



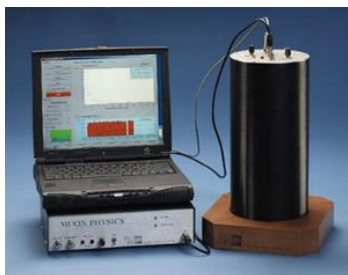
Department of Physics and Electrical Engineering

2015-2016 Alumni Newsletter

Croteau and Marx Family Donation

The Department of Physics and Electrical Engineering is committed to providing our students with a transformative undergraduate experience that prepares them for success in all career pursuits. A generous donation from the Croteau and Marx families will have immediate and long-term impacts on every student through enhancements in equipment, experiential learning, and research opportunities. Equipment purchased with the donation are listed below:

- Electromagnetics Design Lab Enhancements
 - Antenna design and analysis equipment
 - Signal processing and analysis equipment with Fourier methods kit
- Advanced Cross-Disciplinary Projects/Engineering Capstone Equipment
 - BIOPAC – equipment for EMG, EEG, and Eye tracking
 - Visible light Spectrometer
 - Programmable robotic systems
- Upgrade to Electronic Circuits lab equipment for analog/digital signal analysis
 - Keysight MSOX2012A Mixed Signal Oscilloscopes: 100 MHz, 2 Analog Plus 8 Digital Channels (8 units)
 - Keysight 33500B Series Trueform Waveform Generators (8 units)
- Updated equipment for the Modern Physics Lab
 - Gamma Ray Spectrometer and scintillation counter
 - *Muon lifetime apparatus (shown)*
 - X-ray diffraction equipment
- Expanded 3-D printing capabilities for student projects
 - FlashForge 3d Printer Creator Pro
 - 8-colors of filament for printing



Kane Competition 2016

The theme for last year's competition was "Mythbusters", with every event based around a myth from the popular television show on the Discovery Channel. There was a core group of fifteen department students, led by **Christian Anderson** *Physics junior* that helped to create events, organize and administer the competition held on April 20th, 2016. There were 192 students from 15 high school at this year's competition. North Pocono High school, coached by their physics teacher and Scranton alumnus Dr. John Croom, took home the perpetual trophy and the first place team prize.



Student awaiting the media event at the 2016 Kane Competition.

High School Competition Funding

Edward Hayes '61, physics department alumnus, along with his wife Margaret, visited the University of Scranton on April 14th, 2016. They have decided to gift the department funds so the high school physics competition will continue for years to come. The competition has generously been funded by the Joseph Kane Estate and the Hayes family for the past few years. The Hayes Family will also contribute a yearly gift for the purchase of equipment for both the physics and engineering laboratories.



Student Internships and REUs

Summer 2016

Christopher Gasper - Infotainment Test

Department, Honda R&D America

Matthew Collier - Tobyhanna Army Depot,

Electronics Engineers Pathway Internship

Richard Olechna - Fairchild Semiconductors

Connor Beers - Hargrove Engineers &

Constructors, Philadelphia PA

Megan Glassell - REU, Applied Physics,

University of South Florida

Sara Gleco - REU, Biophysics, Purdue University

Zachary Black - CorCystems, Lab Engineering

Matthew Reynolds - Intern, Biophysics,

Wadsworth Center - New York State

Department of Health

Ryan Ceccacci - Hyland Associates

Nathan Williams - Iridium Satellite

Communications, Engineering Associate

Highlight

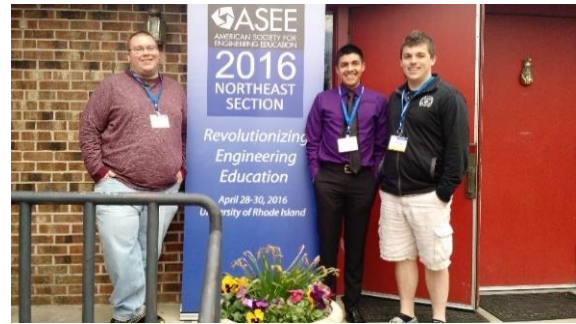
Sophomore, **Nicholas Chaump**

NASA MARTI Intern, Summer 2016

Located at the Ames Research Center in Sunnyvale, California, NASA's Multidisciplinary Aeronautics Research Team Initiative (MARTI) offers students an opportunity to immerse themselves in the aeronautics, or aerospace enterprise. MARTI helps prepare young professionals for employment by providing direct science and engineering experiences with an awareness of the complex managerial, political, financial, social, and human issues faced by current and future aerospace programs. They receive training in integrated systems research, project management, leadership, teamwork, and multidisciplinary collaboration. Students work as a team on a multifaceted problem as guided by professional scientists and engineers.



