LSSU FANUC Robotics Integration Project
– Electrical & Computer –

Members:
   Blake Dansfield (CE), Nikolai Dowd (CE), Jon Mardyla (EET), Joshua Passino (EET), and Geno Peyerk (CE)

Faculty Advisor:
   Jeff King

Company:
   Lake Superior State University - Robotics Lab
   Sault Ste. Marie, Mich.

Sponsor:
   Applied Manufacturing Technology (AMT)
   Lake Orion, Mich.

Industrial Contacts:
   Dr. David Roland Finley, P.E./LSSU, Jason Markesino,/AMT

Presentation: 1:15 pm | CAS 123
Demonstration: 2:00 pm | CAS 125

Team Crystal Robotic Systems (CRS), along with team Laker Integrated Fabrication Technology (LIFT) updated Lake Superior University's existing FANUC flowline by installing four new FANUC M-10iA robots, their associated peripheral hardware, and their new controller software.

The software includes new features that will increase robot and user safety, enrich student laboratory learning, and give students hands-on experience with current technology. In addition, a flowline demonstration was developed to validate the line's capability, highlight new features, and attract prospective students. The line enhances LSSU's robotics engineering option and keeps the university at the forefront of industrial robotics education.

LSSU FANUC Robotics Integration Project
– Mechanical –

Members:
   Steven Morehouse (ME), Scott Urbanc (ME), and Nolin Livingston (MfgET)

Faculty Advisor:
   Prof. Jim Devaprasad

Company:
   Lake Superior State University - Robotics Lab
   Sault Ste. Marie, Mich.

Sponsor:
   Applied Manufacturing Technology (AMT)
   Lake Orion, Mich.

Industrial Contacts:
   Dr. David Roland Finley, P.E./LSSU, Jason Markesino/AMT

Presentation: 1:15 pm | CAS 123
Demonstration: 2:00 pm | CAS 125

Team Laker Integrated Fabrication Technology (LIFT), along with team Crystal Robotic Systems (CRS), upgraded LSSU's robotics lab by integrating four new FANUC M-10iA robots within an oval conveyor system.

This robotics line will serve as an educational platform for future graduates from LSSU and will be used for automation projects, summer camps, and demonstrations to visitors. To illustrate the new flowline's functionality and features, a demonstration of the robots playing the game Tetris will be presented. Team LIFT is responsible for the design and fabrication of the mechanical components necessary for completing this project as well as integrating appropriate End-of-Arm Tooling (EOAT) for the robots. This project will "LIFT" LSSU as the leader in industrial robotics education.

Robotic Vision Integration
Portable Robotics Cell

Members:
   Dylan Brown (CE), Casian Holsinger (EE), Isaac Leach (MfgET), Carl Mason (EET), and Daniel Verbanac (MfgET)

Faculty Advisor:
   Jon Coullard

Company:
   4D Systems, LLC
   Flint Township, Mich.

Industrial Contacts:
   JP Rasaiah, Philip Nicholson, and Brett Newill

Presentation: 2:30 pm | CAS 123
Demonstration: 3:00 pm | CAS 124

Team RVI was tasked with the design and build of a stand-alone robotics work cell, entitled the *Pharm-Assist*, by 4D Systems. The work cell is a multi-phase project. RVI was responsible for development of Phase I which focused on the delivery system and overall feasibility of the project. The Pharm-Assist will be used by pharmacists to aid in the filling of prescription medication, thereby reducing human error and making pharmacies more efficient.

The Phase I work cell demonstration used candies, in place of medications, that were picked from bins and placed into cups by the robot using machine vision.

Steering Alignment Guided Autonomously
Automation of Robot Alignment

Members:
   Aaron Frederick (CE), Casey Johnson (ME), James Mulligan (EE), and Jason Pizza (EET)

Faculty Advisor:
   Prof. Dave McDonald

Company:
   Nexteer Automotive
   Saginaw, Mich.

Industrial Contacts:
   Fred Berg, Tim Bennett, and David Prior

Presentation: 2:00 pm | CAS 123
Demonstration: 2:30 pm | CAS 125

Team SAGA designed and built a system which utilizes laser measurements to achieve alignment between a robot arm and a steering column. The system will replace the current manual method of robot alignment at Nexteer and increase the repeatability and accuracy of the testing procedure.

The removeable system uses lasers mounted to the steering column and a target mounted to the robot arm. Together, the tools measure the robot's position and orientation in order to calculate and execute the required movements to achieve proper alignment.

3S Solar Shade Systems

Prototype of a Self-powered, Remote-controlled Bermuda-style Window Shutter

Members:
Matthew Cramer (MfgET), Trace Hill (CE),
Elizabeth VanSipe (CE), and Taylor Vollick (ME)

Faculty Advisor:
Dr. Robert Hildebrand

Sponsor:
3M
Maplewood, Minn.

