SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
FACULTY OF ENGINEERING
Website: https://www.eng.nus.edu.sg/ece/

Area: Microwave & Radio Frequency

Host: Assoc Prof Qiu Chengwei

Research Seminar

TOPIC	**:**	**Spatiotemporal Light Control with Active Metasurfaces**
SPEAKER	**:**	**Dr Amr Shaltout** **Staff Systems Engineer** **Velodyne Lidar, Inc., San Jose, CA**
DATE	**:**	**Wednesday, 27 October 2021**
TIME	**:**	**10.00AM to 11.00AM**
WEBINAR	**:**	**Join Zoom Meeting** **https://nus-sg.zoom.us/j/4156763801?pwd=NUwzUWhwdlZIcGt3cmhyTzFId1V0QT09** **Meeting ID: 415 676 3801** **Passcode: 662108**

ABSTRACT

In optics, researchers are continuously trying to find new ways to manipulate the intrinsic properties of light, such as the direction, polarization state, and frequency. Currently, this is accomplished using relatively bulky optical elements, such as lenses, gratings, polarization filters and non-linear crystals. However, a new class of optical elements termed metasurfaces is emerging. Metasurfaces are essentially two-dimensional, flat optical elements composed of a dense array of nano-structured particles, called optical antennas. They can achieve many of the same functions as their bulky counterparts, but also provide new opportunities. They offer remarkable ways to manipulate light by locally controlling the amplitude, phase and/or polarization of optical wave-fronts. However, most of these optical elements are passive and their functions are set in stone during the fabrication process.

In my research, I am exploring new approaches to expand on the field of passive metasurfaces by creating active metasurface-devices. This is motivated by the notion that space and time play complementary roles in Maxwell's equations. It suggests that structuring of materials in both space and time can bring forth exciting new physical phenomena and further broaden device applications. I show that concepts from nanotechnology and ultrafast laser physics can be effectively combined to achieve control over light beams with high spatiotemporal precision. The emergence of active metasurfaces is very timely given the many applications that would benefit from tunable, flat, and easy-to-integrate optical elements. These include a variety of wearables and displays, on-chip LIDAR, augmented/virtual reality, biosensing, computational imaging, and quantum optics.

BIOGRAPHY

Dr. Amr Shaltout received education and training at Stanford university as a postdoctoral scholar at the Geballe Lab for Advanced Materials, and at Purdue university where he received his Ph.D. from the Department of Electrical and Computer Engineering in December 2015. Prior to that, he received his B.Sc. in Electrical Engineering, and M.Sc. in Engineering Physics and Mathematics from Ain Shams University, Cairo, Egypt. He also has industrial experience working in optical sensing at Velodyne Lidar company in the United States and in Optical MEMS at Si-Ware Systems company, Cairo, Egypt.

His current research interests are in the area of active nanophotonics, where he focuses on developing tunable metasurfaces for spatiotemporal and ultrafast light control. He authored and co-authored 18 journal papers in top-tier journals including Nature and Science family. He is also the inventor of six related technologies with granted and pending patents in the United States.