Two-semester Major Design Experience (MDE) and other design experiences in ECE

POSTER EVENT
December 5, 2018 | The Inn at Virginia Tech
The Major Design Experience (MDE), ECE 4805-06, is a culminating experience for undergraduate and graduate students during which they have the opportunity to combine all the technical, communication, and teamwork skills that they have learned in one exciting and meaningful project. Whether a student's career interests lie in working for industry, continuing on for an advanced degree, or pursuing a job in our national labs, the capstone experience is an opportunity to define how they will impact the technical community or society in general.

After much success with combining a two-semester format with industry sponsorship, we are pleased to host our second-ever MDE Poster Event for the student teams in the Spring-Fall sequence. This parallel section was created out of feedback from industry that they would also like juniors to participate. Now second semester junior students are joining this class and can consider an internship during the summer break. I think that you will agree with me that the result has been a wealth of inspiring and useful projects that have challenged our students to solve open-ended technical problems defined by our industry partners and guided by our faculty subject matter experts.

I was very pleased to have Professor of Practice Ken Schulz lead this effort this year, partnering with Gino Manzo and Toby Meadows as this course grows in importance to our department. Ken, Gino, and Toby's combined experience and insight is invaluable to our students in preparing them for the next step in their engineering careers beyond graduation.

Congratulations to all the students for their dedicated efforts, and thanks to our industry sponsors, instructors, and subject matter experts for their tremendous support in this endeavor.

Welcome and thank you for attending our fifth Major Design Experience (MDE) Poster Event! This is also the second ever Poster Event in our new Spring/Fall Cohort.

Today we are celebrating the achievements of about 30 students who have diligently worked on eight diverse industry problems. We are pleased to showcase projects from our 4805/4806 Major Design Experience and a project from Virgilio Centeno’s ECE 4104 Design in Power Engineering Capstone projects.

The goal of this class is to provide students with a “real-life” industry project as part of their major design experience. Student teams work with sponsors, who are the customers. With advice from subject matter experts, they complete a meaningful engineering project. This project is managed exactly as if the students were just hired by a company and placed on an engineering team. Students are responsible for generating the project plan and then executing the plan. Throughout the two semesters, they are guided in technical areas by the subject matter experts, and mentored by the instructors in a host of professional and business skills, such as communication, teamwork, ethics, professionalism, company values, metrics, and new-business acquisition. By working in teams, they develop leadership and group interpersonal skills and deal with schedule conflicts and meeting deliverables. Students are responsible for managing the customer relationship and solving the many real-life issues that undoubtedly will occur.

This program is only possible with dedicated support from our sponsors and subject matter experts whom we whole-heartedly thank for their unwavering assistance. Thank you for engaging with our program and helping make our students more valuable.

I also want to acknowledge and thank Luke Lester for initiating this class at Virginia Tech and guiding this strategy to better prepare Virginia Tech ECE graduates for the workplace. Thank you, Luke Lester! We also thank Virgilio Centeno and his students for joining this exciting poster event.

The growth in student enrollment, projects, and parallel sections has allowed us to utilize Toby Meadows and Gino Manzo in addition to myself as professors, providing the students with industry perspective as they navigate their projects. Between the three of us, we have over 100 years of industry experience as practicing engineers and leaders in our respective companies.

Finally, we want to thank our students, who were brave enough to try something new. Stepping out of your comfort zone is always a valuable learning experience. We wish you all the best as you pursue your aspirations.

Kenneth R. Schulz
Major Design Experience Professor of Practice
All guests are requested to vote for Best Poster. *Every vote counts.*

**PROGRAM**

- Sign-in, review posters | 11:30
- Welcome remarks, short team presentations | 12:00
- Lunch, review posters | 1:00
- Best Poster awards | 2:00
- Adjourn | 2:30

“This class challenged me to work without a set of constraints that we normally have in a class. The open-ended nature of the class leaves the students to find and solve their own problems.”
We greatly appreciate their support.

“I enjoyed having more of a real-world experience than that of just a classroom setting. This course has really made me aware of how important communication truly is in the industry.”
In addition to our project sponsors and subject matter experts, there were many others that significantly contributed to the success of this class. We want to take this opportunity to express our deep-felt appreciation and thanks for their contributions.

