



Bilkent EEE



Bilkent EEE Distinguished Seminar Series

Bilkent University - Department of Electrical and Electronics Engineering

Microelectromechanical Systems: Bridging Device Physics and Engineering Application

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University of Cambridge

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Microelectromechanical systems (MEMS) technology has had a significant impact on the availability of miniaturized and cost-effective sensor systems. The technology also provides an invaluable toolkit for scientific studies including exploring nonlinear and scale-dependent effects. This talk will cover three specific case studies from our group that illustrate this potential and bridge the gap between exploratory studies of device phenomena and practical application. The first will cover the principle of vibration mode localization and its application in a sensing context. The second will cover the principle of parametric resonance and its application to vibration energy harvesting and the wider context of energy harvesting-enabled sensing. The third case study will introduce phononic frequency combs and potential applications to resonance tracking in physical sensors and energy harvesting. The experimental observations of this phenomenon were reported in 2017 in a piezoelectric-on-silicon microresonator device and have now been independently validated in several other platforms. The talk will conclude by providing a look ahead to future applications.

Bio: Ashwin A. Seshia is a Professor of Microsystems Technology at Cambridge University and Institute Chair Professor in Electrical Engineering at IIT Bombay. He received his B.Tech. degree in Engineering Physics from IIT Bombay in 1996, and the MS and PhD degrees in Electrical Engineering and Computer Science from the University of California, Berkeley in 1999 and 2002, respectively.

His research interests include microelectromechanical systems (MEMS) design, particularly in relation to sensors and sensor systems. Ashwin received the IEEE Sensors Technical Achievement Award, and was a IEEE Sensors Council distinguished lecturer. Ashwin has acted in numerous service and leadership roles for the MEMS technical communities and journals and is currently serving on the International Steering Committee for the IEEE MEMS Conference as co-General Chair of IEEE MEMS 2026.

Ashwin is a Chartered Engineer (CEng), Fellow of the Institute of Physics (IOP), Fellow of the Institution for Engineering and Technology (IET) and a Fellow of the Institute of Electrical and Electronics Engineers (IEEE). He was elected a Fellow of the Royal Academy of Engineering (FREng) in 2023.

