



**NEWARK COLLEGE  
OF ENGINEERING**

# **Senior Design Showcase**

**A University-Industry Partnership  
Initiative of the Helen & John C.  
Hartmann Department of  
Electrical and Computer  
Engineering**

**Tuesday, December 09, 2025  
Campus Center Atrium**

*Sponsored by Brian Kiernan*

*Message from the Chair*

The mission of the Department of Electrical and Computer Engineering at NJIT is to provide outstanding academic and research experience to students to prepare them to meet the needs and challenges of the 21st Century in electrical and computer engineering. The mission includes providing state-of-the-art interactive education through innovation, cutting-edge research, real-world experience, and promoting industry-university partnerships.

The ECE Department faculty and staff are committed to providing an outstanding educational experience to our students to prepare them for personal and professional achievements. The Department continues to take new synergistic initiatives to bring experts from leading industries in mentoring and advising students for Senior Design projects.

This ECE Senior Design Showcase brings a synergy among students, faculty, and industry experts to help students gain an exciting and valuable experience in engineering project design and management that is closer to real-world situations while attending to budgets, deadlines, teamwork, and professionalism. It further provides industry participants an opportunity to get to know students for future recruiting and enhancement of public relations.

We have been fortunate to have many industry partners and we would like to extend our appreciation to all judges and their strong support for our students and programs.

Sincerely,



Durgamadhab Misra, PhD  
Fellow of IEEE & Fellow of ECS  
Professor and Department Chair  
Helen and John C. Hartmann Department of  
Electrical and Computer Engineering

## SENIOR DESIGN SHOWCASE SPONSORS AND PARTNERS

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**Senior Design Showcase**  
**December 09, 2025**  
**Program**

All program events will take place in the Campus Center Atrium

9:00 a.m. to 9:30 a.m.      Coffee & Light Breakfast

9:30 a.m. to 10:00 a.m.      Projects on Display

10:00 a.m.                      Opening Remarks  
*Moshe Kam, NCE Dean*  
*Durga Misra, ECE Chair*

Project Presentations  
*Students*

12:00 p.m.                      Lunch

Showcase Awards Ceremony  
*Durga Misra, ECE Chair & Judges*

## Judges Panel

Arsalan Gilani ('89)  
Vice President, Business Strategy  
Smartply, Inc.

Brian Kiernan ('70)  
InterDigital Communications (Ret.)

Carol Benitez (Mendez) ('12)  
Vice President of Operations  
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Victor Bonachea  
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ASCO Power Technologies

Doru Popescu ('81,'85)  
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Kevin G. Carswell ('79)  
Vice President, World Wide Sales  
Solid State Cooling Systems

Leon K. Baptiste ('91)  
President/CEO  
LB Electric Company, LLC

Shamoon Siddiqui ('04, 05)  
Technology Consultant  
Develop.IO

## Senior Design Showcase Presentation Roster

Group #	Presenter(s)	Project Title	Advisor(s)
1	Amiyah Stephens (CoE) Brandon Lee (CoE) Cheyenne Campos (EE) Chris Davorson (EE) Edward Hernandez (EE)	Machine Learning Enhanced EMG Prosthetic Arm	Dr. Xuan Liu
2	Korhan Gegcil (CoE) Isbah Kurury (EE) Saif Ali (CoE) Tunmise Olayiwola (EE)	OmniTrack: Multi-Axis Tracking/Recognition System	Dr. Xuan Liu
3	Jiahao Lin (EE)	Smart AR Glasses Attachment	Dr. Xuan Liu
4	Taha Rizvi (CoE) Collins Mba (CoE) Jason Li (EE)	Robotic Care Companion for the Elderly	Dr. Xuan Liu
5	Thomas Scaturro (EE) Malik Salim (CoE) Kevin Flores-Camacho (CoE) Hellen Montoya (CoE)	P.O.S.H.: Pet Oriented Smart Home	Dr. Xuan Liu
6	Carol Wisly Latif (CoE) Jannatul Zenith (CoE)	Electric-Powered Rescue Vehicle with Motion Detection/Cameras	Dr. Xuan Liu
7	Gabriel Oliveira Drehmer (CoE) Alp Hance (CoE)	Advanced Fire Detection System for Server Rooms	Dr. Xuan Liu

