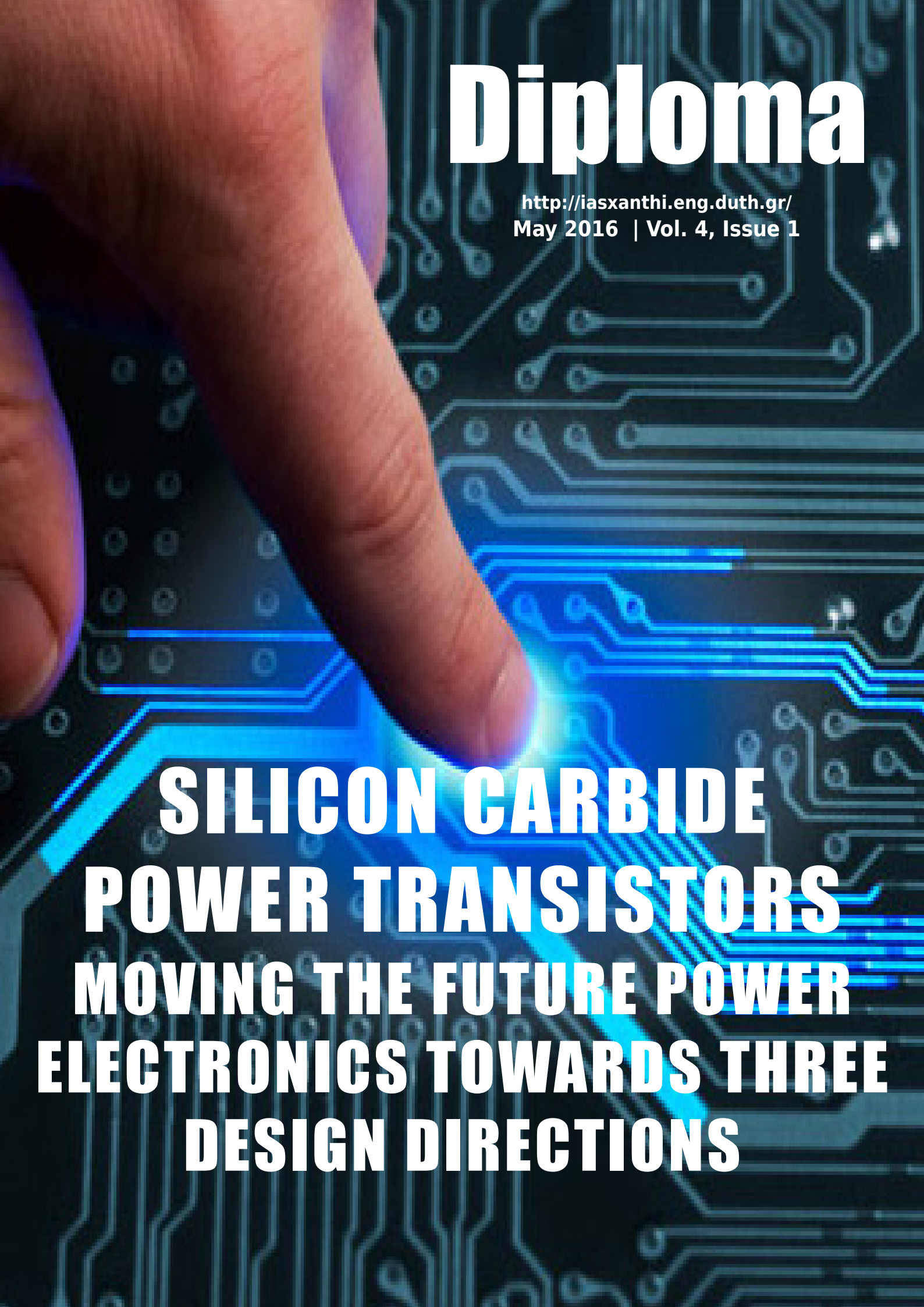

Diploma

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SILICON CARBIDE POWER TRANSISTORS

MOVING THE FUTURE POWER ELECTRONICS TOWARDS THREE DESIGN DIRECTIONS

Democritus **I**ndustrial Ap**PL**icati**O**ns **MA**gazine

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Industry Applications Society

SBC·DUTH

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Letter from the Advisor

Dear friends of the IEEE Industry Application Society Student Branch Chapter of Democritus University of Thrace, Greece.

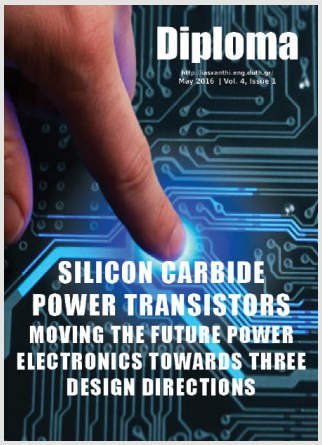
The new issue of Diploma Magazine is here. IEEE Industry Applications Society celebrated recently 50 years of existence and the members of our Student Branch Chapter and, I want to believe, all the members of this great Society of IEEE shared the same joy, since it is a privilege and pleasure to be a part of it. As a Student Branch Chapter, we continue our efforts to bring together the Students of our Department with Industry, to offer them knowledge presented by professionals and to motivate them to think, design, participate and volunteer. In this issue of our Magazine (supported from the IAS Chapters and Membership Development Department) we added a new column, dedicated to the Alumni of our University. I hope you will enjoy reading it along with all the other articles of the Magazine and send us valuable feedback and comments.

Prof. Athanasios Karlis

Chapter's Advisor

ALL PRINTING EXPENSES ARE COVERED BY IAS CMD

DIPLOMA



On the cover: Silicon Carbide Power Transistor: Moving the future power electronics towards three design directions

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Special thanks to **Elizabeth Devore**, **Saad Rind** and **Istvan Taczi** for their articles in the **Get Connected Section** and **Esther Ling** for her engineering article!

