



**COLLEGE OF ENGINEERING TECHNOLOGY**

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

*Imagine More*

**SENIOR DESIGN PRESENTATIONS**

**APRIL 24, 2009**

**Welcome to the Electrical/Electronics Engineering Technology and Computer Networks and Systems Senior Design Presentations for 2009. To quote H.L. Thoreau in the early part of the 19<sup>th</sup> century, “Success usually comes to those who are too busy to be looking for it.” The seven project teams today are here to share with you their successes, shortcomings, and enlightenment.**

**These presentations represent a year of work by the students, encompassing multi-disciplinary problem solving and group interaction. The Senior Design Course is a unique opportunity in education; it gives students great freedom to solve an engineering problem with creativity and skill. Managing the project itself is also a key outcome. The students have learned what it takes to put into practice project management components and communications skills as a compliment to good engineering principles.**

**I invite you to meet with the students and faculty today, ask questions, and get to know them. A special thanks to the faculty members who served as advisors to the groups, your input and guidance for the students has been a great asset. It is with your help, that you have enabled our students to “Imagine More” ...**

**Gary Todd  
Assistant Professor  
April 24, 2009**

# Presentation Schedule

## **Morning Events:**

8:30 Noise Suppression through Light Manipulation Presentation

9:00 Adaptive Cruise Control-Using LIDAR Range Finding Presentation

9:30 Biometric Safe Presentation

10:00 EET/CNS Awards Ceremony

10:30 White Cloud Utility Billing Software Presentation

11:00 RFID Assistant for the Visually Impaired (Code name: RFI-DAVI) Presentation

11:30 Impact Shirt Presentation

12:00 Instrumentation and Process Control Presentation

## **Break for Lunch:**

12:30 Lunch (All EEET/CNS Students, Faculty, Staff, Advisors, Alumni, and Guests)

## **Afternoon Events:**

1:30 Poster Session

2:30 Best Project Award

## NOISE SUPPRESSION THROUGH LIGHT MANIPULATION

This project was developed out of a necessity expressed by the Technological Director of the Neonatal Intensive Care Unit at Henry Ford Hospital in Detroit. The problem presented was the need for a device that can inversely vary the intensity of light based on the noise level in the room. This means that as the noise level goes up, the intensity of the lighting in the room goes down. Once the noise level in the room returns to normal, the lighting in the room is to return to a normal fully on level. This is to be accomplished using a Parallax microprocessor to interpret a noise and light level, then vary the light level as required based on the input noise level. There is also an additional requirement for trend analysis to be incorporated into the monitoring of the noise level throughout the day to determine peak hours of noise. The budget for this project is estimated to be approximately \$350.



Edward Preczewski is a senior at Ferris State University enrolled in the Electrical/Electronics Engineering Technology Program. As a Radio and Electronic Repairer in the Army, he has brought hands-on experience to the project. Ed has been on the Dean's list and was awarded the Good Conduct Medal and the Army Achievement Medal. He enjoys basketball, hockey, and video gaming.



Chris Kozak is a senior in the Electrical/Electronics Engineering Technology Program at Ferris State University. Upon graduation from high school, he spent four years in the Air Force working as a network infrastructure technician and a long haul communications technician. After completion of this semester, Chris will only require his internship in order to complete his Bachelor's degree. In his free time, Chris enjoys spending time with his girlfriend and working on his computer.

## ADAPTIVE CRUISE CONTROL – USING LIDAR RANGE FINDING

This senior project provides an in-depth look at the implementation of an Adaptive Cruise Control (ACC) system which makes use of LIDAR (Light Detection and Ranging) based range finding. The ACC system will use the LIDAR transceiver to allow the vehicle to slow down when approaching another vehicle and accelerate again to the preset speed when traffic allows. This project has been estimated to cost \$700. This includes the Microchip PIC development board for controlling the LIDAR transceiver, infrared (IR) laser for distance detection, phototransistor to detect reflected laser pulse, SLR camera lens for IR scattered beam focusing, and MP Lab for programming the PIC microprocessor.



Joshua Peirce is a senior in the EET program. He is from Carson City, Michigan, and works as a computer technician at FSU's Student Technological Services. His position as a student technician includes working with people and helping students in the fall to connect their computer to the Ferris Network. Joshua enjoys repairing and experimenting with different electronic devices. This includes the building and tearing apart of circuits. This also includes experimenting with radio equipment; he has a Technician Class Amateur Radio license. He also enjoys working with automobiles as the current projects deals with implementing automated cruise control into an automobile.



Patryk Ruchniak is a senior in the Electrical/Electronics Engineering Technology program. His specific area of study is in Industrial Automation. Once Patryk graduates in May 2009, his goal is to find a career that involves programmable logic controllers and implement and design embedded systems. In his spare time, he likes to jog and browsing the internet for new and interesting topics.