Industrial Contact:
Mr. Tim Hebrink, Staff Scientist

Presentation: 3:00 pm | CAS 123
Demonstration: 3:30 pm | CAS 120

Team 3S designed and built a set of Bermuda-style window shutters with motorized blades. Photovoltaic (PV) cells power blade rotation, a USB charging station, and ambient lighting. Lighting can be adjusted and the blades rotated by a smartphone application that communicates with the shutters via Wi-Fi. 3M will use the prototype to demonstrate the use of its patented solar encapsulate and polarizing films in a product that could be marketed as an environmentally-friendly alternative to traditional Bermuda window shutters.

MAC
Machining Automation and Controls

Development of an Automated Hydraulic Tooling Control System

Members:
David Bussiere (ME), Kyle Leverton (EET),
David Santose (MfgET), and Jessica Tyer (EE)

Faculty Advisor:
Dr. David Baumann

Company:
Mactech
Red Wing, Minn.

Industrial Contacts:
Mike Harper and Joel Wittenbraker

Presentation: 3:30 pm | CAS 123
Demonstration: 4:00 pm | CAS 122

Team MAC designed and built an automated hydraulic control cart for Mactech Offshore, which is a leader in offshore and subsea machining.

The newly designed cart will be used in place of a manual unit currently in use to control Mactech's Diamond Wire Saw and Internal Milling Machine. These are used for subsea cutting and decommissioning in the oil industry. The automated system precisely controls the cutting process of the tools, while allowing the cutting operation to be optimized on-site. Team MAC also incorporated a hydraulic leak detection system which shuts down operation in the event of a fluid leak.

Welcome to the School of Engineering & Technology

Presentations & Demonstrations Tentative Schedule

■ 1:15 p.m.
Presentation:
CASET 123   Teams
                         CRS & LIFT

■ 2:00 p.m.
Presentation:
CASET 123   Team SAGA
Demonstration:
CASET 125   Teams
                         CRS & LIFT

■ 2:30 p.m.
Presentation:
CASET 123   Team RVI
Demonstration:
CASET 125   Team SAGA

■ 3:00 p.m.
Presentation:
CASET 123   Team 3S
Demonstrations
CASET 124   Team RVI

■ 3:30 p.m.
Presentation:
CASET 123   Team MAC
Demonstration:
CASET 120   Team 3S

■ 4:00 p.m.
Demonstration:
CASET 122   Team MAC

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

The Engineering Living Learning Community House (Chippewa Hall) will be open for tours.

2015-16 Senior Projects Faculty Board Members

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

Paul Weber (chair), David Baumann, Jon Coullard, Jim Devaprasad, Robert Hildebrand, Jeff King, and Dave McDonald

Special thanks to Eric Becks, Laura Bofinger, and Jeanne Shibley

The School of Engineering & Technology comprises the following disciplines:

- Computer Engineering
- Mechanical Engineering
- Electrical Engineering Technology
- Electrical Engineering
- Industrial Technology
- Manufacturing Engineering 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.
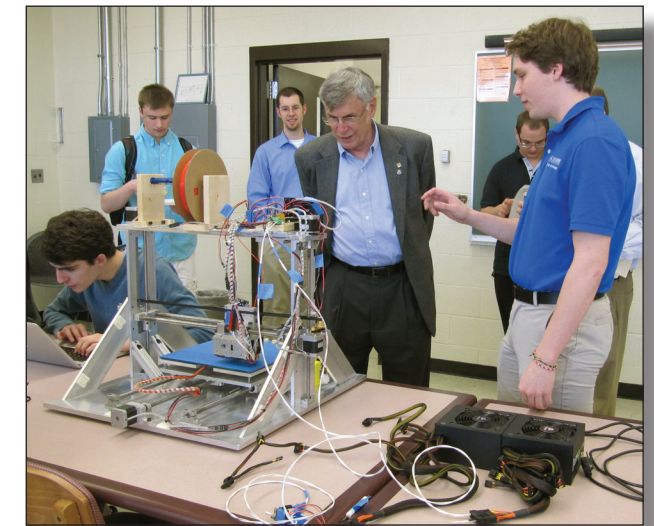
For more information about LSSU's School of Engineering & Technology
www.lssu.edu/eng *or* 906-635-2207

LAKE SUPERIOR STATE UNIVERSITY

The School of Engineering & Technology

presents the

Class of 2016 Senior Design Project Presentations & Demonstrations

Friday • April 29, 2016
1:15 p.m. - 4:30 p.m.

in the

Center for Applied Science and Engineering Technology