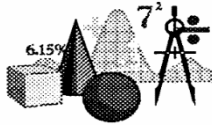




SPARKS

Daytona Section Newsletter
November/December 2021



<https://r3.ieee.org/daytona/>

SECTION MEETING
Thursday December 2nd
7:00 – 8:30 PM
MicaPlex Building in Embry-Riddle Research Park
1511 Aviation Center Pkwy
Daytona Beach

CHAIR'S REPORT



Hello Daytona Section!

I hope each of you is doing well and have taken advantage of the annual renewal event which began in September 2021.

Your involvement with the Daytona Section is very import to me as I am sure it is to you. Please do not

procrastinate. Holiday season is upon us and this simple process can get pushed to the back burner. Thanks to you, we are proud to announce the Daytona Section received the Silver Recognition Award for membership retention for the year ending August 2021.



2021 Outstanding Section Membership Retention Performance

Daytona Section

THINGS ARE CHANGING

As you may have seen in the October 2021 meeting, we have taken steps to make Zoom participation a better experience. We are still working on perfecting the experience, please let us know how the format meets your virtual attendance needs. You may have also noticed an increase in meeting participation. Our initial goal is to have between 20 and 30 members as well as spouses, guests, and the public in attendance. We are also looking at ways to make the meetings more informative and less technical (think full page product release announcement versus a white paper). More technical meetings can be held in “special” venues or in chapter environments where the conversation and presentation can be more in line with a formal presentation and discussion.

THE FUTURE

We are in active communication with Bethune-Cookman College (BCU) and Embry Riddle. On Friday November 5th, a group of Life Members, Dr. Liu, and myself had a well-received meeting in which we shared wisdom, advice, and insight with the student robotics club members, and other students, at Bethune-Cookman University. We look to foster this relationship in the near future. We are also having a meeting at Embry Riddle Aeronautical University to solidify and extend the Daytona Section's relationship there. We are also looking at establishing relationships at Daytona State, Keiser, and University Central Florida. We hope that each relationship will provide opportunity for the members of the Daytona Section to serve as mentors, tutors, judges, subject matter experts, and chapter officers as well as members. 2022 is looking better every day.

Shawn

MEETING VENUE

Our Sections November/December meeting will again be at the MicaPlex building which is located just south of the campus of Embry-Riddle.



The new location being near Embry-Riddle makes it easier for students to participate in our meetings and provides a more private atmosphere. There are ample meeting rooms for our needs, and parking is not a problem at that time of day.

Shown is a screenshot of the MicaPlex, which is located at the intersection of S. Clyde Morris Blvd and Aviation Center Pkwy (the other side is Bellevue Ave) just south of the ERAU campus.

We need to use the building entrance at the north east side of the building, shown in the area of the light green circle in the map shown below. There are ample parking spaces at the south side of the building, if you cannot find one close to the entrance. Dr. Liu or Dr. Rojas will be at the entrance to open the door before the meeting as it is normally locked.

For those planning to attend, because of security requirements, attendees are asked to notify us with their names so a list can be provided to facilitate the process. You can register at the door, but letting us know beforehand will speed up the process.

You can respond by email or phone to: Al Jusko, a.jusko@ieee.org or 386-671-3706

CONGRADULATIONS ARE IN ORDER



Shawn Wilkerson, our Section's Chair, recently received his Ph.D from Nova Southeastern University, College of Computing and Engineering, Fort Lauderdale, Florida. The title of his degree is a Ph.D. in Information Systems with Concentration in Information Security

We wish Dr. Wilkerson success in his professional endeavors and look forward to his continuing contributions to the Daytona Section.

