**COLLEGE OF ENGINEERING TECHNOLOGY**

*Electrical/Electronics Engineering Technology*
*and*
*Computer Networks and Systems*

Imagine More

**SENIOR DESIGN PRESENTATIONS**

**APRIL 15, 2011**

# Welcome to the EET & CNS Senior Design Presentations!

The Electrical/Electronics Engineering Technology and Computer Networks and Systems faculty and staff would like to welcome our friends, students' families, industrial advisors, and industrial partners to the 2011 Senior Projects Presentations. "To define it rudely but not ineptly, engineering is the art of doing that well with one dollar, which any bungler can do with two after a fashion." – *Arthur Wellesley(1769-1852).* Industry today demands that which the Duke of Wellington proclaimed over one-hundred and sixty years ago: Graduates not only need to do it well, but do it well for less. The seniors featured here today have done just that. On a college student's budget, they have taken a concept from a thought to fruition.

These presentations are the result of one complete year of work. In the fall, the students study management of projects with today as the focal point. It is difficult to visualize this event at that time, but they know this day will soon arrive. By the end of the first semester, they have fomented an idea, created a team to solve the problem, and devised a plan to achieve success within 13 weeks. During the spring semester, they build the devices and systems that are on display here today while trying to maintain their budget and other classes. As one can imagine, this is no small task!

Please feel free to meet with the students and faculty, visit the project booths, ask questions, and get acquainted. Some of these students may be your employees one day! Finally, today would not be possible if not for the efforts of many people. Thank you to the faculty who serve as advisors and mentors, and our outstanding secretary and technician. The department, college, and Ferris State University now proudly present the 2011 Senior Design Projects!

Gary Todd
Associate Professor
April 15, 2011

"A man with a new idea is a crank until he succeeds." —*Mark Twain*

# Presentation Schedule

**Morning Events:**
9:00    Automated Ice Shanty
9:30    Human Powered Vehicle Electric Assist
10:00   Semi-Autonomous Aerial Search and Rescue
10:30   RVAC – RFID Vehicle Access Control
11:00   Smart Charging Table
11:30   Mobile Secure Alarms

**Break for Lunch:**
12:00   Lunch (All EEET/CNS Students, Faculty, Staff, Advisors, Alumni, and Guests)

**Afternoon Events:**
1:00    Automated Weapon System
1:30    Automatic Sorting Vision System
2:00    Project Blitzkrieg (Fuzzer)
2:30    Award Presentation and Poster session

# Automated Ice Shanty
### Advisor:  Murry Stocking

The project of building an automated ice shanty was derived from surveying the needs of elderly and handicapped fishing enthusiasts whose physical abilities are diminished and can no longer fish by themselves.  This project will make setting up an ice fishing location more convenient and easier for fishermen while still making the experience enjoyable. The automation reduces the many steps involved in the process of ice fishing, along with transporting the heaviest equipment in a single package.  The project team will accomplish this goal by using a Logix-5550 Allen Bradley PLC along with other components to make ice fishing an automated experience.

Keith Lackscheide is a senior in the Electrical/Electronics Engineering Technology (EEET) program. He has chosen the Industrial Automation path within the degree. This past summer, Keith completed his internship at Schlumberger, where he participated in the inter-workings of the oilfield services industry. In Keith's spare time, he likes to be outdoors as much as possible and most of all Ice Fishing.

Douglas Ryan Klipfel is an Electrical/Electronics Engineering Technology student at Ferris State University. He was an intern at Yazaki North America this past summer focusing on cost savings for automotive wiring harnesses. Mr. Klipfel has many hobbies that he enjoys in all weather including snowmobiling, snowboarding, wake boarding, boating, fishing, being hands on, and spending time with family and friends. Doug, as you can see, likes to keep busy; one of the ways he does that is staying active on many different projects like working on cars, building improvements, playing with his tools and toys, and helping out friends and family.

 Michael A. Milford is a senior in the Electrical/Electronic Engineering Technology program. He is experienced in various disciplines of electrical, mechanical, hydraulic, and pneumatic technologies. His direct hands-on experience ranges from car radio repair to test and tune aviation circuits for the space shuttle. He is also a US Army veteran and has served as the President of the Ferris State University Veterans Association.

