

Join Binghamton University and IIT Ropar FALL 2021 WEBINAR SERIES ON SMART ENERGY AND SYSTEMS

Energy Harvesting and Self-powered Sensors

8:30 a.m. New York / 7 p.m. Rupnagar
Tuesday, Dec. 7



SESSIONS WILL BE HELD VIA ZOOM, WITH REGISTRATION REQUIRED.

Register for the webinar at <https://bit.ly/3ogTy8S>

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The growth of IoT devices demands low power and more efficient sensors. Advancements in electronic devices have led to low-power sensors in mW range that enabled use of ubiquitous energy sources such as mechanical vibration. In the MEMS and energy harvesting laboratory at Binghamton University, Shahrzad Towfighian's team investigates energy harvesting mechanisms to convert mechanical energy to electrical energy to operate low-power sensors. The team also designs microelectromechanical systems (MEMS) sensors and actuators with higher resolution and sensitivity. Merging the two research paths, Towfighian explores new possibilities such as shock sensors that can be self-powered from mechanical shock without any external power sources. This seminar describes three research themes:

- Self-powered load sensors for total knee replacement. We implemented triboelectric energy harvesters inside a knee implant package to generate the power required for embedded digitization and communications circuitry.
- Electrostatic levitation as a new mechanism for sensing and actuation. MEMS accelerometers, microphones and switches can benefit from this new type of actuation and sensing for improved performance and functionality.
- A combined system of triboelectric energy harvesters and MEMS actuators. This project will create self-powered shock sensors that trigger a switch when the shock goes beyond a certain limit without any external power requirement.

Shahrzad "Sherry" Towfighian, associate professor of mechanical engineering, received a bachelor's degree from the Amirkabir University of Technology, Iran; a master's degree from Ryerson University, Canada; and a doctorate from the University of Waterloo, Canada, all in mechanical engineering. She completed a postdoc at Ryerson before joining Binghamton University in 2013. Her research interests are microelectromechanical systems and vibration energy harvesting for bio-medical devices. A recipient of grants from the National Science Foundation and the National Institutes of Health, Towfighian has published more than 75 journal and conference papers.