



FERRIS STATE UNIVERSITY

College of Engineering Technology

COMPUTER NETWORKS AND SYSTEMS

&

ELECTRICAL/ELECTRONICS ENGINEERING TECHNOLOGY

SENIOR DESIGN PROJECTS PRESENTATIONS

APRIL 21, 2017



IMAGINE MORE

Welcome to the 26th annual Senior Projects Presentations of the Computer Networks & Systems and Electrical/Electronics Engineering Technology programs. These projects are conceived from the imagination of our students and incorporate their comprehensive professional development cultured here at Ferris State University. The presentations today show the many hours of design, development, construction, and troubleshooting of their vision. These presentations also highlight their acquired project management skills of working together as a team, developing a schedule, creating a budget, assigning tasks, and monitoring the progress of their project. Today is the culmination of their efforts. Please enjoy the presentations and the results of their imagination and diversified skilled efforts.

“Imagination is everything. It is the preview of life's coming attractions.” – Albert Einstein

Thank you all for coming today,

Steve Johnson, Professor

PRESENTATION ORDER

- 1. PETRA VISION SYSTEM (PVS)**
- 2. HERMES VEST**
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- 4. SIMPLE MANAGEMENT OF AQUARIUM AND REEF TECHNOLOGY**
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- 7. AUTOMATING A RAILROAD CROSSING (ARC)**
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PETRA VISION SYSTEM (PVS)

Advisor - Gareth Todd

The purpose of the PVS is to take the existing automated Petra part checking system used in previous Electrical/Electronics Engineering Technology (EEET) controls labs, and augment the current proximity sensor system with an Omron vision system donated by Yazaki North America Inc. PVS was designed for future students to receive valuable hands on experience with a vision system that will simulate real-life controls applications found in industry. They will gain knowledge by completing multiple lab instructions designed to setup and operate the Omron vision system. When the vision camera detects a bad part, the data is analyzed by the vision components including the controller and Human Machine Interface (HMI). The data is sent to the Allen Bradley Programmable Logic Controller (PLC). Then, the PLC program tracks the bad part which is removed once the part reaches the end of the Petra EEET lab system.



Nick Gugin – was born and raised in Howell, MI. He attended Hartland High School, until graduating in 2011. After his high school graduation, Nick attended Washtenaw Community College where he determined his career path. In August of 2013, Nick transferred to Ferris State University as a sophomore in the Electrical/Electronics Engineering Technology program. Additionally, Nick is also in the Mechanical Engineering Technology program. He will obtain a Bachelor's Degree in Electrical/Electronics Engineering Technology, an Associate's Degree in Mechanical Engineering Technology, and has already obtained an Associate's Degree in Industrial Electronics Technology.



Garrett Troike – was raised in Vassar, Michigan. During high school, he attended the Tuscola County Technology Center for electronics. He then received his Associates in Applied Science at Delta Community College. His continued interest in electronics propelled his decision to attend Ferris State University. Garrett has been an active member of The National Society of Collegiate Scholars at Ferris State University, and held the position of VP of Community Service his senior year. Garrett is dual majoring with a Bachelors in Electrical/Electronics Engineering Technology and an Associates in Mechanical Engineering Technology. He accepted a position at Nexteer Automotive after completing an internship in the Control Systems Engineering department.



Justin Walejewski – was born in Grand Rapids, MI and graduated from Rockford High School in 2013. He is a senior in the Electrical/Electronics Engineering Technology program pursuing his bachelors degree. Justin has worked in tool and die for the past 7 years as an assembler and a CNC programmer, but he always knew his real goal was to work with electronics. In his free time, he likes working on his Subaru's, stand up jet skis, and most board sports like wakeboarding, snowboarding, and wakesurfing.

HERMES VEST

Advisor - Warren Klope

The purpose of this project is to develop a vest that will aid in keeping motorcyclists safe. The vest works to make riders more visible to other motorists on the road. This is achieved by having a series of LEDs on the vest that function as additional brake lights. The vest is fitted with a microprocessor that uses an accelerometer to monitor the deceleration of a rider. Once a certain amount of deceleration is detected the LEDs turn on. The vest is also able to detect the event of a collision, such as automobile accident. When a collision is detected the LEDs will strobe until they are reset. This feature could be potentially lifesaving, especially for motorcyclists involved in a single vehicle accident.