PRESENTING OUR NEW BOARD

by Christina - Panagiota Malliou, DUTh SB IAS Chapter Treasurer

On February 29th 2016, the Democritus University of Thrace SB IAS Chapter elections took place at the Electrical Machines Laboratory of our Department. Those elections, despite the long delay, **don't just mark the end of a successful era for our Chapter, but also the beginning of a new year with a lot of new and active members undertaking responsibilities**! We were excited to find out that **a lot of our new members wanted to volunteer** and submit their nomination for a board position.

The recruitment day started with a few membership renewals as well as with the registration of new members. When the recruitment day came to an end, it was time for our **elections, which were held electronically in order to insure maximum transparency for the procedure** and at the same time this gave **the opportunity to some of our members that could not attend the recruitment day due to other obligations to vote for our new board members**. All the attendees seemed comfortable throughout this procedure.

Professor Karlis attend the elections and he had the chance to meet the new members and be one of the first to welcome and congratulate the new board.

The day ended with **the results of the elections** and as a part of our bonding ritual the members of **the newly elected board headed for a night out**.

We are pleased to announce the new board members and their respective positions:

- **Eleni Bouloukosta** - Chair
- **Adamantios Bampoulas** - Vice Chair
- **Konstantinos Papatheologou** - Secretary
- **Christina-Panagiota Malliou** - Treasurer
- **Christos Pnevmatikos** - Membership Development Officer
- **Polichronis Orfanidis** - P.R. Manager
- **Georgios Barlas** - Young Members Liaison
- **Aristotelis Farmakis** - Webmaster

On behalf of the new board, I would like to promise that we will all **do our best to continue the good work that the founders did and set higher goals to achieve.**

We plan to organise **more events**, **invite distinguished lecturers and IAS members to our university**, t**ake part in international contests and conferences**, **make more educational trips for our students** and **increase the members in our chapter.** Nevertheless, our main goal is to **expand our horizons globally.**

Some of the newly elected board members of our chapter (left to right: Eleni Bouloukosta - Chair, Georgios Barlas - Young Members Liaison and Polichronis Orfanidis - P.R. Manager.

A few words from our new board members!

As the new chair of our chapter, I am very glad to have the opportunity to coordinate a team like this one. I support that volunteering is very important for everyone, and IAS gave me the chance to demonstrate my skills and my willingness to help our chapter be improved with time further more. I hope this year will be creative as every year until now and the number of members, who have passion and innovative ideas, will be increased. It is very positive that the board composed mainly of new members, with the older members to form stable value for the progress of our chapter.

Eleni Bouloukosta
DUTh SB IAS Chapter Chair

I am now completing one year of active action in the DUTh SBC. In a short period of time, I got involved in my Chapter's activities and I was intrigued by them. I feel very lucky to be the chapter's vice chair since it gives me the opportunity to get in touch with my colleagues from all over the world and extent my skills as an Electrical Engineer. I am sure that all together old and new board members will have a fruitful collaboration, enhancing involvement in our University.

Adamantios Bampoulas
DUTh SB IAS Chapter Vice Chair

After one year of active action in IAS, I finally decided to announce my nomination and get elected for Secretary. I firmly believe that this position will help me expand my knowledge about IEEE IAS, amplify my soft skills and improve my management process. So far the cooperation between the board members and their departments is very good and I hope that this year will be productive and fruitful so we can surpass the success and the achievements of the last year. United we will do the best we can to deliver.

Konstantinos Papatheologou
DUTh SB IAS Chapter Secretary

As I start my 4th year in IAS, after having served in various board posisions, I couldn't be happier and more excited for the year to come and the team that we have build. I have been a board member long enough and I had the chance to watch new members turn into active volunteers and volunteers to become leaders. It is one of the biggest rewards for me personally to be able to motivate and at the same time learn from each year's new members. I hope that this year will be as productive, successful and fruitful as the previous ones.

Christina-Panagiota Malliou
DUTh SB IAS Chapter Treasurer

I joint IAS some years ago. I don't remember why I joint but I'm know why still staying. I feel very lucky to have an IAS chapter in my university since it gives me the opportunity to extent my skills as an Electrical Engineer. Making projects and getting in touch with engineers from other places it is ideal for me. Now, as a Young Members Liaison for second year, I'm feeling very happy to have the opportunity one more time to provide all this to my younger colleagues.

Georgios Barlas
DUTh SB IAS Chapter Young Members Liaison

Involvement with our Chapter, the DUTh SB IAS Chapter, seems to have grown in me, becoming sort of an engaging addiction! This time, given the extent of our achievements and distinction in IAS and IEEE in general, we simply needed an online facelift, which in turn turned out to a whole new different project, that of creating a totally new website. A website engineered and designed to be eye-catching and mobile-efficient, constantly up-to-date, intended to provide the best possible user experience. As a result, anyone interested in getting to know IEEE, IAS and DUTh SB IAS Chapter can finally get all information they may possibly need, in one place: http://iasxanthi.eng.duth.gr/. I have eagerly decided to undertake such a challenging project and become the Chapter's Webmaster.

Aristotelis Farmakis
DUTh SB IAS Chapter Webmaster

I would like to congratulate all our members for their continuous efforts that provide growing development of our chapter. As a Membership Development Officer this year I am glad to be a part of that team and see the chapter grow day after day. I am sure that we will have another even more productive season with lots of activities and awards.

Christos Pnevmatikos
DUTh SB IAS Chapter Membership Development Officer

IAS CHAPTER AWARDS AND CONTESTS 2016

by Christina - Pamagiota Malliou, DUTh SB IAS Chapter Treasurer

Before presenting this year's awards, I would like, on behalf of the DUTh SB IAS Chapter, to congratulate all 145 IAS Chapters for their efforts during this year. Their hard work and their innovative ideas along with the experience and the knowledge from all IAS members around the world keep IAS one of the most active Societies in IEEE. I would also like to congratulate the Outstanding IAS Chapters, Web Contest Winners, Most Happening IAS Chapters and the Outstanding CMD Officers and Chapter Members. I wish you all an even more successful year.