William Baumann  
Virginia Tech - ECE  
Design Studio Safety Training and Material Procurement Instruction

Michael Miller  
Intellectual Property Specialist Professional

“This class allowed me to apply what I learned, improve my teamwork skills, and experience what it is like to work in a real-life industry project.”
This class is only possible because of the commitment, dedication, and spirit of the following customers and subject matter experts. Thank you!

<table>
<thead>
<tr>
<th>SPONSOR</th>
<th>CUSTOMERS</th>
<th>PROJECT</th>
<th>SUBJECT MATTER EXPERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altria, Richmond, VA</td>
<td>Brian Cramer</td>
<td>On-Line Vision Based Quality Inspection System</td>
<td>Lynn Abbott</td>
</tr>
<tr>
<td></td>
<td>Warren Hall</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clinton Blake</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analog Devices, Greensboro, NC</td>
<td>Ryan Bunch</td>
<td>FPGA-Based FM Receiver</td>
<td>Dong Ha</td>
</tr>
<tr>
<td>Belle-Hampton Farms, Dublin, VA</td>
<td>Tom Hoge</td>
<td>Belle-Hampton Microgrid Project</td>
<td>Virgilio Centeno</td>
</tr>
<tr>
<td>General Motors, Detroit, MI</td>
<td>Keith Van Houten</td>
<td>High-Definition Map Update from DOT Construction Data</td>
<td>Walid Saad</td>
</tr>
<tr>
<td>Macom, Lowell, MA</td>
<td>Thomas Winslow</td>
<td>GaN-Si High Power Amplifier Design</td>
<td>Dong Ha</td>
</tr>
<tr>
<td>SAIC, San Diego, CA</td>
<td>Taylor Wilson</td>
<td>Sensor Package for Underwater Remotely Operated Vehicle</td>
<td>Dan Stilwell</td>
</tr>
<tr>
<td>United Technologies Corporation,</td>
<td>Brett Standifer</td>
<td>Next Generation Overheat</td>
<td>Ryan Gerdes</td>
</tr>
<tr>
<td>Wilson, NC</td>
<td>Stefan Coreth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zeta Associates, Fairfax, VA</td>
<td>Ben Beasley</td>
<td>Personal Locator Beacon System</td>
<td>Louis Beex</td>
</tr>
<tr>
<td></td>
<td>Michael Botkin</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mike O'Connor  
Fredericksburg, VA  
B.S. Electrical Engineering  
**Aspirations**  
I aspire to become a well-rounded electrical engineer that can utilize every experience and aspect of my career. I wish to apply the knowledge I have amassed at Virginia Tech and other experiences to a broad spectrum of problems that I will face.  
**Class comment**  
The professional experience and real-world open-ended problem-solving was perhaps one of the most meaningful and well-rounded opportunities I have had.

Jonathan Yu  
Lynchburg, VA  
B.S. Computer Engineering  
**Aspirations**  
In the future, I envision myself working as a software engineer.  
**Class comment**  
I valued the experience of being able to work with Altria on a real-world problem with guidance from mentors and professionals in the field.

Alex Kahnke  
Waseca, MN  
B.S. Electrical Engineering  
**Aspirations**  
Alex prefers working for military defense contractors who work with naval technologies. He completed an internship at BAE Systems in support of the Trident II missile program and will begin work with Huntington Ingalls Industries after graduation working on the Gerald R. Ford class carrier for the U.S. Navy.  
**Class comment**  
I liked the emphasis on the business aspect of engineering. While it is important to be capable of the technical aspects, it is also important to know the business strategy and plan of the company you work for.

Kartik Nair  
Jaipur, Rajasthan, India  
M.S. Electrical Engineering  
**Aspirations**  
To excel in the field of FPGA/ASIC design.  
**Class comment**  
This class provided me an opportunity to gain hands-on experience with the FPGA-based Digital Signal Processing. Also, the class is organized in a way that helps students learn more about how the professional projects work in the industry.

Andrea Baldioceda  
San José, Costa Rica  
B.S. Electrical Engineering  
**Aspirations**  
Combine my two greatest passions, audio and electrical engineering, by forming part of the audio industry and working on DSP, audio, and acoustics.  
**Class comment**  
The senior design experience provided me with an opportunity to apply the knowledge and skills I developed in my classes into a real-world project. It also gave me insight into the professional work environment.

