



KUKA Roboline Upgrade

LSSU KUKA Robot Line

Presentation: 1:30 pm | CASET 212

Demonstration: 2:00 pm | CASET 125

Team Members: Jordan Dasuqi (CE), Kevin Krieg (ME), Jacob Grover (MfgET), Lindsey Pajot (ME), Andrew Purcell (EE), Ben Woods (MfgET)
Faculty Advisor: Jim Devaprasad **Industrial Contacts & Support:** Eric Becks, Ron Bergamin
Sponsors: KUKA Robotics, Textron Aviation, SCHUNK, Cognex, & LSSU

Project Description: Team KUKA Robo-line Upgrade (KRU) has implemented a third KUKA robot to the pre-existing two-robot KUKA workcell in LSSU's Robotics Lab. In addition to updating the workcell's controls, vision, and safety systems, Team KRU installed a rotary index table used to transport work pieces between two robots, a work table, and end-of-arm tooling for the third robot. Team KRU also created two new lab exercises. All documentation such as user manuals, schematics and tutorials were updated. Finally, a synchronized robotics motion project and a robotics deburring project were completed to demonstrate the capabilities of this workcell.



Automotive Lighting & Vision Solutions

Inspection of Automotive Lights

Presentation: 2:00 pm | CASET 212

Demonstration: 2:30 pm | CASET 122

Team Members: Ben Damron (MfgET), Neil Hall (EE), Tony Mongene (ME), Kerry Pierce (CE), Derek Schleben (ME)
Faculty Advisor: David Leach **Company:** Esys Automation (Auburn Hills, MI) **Industrial Contact:** Mark Compton

Project Description: Team ALVS partnered with Esys Automation to develop a machine vision system with the capability to detect the operational status of automotive daytime running lights and center high mount stop lights. The project was broken down into four major tasks. The first task was to mount the camera and lights, then power them up. The second task was to determine an appropriate camera setup to reduce interference from ambient light sources. The third was to develop a vision algorithm to analyze the camera images. Finally the fourth part was to design a graphical user interface that would allow the future operator to begin work with the product while receiving minimal training. These four parts came together to create a product that could in the future, be used at the final inspection stage in automotive plants.



Superior Engineering & Automation

Automated Alignment of Robot with Steering Column

Presentation: 2:30 pm | CASET 212

Demonstration: 3:00 pm | CASET 124

Team Members: Sarah Becks (CE), Jacob Kline (ME), Scott Lordson (CE), Roberto Valdez (ME)
Faculty Advisor: Masoud Zarepoor **Company:** Nexteer Automotive (Saginaw, MI) **Industrial Contacts:** Tim Bennett, Fred Berg, Dave Prior, Scott White

Project Description: Team Superior Engineering Automation (SEA) was tasked with automating the current alignment process between a robot arm and steering column using a vision system and a compliance device for Nexteer Automotive. The goal of the system is to reduce the amount of time required to run the alignment process and improve the repeatability of that process and the testing effort. The system includes a camera and laser system to check alignment at each point, and a force cell to record the force efforts on the steering column. The compliance device allows the robot to move from one point to another with minimal stress on the column. Additionally team SEA was tasked with developing a data acquisition system (DAQ) to collect the force readings of the tests.



Automated Repair Cell

Automatic Filter Cell Repairs

Presentation: 3:00 pm | CASET 212

Demonstration: 3:30 pm | CASET 122

Team Members: Joshua Graham (ME), Wayne Greensky (ME), Aly Hamner (CE), Brian Nash (MfgET), Erik Schwatz (ME), Sheldon Towner (EE)
Faculty Advisor: Eric Becks **Company:** Corning Incorporated (Corning, NY) **Industrial Contacts:** Gail Dyer, Norman Neumayer, Norris Kirby, & Michael Shultz

Project Description: Team Automated Repair Cell (ARC) was charged with creating an automated robotic cell by Corning Incorporated (Corning) which integrated machine vision with a collaborative robot. The project automated a previously manual process at Corning of reworking imperfect ceramic diesel particulate filters. The vision system identified the imperfections in the filters and then provided coordinates to the collaborative robot to affect the rework of the filters. Team ARC designed and built a custom End-of-Arm-Tool (EOAT) for the collaborative robot. The EOAT was dual purpose which punched out unwanted caps and filled in unwanted holes, with a material specified by Corning, in the filter matrix which restored the perfect checkerboard pattern of holes and caps in the filter.