Mohammed Aldhafeeri – was born in Saudi Arabia and received his Associate's Degree in Electrical and Electronics Engineering Technology from King Fahd University. He has worked in the Saudi Electricity company for a year and then moved to the United States to continue his education. Aldhafeeri received his Bachelor's Degree in Electrical and Electronics Engineering Technology. His main characteristics are to team up with colleagues and finish any assigned project on time. Besides that, Mohammed likes to help international students with any homework or assignments that they are struggling with. His goal is to further extend his education to get his master's degree.



Tyler Bovan – is from Farwell, Michigan where he graduated from Farwell High School in 2011. After graduation Tyler attended Mid-Michigan Community College before transferring to Ferris. Tyler is now a senior in the Electrical/Electronics Engineering Technology program and will graduate at the end of the Spring 2017 semester. Tyler enjoys riding motorcycles, tinkering, and building and using computers.



Wyatt Empie – was born in Nashville, Tennessee. Wyatt started his college education pursuing a degree in computer programming, but after taking a fundamentals of electricity class he knew that Electrical Engineering was what he wanted to do. He graduated with a double Associates of Science in Electronics/Electrical Engineering Technology and Industrial Electronics from Monroe County Community College. After graduating Wyatt came to Ferris State University to continue his education and get his Undergraduate degree in Electrical Engineering Technology. Wyatt has worked at the Monroe DTE Power Plant and had a very successful internship with L&W Engineering Group. His hobbies include wood and metal working, high end audio, and working on his car.



Derek Hoppert – grew up in the small town of Ida, MI. He always had a fascination of how things worked and after completing high school, he attended Monroe County Community College where he developed a passion for electronics. After receiving his associate's degree, Derek decided to continue his education and transferred to Ferris State University where he is currently a senior in the Electrical/Electronics Engineering Technology (EET) program. In his free time, he enjoys hunting, snowboarding, socializing with friends, and traveling. Upon graduating in May, Derek is looking forward to beginning his career in the engineering industry.

THE ENHANCED SHOPPING CART

Advisor - Warren Klope

The Enhanced Shopping Cart's purpose is to improve the modern-day shopping cart to allow customers to worry less about pushing a shopping cart around a store, and instead focus on searching for items they need to buy. It is an automated system that enables a shopping cart to follow a designated person throughout the store. A customer will carry a device that will be linked to an onboard processor, allowing the shopping cart to follow only that device. This device, along with the shopping cart, will communicate with each other using ultrasonic sensors to track and measure the distance between them, and the cart will drive based on this information it receives.



Stephen Chicky – was born in Grand Rapids, Michigan. He is from Rockford, Michigan and graduated from Rockford High School. He is currently a senior in the Electrical/Electronics Engineering Technology (EET) program at Ferris State University, and plans to graduate in the Fall of 2017 semester. In his spare time, Stephen enjoys watching baseball and football with his friends and family, as well as travelling to various places around the United States. Stephen is currently seeking an internship, as well as other job opportunities, in the Industrial Automation Controls field.



Timothy G. McManus – was born in Fort Leonard wood, Mo and grew up in Lawton, OK. After graduating from Eisenhower High School in 1997, he enlisted in the U.S. Navy. After separating from the Navy in 2011 he worked at Intel in Rio Rancho, NM. He and his wife relocated to Grand Rapids, MI and had a child. Tim has received his Associate's in Applied Sciences from Grand Rapids Community College and is currently a senior in the Electrical/Electronic Engineering Technology program. In his free time, Tim enjoys playing guitar, working on his house and most importantly spending time with the family.



Tu Thanh Nguyen – is a senior in the Electrical\Electronic Engineering Technology Program. Six years ago, he came to United States from Vietnam. He went to Kelloggsville High School and spent three years at Grand Rapids Community College. After acquiring the Associate degree, he transferred to Ferris State University to continue his education for a Bachelor degree. Tu will graduate on May 2017 and be very proud to be the first generation to graduate from college in his family. Tu is honest, hardworking, and not afraid of challenges, he always looks on the bright side of things to make sure he gets his work done. In fact, he is currently seeking for a position as an electrical engineer and is ready to be a part of society.



