Department of Science & Technology, Government of India
सत्यमेव जयते

IC-IMPACTS
Centres of Excellence Canada

COLLABORATIVE RESEARCH PROJECT PROPOSAL – DESCRIPTION & REQUIREMENTS

Funding Opportunities for Indo-Canadian Research
on
CYBER-PHYSICAL SYSTEMS (CPS) TO SUPPORT GREEN BUILDINGS IN SMART CITIES
TWO-YEAR PROJECT (2019–2021)

BACKGROUND

A UN report indicates that 54 percent of the world's population lives in urban areas, and is expected to increase to 66 percent by 2050 with most of the increase concentrated in Asia and Africa. Mega-cities with more than 10 million inhabitants are increasing in number and size that includes Tokyo, Delhi and Mumbai as well as Shanghai, Mexico City, and São Paulo.[1]

As technology advances in communities, cities have become smarter and more interconnected to the world around us through growing IoT (Internet of Things) and CPS (Cyber-Physical Systems). "Smart-Cities" are defined as "*urban centers that integrate cyber-physical technologies and infrastructure to create environmental and economic efficiency while improving the overall quality of life*". [2]

The U.S. Green Building Council (USGBC), who manage the LEED (Leadership in Energy & Environmental Design) rating system, calculated that in the United States alone, buildings account for 72% of electricity consumption, 39% of energy use, 38% of all carbon dioxide (CO2) emissions, 40% of raw materials use, 30% of waste output (136 million tons annually), and 14% of potable water consumption. It is estimated [3] that green building can reduce energy consumption by 24 - 50%, CO2 emissions by 33 - 39%, water use up to 40%, and solid waste up to 70% over a building life cycle. As a result, the need to build "green buildings" in conjunction with Smart Cities will minimize impact on human health and the environment as well as reduce Life Cycle Cost.

Source:
[1] Web page: http://www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html
[2] Online PDF: https://ics-cert.us-cert.gov/sites/default/files/documents/OCIA%20-%20The%20Future%20of%20Smart%20Cities%20-%20Cyber-Physical%20Infrastructure%20Risk.pdf
[3] Web page: https://www.nationalgeographic.com/environment/urban-expeditions/green-buildings/benefits-of-green-buildings-human-health-economics-environment/

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PROPOSALS

IC-IMPACTS and the Department of Science & Technology (DST) invite researchers to submit proposals for projects that can be completed in two years (or less) and that focus on Cyber-Physical Systems to Support Green Buildings in Smart Cities.

Cyber-Physical Systems to Support Green Buildings in Smart Cities

The proposals may focus on one or more of the following or related topics:

A. **Development of Sensors, Cyber-Physical Interfaces and Solutions for**:
   - Monitoring Structural Performance of Buildings for Safety, Reduced Life Cycle Costs, and Efficient Asset Management
   - Building Disaster Management during Fire, Earthquakes, etc. to Improve Occupant Survivability
   - Enhancing Thermal, Acoustical, and Lighting Comfort in Buildings
   - Monitoring of Volatile Organic Compounds in Air, Human-Generated Aerosols, and Aerosol Transport
   - Energy Reduction, Net Zero Energy, and Carbon Neutrality
   - Reduced Water Usage, Water Harvesting, and On-Site Treatment

B. **Demonstration of Technologies developed in Part A in Buildings in India and Canada**. Technology demonstrations should rank high on the Technology Readiness Level (TRL) Scale and enable the dream of building Smart and Sustainable Buildings. Central to the successful execution of the proposed project will be demonstrating a scalable technology that can be developed as a commercially viable option for Indian and Canadian companies.

KEY CRITERIA FOR A SUCCESSFUL APPLICATION:

Successful applications will be relevant to Indian and Canadian ecosystems and conducive to commercialization, particularly in evolving cities in India and Canada. Successful applications will also include:

- Strong potential to scale up research and build rapid demonstration capabilities.
- Availability of strong industry partnership and/or city government (municipal, local administrative bodies) to assist with commercialization of the project. Please submit a letter of support from the industry/local body partner with details of their potential cash-funding commitment.
- Achievable research-based deployment at a suitable location in India, within the two years of the project life cycle. (July 2019–June 2021)
- Provide training opportunities for Highly Qualified Professionals (HQP), particularly master's and doctoral students as well as postdoctoral fellows.

IMPLEMENTING AGENCIES:

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The Department of Science & Technology (DST), Ministry of Science and Technology, Government of India, was established with the objective of promoting new areas of science and technology and to play the role of a nodal department for organizing, coordinating and promoting these activities in India. The department is mandated to formulate policy statements and guidelines and to support basic and applied research in national institutions.