Dan Bowen is a senior in the Computer Networks and Systems program. He is from Saginaw, Michigan. Dan works for Ferris State University's Student Technological Services and is a firefighter and first responder for Big Rapids Township Fire & Rescue. He has multiple certifications in both emergency response and computer fields. In his free time, Dan enjoys target shooting, video games, and being with his friends and family.



Chris Woelkers is a senior currently seeking a Bachelors degree in Computer Networks and Systems program with a minor in Computer Information Systems. He hails from Marine City Michigan where he is the oldest of five children. During his spare time, Chris enjoys experimenting with his Linux-based laptop and self-built UNIX-based router. He also enjoys Japanese anime and manga, which he uses to expand his knowledge of the Japanese language and culture.

## BIOMETRIC SAFE

In order to secure financial records and other important documents for the Ferris State University Chapter of the Institute of Electronics and Electrical Engineers (IEEE), a project to design and build a biometric safe will be conducted. The safe will be accessed through either the use of an attached biometric reader or keypad, which will identify the user accessing the safe. When a user is recognized, the safe will power a locking mechanism which will unlock the safe, allowing it to be opened. This system of storage will allow the FSU IEEE organization to securely store important information in a single, central location that is easily accessible to all of the officers who may have need of its contents.



Adam Keally is a third year Senior Computer Networks and Systems Major at Ferris State University (FSU). He has earned a Cisco Certified Networking Associate (CCNA) certificate and was the President of the FSU Chapter of the Institute of Electrical and Electronics Engineers (IEEE) for two years. He enjoys learning about computers, particularly about programming software and how software can be made to control the attached hardware devices. In his free time, Adam enjoys playing video games, watching sports (especially NHL hockey), and spending time with family and friends.



Christopher Laczek is a senior in the Computer Networks and Systems program and is also enrolled in classes for an Industrial Control Systems minor. He will be taking the Cisco Certified Networking Associate (CCNA) certificate exam shortly after graduation from Ferris. Chris has worked for the Computer Technology Services (CTS) department for over three years where he repairs and troubleshoots various computer-related issues. He likes troubleshooting computer issues and enjoys learning new things about networks. With any spare time, Chris enjoys riding quads, playing paintball, and hanging out with friends and family.



Michael McArthur is a senior in the Computer Networks and Systems program with a Homeland Security and Digital Forensics Minor. He has worked as a computer technician for Ferris' Computer Technology Services for two years, supporting the College of Engineering Technology. He will be taking the CCNA certificate exam after graduating. In his spare time, Michael enjoys the outdoors, riding his four-wheeler, and hunting. He also likes working on computers and fixing problems that don't seem to have solutions.

## WHITE CLOUD UTILITY BILLING SOFTWARE

The Utilities Authority in the city of White Cloud, MI is in need of a software application that has the ability to properly calculate balances for their customers, as well as print detailed reports for the financial information of these customers. The current software solution no longer meets the needs and requirements for the White Cloud Utilities Authority, so a new application is needed. The C# programming language will be used to provide the front-end user interface in addition to a SQL server that will be implemented as the database. The software will interface with the database to hold customer account information. The final solution will include all of the features of their current software, along with improvements to increase functionality, expandability and ease of use.



Nathan Richter is a senior in the Computer Networks and Systems program. This past summer, he completed his internship at Alcoa Howmet in Whitehall, MI, working on several software development projects. Nathan is an avid sports fan and enjoys spending his free time watching movies and reading.



James Austin is a senior in the Computer Networks and Systems program. He just finished his internship at Applied Dynamics International in Ann Arbor, MI, where he created an automated test harness for their software products using the Python Scripting Language. He enjoys watching movies, listening to music, and playing video games.

## RFID ASSISTANT FOR THE VISUALLY IMPAIRED (CODE NAME: RFI-DAVI)

From research to production, the RFID Assistant is a combination of technologies that allow the visually impaired to discern locations and real-time information in a real world environment without the use of traditional Braille. The technologies included in the creation of this device will allow it to communicate not only to the user but also to a networked server to retrieve updates based on the location detected. Then once the information is retrieved, a simple text-to-speech conversion allows the visually impaired person to hear room number and associated room information. The device has four main components: an RFID reader, a PIC microcontroller board, a text-to-speech module, and a network adapter. The estimated cost for this project is \$350 - \$400 for one working prototype.



Brad Bammert is in his fourth year of college planning to graduate in the spring of 2009. He is currently working toward a Bachelors degree in Computer Networks and Systems with a minor in Homeland Security: Digital Security and Forensics. Brad has also been a member of the football team at Ferris State University since 2005 and has one more year remaining to earn his degree.



