

Energy Efficient Optoelectronics for Science, Medical, and Consumers Applications

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Abstract

What is the common challenge between reading a million neurons in the brain, searching for life in distant exoplanets, and turning your smartphone camera into a 3D depth camera? It turns out that receiving and sending information with very low energy is the key to achieving these and many more breakthroughs. I will present our efforts in making novel nanophotonics and optoelectronics to achieve extremely low energy per bit of information. I will also share some of our recent breakthroughs, including an infrared camera, based on Electron Nano-Injection, with extreme sensitivity and speed. This new technology is being developed for the 8 m Subaru Telescope for imaging of Earth-like exoplanets for the first time. This same detector has recently been used in a commercial medical optical tomography system, in collaboration with Zeiss, and achieved ~1000 times higher sensitivity at very low light conditions. I will present our research on using Photonic Jets that show strong and lossless photon coupling to quantum dots. Finally, I will present novel quantum wells optical shutters with record energy efficiency, leading to record performance in our infrared 3D depth camera for robotics and consumer applications.

Short Biography

Hooman Mohseni is the AT&T professor at the Department of Electrical Engineering and Computer Sciences, and Physics and Astronomy Department, at Northwestern University. He is the recipient of several research and teaching award including W.M. Keck Foundation Award, NSF CAREER Award, DARPA Young Faculty Award, and Northwestern Faculty Honor Roll. Mohseni serves at several editorial boards including IEEE Photonics, IEEE Selected Topics in Quantum Electronics, and Frontiers in Material. He has published over 120 peer-reviewed articles in major journals including Nature, Nano Letters, and ACS Nano. He has presented more than 72 plenary and invited talks, and holds 14 issued US and International patents. He is a Fellow of SPIE and OSA.