OCTOBER'S PRESENTATIONS

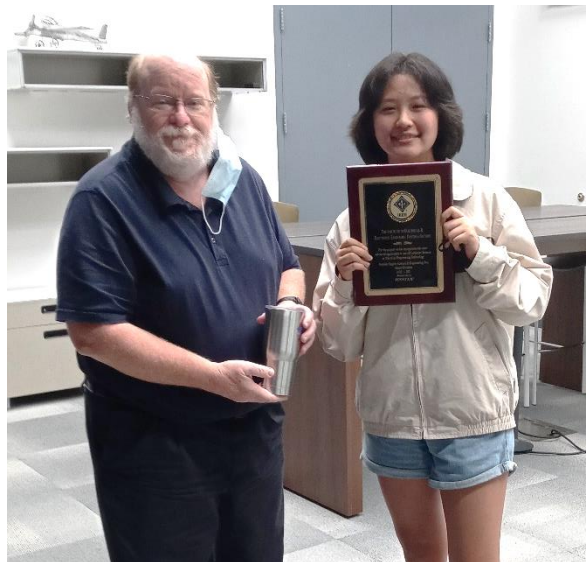
Dr. Helen Hernandez presented a program titled *Virtual Care: A Paradigm Shift in Healthcare Delivery*. The 2020 pandemic has caused a cultural shift and accelerated the acceptance of a virtual environment in healthcare delivery. We learned about four distinct models of virtual care. In addition, we learned from comments from the audience that the traditional model of face-to-face encounters between physician and patient must also undergo changes to ensure a high standard of quality of care.



Dr. Hernandez receiving our Sections travel mug from Section Chair Dr. Wilkerson

2021 TOMOKA REGIONAL SCIENCE AND ENGINEERING FAIR

At our October meeting, we also had a presentation from our 2021 Tomoka Regional Science and Engineering Fair Senior Division winner, Jenny Liu from Spruce Creek High School, about her project "Enhancing the Accuracy of Recyclable Material Classification Using Transfer Learning and Image Augmentation.



Jenny Liu receiving our Sections Senior Division winner's plaque and travel mug from Section Chair Dr. Wilkerson

NOVEMBER - DECEMBER PRESENTATION

THE ORIGINS OF AUTONOMOUS DRIVING: THE DARPA GRAND CHALLENGES

The automotive industry is in the beginning stages of a transformational change from purely human driving to computer assisted and eventually fully autonomous driving. This presentation will talk about the history of autonomous driving, in particular focusing on the presenter's experience with the DARPA Grand & Urban Challenges of the mid 2000's. These challenges addressed the mainly theoretical problem of autonomous driving by challenging teams around the world to compete, thus accelerating the industry and kick-starting the autonomous driving revolution.

OUR PRESENTER

Dr. Patrick Currier is Professor and Associate Chair of Mechanical Engineering at Embry-Riddle Aeronautical University. He has extensive experience developing complex electro-mechanical systems, with projects including for organizations including DARPA, USMC, US Army, ONR, DOE, and Boeing. He currently serves as an advisor to the Robotics Association at Embry-Riddle, which competes in seven different student robotics competitions spanning maritime, aerial, and ground domains and as the lead advisor for the DOE and GM sponsored ERAU EcoCAR Mobility Challenge hybrid vehicle development team. His areas of expertise include unmanned systems development, hybrid systems development, systems integration, and dynamic modeling and control

For those wanted to attend virtually, we will Zoom the meeting. You can join at:

<https://erau.zoom.us/j/7402517688>

Meeting ID: 740 251 7688

Date & Time: Dec 2nd, 2021 07:00 PM Eastern Time (US and Canada)

LIFE MEMBER AFFINITY GROUP VISIT TO BETHUNE COOKMAN

The Life Members Affinity Group were hosted by Dr. Wu, Bethune Cookman University, on Friday, Nov. 5. We met Dr. Herbert Thompson, Dean of the College of Natural and Health Sciences, Engineering, and Mathematics, and Professors Roy Savoca, Ahmed Badi and Morrison Obeng, in addition to Dr. Wu.