---

**ON-LINE VISION BASED QUALITY INSPECTION SYSTEM**

**CHALLENGE**
Develop a camera system that is capable of inspecting products at high frequency and interface with the existing inspection system.

**FPGA-BASED FM RECEIVER**

**CHALLENGE**
Implement an FPGA-based FM Receiver using the AD9689 Evaluation Board’s full bandwidth capture and the FPGA on the ADS7 Evaluation Board to output an FM radio station.

---

**PROJECT SPONSORS:** BRIAN CRAMER, WARREN HALL, CLINTON BLAKE  
**PROJECT SPONSOR:** RYAN BUNCH
Thaddeus Petty  Phoenix, AZ  B.S. Electrical Engineering  
Aspirations  Work in the automotive industry to advance the limits of what we believe is possible.  
Class comment  This class challenged me to work without a set of constraints that we normally have in a class. The open-ended nature of the class leaves the students to find and solve their own problems.

Huy P. Nguyen  Annandale, VA  B.S. Electrical Engineering  
Aspirations  I hope to apply what I learned at Virginia Tech to contribute and make an impact on the world.  
Class comment  The class provided me an opportunity to work on the future of the power distribution system. The course allowed me to apply my knowledge to solve the real-world problem.

Matthew Tucker  Knoxville, TN  B.S. Electrical Engineering  
Aspirations  Following graduation, I hope to put the skills I’ve developed here at Virginia Tech into action in the industry. Tech has provided me with numerous opportunities to work with teams in a professional environment, and I feel very prepared moving forward.  
Class comment  The most valuable experiences I gained from this course were those involving our customer at General Motors. We were incredibly lucky to be partnered with a knowledgeable, experienced engineer, who not only coached us throughout the project, but also gave us professional advice.

Fayzan Saleem  Chantilly, VA  B.S. Electrical Engineering  
Aspirations  To continuously strive for the best work and achievement in life and establish myself as a critical-thinking developer.  
Class comment  I appreciated the real-world experience that this class had to offer, and working with a professional from the industry helped me to boost not only my technical skills but also my interpersonal skills.

Ryan Gold  Blacksburg, VA  B.S. Electrical Engineering  
Aspirations  Gain relevant engineering experience within my field of study, then transition into management to lead many high performing teams.  
Class comment  This course introduced us to many professionals who were and continue to be excellent mentors for us. Being able to network and gain professional experience is the best benefit from this course.

Belleville-Farm Microgrid Project  
CHALLENGE  Developing a power supply and infrastructure that will allow the Belleville-Farm, owned by Tom Hoge, to be completely off the grid. The project includes the design and development of a hydro-electric pump, which can harness the water flow from a dam on the property as well as energy storage for peak demand.

High-definition Map Update from DOT Construction Data  
CHALLENGE  General Motors needed updates to the road work documentation process in order to expedite integration in global positioning satellite (GPS) systems in autonomous vehicles. Our team created a solution that automatically updates and generates a database clearly identifying roadway projects for GPS use.
Lauren Swan  
Lynchburg, VA  
B.S. Electrical Engineering  
Aspirations  
I will be working full-time at NAVAIR after I graduate and hope to eventually start to develop my own electronic hardware applications and products.  
Class comment  
I enjoyed having more of a real-world experience than that of just a classroom setting. This course has really made me aware of how important communication truly is in the industry.  

Camilo A. Riascos  
Cali, Colombia  
B.S. Electrical Engineering  
Aspirations  
Following graduation I will start a career with Marathon Petroleum Corporation as a refining engineer. I would like to be the technical lead for power distribution, process instrumentation, and control at their refinery in Garyville, Louisiana.  
Class comment  
The senior design experience allowed me to improve my technical, communication, and teamwork skills. It gave me a good taste of what is coming next in my career.  

Nicholas Kennedy  
Smithfield, VA  
B.S. Electrical Engineering  
Aspirations  
I plan to enter the workforce, obtain an M.S. in electrical power engineering, and explore a variety of roles such as project manager or designer.  
Class comment  
This class was a great experience giving us real-world problems and forcing us to solve them in a team setting, much like we will have to do in our future careers.  

