IEEE FOOTHILL SECTION

Serving to Enhance the Community

(http://www.ieee-foothill.org/)

Monthly Newsletter

In this Issue

Section Announcement

Section Elections is still ongoing until January 11th, 2021. Please don't forget to cast your votes!

Newsletter made Possible by:

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Contact David E. González (DavidGonzalez@ieee.org)

or Scott Wedge (wedge@ieee.org)

IEEE Foothill Section Monthly Zoom Meeting for November

Section Monthly Meeting was held on November 10th with 21 attendees. Minutes from the previous meeting was reviewed and approved, we had Chairman's announcement, treasurer's report, as well as student branches and technical societies and then discussed new business.

The Chair announced about the Section elections. That the nominations has to be completed on Nov. 20th and the goal for ballots to be online and polls to open by Dec. 1st. The Chair is also looking on starting a Student Activities Committee (SAC) represent students' interest at Section Management meetings. He's also looking into the possibility of starting Life Members Affinity Group as there are 100 section members in it. We will be establishing our own section Zoom account and the Chair and the Section Secretary will be working on that. The Chair also reminded about year-end reports and all OUs' budget reports for 2020 to be done.

Sections and Committees

For Membership Development, members increased from 982 to 1086. For Educational Activities, we need to establish a STEM tiger team and work with Rialto Unified School District. They're also looking into a 1-day science boot camp for both teachers and students. For Newsletter, Max is urging for content and stories from all OUs. He also emphasized the importance of news from student branches to show section activity and connection with universities. The IEEE Southern California Council has a long-term project with Norco College and is looking to have cooperation with the Corona Navy base.

Student Branches

California Baptist University (CBU) had their first part of "PCB Extra Credit Lab" in person on campus. Second part was held on Nov. 12th, 2020. California Polytechnic University, Pomona (CPP) had their Induction Night Mentorship Program. Workshops were done and members were given certificates. They also interviewed Lockheed Martin about online interviews. California State University, San Bernardino (CSUSB) had an IEEEXtreme event on Oct. 23-24, 2020 and had three teams participated. They also had an online game night in collaboration with 5 clubs. University of California, Riverside (UCR) had "Napkin Pitches" and other meetings.

They have 4 main projects and workshops in line, and had a virtual hackathon for 12 hours.

Technical Societies and Committees

We are still looking for Chair for the Communication Society (ComSoc). Computer Society (CS) had a Cyber Security Technical Talk on Oct. 20th presented by our very own Chair, David E. Gonzalez. Microwave Theory (MTT-S/APS) had a ClasTech held on Oct. 23, 2020, in association with IEEE Coastal LA Section. It was a virtual event our section members helped set up in which microwave and antenna propagation were discussed.