Superior Thermal Solutions

Thermal Trainer System

Presentation: 3:30 pm | CASET 212

Demonstration: 4:00 pm | CASET 106c

Team Members: Derrick Dzedzie (EE), Laura Fernandez de Valderrama (ME), Chris Howe (EE), Kameron Russell (MfgET), Cord Sutter (ME)
Faculty Advisor: Jeff King **Sponsor:** LSSU **Industrial Contact:** Zakaria Mahmud **Special Thanks:** Fund for LSSU
Project Description: Team Superior Thermal Solutions (STS) undertook the task of updating one of two thermal trainer units owned by LSSU. The team revamped the unit's control system and added automated data acquisition. These thermal trainer units serve the core mechanical engineering class: Thermal and Fluids Laboratory and their origins can be traced back to a senior projects team in 2004. They had seen deterioration in performance and were no longer capable of supporting three individual labs inspired by the original design. To combat this deterioration, team STS reinvigorated a single trainer by replacing hardware with modern equipment, adding additional sensors, replacing the software and controls system, and incorporating automated data acquisition for use by students. The unit is now capable of supporting an increased total of five laboratories.



Superior Baja Racing
Mini Baja Kart

Project Description: Team Superior Baja Racing has updated Lake Superior State University's, Society of Automotive Engineers (SAE) mini baja kart. The team enhanced the performance of the kart built by the previous year's team. The updated kart includes greater adjustability, improved handling and an improved data acquisition system. Team Superior Baja Racing has redesigned a new front suspension giving the kart greater suspension travel and improved handling along with tuning the kart to improve performance. An improved data acquisition system was added to record kart data throughout races, which can be later analyzed and used to adjust the kart to different drivers and track conditions.

Presentation: 4:00 pm | CASET 212

Demonstration: 4:30 pm | CASET 120

Team SBR Members:

Garrett Bular (ME), Erich Gainer (ME), Ryan Lloyd (ME), Kiegan McNamara (ME), Mike Reed (MfgET), Derek Reetz (ME)

Faculty Advisor: Robert Hildebrand

Support: Zak Mahmud

Sponsors: Chippewa Motors, Rodenroth Motors, AiM Tech, Lonestar Racing, American Star Racing, Quality Drive Systems, & LSSU

ROBOTICS ENGINEERING DEGREE
LAKE SUPERIOR STATE UNIVERSITY
LSSU.edu/Robotics



Welcome to the School of Engineering & Technology

Team Presentation*/Demonstration Tentative Schedule

KRU 1:30*/2:00pm, CAS125 ARC 3:00*/3:30pm, CAS122

ALVS 2:00*/2:30pm, CAS122 STS 3:30*/4:00pm, CAS106c

SEA 2:30*/3:00pm, CAS124 SBR 4:00*/4:30pm, CAS120

****All Presentations Will Be in CASET Room 212***

Students will be available throughout the afternoon for informal demonstrations and questions.

2017-18 Senior Projects Faculty Board Members

This group serves as advisors, overseers, and guides to help the teams through their overall process:

Paul Weber (Chair), Eric Becks, Jim Devaprasad, Robert Hildebrand, Jordan Huff, Jeff King, David Leach, and Masoud Zarepoor

Special thanks to Eric Becks, Laura Bofinger, and Zak Mahmud

The School of Engineering & Technology comprises:

- Computer Engineering • Electrical Engineering
- Mechanical Engineering • Robotics Engineering (NEW)
- Electrical Eng Technology • Manufacturing Eng Technology

All of the Lake Superior State University senior engineering and engineering technology bachelor's students are required to complete a challenging senior design project. The students work in multidisciplinary teams and use a composite of their technical and general education courses to successfully complete these projects.



For more information about LSSU's School of Engineering & Technology
www.lssu.edu/eng or 906-635-2207

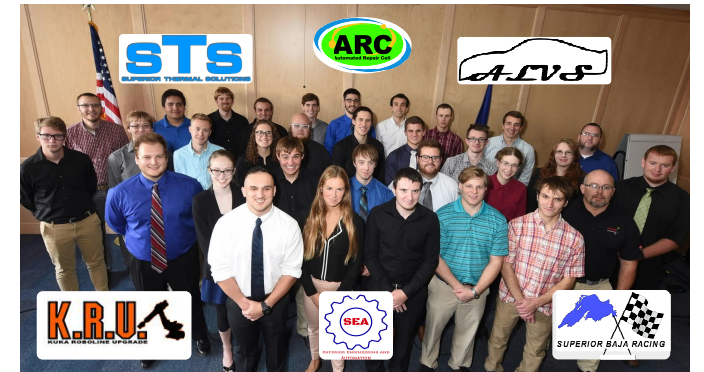


LAKE SUPERIOR STATE UNIVERSITY

The School of Engineering & Technology

presents the

Class of 2018



Senior Design Project Presentations & Demonstrations

Friday • May 4, 2018

1:30 p.m. – 5:00 p.m.

in the

Center for Applied Science and Engineering Technology