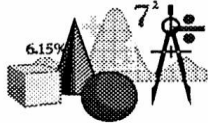




# SPARKS

Daytona Section Newsletter  
September 2017



## SEPTEMBER SECTION MEETING

Thursday September 28th at the Halifax River Yacht Club, 6:00 PM  
331 South Beach Street, Daytona Beach, Florida 32114

### PRESENTATION TOPIC

Designer Drugs

\*\*\*\*\*

### CHAIR'S REPORT



Welcome back from our summer break. Hoping everyone is safe and secure from the effects of Hurricane Irma.

Though the section does not meet during the summer, the members have been active. I attended the Florida Council meeting in June, Jeanette Barott attended the Sections Congress in Australia in August, and several members have completed papers for presentation in the 2017 Digital Avionics Systems Conference to be held in Tampa later this month. Vice Chair Richard Kent has lined up a full slate of interesting speakers for our

fall meetings.

Every year we encourage our members to promote themselves within the IEEE. If you have seven or more years of experience in your field, consider moving to Senior Member status this year. The process is not difficult, and the Section leadership, past and present, are here to help you if needed.

We are always looking for professionals to share their experiences with students at the university and K-12 level. It is important to raise awareness of what engineers of all stripes do and don't do with students – they're going to be building the future! If you would like to arrange a campus visit please let me know and I'll help make it happen.

Again, welcome back.

*Keith*

## SEPTEMBER PRESENTATION

### DESIGNER DRUGS

Designer drugs are synthesized to chemically and psychoactively mimic known illicit drugs, made to avoid the law, and are skillfully marketed.

Since the beginning time, humans have always found ways to use psychoactive substances to alter their perception of their environment. Over the past several hundred years, technological advances have increased the potency of psychoactive substances, intensifying their effect, as well as dangers. Designer drugs represent the most contemporary developments in the evolution of mind-altering chemicals.

Using opioids as an example, Dr. Kent will discuss advances in chemistry and medicine over the past several hundred years that evolved natural plants into the first designer drugs. She will discuss advances in pharmaceuticals, genetics, information technology in recent decades that contributed to proliferation and popularity of designer drugs causing a global public health crisis.

### OUR SPEAKER



Kristen Kent, MD, FAAEM is a board-certified emergency physician who works locum tenens. She received a B.S. in Exercise Science and M.D. from the University of Iowa. She graduated from the Emergency Medicine Residency Program at the University of Massachusetts and trained in medical toxicology for an additional year after residency.

Over the past ten years, Dr. Kent has worked in various emergency departments from small hospitals in rural areas to urban level-one trauma centers, as well as working in flight medicine and telemedicine. She is an active member of the American Medical Association (AMA) and the American Academy of Emergency Medicine (AAEM), and she is an instructor for courses through AAEM. Her publications and conference presentations are in the areas of emergency medicine, psychology, and toxicology. For over twenty years, she has volunteered to care for underserved medical populations both in the United States and abroad.

## ANOTHER TALE FROM THE OLD PROFESSOR

### How a Mechanical Engineer Helped Create the Sound of Jazz and Rock

The design and construction of musical instruments, for the most part, is an art. Consider the violin. It consists of five moving parts; four strings and a bow. That's not counting the tuning pegs that should not move when the instrument is played. In simple terms, the violin is a wooden box with four strings that vibrate. If that's all it was, the name Stradivarius would be forever lost to history. Brass instruments, except for the trombone, involve many moving parts which require careful machining, mechanical linkages, lubrication etc. Brass instruments really didn't take on their modern form until the early 20<sup>th</sup> century and has become more of an engineering art rather than a fine art.

The instrument that takes the prize for complexity, moving parts, and just plain enormity is the pipe organ. Each pipe is like a one-note instrument and is made by a skilled artisan. The complexity is in the contraption that the organist uses to control thousands of pipes by pressing switches, opening valves thus allowing air to pass through the pipe causing the pipe to "speak". With the advent of electronics, a number of engineer/musicians looked for ways to synthesize the sound of a pipe organ without the need for thousands of individual pipes and the obnoxious air supply.

Laurens Hammond started tinkering with the generation of sounds electrically with the idea it could replace the extreme cost of purchasing and maintaining a pipe organ, particularly for small churches. The frequency stability of the sounds generated by a musical instrument must be accurate and stable to a small fraction of a percent. Lacking this, the organ will sound out of tune. The idea of using an individual source for each "pipe" of his electric organ, Hammond would have to use very expensive inductors and condensers, (the name for a capacitor in Hammond's time), to set the tone frequency. Each synthesized "pipe" would require a stable oscillator, which would regain one of the pipe organ's main faults. Thousands of pipes are now thousands of oscillators.

Hammond, who had a degree in mechanical engineering from Cornell, devised an electromechanical tone generator that used a rotating steel wheel with a scalloped periphery. (sort of like a gear with very badly rounded teeth) A magnetic pickup would be placed in close proximity to the edge of the wheel and would produce a near-sine wave output. The frequency of the output was equal to the number of scallops on the wheel times the rotation rate of the wheel. The wheels were on several shafts but ultimately driven from one synchronous motor which was phase locked to the 60 Hz power supply. Hammond used 91 of these tone wheels to generate the sounds for the manuals and pedals.

