

## **Seminar Talk**

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**3:00 p.m. KH 224**

**Title:**

Holography and Its Fundamentals

**Abstract:**

Holography is a three-dimensional (3D) visualization technique that satisfies all the depth-cues and provides the most natural visualization. It is based on generation of an optical replica of the captured 3D object from the captured diffraction field. Holography is used in vast amount of application areas, such as in optical computing, optical metrology and microscopy, non-destructive testing and 3D imaging.

Dynamic holographic reconstructions can be achieved by employing holographic video displays which may have pixelated structures. In practice, spatial light modulators (SLMs) are used in such purposes. The pixelated structure of SLMs can affect the quality of reconstructed objects. Hence, in order to obtain better reconstructions, pixelated structure of SLMs has to be taken into consideration. Rapid calculation of the diffraction field which is emitted by the object is just as important as the accuracy of the diffraction field.

Digital holography is another important field in holography. In digital holography, diffraction field of a 3D object can be captured by devices formed as arrays of sensors. Although, capturing high resolution diffraction field paves the way for reconstructing objects with sharper edges and wider viewing angles, there are some imposed limitations on the capturing devices. For instance, when the size of sensors is decreased, power of the captured light will drop, conversely power of the shot noise will increase. Hence, the quality of the captured pattern may be plummeted. With the aim to capture high resolution diffraction fields, super-resolution algorithms can be utilized.

**Short Bio:**

G. Bora Esmer received Ph.D. in Electrical and Electronics Engineering in 2010 from Bilkent University, Turkey. He worked as an instructor at the same department in the following

semester. In 2011, he joined the Faculty of Engineering at Marmara University in Istanbul, Turkey. His research interests are in the areas of 3D visualization techniques, digital holography and computer-generated holography. He is a member of IEEE and OSA