Students Present at Conferences



Nathan Williams, Wilson Ortiz, and TJ Thomas at the American Society of Engineering Education Northeast Conference at the University of Rhode Island, April 2016

At the ASEE-NE Conference:

"Micromouse Robot Development and Successful Implementation in a Foundations of Engineering Course"

Wilson Ortiz and Nathan Williams

"Autonomous and Adaptive Plant Growth"

Timothy Thomas and Nathan Williams

At the AAPT-CPS Conference:

"Cryptography using cellular automata"

Matthew Anzelmi

"Quantum conductance in a gold wire"

Dawn Dorris

"Rocking motion isochronisms of a cylindrical cut"

Joshua T. Zadoyko



Joshua presenting his poster at the American Association of Physics Teachers - Central Pennsylvania Section conference at Moravian College, April 2016

ALPhA Immersion Equipment Grant

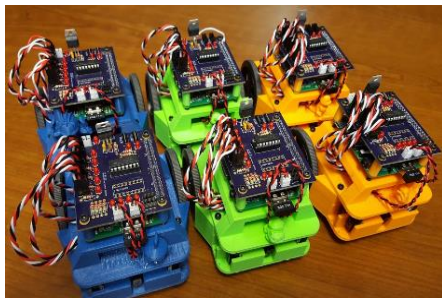
Dr. Juan Serna applied for, and was awarded a \$4000 ALPhA Immersion grant from the Jonathan F. Reichert Foundation with \$6000 matching funds provided by The University of Scranton's Provost Office. This grant allowed the purchase of some detectors and mechanical optics for the optics/advanced lab. This equipment will allow students to perform elegant experiments in Parametric down conversion and Entanglement.



New Foundations of Physics and Engineering Course

First administered in the fall of 2014, “ENGR/PHYS 150 - Foundations of Physics and Engineering” enhances all of the programs within the department by giving our first year students a hands-on experience at the beginning of their University of Scranton Career. Here are some highlights:

Part of the Micromouse fleet students program as a part of their capstone experience in the 150 course. The mice utilize a Raspberry Pi computer and microcontroller.



Course Description: This physics and engineering cornerstone course will cover foundational topics including science literacy, basic computer programming skills, micro-processing, and professional ethical standards. After completing the course, the student will be proficient in oral communication skills and the use of digital technology through assignments and projects relevant to the physicist and engineer.

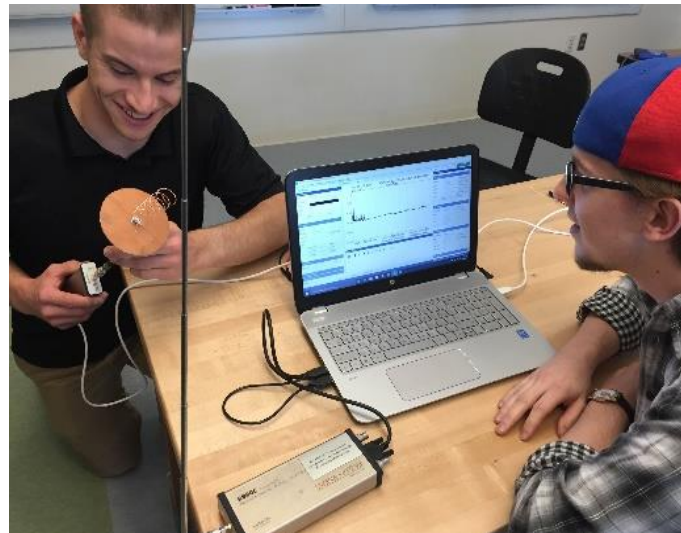
Quote from student who has taken the course:

“...my friends from other schools don’t have a hands-on class like this as freshman...”

A group of 2015-2016 first-year students at their Micromouse competition as a part of the capstone project in the 150 course in the atrium of the Loyola Science Center.