## **#1. Machine Learning Enhanced EMG Prosthetic Arm**

*Presented by*

**Amiyah Stephens (CoE)**

**Brandon Lee (CoE)**

**Cheyenne Campos (EE)**

**Chris Davorson (EE)**

**Edward Hernandez (EE)**

*Adviser:* Dr. Xuan Liu

Upper-limb prosthetics face critical accessibility barriers including prohibitive costs, complex calibration processes that frustrate new users, and a high abandonment rate. This project addresses these challenges through an open source 3D-printed arm design and a machine learning enhanced electromyographic (EMG) control system. Using a single MyoWare sensor we developed an intuitive pressure-based design where users control hand gestures through bicep contractions. Our personalized machine learning approach using a Convolutional Neural Network (CNN) adapts to individual users' muscle patterns, achieving over 80% accuracy for rock-paper-scissors gestures after under 5 minutes of calibration. The ~\$200 system demonstrates that advanced prosthetic control can be accessible, offering a viable alternative to \$20,000+ commercial solutions. This work provides a framework for a system that could increase prosthetic adoption rates among upper-limb amputees.

## **#2. OmniTrack: Multi-Axis Tracking/Recognition System**

*Presented by*

**Korhan Gegcil (CoE)**  
**Isbah Kurury (EE)**  
**Saif Ali (CoE)**  
**Tunmise Olayiwola (EE)**

*Advisor:* Dr. Xuan Liu

OmniTrack, a multi-axis tracking and recognition system, is a stationary tracking platform. It integrates a camera, Raspberry Pi, and software for real-time object recognition and tracking. The system features 180-degree rotation and tilt for enhanced adaptability. Key components include a motorized PTZ (Pan-Tilt-Zoom) camera mount, computer vision algorithms, and embedded control systems. This technology has applications in security, defense, automation, and safety, appealing to industries like military defense, autonomous robotics, and smart surveillance.

### #3. Smart AR Glasses Attachment

*Presented by*

**Jiahao Lin (EE)**

*Advisors: Dr. Xuan Liu*

Smartphone speech-to-text apps are very useful for Deaf and hard-of-hearing users, but the ergonomics of holding the phone or looking down at the screen can be awkward, inconvenient, and unsafe outdoors when walking. Consumer-grade AR headsets are currently too heavy and expensive to be feasible.

This project provides a low-cost smart AR glasses attachment that clips to a normal pair of eyeglasses to display heads-up captions and navigation cues. It features a Seeed XIAO nRF52840 microcontroller, a 0.96" SPI OLED display, a Li-Po battery with USB-C charging, and a small right-angle glass prism which reflects the OLED image into the user's field of view. A custom Android app does speech-to-text and Google Maps navigation on the phone, and streams compacted text and turn-by-turn directions over Bluetooth Low Energy using a very lightweight UART-style protocol. The prototype demonstrates live-caption and walking navigation arrows on the glasses with the phone remaining in the user's pocket for comfortable hands-free operation. With only commodity components and a very simple optical path, this ~\$<100 add-on attachment is a practical and accessible assistive device for hearing-impaired users, and a flexible building block for future smart AR features such as notifications, calendar reminders, and context-aware suggestions.