Leonel Velasquez – Leonel is a senior in the Electrical/Electronics Engineering Technology program and will be graduating in December 2017. He was born in Guatemala, and at the age of ten he moved to Grand Rapids, Michigan. He attended Grand Rapids Community College for two years before transferring to Ferris State University. In his free time, Leonel enjoys spending time with his family and friends.

SIMPLE MANAGEMENT OF AQUARIUM AND REEF TECHNOLOGY (SMART)

Advisor - Gareth Todd

The Simple Management of Aquarium and Reef Technology (SMART) system is an affordable solution for the average aquarist to monitor and maintain their fish tank. The SMART system interfaces with peripherals such as pH, temperature, and water level sensors. Collected data is logged to an external database and is easily viewable from the SMART website. High power peripherals such as lights, heaters, and fans are managed using individually controlled power outlets which can be turned on or off based on the temperature, time of day, or even water level. The aquarist is then able to manage, set up alerts, and monitor their fish tank from anywhere in the world via a web interface. The system is based on the ESP8266, which is an inexpensive microcontroller with integrated WiFi connectivity.



Daniel Canham – Daniel Canham was raised in Mecosta, Michigan and attended Chippewa Hills High School. Dan was the President of IEEE in 2016 and the Vice President in 2015. He also received the Outstanding CNS student of the year award in Spring of 2016. Dan will be graduating with a Bachelor's of Science in Computer Networks and Systems this spring. Since October 2014 he has been working at Big Rapids Public Schools as a Technology Assistant. He enjoys building and racing drones as well as spending time with his family.



Benjamin LaRoche – grew up in Dorr, Michigan where he graduated from Hopkins High School and the ACATEC Information Technology program. He was also a member of FIRST Robotics Competition team 2000, where he got hooked on programming, electronics, and everything in between. Now, Ben is a senior in the Computer Networks and Systems program at Ferris State University. He is a founding member and secretary of the FIRST Robotics RSO as well as secretary of the IEEE RSO. He couldn't escape the robots, and spends his spare time mentoring high school FRC teams 5162 and 2054, along with middle school FTC teams 7837 and 11153. Ben is currently seeking job opportunities in network administration.



Kyle Smith – Kyle Smith was born in Louisville, Kentucky and graduated from Brighton High school. Kyle currently works for the Enterprise Applications and Services Department for Ferris State University as an Active Directory and Office 365 administrator. He is graduating from Ferris State University with a Bachelor of Science degree in Computer Networks and Systems.

SMART INFANT SEAT (SIS)

Advisor - Murry Stocking

Child injuries in car accidents is raising the question of what more can be done to improve the safety of child seats. Children can unlatch their restraints without drivers being aware of it, dramatically increasing the risk of serious injury in the event of an accident. The purpose of this project is to design a system that can alert the driver if the child unlatches their safety restraint. Smart Infant Seat (SIS) integrates the car seat to a receiver attached to the vehicle's Controller Area Network (CAN bus) to activate warnings like that of a traditional unbuckled seat-belt alert. On vehicles 2007 and newer the radio and automotive multimedia devices can be muted when the system detects an unlatched belt and issue an alert to the driver of the unsafe condition. Additionally, S.I.S. has the capability to monitor proper seat installation with an inertial measurement unit to measure stabilization of the seat.



William Bieri – has been a lifelong Michigan resident. For the past seven years, he has lived in Evart, where he graduated from Evart High School. In addition, he earned a certificate with honors in Engineering Precision Technology from the Mecosta Osceola Career Center. After high school, William attended Mid Michigan Community College where he earned an Associate in Applied Science with a concentration in General Technology. He then transferred to Ferris State University in pursuit of a Bachelor of Science in Electrical/Electronics Engineering Technology (EEET). In his spare time, William enjoys spending time with family in Pentwater and kayaking with his dogs at the family cabin near Evart.



Benjamin Blaska – grew up in Shelby Township, Michigan and graduated from Eisenhower High School in 2011. He is currently a senior majoring in the Computer Networks and Systems (CNS) program and minoring in Information Security and Intelligence (ISIN). In 2015 Ben earned his Cisco Certified Network Associate (CCNA) certification and plans to earn more certifications with the goal of beginning a career in cybersecurity. Ben played hockey for 12 years before coming to Ferris State. He continues to embrace his passion for the sport as the Head Coach of the Big Rapids/Cadillac Junior Varsity hockey team, the 131 Wolves.