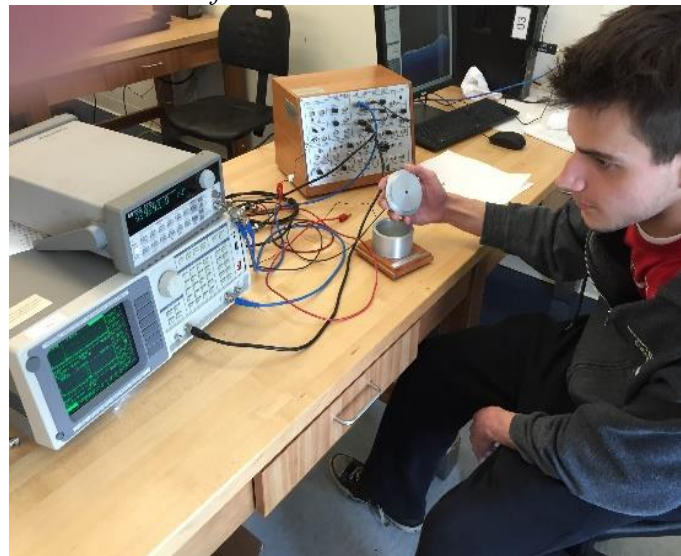


New E&M Lab Equipment



Seniors **Christian Johnson**, EE, and **Brady Rippon**, Physics, working with the Signalhound equipment

Dr. Declan Mulhall: “*The Signalhound RF equipment allows the students to test the transmission properties of their home-made transmitter antennae. The theory they learn in class is verified by analyzing actual data. The Fourier methods equipment allows students to see physical signals in the frequency domain. It allows students to, for example, mix their own AM and FM signals, to see the resonant acoustic modes in an aluminum cavity, and even to see the normal modes of mechanical vibrators.*”



Senior **Ryan Ceccacci**, EE, working on Fourier transforms on the Fourier Methods equipment.



2016 IEEE Region 2 Student Activities Conference

Cleveland State University, April 8-9, 2016

Student participants meet and engage in activities such as leadership training, student paper competitions, robotics competitions, brown bag circuit competition, ethics competition, physics competition, project showcase, T-shirt design competition, and other events. The conference serves as an opportunity for its members to meet, interact, exchange ideas, and network.

A total of 24 students from the Department of Physics & Electrical Engineering attended and participated in this year's IEEE Region 2 SAC with generous funding from the Marx family, IEEE, and the University of Scranton. Students prepared for this event throughout the academic



year, and were rewarded by placing in 5 of the 9 available competitions. All 24 students worked extremely hard to prepare for the competition and did a wonderful job. The following students placed in this year's events:

Nicholas DePierro (EE, class of 2018) took second place in the paper presentation competition for *"Autonomous and Adaptive Environment for Plant Growth"*.

Peter Kulick (EE, class of 2019), **Griffin Mulvihill** (Physics, class of 2019), **Clarence Gallagher** (EE, class of 2019), and **Vu Nguyen** (CE, class of 2019) took second place in the Micromouse kit competition.

Ricky Olechna (EE, class of 2017), **Matthew Collier** (EE, class of 2017), **Nicholas Chaump** (EE, class of 2018), and **John Bowers** (EE, class of 2018) took second place in the project showcase competition on their project, *"The Foginator: Autonomous Environment for Plant Growth"*.

Wilson Ortiz (EE class of 2018) and **TJ Thomas** (EE class of 2016) took third place in the Micromouse scratch competition.

TJ Thomas (EE, class of 2016) took first place in the T-shirt competition with the "IV" Rangers T-Shirt.

EE/CE Senior Capstone Projects

Dr. Robert Spalletta: "For the first time, this semester we set up a student portfolio which served as the main assessment tool for the demonstration of student attainment of the class student learning outcomes"

The Foginator

Nathan Williams, Timothy Thomas, Chad Ryan

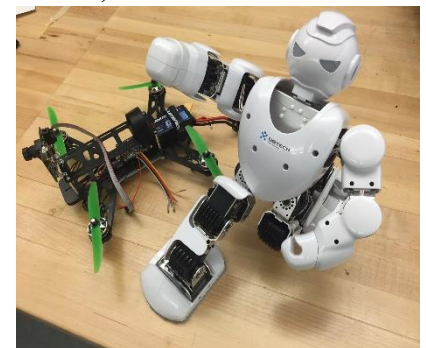
Develop a scalable, autonomous and adaptive indoor growing environment that autonomously adjusts itself based on a database of optimal growing conditions. This system eliminates the need for human monitoring and adjustment while providing a resource, space, energy, and time effective solution to food production.



The Squadcopter

Patricia Dominguez Gonzalez, Daniel Donovan

Create an autonomous drone platform able to "lock on" to a person and then follow them at a specified height as they perform extreme sports and other activities.