Last but certainly not least, I would like to congratulate the Myron Zucker Undergraduate Student Design Contest winners as well as the Graduate Student Thesis Contest winners for their success and their efforts.

Outstanding Chapter Award Contest 2016

Outstanding Student Branch Chapter
Vimal Jyothi Engineering College SB IAS Chapter
Chair: Jesvin Pinto, R-10, Kerala Section, India

Continued Performance Outstanding Student Branch Chapter
Democritus University of Thrace (DUTh) SB IAS Chapter
Chair: Eleni Bouloukosta, R-8, Greece Section, Greece

Outstanding Small Chapter
University College of Engineering and Technology - Islamia University of Bahawalpur SB IAS Chapter
Chair: JSaad Atta Rind, R-10, Lahore Section, Pakistan

Outstanding Small Joint Chapter
Budapest University of Technology and Economics SB Joint PES/IAS Chapter
Chair: István Táczi, R-8, Hungary Section, Hungary

Continued Performance Outstanding Small Chapter
Kolkata Section IAS Chapter
Chair: Prof. Debjani Ganguly, R-10, Kolkata Section, India

Outstanding Large Chapter
University of Sarajevo SB IAS Chapter
Chair: Kavaz Almedin, R-8, Bosnia and Herzegovina Section, Bosnia and Herzegovina

Outstanding Large Joint Chapter
Delhi Section Joint PES/IAS Chapter
Chair: Dr. Rachana Garg, R-10, Delhi Section, India

Continued Performance Outstanding Large Chapter
Southern Alberta Section, Joint PES/IAS Chapter
Chair: Shan Pandher, R-7, Southern Alberta Section, Canada

Outstanding New Chapters
• **University of Strathclyde SB IAS/PELS Chapter**
Chair: Yanni Zhong, R-8, UK&I Section, UK

• **UAmerican International University Bangladesh (AIUB) SB IAS Chapter**
Chair: Mahmudul Haque Jishan, R-10, Bangladesh Section, Bangladesh

• **Telkom University SB IAS Chapter**
Chair: Amanda Julia Isa, R-10, Indonesia Section, Indosnesia

Chapter Web Contest 2016

1st Prize
Democritus University of Thrace (DUTh) SB IAS Chapter
Chair: Eleni Bouloukosta, Web master: Aristotelis Farmakis
R-8, Greece Section, Greece
http://iasxanthi.eng.duth.gr/

2nd Prize
Vimal Jyothi Engineering College (VJEC) SB IAS Chapter
Chair: Jesvin Pinto, Webmaster: Ashige Ganesh
R-10, Kerala Section, India
http://ias.vjec.ac.in/

Joint 3rd Prize

• **Dhirubhai Ambani Institute of Information and Communication Technology (DA-IICT) IAS SB chapter**
Chair: Abhishek Parikh, Webmaster: Saurav Prathihar
R-10, Gujarat Section, India
http://ias.daiict.ac.in/2016/

• **Muslim Educational Association (MEA) Engineering College SB IAS Chapter**
Chair: Suhail P, Webmaster: Akhil Raj
R-10, Kerala Section, India
http://ias.meaieeesb.org/

Most Happening IAS Chapter Contest 2016

1st Prize

Pittsburgh Section Joint PES/IAS Chapter
Chair: David Vaglia
R-2, Pittsburgh Section, USA

2nd Prize

Distrital Francisco Jose de Caldas University SB IAS Chapter
Chair: Carol Johanna Pérez Mera
R-9, Colombia Section, Colombia

3rd Prize

G.H. Patel College of Engineering and Technology SB IAS Chapter
Chair: Bhavin Shah
R-10, Gujarat Section, India

Outstanding Member Contest 2016

Outstanding Project Organizer

• **Marton Gabor Kadar**
Budapest University of Economy and Technology SB PES/IAS Chapter, Chair 2015
R-8 Hungary Section, Hungary

• **Manuel Jesus Ccattamayo Cuya**
Universidad Nacional del Callao SB IAS Chapter, Project Manager
R-9 Peru Section, Peru

• **Suvarun Dalapati,**
Kolkata Section IAS Chapter, Secretary
R-10 Kolkata Section, India

Outstanding SB Chapter Advisor

• **Athanasios Karlis**
Democritus University of Thrace SB IAS Chapter, Advisor
R-8, Greece Section, Greece

• **Nikhil Valsan K**
Vimal Jyothi Engineering College SB IAS Chapter, Advisor
R-10 Kerala Section, India

Outstanding Chapter Chair

• **Carlomagno David Mendoza Reyes**
Universidad Nacional del Callao SB IAS Chapter, Chair 2015
R-9 Peru Section, Peru

• **Roozbeh Kabirikordi**
Royal Melbourne Institute of Technology SB IAS Chapter, Chair
R-10 Victoria Section, Australia

Outstanding Area Chair

José Duran Talledo
IAS SB Chapter Area Chair, R9 South America
R-9 Peru Section, Peru

Outstanding CMD Officer

Lesley Ann Arakkal
CMD Chapter and Member Awards and Contests Committee Chair
R-8 South Africa Section, South Africa

Myron Zucker Undergraduate Student Design Contest Individual Category

1st Prize

JIN Yi, "Research on Novel Primary Wound-Field Flux-Switching Linear Motors", Advisor: **CAO Ruiwu**, Department of Electrical Engineering, Nanjing University of Aeronautics and Astronautics 29 Yudao St., Nanjing 210016, China

2nd Prize

Grace Firsta Lukman, "Anti-lock and Regenerative Braking Control of SRM for Electric Vehicle", Advisor: **Jin-Woo Ahn**, Mechatronics Engineering, Kyungsung University 48434. 309, Suyeong-ro, Nam-gu, Busan, Republic of Korea