Affinity Groups

We are looking for people to run in officer positions available for Women in Engineering (WiE). WiE at CSUSB participated in IEEEXtreme and Game Night. They're also looking at joining Rising Stars in Jan. 2-4, 2021. Young Professionals participated in STEPCon20 on Oct. 8th, had virtual Beers with Engineers on Oct. 24th, and had their first cabinet meeting with interim cabinet officers. They also announced their upcoming Virtual Game Night in Dec. 12, 2020 and Virtual Networking with Engineers on Jan. 16, 2020.
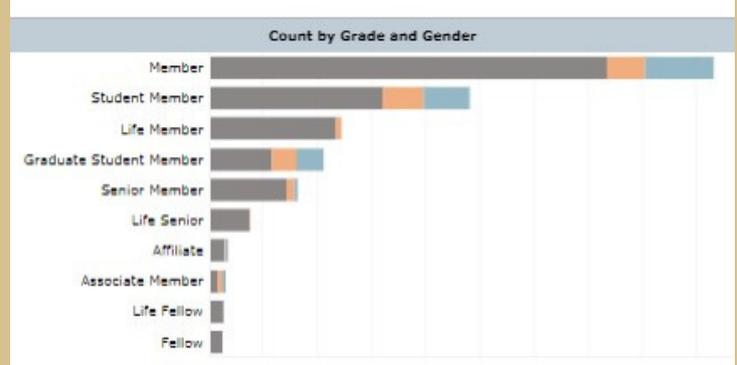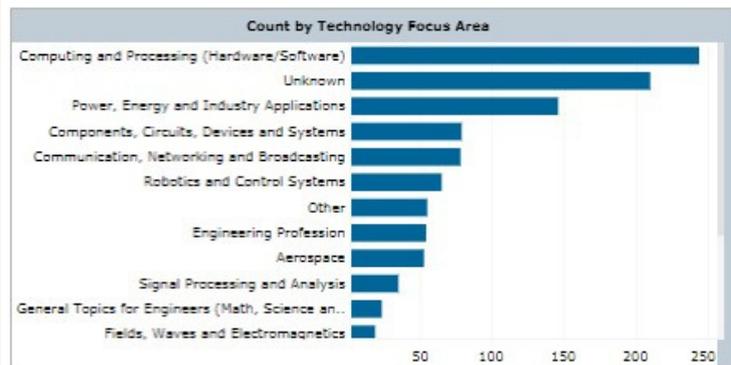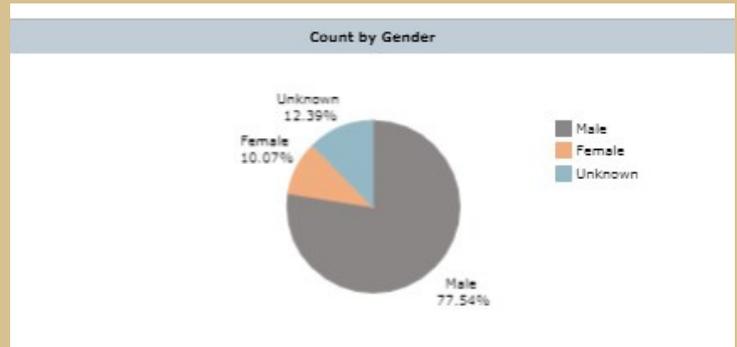
New Business

EDS/CASS (Electronic Devices Society/Circuits and Systems Society) chapter is still around if anyone wants to run for office. Members are urged to run for officer positions for all the Organization Units (OUs).

Membership Development
by Kimberly Mosley

Current membership at 1008/1122, no senior elevations. Looks like an increase of 36 over last month.

Count by Region and Grade

Region	Council	Section	Grade Category	Grade	Total
Southern California Council	Foothill Section		IEEE Grades	Associate Member	17
				Fellow	13
				Graduate Student Member	87
				Life Fellow	14
				Life Member	123
				Life Senior	39
				Member	442
				Senior Member	83
				Student Member	171
			Other Grades	Affiliate	19
			Total		1,008
	Orange County		IEEE Grades	Graduate Student Member	5
				Member	6

Count by Gender — Unknown 12.39%, Female 10.07%, Male 77.54%

Count by Technology Focus Area

Count by Grade and Gender

COMSOC Virtual Briefing: Smart Radio Empowered by Reconfigurable Intelligent Surfaces

by Dr. Frank Freyne

**Presenter : IEEE COMSOC Distinguished Lecturer
Marco Di Renzo
CNRS Research Director (CNRS Professor), CentraleSupelec,
Paris-Saclay University, Paris, France
Held October 28, 2020**

The program of Professor M C Di Renzo at the University of Paris / Saclay is directed to investigate anemerging transmission technology for application to particular future wireless needs. The program considers that the wireless system 5g, 6G and beyond,will be an integrated platform for communications, sensing and computing functions.

The specific problem areas that the speaker identifies are: (1) lack of control over the wireless environment (propagation; atmospheric attenuation, interference due to other physical objects in the field of view, etc.); and (2) more power is needed whenever additional signals are transmitted to deal with the performance degradation in (1).

The solution proposed was to consider almost passive(EM) electromagnetic tuned surfaces that could be used to repoint the 5G transmitted signal (from a base station to a mobile devise -user equipment). This reflection system would have to implement some very involved functions (algorithms) to reorient the signal to the intended user. In this concept work, only a general restriction in minimizing the power required was notionally stated. This type of surface was described as a "Reconfigurable Intelligent Surface"(RIS). RIS is considered an "emerging concept for smart radio environments".