Andrew Carlson – is a senior in Computer Networks and Systems. Andrew aspires to be an Embedded Software Engineer, specializing in Assembly and C. Last summer, he interned at Denso Manufacturing Michigan as a Programmer in Production Quality Engineering. During his time at Denso he applied his experience of programming practices to repair various non-functional web, database, and application systems. He also designed and created a simple messaging system used to send instant messages between management web pages and Heating, Ventilation and Air Conditioning (HVAC) assembly lines using C#, SQL, and Visual Basic.



Benjamin Hofer – has spent most of his adult life in Colorado and has adopted it as his home state. He moved to northern Michigan in 2012, whereupon, after being unable to find a good job in his field as a custom home builder, decided on a career change and enrolled in the CNS program at Ferris State University. He is husband, a proud father of three and currently a senior at Ferris pursuing a Bachelor of Science in Computer Networks and Systems while also operating a small business part-time providing IT services. In the little time he has to spare, Benjamin enjoys spending time outdoors with his family, working with/on computer systems, and small building projects and developing the small apple orchard on his farm.

REMOTE ANIMAL TRAP SYSTEM (RATS)

Advisor - Robert Most

The Remote Animal Trap System (RATS) is designed for homeowners and trappers alike with busy lifestyles. RATS will allow users to check the trap from their phone and release any unwanted animals. Using an Arduino microprocessor system and a dedicated mobile network card, the system communicates with the user via text messaging. When an animal enters the cage, the system records the weight and photographs the animal. This information is sent to the user, who will then decide to release the animal or keep it. If the animal is kept, a timer is started that prevents the cage from being locked for more than 12 hours. This is to prevent harm to the animal if the user forgets to pick up the trap.



Robert Olkowski - grew up in Romeo, Michigan and graduated from Romeo High School. He is working towards a Bachelor of Science Degree in Electrical/Electronics Engineering Technology and is expecting to graduate in May of 2017. In his free time, Robert enjoys playing video games and building hobbyist electronics.



Muteb Ali Rajab - is an Electrical/Electronic Engineering Technology (EET) student who enjoys spending his free time traveling around the world and see new places. He is from Saudi Arabia where he finished his high school and came to Michigan 2011. He is always willing to work on and learn more about new technology that involved his major.



Evan Smith - is a Senior in the Electrical/Electronic Engineering Technology Bachelors program. He was born in Muncie, IN and graduated from Forest Hills Northern High School in Grand Rapids. Evan will graduate in May of 2017 and plans to work for Logic Plus in Reed City as a Controls Engineer. He currently works as a SLA Facilitator at Ferris State, teaching Electrical Circuits 2.

AUTOMATING A RAILROAD CROSSING (ARC)

Advisor - Murry Stocking

The purpose of this Automating a Railroad Crossing project (ARC), is to automate a railroad crossing and upgrade an old existing system to a more modern and safe system. At a railroad crossing, the proximity switch sensors and the Allen Bradley Control Logix PLC will work together to detect an approaching train that will precisely and reliably alarm incoming traffic within the specification of the Federal Railroad Administration (FRA). The VersaCube Equal Sensing Proximity Switch Sensor's enclosures were constructed for either indoor or outdoor use. This makes the sensor protected against dirt, dust, water, sleet, ice, and snow. Ethernet cables are used to establish an Ethernet/IP communication between the Programmable Logic Control (PLC) and the Point I/Os through a Common Industrial Protocol (CIP). The Ethernet cables and the Ethernet/IP are more reliable, flexible, cost effective, and will allow for easier developments of the system in the future.



Salman Alghamdi - was born in Albaha, Saudi Arabia. He is a social person, and he always likes to make friends from different nationalities. He is a senior student earning a Bachelor's Science Degree in Electrical/ Electronics Engineering Technology. He excels in Math and Physics and is a professional technical writer with different styles of writing reports. He received his associate's degree from Hafr Albatin Community College/King Fahd University of Petroleum and Minerals in Saudi Arabia in 2013. Salman has a full scholarship from his government and has attended Ferris since 2015. He likes watching soccer games and enjoys spending his free time with friends, playing cards, watching movies, and using his computer.



