COLLEGE OF ENGINEERING

SEMINAR ANNOUNCMENT

"Precision metrology and manufacturing for smart materials and structures"

Presenter by Assistant Professor ChaBum Lee

Abstract

Advanced research in additive manufacturing (AM) technologies has continued at an accelerating rate over the past decade. Precision AM is the process of using precision machines that can generate precision tool motion to fabricate the dimensions of an object with nanometric tolerance. The overarching goal of this research is synthesis of additive manufacturing with precision engineering device needs for smart materials and structures. In view of the recent research trend of nanotechnology, AM is promising, but it has technologically challenging problems. A team of experts in precision engineering, advanced manufacturing, metrology, mechatronics, and materials need to work together to address this interdisciplinary problem as a team. In the presentation, the current AM technologies will be reviewed. Second, a novel AM process for piezoelectric polymers will be discussed. This research will create fundamental knowledge relating electromechanical material property characterization and processing of piezoelectric polymers and can create a novel and transformative method to produce 3D structured smart materials and devices for sensing, actuation, and energy harvesting applications. Lastly, AM-based precision engineering devices for nanopositioning applications will be introduced. We created the world cheapest high precision stage by exploiting AM, precision engineering, and optics. This research will fill gaps in knowledge base by testing the accuracy, precision, stability and fatigue limits of different AM processes and materials and creating comparative benchmarks and can potentially transform precision engineering device design for sensing and actuation applications.

About the Speaker

ChaBum Lee received a BS degree in Mechanical Engineering from Chung-Ang University in 2006 and an MS and PhD degree in Mechatronics from Gwangju Institute of Science and Technology in 2008 and 2012, respectively. After his PhD, he worked in LG Display as a senior researcher and carried out research related to retina display manufacturing technology. Prior to joining TTU, he studied manufacturing and metrology areas as a research assistant professor at the University of South Carolina. His research interests are precision manufacturing and metrology technology including optical measurement, sensors and actuators, smart materials and structures, precision machining, and optical analysis and fabrication of diffractive optical components.

Date: Tuesday, Nov. 10, 2015
Time: 12 P.M. – 1 P.M.
Location: Prescott 225