# Human Powered Vehicle Electric Assist
## Advisor: Robert Most

In developing an electric assist for the Human Powered Vehicle (HPV) team, a 36VDC system will be used to provide balance between voltage and current, while keeping the power delivery high. Available power when fully charged will be approximately 1000 Watts, similar to what three individuals would produce with their "pedal power" and will provide a substantial boost to the vehicle when needed. Ultracapacitors will be used for the storage device, due to their extremely high efficiency and ability to quickly charge and discharge. Pulse Width Modulation (PWM) will control the rate of charge or discharge, depending on the selected polarity of the motor versus the storage device. This will be done using an H-Bridge with MOSFET solid state devices and a Programmable Interface Controller (PIC). The user will adjust the rate of charge or discharge by varying a voltage input to the PIC via a hand throttle on the steering mechanism connected to a potentiometer voltage divider.



Chris Appledorn is a senior in the Electrical/Electronics Engineering Technology program. He will be graduating in the fall of 2011. Even as a child, he was fascinated with electronic devices and liked to take them apart to figure out how they work. In his spare time, Chris likes to do research to keep current with the latest technology and help troubleshoot family members' computer problems.



Alec Hudson is a senior in the Electrical/Electronics Engineering Technology (EEET) program here at Ferris State University. He first became interested in electronics while in his junior year of high school. While attending Battle Creek Central High School, Alec spent half of his day attending the Calhoun Area Technology Center where he studied Electronics. After high school, he chose to attend Ferris State University to further his studies. He enjoys staying active and has participated in many intramural sports over the years while attending Ferris State University. Alec will be graduating in December of 2011 with a Bachelors degree in Electrical/Electronics Engineering Technology, specializing in automation.



Curtis Lizotte is a senior in the Electrical/Electronics Engineering Technology Program. Prior to his enrollment at FSU, Curtis served for six years in the United States Army working as an armored crewman, military policeman and Shadow 200 unmanned aircraft operator. During his military career, Curtis attained the rank of Sergeant, was deployed during Operation Iraqi Freedom, and received several awards including the Army Commendation Medal and multiple Army Achievement Medals. He looks forward to finding a challenging job supporting industry in Northern Michigan and spending time with his wife and son.

# Semi-Autonomous Aerial Search and Rescue
## Advisor:  Keith Jewett

SAASAR, Semi-Autonomous Aerial Search and Rescue, is a project that will create an unmanned aircraft that is capable of performing search and rescue operations. This will be accomplished with the use of a live video feed capable of both infrared thermal imaging and visible light with night vision, if needed, to locate a person in distress. The base station will receive the video feed as well as send and receive data to and from the aircraft.  The type of information that will be sent to and from the aircraft will be items such as GPS coordinates, battery level, waypoint locations as well as the ability to manually control the flight. To achieve the auto-pilot function, a development board capable of interfacing with required hardware such as GPS, accelerometers, gyroscopes, etc., will be interfaced with the plane and programmed to conduct the search and rescue mission.

Josh Goulet is a senior graduating in May 2011 from the Computer Networks and Systems Program in the College of Engineering Technology at Ferris State University.  He also has a Minor in Computer Science.  Josh recalls his interest in technology came from his first programming class. From then on, he was amazed by the capabilities of technology and the rest is history.  Currently, Josh maintains a 3.51 GPA and has been on the Dean's List. After graduation, he plans on continuing his education by getting a degree in Mathematics and possibly going to graduate school. He enjoys learning new things and finding out how things work. Josh also enjoys programming and problem solving. Some hobbies include hunting, sports, hiking, biking, and playing the guitar.

Jimmy Mock is a senior in the Computer Networks and Systems program in the College of Engineering Technology at Ferris State University. He has been a Student Employee for the Enterprise Technology Services department here at Ferris for the past three years. In his spare time, Jimmy enjoys working with Linux, providing desktop support for friends and family, playing video games, and taking it easy with friends.

John Kurtz is a senior in the Computer Networks and Systems Program at Ferris State University. He is also obtaining an A.A.S. in Mechanical Engineering Technology and a Mathematics Minor. John has worked as a Desk Services Manager in the Residence Halls for the past three years and was a Resident Advisor prior to that. In his free time, he likes to study Brazilian Jujitsu, sailing, camping, skiing and watching movies. Other interests include modifying or creating small electronics.

# RVAC – RFID Vehicle Access Control
## Advisor: Robert Most

This project was conceived with the vision of gaining hands-free entry and keyless operation of a vehicle. While making it easier to access, the idea was to allow multiple users to have access to the vehicle without having to exchange keys. RFID technology is not a new concept, but using the Enhanced Driver's License embedded RFID tag was the focus of this project. The tag's frequency is Ultra High Frequency (UHF) and each license has a unique character string. By reading the information off the driver's license, it was compared to the database of allowed drivers. A user interface will allow users to easily change allowed users or add a new license should one be lost.