The Student Chapter Chair, Manit Bhusal and Vice Chair, Jackinson Marcellus, went over their plans to build a robot to compete in the South East Con competition next spring. We asked the students for questions regarding engineering in industry where we might be able to give them some insight as to what to expect. We also discussed the many advantages of joining IEEE and how IEEE has helped us in our careers.

Dr. Obeng asked if IEEE could provide someone to sit on their Industry Advisory Board that is involved in the periodic review and update of the Program Educational Objectives used by B-CU. They have an excellent set of directives already and track over a dozen prominent computer engineering program Alumni – an outstanding project. I recognized several of the alumni from their participation in the Daytona IEEE Section while they were students.

The LM group enjoyed being able to share experiences with the B-CU students. The students asked a lot of good questions, and were actively engaged with us for about 1 ½ hours. Dr. Savoca picked up on many points we made, taking the opportunity to expand on items he wanted the students to pay particular attention to, such as life-long learning.

Ron Gedney, LMAG Chair

ANOTHER TALE FROM THE OLD PROFESSOR

ON THE IMPORTANCE OF AN UNHOLEY DESIGN

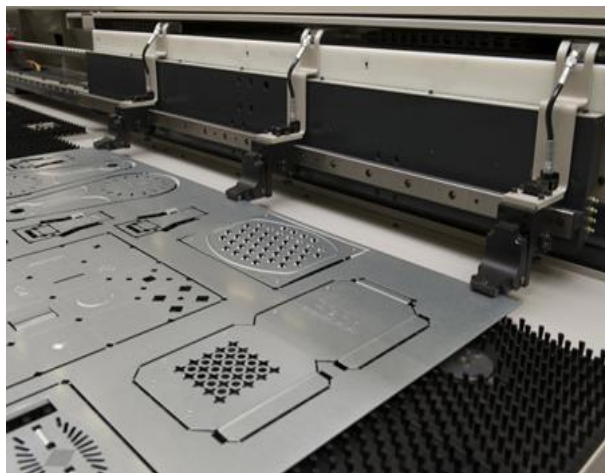
I had the privilege of working for several manufacturing companies both as an employee and as a consulting engineer. I was always eager to learn the entire manufacturing process from concept, design, fabricating and ultimate delivery to a customer. One of my consulting clients was a consumer item manufacturer and I learned what it was like to deliver products in lots of tens of thousands or more. More importantly, I learned what it was like to NOT deliver tens of thousands of items due to an engineering issue.

Even as a child, I was always fascinated with how things were made. In my first jobs I would visit the factory to see how they made the products the engineering department designed. I was always welcomed; sometimes with complaints about what engineers thought were great designs but were difficult to manufacture. My career took me to the position of “director of engineering” of a manufacturing company before I entered full-time academia. My knowledge of the entire manufacturing process was a real plus. Even after becoming an “academic”, my consulting clients had me visiting their factories for various problems. Along the way I learned not only electrical design, but mechanical design and

to a certain extent software and even marketing. You can also throw in government certification procedures too.

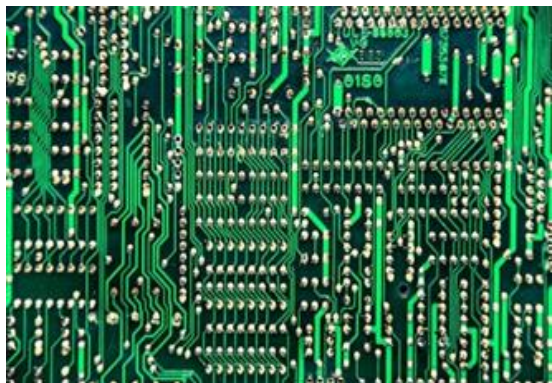
One lesson I learned was that holes are expensive. First, holes are made to pass something through, mostly fasteners. This means that in addition to the cost of making the hole, there is the cost of the fastener and the cost of having someone or some machine insert and tighten the fastener. There is also the cost of future problems with fasteners. Quite often, it is necessary to use fasteners that are of a different material than the things they fasten. Without adequate moisture sealing, another cost item, this can lead to galvanic corrosion years after the fastener was installed. Another failure mode is a fastener that loosens up over time and could possibly completely exit its hole and start rattling around inside the equipment.