3rd Prize

Peter William Knight, "Sensorless Speed Comparison for Vector Controlled Induction Motor Current Rgulation Strategies", Advisor: **Brendan McGrath**, School of Electrical and Computer Engineering, Royal Melbourne Institute of Technology, 124 La Trobe St, Melbourne, Victoria 3000

Myron Zucker Undergraduate Student Design Contest Team Category

1st Prize

Ryan Meng, Ryan McSheffery, Mathieu Malone, Ryan Meng, Sarah Buck, "Energy Storage System for Wind Turbines", Advisor: **Dr. Saleh**, Electrical and Computer Engineering Department, University of New Brunswick, Fredericton, New Brunswick, Canada

2nd Prize

Jyothis Joseph, MEGHANATH K V, SACHIN RANJITH, SHEJIN GEORGE, AKASH MANOJ, ANIRUDH JITHENDRAN, "Novel MPPT based on board solar charging system for an electric scooter", Advisor: **Parag Jose**, ELECTRICAL AND ELECTRONICS DEPARTMENT, VIMAL JYOTHI ENGINEERING COLLEGE CHEMPERI, KANNUR UNIVERSITY, KERALA INDIA, PIN 670644

3rd Prize

Anil Kumar Mathur, Sandeep Kumar, Sudheer Kumar, "A Non-Intrusive Air-Gap Torque Method for Efficiency Estimation of Induction Machines", Advisor: **Dr. Bharat Singh Rajpurohit**, SCHOOL OF COMPUTING AND ELECTRICAL ENGINEERING, Indian Institute of Technology Mandi, Kamand Kampus, VPO Kamand, Distt. Mandi -175005, Himachal Pradesh, India

Graduate Student Thesis Contest 2016 PhD Category

1st Prize

Jun Hang, Prof. Cheng Ming, Prof. Jianzhong Zhang, "Fault Diagnosis

Technology of Direct-Driven Wind Turbine with Permanent Magnet Machine", Southeast University, School of Electrical Engineering, Nanjing, Jiangsu, China.

2nd Prize

Olive Ray, Dr. Santanu Mishra Associate Professor, Dr. Avinash Joshi Emeritus Professor, "Integrated Converters: Synthesis, Characterization, and Application to DC Nano Grid", Department of Electrical Engineering Indian Institute of Technology Kanpur, Uttar Pradesh, India.

3rd Prize

Amarendra Edpuganti, Dr. Akshay Kumar Rathore Associate Professor, "Optimal Pulse Width Modulation of Multilevel Inverters for Medium Voltage Drive", National University of Singapore, Singapore

Graduate Student Thesis Contest 2016
Non-PhD Category

1st Prize

Waled Mohamed, Prof. Chiara Boccaletti, Prof. António João Marques Cardoso, "Control Management of a Propulsion System with Supercapacitors for Electric and Hybrid Vehicles", Sapienza University of Rome, Italy Department of Astronautics, Electrical and Energetic Engineering.

2nd Prize

David Celeita, Gustavo A. Ramos L., PhD Associate Professor, "Heterogeneous platform for IEDs connection on a fault location engine of distribution systems with DG using DSSim-PC", Universidad de los Andes, Bogotá, Colombia, School of Electrical and Electronic Engineering.

3rd Prize

Emmanouil Bafounis-Kottas, Pantelis N. Botsaris Associate Professor, "Use of infrared thermography (IRT), as a non-destructive testing method for fault diagnosis and prognosis on sailing boats and safety protocols at sea", Democritus University of Thrace, Xanthi, Greece, School of Engineering, Department of Production Engineering and management.

IAS DUTH SBC ACTIVITIES

by Konstantinos Papatheologou, DUTh SB IAS Chapter Secretary

Our first activity took place from Jan 7th to 10th, our DUTh Student Branch IAS Chapter was honored by the visit of **Dr. Tomy Sebastian, IAS President Elect for the year 2016 and Dr. Peter Magyar, IAS Chapters and Membership Development Department (CMD) Chair**. The main reason for the visit was the continued involvement of DUTh Students in Society's ongoing global projects and their undertaking of the development of such. Conversations went great, leading to a fully refreshing, new beginning for the year of 2016, for all of us DUTh Student Members of IEEE IAS. Along with those closed meetings, all DUTh Students interested in getting to know IAS had the chance to personally meet Dr. Sebastian and Dr. Magyar. On Jan 8th, an open for all lecture on "**Electrification of Automobiles: Opportunities and Challenges" (Dr. Tomy Sebastian) and "IEEE+IAS+CMD" (Dr. Peter Magyar)" took place**. When our guests' presentations were over, our SBC's Board had the honor to announce **the latest issue of our DIPLOMA**, **printed with expenses covered by IAS CMD** and offered a printed version of it to Dr. Sebastian and Dr. Magyar. All this was finally followed by a Chapter Meeting that took place at the University where individuals potentially interested in IEEE IAS were given a chance to use a promotional code

and join IAS, at no cost. As part of our guests' welcoming and apart from the lunches and dinners in famous traditional Greek cuisine, our guests had the chance to visit the **Monastery of Panagia Archageliotisa**, **a famous Christian Orthodox Monastery**.

Our next event was on February 29th 2016, when the **DUTh SB IAS Chapter elections took place at the Electrical Machines Laboratory of the Department of Electrical and Computer Engineering**. Those elections, despite the long delay, don't just **mark the end of a successful era for our Chapter**, but also **the beginning of a new year with a lot of new and active members undertaking responsibilities**. The recruitment day started with a few **membership renewals as well as with the registration of new members**. When the recruitment day came to an end, it was time for our elections, which were held **electronically in order to insure maximum transparency for the procedure** and at the same time this gave the **opportunity to some of our members that could not attend the the recruitment day** due to other obligations to vote for our new board members. **Professor Karlis attended the elections and he had the chance to meet the new members and be one of the first to welcome and congratulate the new board. The day ended with the results of the elections**.