IC-IMPACTS Centres of Excellence is a not-for-profit organization, established by the Federal Government of Canada through the Centres of Excellence Program to serve as a pan-Canadian agency responsible for the delivery of research programs in the areas of sustainable infrastructure, integrated water management, and public health, disease prevention and treatment between Canada and India. It is the only Networks of Centres of Excellence (NCE) with a mandate focused on research collaborations between Canada and India.

TIMELINE:

- Launch of call on IC-IMPACTS and DST websites: **15 March 2019**
- Project Submission Ends: **31 May 2019**
- Announcement of Successful Projects: To be confirmed

ELIGIBILITY:

- All Canadian researchers eligible to receive funding from IC-IMPACTS and tri-council agencies in Canada are eligible to apply as Principal Investigators from Canada along with an eligible Indian Principal Investigator.
- All Indian researchers generally eligible to apply for DST funding opportunities are eligible to apply as Principal Investigators from India.

INTELLECTUAL PROPERTY:

DST and IC-IMPACTS funded participants in the projects shall agree upon the ownership, access rights, and exploitation of the intellectual property generated during the cooperation. The collaboration agreement(s) shall be made in writing. The guidelines of the funding organizations should be followed when making the agreements.

At a minimum, a letter of intent between the collaborators should be included in the application stating the desire for cooperation and acknowledging that each participant has understood the general terms and conditions of the other project parties.

APPLICATION INSTRUCTIONS:

- Proposals must be written in the English language and clearly marked as DST: IC-IMPACTS proposals and have to be submitted to both IC-IMPACTS and to DST in parallel in accordance with the proposal preparation requirements of each side, respectively.
- While conforming to the different respective regulations, forms and submission procedures of the two agencies, the project descriptions must be identical in their

substance. As the projects must be fully integrated Indo-Canadian research projects, it is expected that the proposals must contain detailed information about the mode and essentiality of collaboration between the Indian and the Canadian side.

- Each project application must consist of a Indian and Canadian applicant (Principal Investigators) who together have developed a joint project proposal and project budget. The joint project proposal along with all supporting documentation required by each funding organization must be submitted online via **https://onlinedst.gov.in/Projectproposalformat.aspx**. All documents and forms required for a project application are accessible online.
- The online application will be automatically sent to both DST and IC-IMPACTS together with all funding organization specific documents submitted as part of the online application process.
- Canadian researchers have to submit the proposals electronically via online IC-IMPACTS' application portal**.**

REVIEW PROCESS FOR THE EVALUATION OF APPLICATIONS:

- All projects will undergo an arms length peer review. The peer-review will be overseen by a joint IC-IMPACTS / DST Committee that will recommend the final projects to appropriate bodies of IC-IMPACTS and DST for final consideration.
- The results of the review process will be shared between the agencies. Funding will be granted for only those proposals where both DST and IC-IMPACTS recommend funding. Unilateral funding of only one part of a joint initiative will not be possible.

FURTHER INFORMATION:

➢ **To submit a proposal to IC-IMPACTS:**

All documents and forms required for a project application are accessible at *www.ic-impacts.com*

➢ **To submit a proposal to DST:**

All documents and forms required for a project application are accessible at www.onlinedst.gov.in

- The deadline for the submission of proposals is **31st may, 2019**.
- The Indian researchers can download the proposal formats from websites www.dst.gov.in/ www.onlinedst.gov.in and should submit completed application form and all relevant information. Proposals must be submitted to DST through the e-application system provided at www.onlinedst.gov.in. **Indian Applicants are also requested to send three hard copies (1 original + 2 copies) to DST by 31st may, 2019**

through proper channel. **It should be ensured that application with identical title has been submitted by his / her Canadian counterpart to IC-IMPACTS by due date.**

- **Proposal submitted only on one side will not be considered.**
- Hard copies of proposal should be submitted/mailed/e-mailed to the following addresses:

  Dr (Mrs) Ujjwala Tripti Tirkey,
  Scientist 'F'/Director,
  Room No. 19 B, S&T Block I,
  International Cooperation (Bilateral),
  Department of Science and Technology,
  Technology Bhavan, New Mehrauli Road, New Delhi 110016
  Tel: +91 (0)11 2659 0377; +91 (0)11 2686 4642
  Email: ujjwala@nic.in

For detailed guidelines and application format, please visit International Cooperation (Bilateral) at https://onlinedst.gov.in/Projectproposalformat.aspx

CONTACTS:

➢ **Contact person at IC-IMPACTS:**

Mr. Shapoor Marfatia
Chief Operations Officer
shapoor@ic-impacts.com

➢ **Contact person at DST:**

Dr Ujjwala T. Tirkey
Scientist 'F', International Bilateral Cooperation
ujjwala@nic.in