Department of Electrical and Computer Engineering

TEXAS TECH UNIVERSITY
Edward E. Whitacre Jr.
College *of* Engineering

Fall 2025 Seminar Series

Seminar Title: ***Cybersecurity and Semiconductor Device Research Overview at TTU***

Time: 3:00-3:50 PM, Monday, Oct. 20, 2025

Location: ECE 101

Speaker:
Argenis Bilbao
ECE Department, TTU

Abstract:
This presentation provides an overview of Dr. Bilbao's current research efforts, focusing on various projects and their outcomes. The presentation begins with background information on his education and professional experience, highlighting his involvement in cyber-security research within the energy field and semiconductor device projects. It covers previous research projects, including critical infrastructure security training programs and defensive charging to mitigate power side-channel attacks on smartphones. The presentation also delves into current sponsored projects, such as the development of a cyber-secure microgrid controller and the analysis of semiconductor opening switches for solid-state pulsed power.

Speaker Bio:
Dr. Bilbao obtained his Bachelor's, Master's, and Ph.D. in Electrical Engineering from Texas Tech University. Before joining Texas Tech, he worked as a software engineer, developing and maintaining computer networks and proprietary software for pharmaceutical companies like Farmax. His current research focuses on cybersecurity for power grids, microgrids, and microgrid control algorithms using artificial intelligence (AI) and machine learning (ML). In this research, he investigates how to leverage machine learning and blockchain technology to enhance power system reliability, resilience, and security. AI/ML can be used for anomaly detection and network traffic analysis, as well as for predicting two critical factors in any power system: energy demand and energy availability. For this reason, artificial neural network models are being developed to identify unknown functions related to user behavior and weather. Dr. Bilbao has also led multiple workforce development programs in the cybersecurity field aimed at providing participants with hands-on experience with computer networks, cyber-attacks and their effects, and defensive/recovery techniques. In addition to this, Dr. Bilbao conducts research on Semiconductor Opening Switches (SOS) to generate narrow-width pulses for directed energy applications. In his previous position at the U.S. Army Research Laboratory (ARL), he researched inductive-resonant Wireless Power Transfer (WPT) and AI/ML applications in power electronic systems. This research resulted in significant contributions to the Versatile Tactical Power & Propulsion (VICTOR) Essential Research Program (ERP), the Next Generation Combat Vehicle (NGCV) initiative, and the Vertical Lift (VL) program. He has also conducted extensive research on ultra-high-voltage SiC insulated gate bipolar transistors (IGBT) and metal-oxide field effect transistors (MOSFET), which are rated to block 20 kV and 15 kV, respectively.