Ian Bacheller is a senior in the Electrical/Electronics Engineering Technology program. He is from Fremont, MI and played both soccer and basketball in high school. He enjoys being with friends, watching/playing sports, and learning about new technologies. His background is in control automation with some programming. Ian plans to work in Michigan once he graduates.

Matthew Herban is graduating in May 2011 with a Bachelors degree in Electrical/Electronics Engineering Technology and a Math Minor degree. Before coming to Ferris, he received an associate degree of science at West Shore Community College. Matthew's interest is in industrial automation applications working with PLC programming. In his spare time, Matthew enjoys spending time with his friends, Kayaking, and working on his car.

Michael Koeppen is a senior in the Electrical/Electronics Engineering Technology program. His concentration has been focused on Industrial Automation and also advanced circuits. His hometown is St. Clair Michigan. He is interested in employment either outside or within Michigan. In his spare time, Michael enjoys being active outdoors, occasionally playing guitar, and is intrigued with smart phones and computers. You will always find him catching up on the newest technology and being social with friends and family.

# Smart Charging Table
## Advisor: Murry Stocking

The alternative energy source desk is designed around green concepts. Energy is harvested from the user of the desk to a battery in order to charge everyday electronics. Energy will be created from user motion on a mechanical device such as push pedals. This motion will transfer mechanical energy to a flywheel in order to power a generator. An example of the mechanical action is a mechanical device that is used to spin wool into yarn. The energy coming from the generator will be used to charge a Lithium Ion battery. An indicator will display the charge of the battery. The power from the battery will then be regulated and sent out to multiple USB ports on the single user table. The USB ports will not be active until a device is plugged into one of them. When the USB port is active, a device can be powered and charged no differently than plugging a USB device into a computer.



Corey Gale is a senior in the Electrical/Electronics Engineering Technology (EEET) program. He transferred from Grand Rapids Community College with an Associates Degree in Electronics Technology. He is now studying industrial automation and digital design here at Ferris. Family and friends are most important to him. Corey is hard working and enjoys learning new skills. He was on the Dean's list last semester. Past job experiences give him a strong manufacturing background. He will graduate in December of 2011 and hopes to find a job related to industrial automation. Corey enjoys outdoor activities such as camping, golfing, and snowmobiling.



Alek Pettinger is a senior in the Electrical/Electronics Engineering Technology Program at Ferris State University. He works as a telecommunications student technician here at Ferris State University. After completion of this semester, he plans on moving to Grand Rapids to work for the company Dematic. He enjoys fishing, disc golfing, and bowling in his spare time.



Zach Speet is an EEET student graduating in the fall of 2011. Being on the robotics team at his high school sparked a desire to work with electricity and other forms of engineering. Working at Haworth, Zach brought the design idea to the group and facilitated the conditions between Haworth and his group members. In his spare time, he likes to spend time with family and friends, and work with computers.



John Wahowiak is a 26 year old senior currently enrolled in the Electrical/ Electronics Engineering Technology program at Ferris State University. He graduated from ITT Technical Institute with an Associate's degree in the same program. He is from Grand Rapids, MI and is currently living in Big Rapids. In his free time, John enjoys fixing electronics, fishing, disc golfing, reading, movies, and video games. He plans on graduating Ferris in the spring of 2012.

# Mobile Secure Alarms
## Advisor: Luiz Costa

This project was developed from the need to keep constant watch over potential alarms that may be triggered from various pieces of equipment owned by DOW Corning. Since DOW employees are constantly busy and could be anywhere in or out of the facility of the equipment, there needs to be a way to monitor the equipment remotely. This is possible since employees are equipped with mobile devices that are capable of being programmed to inform employees of an alarm from the equipment should there be an occurrence. This task is possible by first linking the DOW equipment with an OPC server which constantly monitors the piece of equipment for alarms. Next the OPC Server can be linked to another Server such as an SQL Server which then sends information out to its clients which are the mobile devices posed by the employees. The expected budget for this project is between $100 -$200.



 Michael Jones, a native of Detroit, is a senior at Ferris State University in the Computer Networks and Systems program. He is also currently seeking an Associate's Degree in Computer Science. After he graduates, he plans to pursue a career in building and maintaining computer networks or a career in computer programming. In his spare time, Mike enjoys playing video games, watching sports, and hanging out with friends.



Dean A. Vanover Jr. is a senior in the Computer Networks and Systems program at Ferris State University. He is from Detroit, MI. Dean will be graduating in May 2011. Shortly after graduation, he plans on taking the Cisco Certified Networking Associate (CCNA) certificate exam. In his spare time, he enjoys playing basketball, fishing, computers and spending time with his family.