## #4. Robotic Care Companion for the Elderly

*Presented by*

**Taha Rizvi (CoE)**  
**Collins Mba (CoE)**  
**Jason Li (EE)**

*Advisor:* Dr. Xuan Liu

The goal of this project is to produce an AI-driven robotic companion. The robot will hold conversations, create alarms, contact people, and perform gestures. The design will utilize motors for movement, an LCD screen for displaying information, a microphone and speakers for communication, and a microcontroller with wifi capabilities for information processing. This product will help long-term hospital patients by aiding them with certain hospital functions, such as contacting nurses or timing medication, while alleviating loneliness stemming from isolation. The adaptable design and multilayered implementation of this robot will also give users a range of use cases outside standard medicine.

## #5. P.O.S.H.: Pet Oriented Smart Home

*Presented by*

**Thomas Scaturo (EE)**  
**Malik Salim (CoE)**  
**Kevin Flores-Camacho (CoE)**  
**Hellen Montoya (CoE)**

*Advisor:* Dr. Xuan Liu

This project presents a smart, pet-oriented home system designed to simplify and secure pet care. The system features an RFID-enabled door lock, a real-time video monitoring camera, and an automated food dispenser. A motorized door mechanism and integrated dispenser form the core mechanical design, while the electronics rely on RFID sensors, cameras, and IoT modules for seamless operation. The modular software architecture offers local control over access and feeding schedules, minimizing manual oversight. Ensuring reliability remains central to the design. Potential markets include busy pet owners seeking convenience, veterinary clinics requiring supervised access, and kennels optimizing feeding schedules and security

## #6. Electric-Powered Rescue Vehicle with Motion Detection/Cameras

*Presented by*

**Carol Wisly Latif (CoE)**  
**Jannatul Zenith (CoE)**

*Advisor:* Dr. Xuan Liu

The purpose of this project is to build a small prototype vehicle that can be used by emergency teams during fires, building collapses, or earthquakes to look for trapped survivors in spaces that are too dangerous or too tight for people to enter.

The vehicle is driven by an Arduino Uno and two motor drivers that independently control four DC motors, while Bluetooth allows commands to be sent from a phone or laptop. A Raspberry Pi with a camera and onboard sensors provides video streaming and basic sensing of the environment. All electronics are powered from a single 12 V battery using DC-DC converters to supply safe 5 V rails. We tested the system for different motion modes, Bluetooth range, camera performance, and sensor response. The vehicle was able to respond correctly to motion commands, operate reliably over typical indoor distances, stream usable video, and detect nearby motion. This platform offers a low-cost, modular base that can be extended with more advanced autonomous navigation and sensing in future work.

## **#7. Advanced Fire Detection System for Server Rooms**

Presented by

**Gabriel Oliveira Drehmer (CoE)**

**Alp Hance (CoE)**

*Adviser:* Dr. Xuan Liu

With the rapid expansion of data-center infrastructure, the need for efficient computational and environmental management has become increasingly critical as cooling and equipment maintenance represent major operational expenses. This project introduces a low-cost, high-resolution monitoring solution designed to reduce waste and improve equipment reliability by providing appliance-level thermal visibility. Using DHT22 sensor probes, the system captures temperature and humidity data from the exhaust of individual network appliances and sends digital readings to a Raspberry Pi every two seconds, where they are displayed on a web-based administrative dashboard. Administrators can configure device-specific thresholds. When a threshold is exceeded, the system automatically triggers an MLX90640 thermal imaging camera to capture a snapshot and email it to the designated recipient. This \$150 solution supports multiple probes and delivers device-specific measurements, offering a level of thermal monitoring not available in traditional rack or room-based commercial systems.

## ACKNOWLEDGEMENT

The Department would like to thank the members of the ECE Industry Advisory Board for their generous dedication and contributions to improving the quality of the ECE academic and research programs.

Brian Kiernan ('70)  
InterDigital Communications (ret.)

Leon K. Baptiste ('91) President/CEO  
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World Class Telecommunications

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Antrix Systems, LLC

Ahmed Mousa  
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Futuristic TD&D & DER Systems  
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Victor Bonachea  
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Product Owner  
ASCO Power Technologies

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President/CEO, Luna Innovations

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