Also on February 29th, our branch visited the "**Freiderikos Tsoumakis S.A.**" **Machinery**. Freiderikos Tsoumakis S.A. was established in Kavala in 1972 by the owner Freiderikos Tsoumakis and is located on the 8th km Kavala- Xanthi. **The company initially started as a machinery workshop, but their manufacturing capability soon spread to cover construction, repair and maintenance of industrial units. This machinery employs 45 people**, including many experienced engineers and craftsmen with 40 years of experience in construction and industry. At the end of the visit, **a conversation followed with the owner, who gave some advices to the students, as he has many years' experience**.

Last but not least a lecture on "**Start Ups and Innovation**" was organized by DUTh SB IAS Chapter, on Wednesday March 23rd at the Department of Electrical and Computer Engineering, Democritus University of Thrace (DUTh). **Christos Papadakis, the main speaker of this event, is an alumnus of Department of Electrical and Computer Engineering of DUTh**, has a MSc Student on Electrical Power Systems and Renewable Sources Engineering and he is also **co-founder of "Lioncode Web and Mobile Solutions" and "I-Local"**. The speech was in the form of **interactive lecture**, where the participants could place their questions when they deemed necessary. The main topics of the lecture was **the importance of the team and trust between you and your partners, in order to create a Start Up and the risks and difficulties you are going to face according to the current markets and of course the country you live.** Mr. Papadakis highlighted the **importance of funding your Start Up and emphasized in the risks you have to take**, so your investors back you up. He stated that you should be very **careful choosing your backers and investors or you could lose control of your own company**. In the end of the speech, there was **the Q & A part where Christos Papadakis answered questions about his decision making as co-founder of two Start Ups and his personal opinion about starting a company in Greece. The lecture ended with success.**

WHAT'S NEXT?

by Eleni Bouloukosta, DUTh SB IAS Chapter Chair

As last year proved to be very dynamic for our chapter, so after the election of the new board effort continues with new ideas both for the promotion of the chapter and the training of its own members through activities such as lectures, educational trips and workshops.

So what is next?

Meetings of active members have created a timetable for some very interesting activities that are directly related to the engineering profession.

Initially, we plan a presentation on "**Measurement and Control Systems with LabView**». As we all know, in recent years the increasing demands posed by the acquisition systems, recording and data processing in a laboratory, research and industrial level have led to the development hardware and software that go beyond the capabilities of systems used until now. The LabView is a Virtual Instrument which makes it possible to display the measurement and control of real-time systems and has become one of the key tools for Science in Electrical Engineering.

Still, it was said as a proposal in the context of brainstorming meetings to implement a seminar related to **the use of English in the engineering profession and the need for specialized knowledge of terminology**.

In addition, a seminar with the main point the need for a **successful presentation of a new engineer for entry into an organization, which was held with great success three years ago**, is likely to recur for people who have not had the opportunity to attend this before. The speaker will develop the goals, the aspirations and the challenges for a young engineer in the job market. He will give advices to the students on how to present themselves and the seminar will conclude with a real interview.

An equally important and productive participation in our chapter was that in **Emobility workshop and Eco Rally,** which constituted the technical support. For this year will be a renewed effort to make this event for the second consecutive successful series. For information, the International Eco Rally gives the opportunity to Electric

Hybrid Electric and Alternative Energy Vehicles to fight for first place.

Also, there is a will about the organization of a **training workshop for educators from primary and secondary education level of Xanthi, in order to support activities that promote engineering to the students**. Our advisor Professor Athanasios Karlis and Aristotelis Farmakis, the webmaster of our chapter, had attended a similar workshop, so they have the experience to make it.

How about going an educational trip?

We are planning to visit a company named **Sunlight Recycling about through May.** Sunlight Recycling is a Lead-acid Battery Recycling Branch of Sunlight S.A. that specializes in the production of custom batteries, power supplies, diesel generators and other autonomous power products for industrial and military use. With this educational trip, **the students will learn what the operating characteristics of an industry are and gained an insight into the realities beyond what one learns in theory.**

Last but not least, it is scheduled to take place the next academic year, a meeting entitles "**Career Goes DUTh**" with lectures and workshops, in order to connect the student and the graduates of our university with employers. Representatives of companies will present the **job possibilities for graduates of the Faculty of Engineering.**

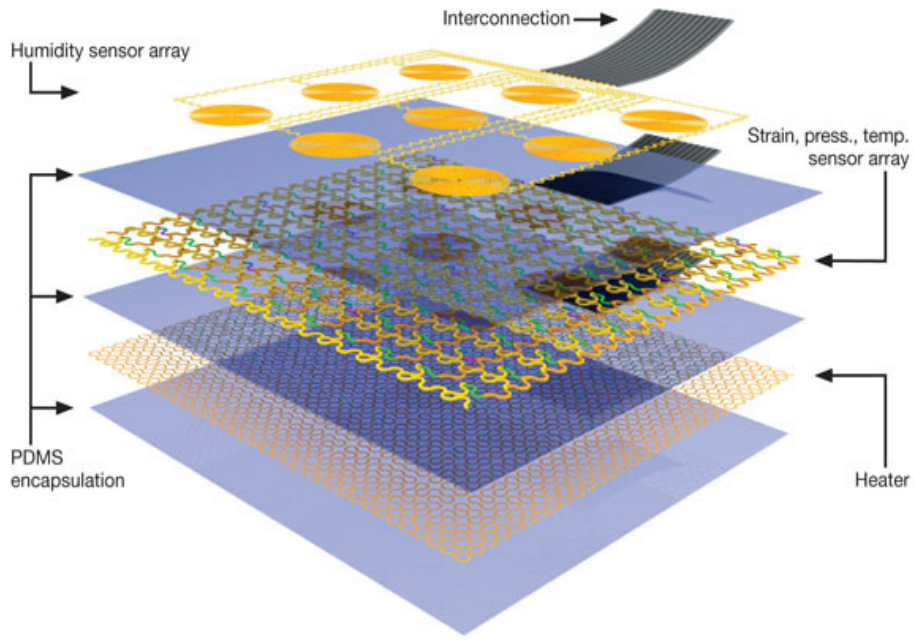
Stay Tuned!!

