of the finalist competition. Entrants in the Need-Oriented Innovation will also be considered within the other, general MDDC Awards.

The unmet need categories for the 2022-2023 year are given below. A solution in each area may have substantial healthcare and economic benefits and should have follow-on investment potential. Entrants may choose any of the following identified categories. Entries outside these categories, or entries that are not at a stage where a working prototype cannot be demonstrated, will not be considered for this Special Award (but will of course be eligible for consideration under the traditional criteria).

1. Cuffless blood pressure monitor, suitable for incorporation into a wearable and/or smartwatch

There is a high-priority unmet need for a cuffless blood pressure monitor that can be integrated into a wearable or smartwatch or eye-based apparatus. The measurements must be reasonably accurate relative to central BP measurements; current approaches such as those that make use of pulse wave transit time (PWTT) must be calibrated initially with a cuff-based system. A bonus goal would be to provide a cuffless device that can measure blood pressure during sleep, and an even bigger bonus goal would be to provide a device that can continuously monitor blood pressure. An example of a creative approach can be seen by visiting veyetals.com. Measurement of central blood pressure, (the pressure within the aorta) versus peripheral blood pressure (blood pressure in the arm or leg) is the optimum target.

2. Alert system for personal distress and fall detection, suitable for overcoming the serious limitations of currently offered pendant solutions

Seniors living alone are at risk from falls, injuries, or other undetected distress. Current PERS (Personal Emergency Response Systems) require the wearing of a pendant or other device, which is not well accepted by seniors. There is a need for an unobtrusive, non-invasive and ubiquitous means for monitoring the homes of seniors to detect distress that does not require the senior to remember to wear a device, recharge it, or otherwise take positive action. An ideal solution will reliably detect and report distress, both automatically under appropriate conditions, and on demand when desired by the senior.

3. Robotic system for substantially reducing staff injuries and ergonomic problems associated with performing shoulder ultrasound examinations

Sonographers suffer from a high rate of work-related repetitive strain injuries because the ultrasound transducer has to be held against the patient in positions that are often taxing for the user.

Tele-ultrasound with robot assistance has been proposed in the past and demonstrated to be effective in several patient studies. However, there are difficulties in setting up and operating such a system, as it requires both a "console" and a "patient-side manipulator" or PSM.

New robotic technology allows a more collaborative approach to PSM design and operation, opening up the possibility of the sonographer directly maneuvering the robot-held transducer, in a collaborative approach, with the PSM as a cobot.

The design of such a cobot system may provide benefits to sonographers, patients and the healthcare system. In particular, there is a high incidence of injury for shoulder scans, and this may be a first application to be considered.

Details and reference to robot-assisted ultrasound can be found at <https://ieeexplore.ieee.org/abstract/document/9756910>

4. Improving efficiencies of medical staff and health care workers to reduce costs.

Efficient healthcare delivery is top of mind to all healthcare administrators and innovation in their parlance is not introducing a new implantable device or cure for a disease, it is finding efficiencies, and avoidance of patient harm. These can be analogous to Lean Engineering practices. Recent award-winning innovations in Canadian healthcare include digitization of influenza vaccination clinics, improvement of cybersecurity for IOT devices, methods to shorten room cleaning time between procedures and a reusable N95 mask.

Other examples (listed here to provide the scope of possibilities but not intended to be comprehensive) include:

- a. Developing methods to reduce hospitalization related infection. This can happen by changing the handling of catheters or tubes, documentation techniques, changes in how patients are housed or moved, etc.
- b. Reducing hospital waste or more efficient means of disposing of hospital packaging or
- c. Any innovation or process that improves nursing productivity.

Healthcare administrators are now the gatekeepers of introduction of new ideas and innovations which solve their problems. These innovations are more likely to have a timely reception and can make immediate and significant improvements in patient welfare.

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