Ibrahim Alhuwaysh - Ibrahim Alhuwaysh was born in Jeddah, Saudi Arabia, and Graduated from Alfudail bin Ayiad High School in Makkah. He is working on a Bachelor of Science degree in Electrical/Electronics Engineering Technology at Ferris State University and plans to graduate in spring of 2017. He had a summer internship at ORBIS Corporation where he worked on several projects and operated and troubleshot Injection Molding Machines and Fanuc Robots. He enjoys traveling and spending time with friends.



Abdulaziz Aloraifi - is an international student at Ferris State University, and he has been pursuing the EEET major since January, 2015. He received his associate's degree from Ha'il Community College in 2007. Before attending Ferris, he handled computer issues in a Saudi post office for four years. During his free time, he spends it with his family, especially with his gorgeous, 7-year-old daughter and his handsome, 3-year-old son. He also likes to read history books, travel, and fix broken items that his little gentleman has broken.



Travis Trung Nguyen - Travis Trung Nguyen was born in South Vietnam. He is a senior in the Electrical/Electronic Engineering Technology program at Ferris State University and plans on graduating in the Fall of 2017. He finished his Associate Degree in Electrical Engineering Technology from Grand Rapids Community College. Before he studied in the electrical field, he spent two years working in automotive service that motivated him to learn electronics. In his free time, he enjoys playing on the computer, and every Sunday he enjoys his time at church teaching Vietnamese and the doctrines of Catholicism to children. He also a member of the Vietnamese Eucharistic Youth Movement in the USA (VEYM-USA), which is a non-profit organization under the leadership of the Catholic Church. Its aim is to teach youths to be virtuous people and good Christians.

PINPOINT

Advisor - Robert Most

Pinpoint is a portable GPS tracking device intended to be attached to the uniforms of law enforcement officers. The device would instantly alert dispatch when a high-decibel sound is detected, which could indicate that a gunshot or car accident occurred nearby. The Pinpoint device has the potential to save the lives of law enforcement officers by notifying dispatch much faster than an officer calling for backup, especially when the officer is incapable of calling for backup due to the situation at hand. The device uses radio frequency waves to transmit information wirelessly to a receiver that is connected via USB to the laptop located in the officer's squad car. A program running on the officer's laptop sends the GPS data to a server located at the police headquarters. A web interface allows dispatchers to be notified as soon as the high decibel sound is detected.



Nicholas Adams - After graduating from Wyoming Rogers High School I completed an Associate's Degree in Electronics Engineering Technology at Grand Rapids Community College before beginning the Electronics Technology Bachelor's Degree program at Ferris. While at GRCC I was selected for the sole Electronics lab assistant position. At both GRCC and Ferris I have been named to the Dean's/President's lists many times and was awarded the 2016-17 John Deere Scholarship. I have a talent for diagnosing and creating solutions for mechanical and electronic problems. In my spare time I enjoy blacksmithing on a forge I constructed, gaming, and outdoor activities.



Oscar McCully - will be graduating with a Bachelor of Science degree in Computer Networks and Systems and a Computer Science minor. As of the Spring of 2017, his cumulative GPA is 3.73. He is also a self-taught web developer. In 2013, he developed a website that has since generated more than \$14,000 in total revenue and continues to attract around 4,500 users per day. Oscar is interested in a career in embedded systems or software development. In his spare time, he enjoys reading and playing tennis.



Evan Seay - was raised in Reed City, Michigan, and graduated from Reed City High School in 2012. He is pursuing a bachelor's degree in the Electrical/Electronics Engineering Technology program here at Ferris State University. Evan was employed over the past summer at Byrne Electrical Specialists as an Electrical Engineering Intern. In his spare time, he enjoys playing soccer as well as video games. He hopes to pursue a career in renewable energy involving solar or wind generated power.



Justin Tschida - was born in South Bend, Indiana where he graduated from James Whitcomb Riley High School. Justin is a senior in the Electrical and Electronics Engineering Technology program and will be graduating at the end of the Spring 2017 semester. His interests include playing golf, volleyball, and watching Oklahoma football. Justin will also be getting married in the month of October 2017. He is excited to begin a new journey building a career as a husband.

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