Coming soon!!

ARTIFICIAL SKIN

by Victoria Meshkova

Some decades ago, no one could imagine that technology would develop to the current extent, especially referring to engineering and medicine. A paramount issue that occupies researchers in the past several years is to bridge the technological gap between artificial and real skin. In reality, sensory receptors in human skin transmit an abundance of thermal and tactile signals from external environments to the brain, which scientists try to replicate in artificial models.



Here is a demonstration of smart prosthetic skin fabricated with ultrathin, single crystalline silicon nanoribbon strain, pressure, humidity and temperature sensor arrays as well as electro-resistive heaters and multi-electrode layers for nerve stimulation. This combination of stretchable actuators and sensors expedite highly localized thermal and mechanical skin-like perception in reaction to ambient stimuli.

The artificial skin is made of flexible organic electronics, nanomaterial-based transistors and mainly pressure-sensitive rubbers (PSRs) which are used as resistive elements that respond to tensile strains. The surface is highly compliant and mechanically fits to the curvilinear epiphany of the prosthesis.

The **bottom layer** contains electroresistive heaters outspread in filamentary patterns right above the polydimethylsiloxane (PDMS) substrate. These thermal actuators facilitate uniform heating during stretching and contraction of the skin layer.

The **middle layer** consists of strain, pressure and temperature sensor arrays that

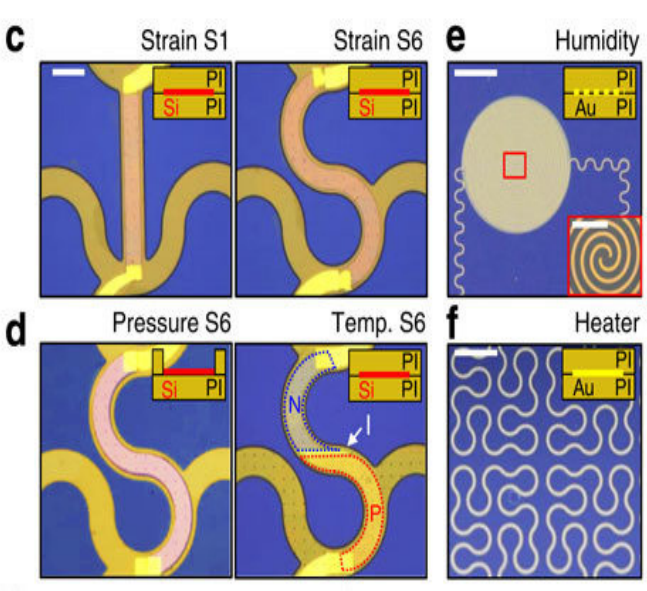
monitor tactile and thermal feedback during a movement of the prosthetic. The geometrical design of this network of sensors is ranging from linear to serpentine shapes depending on the mechanics of the underlying prosthetic limb.

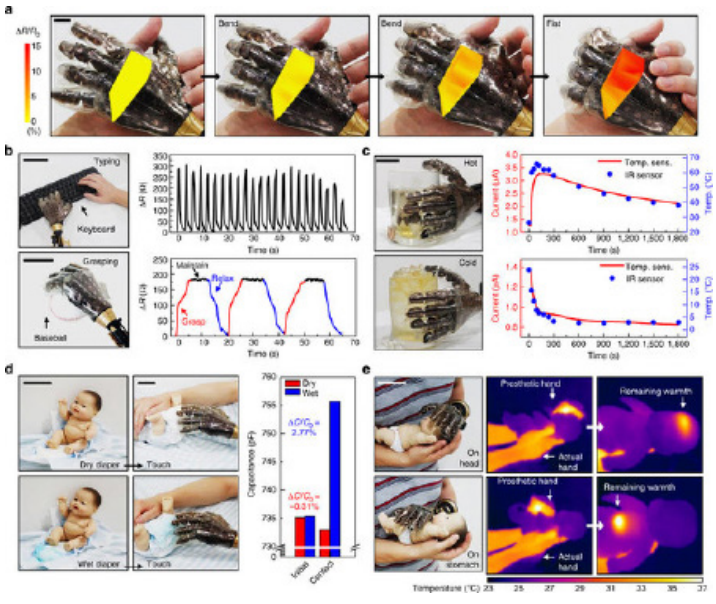
The **top layer** includes humidity sensors which detect capacitance changes at the humidity scale using coplanar and capture information about ambient conditions.

Each layer interconnects distinctly with the external environment. Stowing sensor/actuator layers on each other by using via-hole structures makes the wiring requirements simpler and due to this stacked structure configuration, sensor arrays operate with mechanical interference.

For instance, strain/pressure sensors located beneath humidity sensors add additional rigidity to the skin and incommode the mechanical responses to external deformations. As a solution, stacked structures with staggered arrangement of sensors are positioned between them.

All in all, a prosthetic hand covered by laminated electronic skin could encounter many complex life situations and operations such as keyboard tapping, hand shaking, ball grasping, holding a cup of hot/cold drink, touching wet surfaces and human to human contact. Research is underway promising even more realistic and sufficient features.





THE ENGINEER'S LANGUAGE

by Esther Lmg, IEEE IAS Malaysia

MATLAB and Low-Cost Hardware

In recent years, a number of low-cost hardware such as Arduino, Raspberry Pi, Beagle Board and many more have stormed the market and stirred up interest in DIY embedded systems and robotics. With a large number of platforms to choose from, is there a language and programming environment would be the most ubiquitous, and thus, advantageous to learn?

In keeping up with the Maker movement, MathWorks released support for many low-cost platforms, including the three mentioned above. Working with MATLAB for the past two years, I was given the opportunity to explore what the software has to offer and work on different projects involving these boards. Here is my take on it.