Not all holes are for fasteners. Some are for connectors or passage of wires like a power cord or airflow for cooling.



If an item that uses a lot of holes is made of thin metal like sheet steel or sheet aluminum, both common in electronic equipment, the holes can be punched. Holes of all shapes, round, square, etc., or holes that are not completely open like air vents can be punched. One punch and die set could make all the openings in the sheet metal at the same time before it is bent into its final shape. Those are cheap holes. A CNC machine with the necessary punch and die pairs can also make a lot of cheap holes.

If enclosures are made of molded plastic, the holes can be molded-in which is even cheaper than punching. But there are some limits on what kind of holes can be included in the molding process and some housings can't be made of molded plastic.



Printed circuit boards can have a huge number of holes. Before the widespread use of surface-mount components when integrated circuits and discrete semiconductors used "through hole" pins, the hole count on a large PC board could be in the thousands. The issue with holes in printed circuit boards is the glass fiber used to stiffen the board. It is not possible to punch holes in a glass-reinforced PC board and every hole has to be either drilled or routed. Both are an expensive process. Even very cheap unreinforced PC boards will crack if punched and have to be drilled.

Holes, holes, everywhere!

Going back to an earlier point. Making a hole implies that something is going to pass through it. In modern printed circuit boards, some holes may be for fasteners or through-hole parts but most are for connecting the top and bottom traces of the PC board or in the case of a multilayer board, between the top, bottom and inner layers. Drilling is the first step in making holes in PC boards which is followed by plating; and usually more than one plating process. Each one of those steps is a cost item for the end product.

Minimizing holes in electronic design seems to be a good idea but there is one area we can't eliminate holes: the charge carriers in the p-type semiconductors used for the substrate of integrated circuits. The typical charge density for p-type silicon is on the order of 10^{10} holes per cm^3 . That's a lot of holes. No integrated circuit uses a substrate as large as a cubic centimeter although some are getting pretty big.

The holes in p-type silicon or other semiconductors are made by doping the intrinsic material with an impurity which is a pretty simple process when comparing it to other semiconductor manufacturing steps. Other than the price of a semiconductor itself, there is no charge for these necessary holes. One thing is for sure, integrated circuits have a lot of holes but these are good holes.

Before finishing my Tale of holes, I want to touch on the worst type of holes. Those are the ones in the basic design itself. The V and V process or "verification and validation", is the all-important step in an engineering design to fill these potentially dangerous holes.

Dr. Al Helffrick, a.k.a. The Old Professor

PE CORNER

The Steps to Professional Licensure, Part 1

So, you want to become a PE? Great! In the next couple of months, I'll review the process to get your PE license. Though there have been several significant changes to the process in recent years, there are still essentially four steps required to get your PE.

First, get an ABET-accredited four-year engineering degree (or equivalent—see below). Second, take the Fundamentals of Engineering (FE) exam, formerly known as the Engineer Intern or Engineer in Training (EIT) Exam. Once you pass, you are an Engineer Intern (EI). Third, an EI must obtain appropriate experience, typically four years, as defined in the rules. And last, the EI may take the Professional Engineers exam. Passing the exam and having the required experience qualifies the applicant as a Professional Engineer.

Recently, the Florida legislature passed changes to the "equivalent" requirements to take the FE exam related to Engineering Technology Degrees. They also made changes to the experience and timing requirements to take the PE. These will be the subject of a future column.

In Florida, an applicant may apply to take the FE directly with the National Council of

Examiners for Engineering and Surveying (NCEES). The process is described on the FBPE website. <https://fbpe.org/licensure/licensure-process/> If the applicant obtained their engineering degree from a foreign institution not subject to ABET accreditation, the Board will typically require that additional information be provided to determinate whether the courses taken are substantially equivalent to a program meeting ABET accreditation standards.

