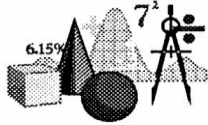




SPARKS

Daytona Section Newsletter
November 2017



NOVEMBER SECTION MEETING

Thursday November 30th at the Halifax River Yacht Club, 6:00 PM
331 South Beach Street, Daytona Beach, Florida 32114

PRESENTATION TOPIC

**THE BURNS SCIENCE & TECHNOLOGY
CHARTER SCHOOL: A SUCCESS STORY**

CHAIR'S REPORT



Welcome to the November newsletter and the threshold of the holiday season.

As usual, there is a lot going on. ERAU entered one team in the IEEEExtreme programming competition. The official results are not released as of this writing, but the unofficial results placed us around the top 20% in the world. It's membership renewal time, so please don't neglect this important annual milestone.

IEEE membership comes with many benefits including travel discounts, software discounts, and access to health and life insurance plans. The list is larger than that, so be sure to check out all the benefits when you go online to renew.

Our last dinner meeting of the year will be held on November 30, and we hope to see you there.

Keith

NEW COLUMN ANNOUNCEMENT

The Daytona Section Newsletter is adding a new column titled "THE PE CORNER". The column is written by Art Nordlinger, P.E., Senior Member, Manager, Transmission Tariff & Contracts, Tampa Electric Company. Although written for the Professional Engineering community, its content can be of interest to all in the profession. We hope you enjoy the column.

Editor

THE PE CORNER

WHAT IS FEMC?

I'd guess that it's pretty-much universally understood, at least among the engineering community, that the Florida Board of Professional Engineers licenses engineers in Florida and regulates the practice of engineering. And it's probably a little less well known that the FBPE operates under the auspices of the Department of Professional and Business Regulation (DPBR), which is a state agency. So who or what is FEMC?

Until July 1998, administrative and investigative functions for the FBPE were performed by DPBR employees. In 1997, the Florida Legislature determined "that the privatization of certain functions that are performed by the department for the board will encourage greater operational and economic efficiency and, therefore, will benefit regulated persons and the public."

Section 471.038, F.S. (97-312, Laws of Florida [L.O.F]), created the Florida Engineers Management Corporation (FEMC), a public-private partnership, for the purpose of performing staff duties for the Florida Board of Professional Engineers (Board). FEMC provides administrative, investigative, and prosecutorial services according to a contract with the Department of Business and Professional Regulation (DPBR). FEMC is established as a nonprofit corporation with a seven-member board. The FEMC board is composed of five registered engineers appointed by the FBPE, and two laypersons appointed by the Secretary of DBPR. FEMC took over the administrative duties for the FBPE on July 1, 1998. As an integral part of the FBPR, FBPR and FEMC share resources including the Board's website.

It may surprise many of you that for nearly 20 years the FBPE support staff has been employed by FEMC and not by the State (DPBR) or the Board itself. I would say, though, that this transparency is indicative of the success of the arrangement. As required by statute, the Legislature must review the FEMC's performance and reenact the enabling legislation. To date, this arrangement has received favorable review and the Legislature has continued FEMC's mandate.

Additional information about FEMC and FEMC Board Members is available on the FBPE's website. Whether you are a PE looking to attain required CEHs, or an engineer looking to learn something new or keep current with the latest trends in the profession, IEEE has seminars that will meet your needs.

OCTOBERS PRESENTATION

One of the elements of a successful business is customer service and the continuing relationship with its customers. Mr. Baran's presentation described how a software system can be used to improve the customer relationship.

He described how it can interact with different people based on their roles, and what benefits it brings to those who use it. He also described why some systems are very successful while others failed to be implemented properly and thereby did not produce the desired results.

The concept is applicable to any type of business, especially when customer interaction with multiple departments of the business is typical.



Daytona Section Secretary Ron Gedney presenting the Sections travel mug to Michael Baran

NOVEMBER PRESENTATION

THE BURNS SCIENCE & TECHNOLOGY CHARTER SCHOOL: A SUCCESS STORY

Why are parents driving to Burns Science & Technology Charter School in Oak Hill? This month's presentation will show how a unique culture of hands-on learning, kindness, and involved parents and community, have successfully developed a "High Performing", STEM (Science, Technology, Engineering, Math) driven education for Kindergarten through 8th grade.

The innovative ways software, hardware, CNC machines, laser cutters, 3D printers, robots, drones, and basic electronics can be used to inspire creativity will be described. Plans for the future will be discussed.

OUR SPEAKERS

Dana Greatrex is a founder and currently Student and Community Coordinator and Librarian at the Burns K-8 STEM school. With a B.A. In Social Sciences, and an M.A. in Media & Technology, Ms. Greatrex has been a teacher in Volusia County for 48 years.

Luis Zengotta teaches technology from kindergarten to 8th grade at Burns. He has taught students of all ages at the Museum of Arts and Sciences, Florida International Museum and the Smithsonian Institution. He has a B.S. in Business Management.

ANOTHER TALE FROM THE OLD PROFESSOR

TALK TO MY CAPACITOR, IT'S LISTENING

Many years ago, I was building a radio receiver where most of the gain was at audio frequencies. This is the norm for what is called "direct conversion" or "zero IF" a technique that is in widespread use today.

My radio receiver would howl and make all kinds of obnoxious noises if I turned the volume up too high. Then I noticed that tapping the PC board caused a loud "bang" in the speaker. It was clear the PC board was sensitive to mechanical vibration. In other words, it was a microphone.