Programming Approaches: MATLAB Approach

There are two methods when it comes to working with hardware using MATLAB. The first is the MATLAB approach, which requires the board to be always plugged to the computer. Using a set of commands, you can access peripherals on the board such as LEDs, servos, I2C devices and others and see the results immediately without having to go through the compile-link-run process.

This is useful for prototyping code and if you need to do quick tests or data collection from the board. It is not meant for standalone targeting.

Advantage: Consistency in code across platforms

MATLAB uses similar function names and methods for connecting across platforms, so once you learn how to connect to one type of board, learning to interface a second board will be intuitive.

For example, to connect to an Arduino:

```
a = arduino();
```

Similarly, to connect to a Raspberry Pi:

```
rpi = raspi();
```

Programming Approaches: Simulink Approach

This is a block diagram environment which has the advantage of designing complicated systems in a modular manner. Input and output functions are replaced by input and output blocks. You can leverage on blocks from the Simulink library and other toolboxes to aid in your design.

For the Simulink Approach, you can run code on the board while seeing the results in a Scope with External Mode, or you can generate C/C++ code that will be deployed on the board for standalone execution.

Advantage: Portability to other platforms

The way Simulink is set up makes an algorithm portable to other platforms. For instance, designing a controller in Arduino or in Lego Mindstorms will have the same workflow of plant modelling motor and tuning controller gains. If the motor to be controlled is assumed constant, all that needs to be changed are the interfacing input and output blocks and scaling of data types if necessary.

A Caveat in Simulink

One shortcoming is the time taken for Simulink to deploy code to the hardware. Compared with Arduino IDE, where code can be compiled and run within 10 seconds, on Simulink, it may take 30 seconds or more, depending on your computer specifications. Simulink first needs to generate C/C++ code from the Simulink models before deploying to the board. Nevertheless, this may be a bearable trade-off for the programmer who prefers a block diagram environment compared to the traditional coding process.

Conclusion

People grow up speaking a native language. They then go on to learn a second, or a third language. Mastering multiple languages gives one the advantage of connecting with more people outside your culture. Mastering a widely used language, such as English, can also have a comparable effect, as far as the language reaches.

In the same way, engineers and programmers have a native language. For example, we may speak C, C++, MATLAB, Python or Java, and be fluent in a number of languages.

Working with MATLAB has enabled me to try many projects with Arduino, Raspberry Pi, BeagleBone Black and Lego Mindstorms, without having to learn the native

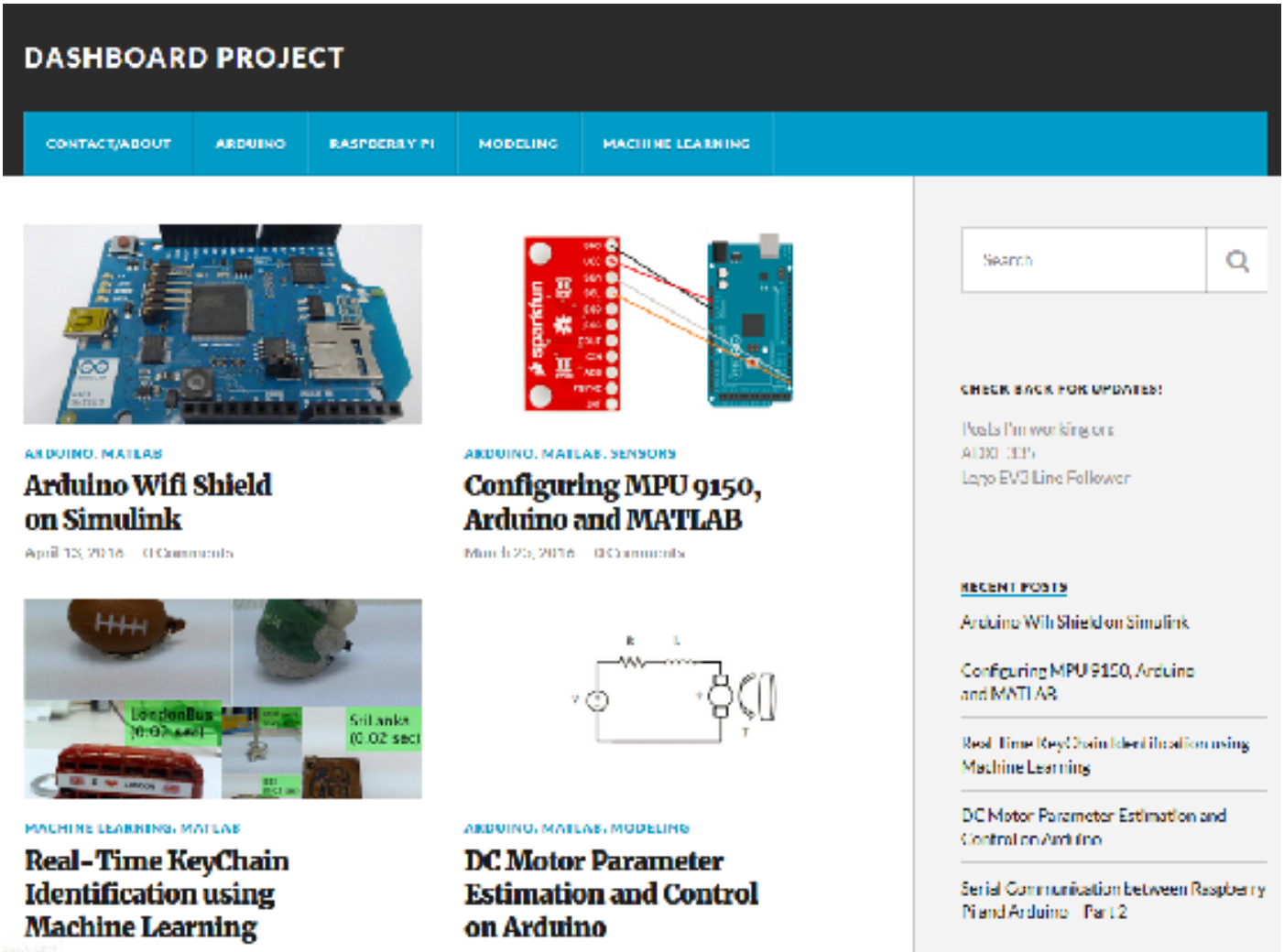
environment for each of these boards. You can check out some of the projects at my blog, which is provided below.