But Hammond had a problem. In the equally-tempered scale, which is what is used for all Western music after Bach, the ratio of the frequency of one note to its adjacent note is the 12th root of two. Since Hammond's tone wheels were geared to one motor, all the tones had to be related to the motor's speed by products and/or ratios of integers. This is because you can only have an integer number of teeth on a gear or scallops on a tone wheel. Since the 12th root of two is an irrational number, no combination of dividing or multiplying integers can equal it.

Therefore, if you generate one note accurately you can't generate all the notes leading up the chromatic scale to the next octave accurately. Also, the pure sine wave from the tone wheel would produce the sound of only one type of organ pipe; essentially a flute sound. What

distinguishes one instrument sound from another are the “overtones” or harmonics. To create different pipe sounds Hammond added in other tones at different levels using what is called a “drawbar”. But, except for harmonics that are powers of 2, (higher octaves), these added tones are not harmonics of the fundamental. In addition, the keyboard and pedals simply switched the tones on and off. Musical instruments have an attack and decay which is not instantaneous. The Hammond organ had a “clicky”, staccato characteristic. Hammond added other features to emulate a pipe organ but, alas, never really duplicated an authentic pipe organ sound. Hammond came as close as he could while still having a practical instrument. But it was a unique musical scale and harmonic structure and a staccato sound that no other instrument had. Hammond created a new sound that appealed to Jazz and Rock bands.



Hammond drawbars

After being introduced in 1935, the Hammond electric organ found its home in many smaller churches that couldn't afford or fit a pipe organ. But Rock and Jazz groups would use the instrument back in the 1940's and 50's, long before there were electronic keyboards. The most popular Hammond model was the B3. Often performers would cut off the legs and use a collapsible stand to make it portable. They removed the music rack since they didn't read from charts. The pedals were removed because that was the “bass-man's” part and the keyboardist would play standing. There were also artists that adopted the instrument without modifications and had successful performing and recording careers.



The Hammond B3

Now the pendulum has swung the other way. Companies that that make electronic keyboards are struggling to create the old Hammond sound with only modest success. In fact, a good “original” B3 will cost you much more than a brand-new electronic copy.

*Al 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](mailto:a.jusko@ieee.org).

## 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](http://www.ieeemelbourne.org)

### **Orlando Section website**

[www.ieee.org/orlando](http://www.ieee.org/orlando)

## **FUTURE MEETING DATES:**

The dates for the fall 2017 spring session are:  
Oct 26 and Nov 30

## **IEEE MEMBERSHIP PINS**

Membership pins are available for all member grades. Check out this website for more information.

[http://www.ieee.org/membership\\_services/membership/products/pins.html](http://www.ieee.org/membership_services/membership/products/pins.html)

## 2017 SECTION OFFICERS

### Chair – Dr. Keith Garfield

386-226-7081 garfielk@erau.edu

### Vice Chair – Richard Kent

206-369-1965 rtkentjr@msn.com

### Treasurer - Dr. Jianhua Liu

386-226-7713 liu620@erau.edu

### Secretary – Ron Gedney

386-478-1204 r.gedney@ieee.org

### Membership Development –

### Publicity/Media – Ron Gedney

386-478-1204 r.gedney@ieee.org

### PACE Representative –

#### Dr. William Barott

386-226-8973 barottw@erau.edu

### Life Member Chair – Ron Gedney

386-478-1204 r.gedney@ieee.org

### Computer Society Chair – Dr. Keith Garfield

386-226-7081 garfielk@erau.edu

### Student Activities, (Co-Chairs)

#### ERAU - Dr. William Barott

386-226-8973 barottw@erau.edu

#### B-CU - Dr. Ahmed Badi

386-481-2671 badia@cookman.edu

### ERAU Student Chapter Chair- Dean Laga

lagad@my.erau.edu

### ERAU WIE Student Chair –

### Webmaster – Charlie Husbands

386-760-7163 chusbands@ieee.org

### SRT Project Coordinator - Charlie Husbands

386-760-7163 chusbands@ieee.org

### SPARKS Editor - Allan Jusko

386-671-3706 a.jusko@ieee.org

## ENGINEERING HUMOR



Programmer in prison.

# SEPTEMBER 2017 MEETING

**Thursday September 28<sup>TH</sup>** 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**– Designer Drugs

**SPEAKER** – Kristen Kent, MD, FAAEM  
Board-Certified Emergency Physician

## **AGENDA**

5:30 PM Greetings & Cocktails

6:00 PM Dinner

7:00 PM Presentation

## **Dinner Menu**

**Sautéed beef tips with mushrooms**- Marsala wine and demi-glace. Served over egg noodles.

**Chicken Provençale**- pan seared chicken breast with capers, tomatoes, garlic in a lemon butter sauce. Served with rice pilaf and vegetable medley.

**Flounder Almondine**- sautéed flounder, brown butter, lemon and almonds. Served with rice pilaf and vegetable medley.

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

**Please contact Allan Jusko by Wednesday September 27th 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

Editor

386-671-3706

a.jusko@ieee.org