Mario Ortiz  
Mexico City, Mexico  
B.S. Electrical Engineering  
Aspirations  
My goal is working in a company as a project engineer, design, and development.  
Class comment  
The project was very challenging, and I enjoy working in design and development.
Moath Alhefdhi  
Abha, Saudi Arabia  
B.S. Electrical Engineering  
Aspirations  
My aspiration is to develop products that would make an impact on people’s daily lives.  
Class comment  
This class allowed me to apply what I learned, improve my teamwork skills, and experience what it is like to work in a real-life industry project.

Kemaya Nguyen  
Alexandria, VA  
M.S. Electrical Engineering  
Aspirations  
Serve my country and join the United States federal civil service. Work as an electrical engineer with a focus in photonics.  
Class comment  
This class provided real, hands-on experience in industry work. I gained confidence in my decision between a future in academia versus industry.

Oscar Alarcon  
Centreville, VA  
B.S. Electrical Engineering  
Aspirations  
I’d like to continue my development as an electrical engineer and inspire future generations of electrical engineers with my work.  
Class comment  
Senior design has brought the opportunity to experience real job projects in the field of electrical engineering.

Beau Robertson  
Rocky Mount, VA  
B.S. Electrical Engineering  
Aspirations  
Solve complex engineering problems with innovative solutions.  
Class comment  
This course was exceptional at garnering professional skills and gaining experience in real-world problem solving.

Huy Nguyen  
Annandale, VA  
B.S. Electrical Engineering  
Aspirations  
I hope to apply what I learned at Virginia Tech to contribute and make an impact on the world.  
Class comment  
The class was a fantastic platform for me to develop my technical knowledge, and also prepared me to be successful in the professional world.

Alvin Dela Paz  
Dumfries, VA  
B.S. Computer Engineering  
Aspirations  
Lead an engineering team.  
Class comment  
I have learned the process of requesting a proposal, getting client feedback, and revising appropriately, as well as creating the proposal and providing updates to the client.

Weerasu Warajuntano  
Centreville, VA  
B.S. Electrical Engineering  
Aspirations  
I hope to work in the field that relates to power and learn more about that area to increase the power efficiency.  
Class comment  
I like that the class allows the students to come up with our own solution to solve a problem with a real-world application. Sometimes, our solution might be hard to achieve, but the class has a subject matter expert to give advice to achieve the goal. Moreover, the class taught us to communicate, be accountable for the team’s task, and be a leader.
Many people contributed to this program who we want to acknowledge and thank:

Luke Lester
for his vision and continued unyielding support to make this class available for students.

Gino Manzo and Toby Meadows
for being our assistant instructors, mentoring teams, and making the class better.

Greg Atkins
for developing an outstanding class website.

Mary Brewer, Nicole Gholston, Kimberly Johnston, JoAnna Lewis, Susan Broniak, Minerva Sanabria, Jamie De La Ree, Paul Plassmann, and Laura Villada
for setting up information sessions and guiding students into the class.

William Baumann and Bob Lineberry
for allowing us complete access to the design studio and conference room, and providing assistance to students in need.

Karin Clark, Lisa Young
for being our partners and diligently working to secure us industry sponsorships.

Arthur Ball
for integrating the masters students into our class and providing them ongoing guidance.

Kim Medley
for ordering our materials and helping us solve supplier issues.

Kathy Atkins, Melanie Gilmore
for providing financial guidance and support.

Roderick DeHart, Brandon Russell
for solving our many IT issues and printing the poster papers in quick time.

Blanca Norton and the Virginia Tech Inn staff
for helping plan, cater, and secure all arrangements for the Poster Paper Event.

Special thanks to Mohammad Al-Mamun
Teaching assistant specializing in semiconductor projects. Provided excellent safety, tool, and semiconductor processing, and mask design training.

Virginia Tech does not discriminate against employees, students, or applicants on the basis of age, color, disability, sex (including pregnancy), gender, gender identity, gender expression, genetic information, national origin, political affiliation, race, religion, sexual orientation, or veteran status, or otherwise discriminate against employees or applicants who inquire about, discuss, or disclose their compensation or the compensation of other employees or applicants, or on any other basis protected by law.

For inquiries regarding non-discrimination policies, contact the Office for Equity and Accessibility at 540-231-2310 or Virginia Tech, North End Center, Suite 2300 (0318), 300 Turner St. NW, Blacksburg, VA 24061.