The FE exam has changed in several regards over the years. One thing that has remained consistent, however, is that the exam is administered by NCEES in all fifty states and most US territories. No matter what state you pass the exam in, that passing grade is accepted by every state. In terms of the exam itself however, much has changed. For example, up until about twenty years ago, applicants could bring any books they desired into the exam room to use as a reference. This has changed to where the applicant can only use a formula reference book provided by NCEES. An applicant is given a new book for use during the exam; you can't bring one with you. In fact, nothing may be brought into the exam room except for pencils and an approved calculator. The exam is multiple choice, but now it is computer-based and taken at a testing center online. The exam may be taken during eight months of the year where previously it was only given on two specific dates each year. The exam is one hundred ten questions in length, half in the morning and half in the afternoon with an optional twenty-five minute break.

Next, the exam used to cover eleven subject areas in the morning, followed by specific areas of the applicant's choosing in the afternoon. This has also changed to where the whole exam is specific to each engineering discipline. This is in line with changes in engineering curricula in that, for example, many electrical engineers no longer are required to take statics and dynamics, and structural engineers may not be required to take circuits.

Next month I'll discuss the experience required for an Engineer Intern.

Whether you are a PE looking to attain required CEHs, or an engineer looking to learn something new or keep current with the latest trend in the profession, IEEE has seminars that will meet your needs.

Art Nordlinger, PE, Senior Member

DAYTONA SECTION SHIRTS



We are pleased to offer Daytona Section polo shirts for our Section members. The shirts are embroidered with the IEEE Logo and DAYTONA SECTION on the left and your name and grade, if desired, on the right. The shirt is a high quality 5 oz, 65/35 poly/cotton pique in Royal Blue with white embroidery. Available in S - 2XL in men's as well as ladies' sizes. Price is \$35, including tax, for S-XL size's, 2XL size is \$3 additional.

For more information or to order shirts contact: Allan Jusko 386-671-3706 or a.jusko@ieee.org

FUTURE MEETING DATES

2022 Section meetings, depending on the coronavirus situation at the time:
Spring semester: Jan 27, Feb 24, Mar 24, Apr 28

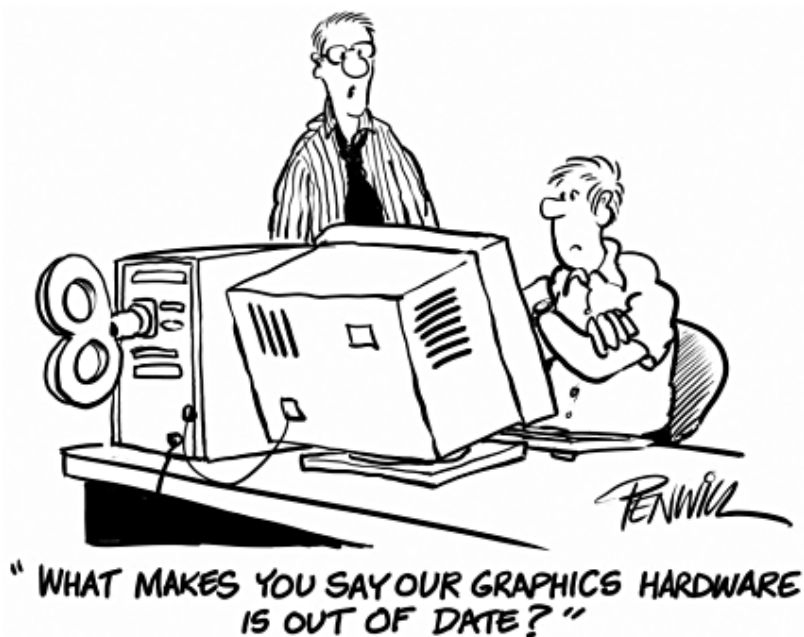
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ENGINEERING HUMOR



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