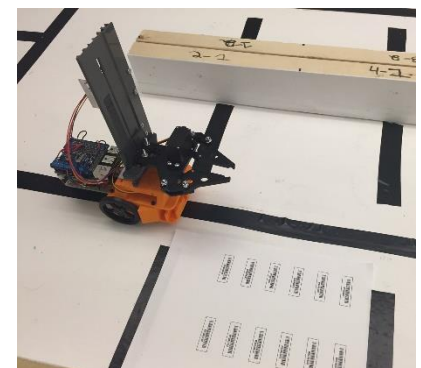
The Remote PT Compliance System

Robert Dudik, Ryan Ceccacci

Build a remote system to aid in physical therapy for patients who find it troublesome to make the trip to the PT office several days a week.

The Autonomous Model Warehouse **Christian Johnson, Frank Pallien, James Roche**

Model warehouse delivery systems incorporating multiple fully mobile autonomous robots.





Undergraduate Physics Research Projects

Characterization of Graphene Devices

Chris Pochis (Physics, class of 2016)

This Senior Research Project investigates the properties of Graphene and graphene devices at room temperature and at cryogenic temperatures. Graphene is a unique material composed of a monolayer of carbon atoms. This structure exhibits some unusual mechanical and electrical properties. This study uses a semiconductor analyzer, an atomic force microscope and a modified cryogenic Dewar to investigate these properties.

Gastroesophageal Reflux Disease (GERD) Gas Analyzing Application Utilizing Electronic Nose Instrumentation

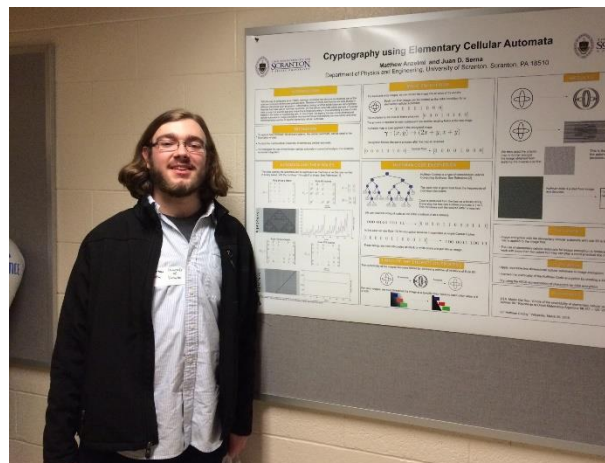
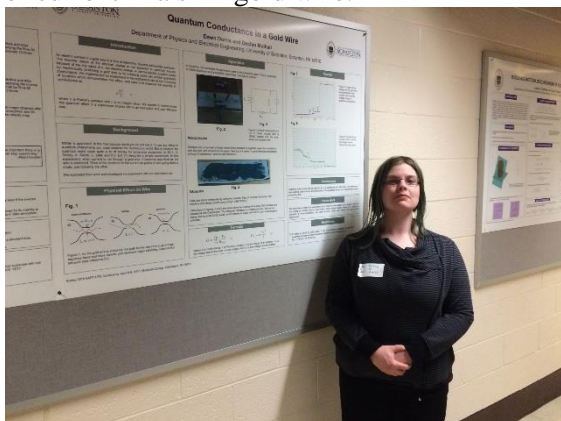
Zachary G. Mulhaul (Biophysics, class of 2016)

This Senior Research Project is to improve quality of life for patients with neurological disorders who suffer from Gastroesophageal reflux disease, commonly referred to as GERD. The Mayo Clinic defines GERD as a chronic digestive disease that “occurs when stomach acid or, occasionally, stomach content, flows back into your food pipe (esophagus).” This disease is not unique to, but predominately concerns, individuals with a dysfunctional lower esophageal sphincter (LES), a valve responsible for the regulatory passage of fluid from the esophagus to the stomach. Many people with Cerebral Palsy, one of the most common neurological disorders, are unable to ingest nutrient-rich meals neither fluently nor comfortably, causing malnutrition.

Quantized Conduction in a Gold Wire

Dawn Dorris (Physics, class of 2018)

She streamlined a tricky experiment and now it is offered in the modern physics lab. She measured the quantization of current in a slim gold wire.



Evolution of a System of Elementary Automata

Matthew Anzelmi (Physics, Class of 2017)

He used the results to explore some methods used by computational scientist to encrypt information, and combined it with the evolution of a well-known chaotic map to further increase the security level. He programmed the computer simulations (in Java) and used them to visualize and analyze the results.

Interferometer Comparisons using Fourier Spectroscopy

Riley J. Carey (Physics, class of 2016)

In this project, a practical yet accurate procedure to calculate the peak characteristic wavelengths of a source light emission spectrum using an Arduino and other open source software was devised. Two physical setups were discussed: The first used a Michelson interferometer and the second a modified Mach-Zehnder interferometer. The raw data obtained was analyzed using Fast Fourier Transform techniques and provided the intrinsic frequencies of the emitted light. This technique allowed to explore light emitted by a sodium lamp, which emits a characteristic doublet at 588.9950nm and 589.5924nm, and difficult to observe using other techniques.