The intent of this RIS program can be described in the pictorial shown in Figure 1. A set of Base Stations (BS) may be transmitting their signal intended to the particular user equipment (UE). However, the UE may not be in the main beam of the BS. Hence its received signal is severely diminished, being in the sidelobe. This will result in much lesser synchronization probability of the signal, plus increased bit error. For the Smart phone, a properly placed RIS would capture the signal from the BS, and re-route It to the properly selected UE. This RIS would(potentially, but not necessarily) also compensate for the loss of signal due to attenuation (environmental, physical intervening buildings and structures, multipath bounce off the ground that introduced multiphase clutter at the UE input antenna port). If the RIS system were able to do these tasks, it could become an integral part of the wireless network.
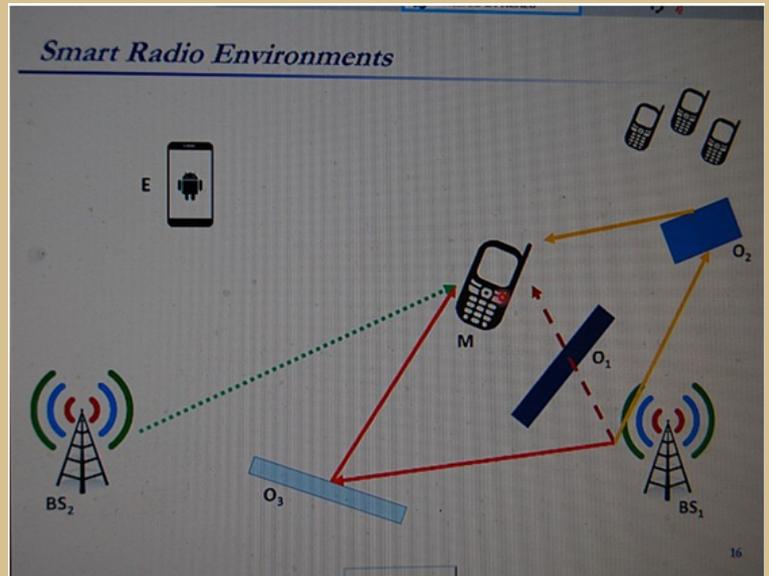

Figure 1: Shows a notion of a "Smart Radio Environment"---- with an active RIS to steer the signal to the UE.

To carry this concept a step further, RIS is proposing more than a simple reflection from a smooth homogeneous metallic sheet, RIS would do more than a straight forward Snell's law(angle of reflection equals angle of incidence for a metallic surface with no absorption of energy from the wave).

It fact, it would have to implement a modified Snell's Law. It would be receiving a beam from the BS, and accurately routing it the precise direction of the UE. Again, RIS depends on adding a minimal (TBD) power requirement to the wireless network. A concept of the basic unit set for an RIS is shown in Figure 2.
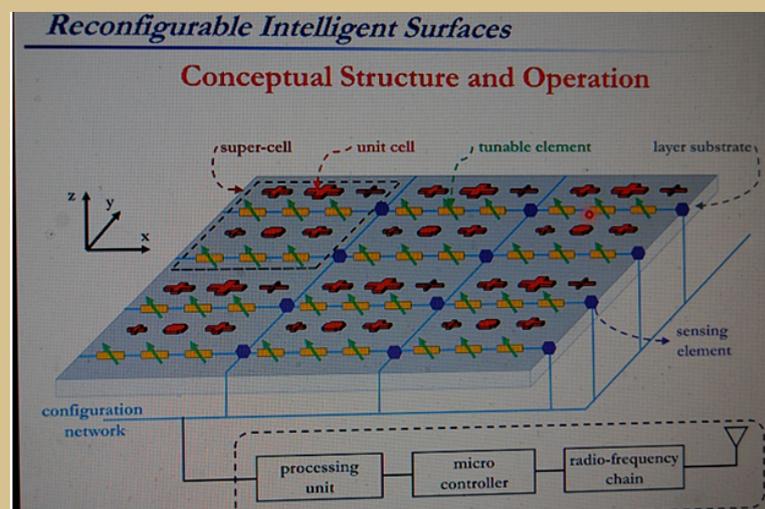

Figure 2: Concept of the basic cell for a RIS.

Several initial models of the RIS units have been constructed at MIT. UC Sab Diego and Aanlt University in Sweden, as described by Professor Di Renzo. However, no experimental data was presented on their performance. No testing plans that would include any model scenarios were

presented. The speaker said that no such data is available. It must be noted that Professor DiRenzo's group concentrates on analyses and physical modeling. It contracts with experimental groups to do actual testing. One chart presented showed a test of an RIS surface in some anechoic chamber in a non-specified lab in China.