# Automated Weapon System
## Advisor:  Warren Klope

The purpose of this project is to eliminate the need for having a soldier atop a vehicle while conducting combat operations. Currently the turrets atop military vehicles are manned by a soldier putting them in control of that weapon system. This also puts the soldier at risk for incoming small arms fire, IED (Improvised Explosive device) attacks, and potential rollover dangers. This is how the military has operated for years and many soldiers have been injured or lost their lives from manning these weapon systems. This project will allow the soldiers to remotely control the weapon system from inside the vehicle allowing them to observe and engage targets from the safety of the cab.



Anthony Little is a senior in the Electrical/Electronics Engineering Technology program at Ferris State University. He is an Army Reservist and is working to become an Army Officer upon graduation through the Ferris ROTC program. Anthony enjoys snowboarding and hunting.



Craig Jones is a senior at Ferris State University in the Electrical/Electronics Engineering Technology program. He is from Dexter, MI, and upon graduation in May 2011, hopes to find a job that will move him towards Colorado. Craig enjoys snowboarding, hunting, and fishing.



 Matthew Whitehead is a senior in the Electrical/Electronics Engineering Technology program at Ferris State University. He has completed coursework in analog and digital electronics, and has specifically directed his efforts towards embedded hardware and software.  He has a wife and a one son, and his hobbies include tinkering with electronics, playing video games, and spending time with his family.

# Automatic Sorting Vision System
## Advisor: Ron Mehringer

The Automated Sorting Vision System will use a high speed camera in addition to a developed/programmed software interface, to perform bottle sorting on a production. A conveyor will transport the bottles past the vision system. The vision system will make decisions from the pictures taken by the camera as it passes by, based on the desired characteristics.



David Coleman is currently attending Ferris State University in the Computer Networks and Systems program. He is also working towards a minor in Homeland Security. He enjoys working with computers and audio equipment.



Adam Shirey is a senior in the Electrical/Electronics Engineering Technology program here at Ferris State University. In addition to electrical classes, he has taken mechanical, material, manufacturing, and sales/marketing classes in order to expand his knowledge in those fields and better prepare for industry. Adam plans on advancing his knowledge by pursuing a master's degree starting this fall. With interests in prototyping, mobile robotics, industrial robotics and automated systems, he is currently pursuing career opportunities in those fields. A few of Adam's favorite hobbies are fishing, fly-fishing, lure prototyping, robotics, camping, boating, wakeboarding, photography and graphic design.



Dustin Pilbeam is a senior in the Electrical/Electronics Engineering Technology program in the College of Engineering Technology here at Ferris State University. For the past five years, he has been employed at Ferris State University's Student Technology Services as a computer technician helping students with computer problems. He enjoys troubleshooting computers and working with machine vision. In Dustin's free time, he enjoys spending time with friends and family, watching any sporting event, and playing games.

# Project Blitzkrieg
## Advisor: Ron Mehringer

Using myriad computers and operating systems based on 64-bit technology, as well as development environments of the like, we designed a software title which performs vulnerability analysis on any given target user software. This will be accomplished by means of a debugger, disassembler, and fuzzing framework. Use of the debugger will allow for dynamic analysis of the target as well as execution manipulation. The disassembler will produce memory offsets to a predetermined list of instructions; these two tools combined will make up the monitoring system. The fuzzer will test the target for robustness and report interesting results. The aforementioned results will later be analyzed to determine if vulnerability exists in the target.



Cody Appledorn is a senior at Ferris State University in the Computer Networks and Systems program and is planning to graduate in summer 2011. During his free time, he likes to hang out with friends, watch TV, play video games, read, and work on projects. His interests in college are in computer networks, programming, and electronics.



Tim Malina is a senior in the Computer Networks and Systems program in the College of Engineering Technology at Ferris State University. When not programming or troubleshooting, Tim enjoys target shooting and discussing myriad subjects with friends and family.



Jeremy Ockerman is a senior in the Computer Networks and Systems program at Ferris State University. Having 10+ years of programming experience as well as having won awards in high school for competitive programming, opting to work on a software project was expected. After graduation, Jeremy wishes to pursue a career in software vulnerability research and eventually earn his masters degree in computer science. In his free time, Jeremy enjoys writing software, reading about security and algorithm topics, attending webcasts from SANS and Veracode, participating in bowling, and playing the occasional MMO.

# EET AND CNS FACULTY

Luiz Costa

Keith Jewett

Warren Klope

Ron Mehringer

Bob Most

Murry Stocking

Gary Todd

*Thank you for Coming!*