Dynamics of a Rocking Cylinder

Joshua Zadoyko (Physics, Class of 2018)

Explored theoretically the dynamics of a rocking cylinder for which the center of mass is 'off' its center of rotation. He used different calculus techniques to obtain the center of mass and moment of inertia of the cylinder, and determined the equations of motions using the Lagrange equations. In addition, he used numerical methods to solve the differential equations describing the evolution of the system and found that the angular amplitude did affect the period of oscillation of the cylinder.



Industrial Advisory Board (IAB) Meeting Fall 2015

Our engineering IAB Meeting with board members, many of whom are alumni, met to discuss our engineering programs. Here is a summary of this year's meeting.



Dante Papada '07, Angela Croteau Marx '07, Greg Marx '05 at the fall 2015 IAB meeting

- ABET timeline - Next site visit **2017**
 - Assessment/Review – on schedule
- Changes implemented
 - Freshman Engineering Design Experience – ENGR 150
 - Probability/Statistics – intro in DSP course
 - Engineering Standards and Engineering Code of Ethics
 - IEEE – Eta Kappa Nu – Engineering Honor Society
- ABET - Criterion 4: Continuous Improvement
 - Enhance - SO/PEO Course Support/Assessment instruments
 - IAB/Alumni/Seniors/Course Exit – Surveys
 - Assessment rubrics update
 - 3 year assessment plan
- Engineering Management
 - Project Management/Simulation presentation
 - Curriculum Review
 - EM Capstone Experience

NEXT IAB MEETING:
Friday November 4th, 2016

Graduating Senior Highlights

Daniel Donovan - EE, Class of 2016

Lockheed Martin, Owego, NY. Engineering Leadership Development Program, Associate Systems Engineer. MS *Cornell University*, Systems Engineering.

Robert Dudik - EE, Class of '16

Parsons Brinckerhoff, NY, NY. Engineering Associate

Michelle Graham - Biophysics, Class of '15

Johns Hopkins University, PhD in Electrical Engineering, will begin fall 2016.

Zachary Mulhaul - Biophysics, Class of '16

Stevens Institute of Technology, NJ, MS Biomedical Engineering

Daniel Ortiz - MBA, Class of '16; EM Class of '15

Raytheon, Andover, MA. Operations Engineer II, Operations Talent Development Program

Frank Pallien – EE, Class of '16,

Crane Payment Innovations (CPI), Design Assurance Technician, Malvern, PA

Brady Rippon - Physics, Class of '16

Columbia University, MS Biostatistics

James Roche – EE, Class of '16

Lockheed Martin, Associate Electrical Engineer, Archbald, PA

Chad Ryan – EE, Class of '16

Armstrong, Leadership Development Program, Lancaster PA

Timothy “TJ” Thomas - EE, Class of '16

Tobyhanna Army Depot, Electrical Engineer, Tobyhanna, PA

Project Management Competition

April 30th, 2016

Scranton's Engineering and KSOM seniors competed in the SimulTrain® Project Management game. Students learn basic tools and principles of PM such as the use of Gantt charts, activity networks, the critical path method and project risk management. The game allows students to put the knowledge they learned about managing a team and a project into action, and contributes to our assessment, evaluation and accreditation efforts.



Thank you for reading our inaugural Physics/EE newsletter! We hope to continue to provide our alumni and friends with future updates on our students' activities and accomplishments. Feel free to contact any of us at any time!



**Dr. W. Andrew
Berger**

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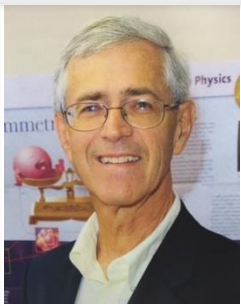
**Dr. Joseph
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Interested in getting some Scranton Physics/EE Gear?

Be on the lookout for another email and order form! Send inquiries to:

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**Dr. Declan
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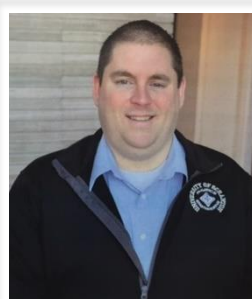
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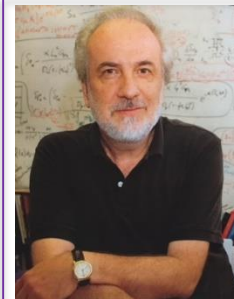
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