Herry Tanadi Lau is graduating with a Bachelor degree in Computer Networks and Systems. Herry is an international student who obtained his Associates degree in Malaysia before coming to the United States. Herry finished his internship as a Ferris State University technician where he provided technical support to faculty members and students. He enjoys hanging out with friends, watching movies, listening to music, reading the news, playing computer games, and learning new technology.



Samuel James is a senior in the Computer Networks and Systems program. He is currently employed at Ferris State University by the Enterprise Technical Support Group. He enjoys learning about new technologies.



Robert Freridge is originally from Southwest Michigan where he graduated from Lake Michigan College, receiving an Associate Degree in Liberal Arts. He became IC3 certified in 2005 and then attended Ferris State University where he is currently pursuing a Bachelor of Science Degree in Computer Networks and Systems. While at Ferris, he worked for Computer Technology Services for two years before obtaining a full-time position with Big Rapids Public Schools as a Computer Technician. He is currently living with his wife, Jennifer, of almost two years and enjoys spending time with friends and testing out new technologies.



Matthew John Endres is graduating with a Bachelor degree in Computer Network Systems. Matt is currently interning at V3 LLC in Grand Rapids, Michigan. V3 is a small business that provides its clients with Network Administrating, technical support, and infrastructure management. At this time, Matt is the only employee aside from the owner and together they maintain more than ten separate company networks. He currently lives with his fiancé in Rockford and they are set to be married this fall. Matt has commuted every day to attend classes here at Ferris for the past four years and as a result his car is now nearing over 400,000 miles.



## IMPACT SHIRT

The Impact Shirt is a new system that will record and display impacts taken to the body of an individual. This shirt will record and transmit the force and quantity of blows taken to the body and send the data to be displayed on a PC. The inspiration for this project comes from the multiple physical contact sports that are becoming more popular in the world today. This shirt will incorporate programs using C and C# programming languages, a Microchip PIC18 series microcontroller, and unique sensors. The purpose of this shirt is to provide athletes with the ability to monitor where and how much damage they are taking to their body. This system will be able to be adapted to many types of applications and not limited just to sports. The final product will yield a functional model of the Impact Shirt for approximately \$300.



Brent Johnson is a senior in the Computer Networks and Systems program with a minor in Homeland Security. Brent has done two internships while attending Ferris, one here at Ferris and the other at the Defense Finance and Accounting Service in Columbus, OH. In the future, he would like to explore digital security and computer forensics. In his spare time, Brent enjoys playing Wii and training with the Ferris State University Mixed Martial Arts Club.



Anthony Gilbert is a senior in the Electrical/Electronics Engineering Technology program. Anthony has been a part of the Delta Chi fraternity for the past two years. He cofounded the robotics club at Ferris serving as the president for two years and is a continuing member of the IEEE organization. In the future, Anthony would like to get settled down in the Grand Rapids area. In his spare time, Anthony enjoys many hobbies such as woodworking and computers.

## INSTRUMENTATION AND PROCESS CONTROL

Using instrumentation control to make a batch of any two different liquids is an example of how a process can be controlled automatically on a small scale. Abdulhaq Balobaid and Justin Stewart created this project so that mixing two different liquids could be done in an automated and controlled process. The project uses an Allen Bradley PLC to control the process precisely. The controller interfaces to point I/O through Ethernet/IP networking. The inputs are three analog signals that come from two level transmitters and one RTD. There are two liquid tanks and one mixing tank, and those tanks are connected to the mixing tank through two control valves. The controller reads the signal from level transmitters and controls the desirable quantity of liquids that will go to the mixing tank. The mixing tank is provided with temperature transmitter, agitator and heater element. As soon as the liquids are dumped into the mixing tank, the controller will maintain specific temperatures and agitates the mixture for a specific time. Once the process is complete, the mixture will dump, as a product, into another tank.



Justin Stewart is in the Electrical/Electronics Engineering Technology program at Ferris State University. He has chosen to pursue the Industrial Automation path in this degree. Justin has experience with Allen Bradley controls and ladder logic. In his spare time, he is also a member of the Professional Bowlers Tour and is an avid bowler.



Abdulhaq Balobaid is from Saudi Arabia. He is a senior at Ferris State University. His major is Electrical/Electronics Engineering Technology with a concentration in industrial automation. Abdulhaq enjoys working with instrumentation and process control. In his spare time, he likes to watch documentary programs and read technical magazines.

## EET AND CNS FACULTY



Clare Cook



Keith Jewett



Warren Klope



Ron Mehringer



Bob Most



Murry Stocking



Gary Todd