This kind of problem has been observed in electronics for many decades and is called "microphonics". Vacuum tubes were notorious for microphonics. In low level audio amplifiers, vacuum tubes were often mounted on sockets with rubber bushings to mechanically isolate the tube from the chassis.

Obviously, the PC board wasn't responsible for the microphonics but some component on the PC board was the culprit. Tapping various components with a pencil located the suspect component; a rather high-value DC blocking capacitor at the input of the audio amplifier. Of course! The capacitor was a ceramic capacitor and had piezoelectric characteristics. A popular type of inexpensive microphone for many years was the "ceramic" microphone and that is exactly what this capacitor was.

But that got me thinking. Another type of microphone, often found in broadcast studios, and certainly not inexpensive, was the "condenser microphone". Condenser microphones worked on the principle of a diaphragm that was a capacitor plate which would allow sound waves to change the capacitance against a fixed plate in the microphone. A high voltage, perhaps hundreds of volts, was applied between the plates. Changing the capacitance but maintaining a constant voltage across the capacitance causes current to flow in and out of the capacitor in concert with the vibrations of the diaphragm. This variable current is the desired output for the microphone. I was about to replace the ceramic capacitor with a plastic film capacitor. But was I replacing a ceramic microphone with a condenser microphone? The capacitor was for DC blocking so there was a couple of volts across it and the plastic film used for the replacement capacitor would probably be compressible enough to allow for a small capacitance change if struck mechanically.

I made the change to a plastic film capacitor just to see if it was microphonic too. It was; not as bad as the ceramic capacitor but if it was tapped, a distinctive "thud" would come from the speaker. I replaced the microphonic ceramic capacitor with an electrolytic capacitor and had no more microphonic problems.

Some electronic components are not microphones but sound generators. One of the radio stations that I worked for was a 5 kW AM station. This means the transmitter had a 2500-watt modulator; a giant audio amplifier. The transmitter was a vacuum tube type and the modulator

involved a large modulation transformer. (Solid state transmitters were not available for AM radio stations when the Old Professor was working in broadcasting.)

The radio station's program audio could be clearly heard coming from the transmitter cabinet. The acoustic noise was generated by the modulation transformer. The phenomenon that turned electrical signals to acoustic was the "magnetostriction" of the transformer core.

Magnetostriction is the change in length of a magnetic material in response to a change in the internal magnetic flux density.

The transformer which was bolted to the floor of the transmitter cabinet coupled the acoustic energy to the cabinet which became a loudspeaker. If you ever visit a power substation you can clearly hear the transformers buzzing away.



In addition to being microphones, capacitors can also generate acoustic noise. Once when I was troubleshooting a high voltage power supply that was not providing the correct output voltage, (This was vacuum tube days again) I heard a hissing sound coming from inside the power supply cabinet. I opened the top door to the power supply to see what was going on. I immediately recognized what was happening and slammed the top door shut just

as a large can-style electrolytic capacitor disgorged its entire innards from the top of the capacitor. Had I been still looking around through the open top I would have received a face full of capacitor guts. Even though the capacitor that exploded was from the 1950's this failure mode for electrolytic capacitors still exists. Modern large electrolytic capacitors have a safety vent to prevent the capacitor from exploding. Today the safety vent generates the hissing sound and the capacitor stays intact.

With all this in mind, be careful what you say around electronic systems as they have ears and could possibly talk back to you.

All Helfrick, a.k.a. The Old Professor

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 \$29, 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.

IEEE MEMBERSHIP PINS

We have IEEE Membership pins available for years of IEEE membership. See Richard Kent or Allan Jusko if you're interested

FUTURE MEETING DATES:

The dates for the spring sessions are: Jan 25, Feb 22, Mar 22, Apr 26

EDITORS NOTES

The **SPARKS** newsletter is also available on our website <http://www.ieee.org/go/daytona>

Region 3 website
<http://www.ewh.ieee.org/reg/3/>

Other web sites of note
Melbourne Section website
www.ieeemelbourne.org

Orlando Section website
www.ieee.org/orlando

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ENGINEERING HUMOR



NOVEMBER 2017 MEETING

Thursday November 30TH at the Halifax River Yacht Club
331 South Beach Street, Daytona Beach, Florida 32114
Just south of the Fire Station at the corner of Beach and Orange Streets

TOPIC– The Burns Science & Technology
Charter School: A Success Story

SPEAKERS – Dana Greatrex
and Luis Zengotta

AGENDA

5:30 PM Greetings & Cocktails
6:00 PM Dinner
7:00 PM Presentation

Dinner Menu

Beef Tips Dianne – Sautéed beef tips flambeed with brandy, shallots, mushrooms and Dijon mustard, finished in a demi cream sauce. Served with mashed potatoes and broccoli.

Shrimp Penne Pasta in a garlic cream sauce.

Chicken Francaise – Boneless chicken breast dipped in egg batter and sautéed with fresh herbs, lemon garlic butter sauce and served with mashed potatoes and broccoli.

Members and guests \$20.00 each. Students \$10.00 each

**Please contact Allan Jusko by Wednesday November 29th at noon
to give us a count for dinner or for further information**

If you make reservations and are unable to attend, call prior to the event to cancel.

The Section is charged for all dinners ordered, please let us know if your plans change

Allan Jusko

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