The remainder of the talk covered the extensive work of Professor Di Renzo's analyses group. One notional effort examined the mutual coupling results for an array of spaced reflecting elements, Another looked at the bit transmission rates (bits per second per Hz) and bit error rates. Another considered reliability. A general notion of what each block of the RIS unit would be is shown in Figure 2. Discussion of the actual shifting reflective array elements that would be proposed(say SOI with PIN diodes, or a MEMS unit with capacitive coupling, etc for example) would be a topic that all COMSOC antenna engineers would be interested in hearing.

An area of future analyses is shown in Figure 3. Note that minimal power would be used for control and pointing re RIS array's pointing. Minimal Digital Signal Processing is proposed. The title of the Figure 3 gives their goal as RIS Assisted Wireless.

Note that two complex feedback loops are conceptually proposed. One is listed as "RIS Feedback", which presumably provides data from the RIS back to the BS ("encoder"). The other is listed as "receiver feedback", which presumably means providing data from the UE receiver back to the BS via the RIS.

Certainly, many interesting concepts were proposed by Professor Di Renzo in this talk. We will be looking forward to future presentations of actual test data for his RIS concepts. Then we could begin to examine how this would potentially fit within the current 5G specifications and 5G standardizations. We are probably looking at 6G for such an enhanced system. See Figure 4 for a chart from Samsung alluding to a similar technology.

Figure 4: Note that SAMSUNG is also looking forward to thisRIS technology for 6G.

We thank Professor Di Renzo for a most interesting IEEE COMSOC presentation. Fortunately we on the West Coast USA were able to attend the VIRTUAL meeting at a convenient time for Professor Di Renzo in Paris, 9 time zones ahead of us. Thanks to the IEEE COMSOC Distinguished Lecturer program organizers for making this presentation possible.
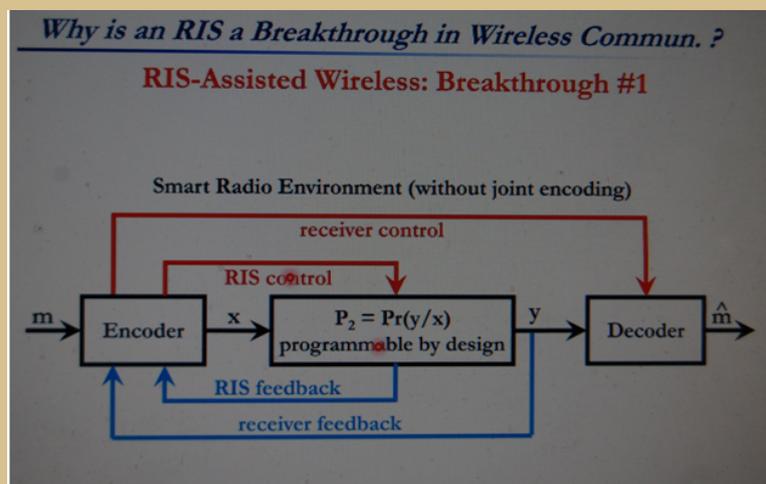

Figure 3: Shows a notional control block diagram for RIS system. It will be a challenge to implement such a system with the implied (and extensive proposed tracking, identifying, and correcting the coded modulation) signal processing.

Student Design Competition of Maury Microwave

by Dr. Osman Ceylan

European Microwave Week 2020
January 10-15, 2021
Webpage of the event:
https://www.eumweek.com/students/student_design_competition.html
Competition topic:
Linear HPA Design with Behavioral Model

Maury Microwave is the sponsor of the Thrust-3. This competition aims to introduce the students to the linearity concept of high-power amplifiers. The students will design a high-power amplifier with improved linearity. The HPA revealing the smallest Adjacent Channel Power Ratio (ACPR) will be the winner. Maury Microwave is going to provide the transistor model. Wolfspeed is the transistor sponsor of the competition. The competition will be online, and the measurements of the amplifiers will be performed with a live session at Maury Microwave. The first and second place winners will receive $1500 and $1000, respectively. All invited participants will receive $100 if their amplifier is able to reveal more than 25% average PAE.

For the competition rules and design tools, contact Dr. Osman Ceylan at **oceylan@mauryw.com**.

2021 IEEE Rising Stars Global Conference
January 2-4, 2021

Registration Fee:
IEEE Member - $75
Non-Member - $100

Register here:
https://ieee-risingstars.org/