So, which programming language is the right one for you?

About the Author

Esther Ling is an IAS member from Malaysia. A graduate from Curtin University with a Bachelor's in Electrical Power Engineering, she has working experience as a Technical Support Engineer and later Edu Engineer, working with universities to adopt MATLAB/Simulink into curriculum. This Fall, Esther will pursue a Masters in Electrical Engineering at Georgia Tech.

Esther writes about MATLAB at: *https://dashboardproject.wordpress.com/*



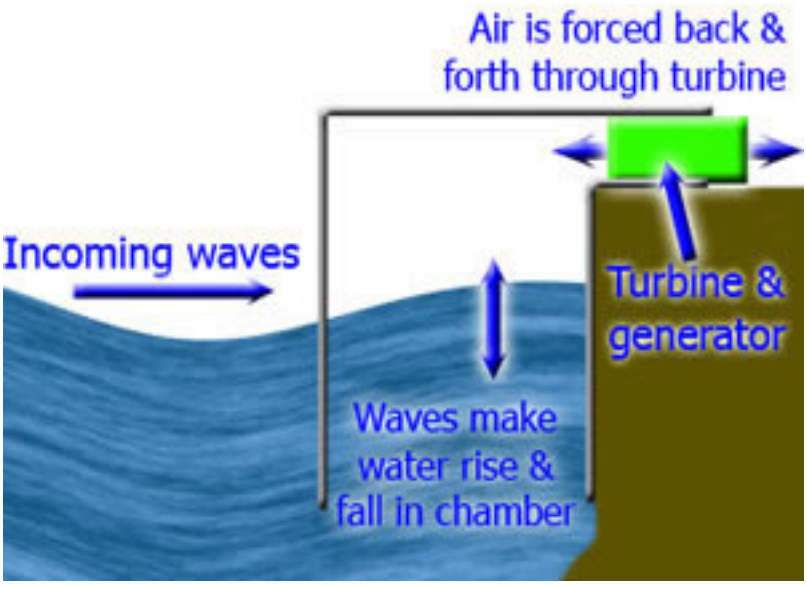
RENEWABLE "WAVE-ENERGY"

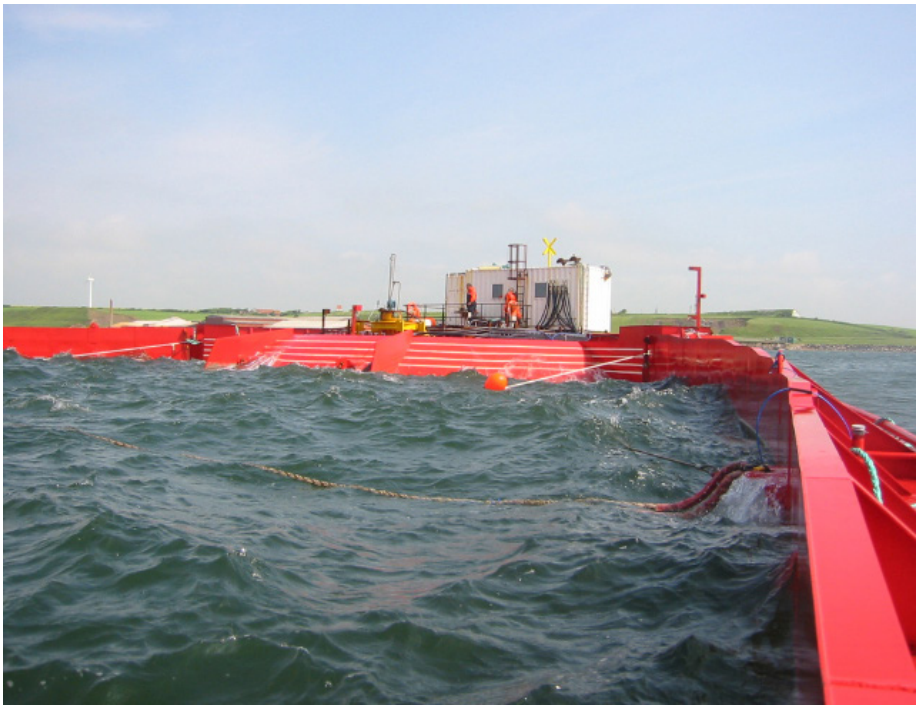
by Konstantinos Papatheologou

It's not hard to envision what wind energy resemble. We all have seen the towering turbines spotting the scene. The same goes for sun oriented power and the panels that are spreading crosswise over roofs around the world. Be that as it may, there is another type of renewable energy, accessible in tremendous quantities. **Wave energy is the transport of energy by wind waves, and the redirection of this energy to do helpful work such as, electricity generation, energy storage for later use and water pumping**. Wave energy is unique because of the diurnal flux of tidal force and the relentless gyre of ocean currents. Wave-power generation is not as of now a generally utilized business innovation, despite the fact that there have been endeavors to utilize it since no less than 1890. **Wave energy is produced when electricity generators are set on the surface of the sea.** The energy output is regularly utilized as a part of desalination plants, power plants and water pumps. **The energy provided is dictated by wave tallness, wave rate, wavelength, and water density.** To date there are just a modest bunch of exploratory wave generator plants in operation around the globe.

Advantages of Wave Energy

First of all, wave energy is **renewable**. This means **it will never run out**. There will always be waves and tides crashing upon the shores of nations, near populated regions. Not at all like fossil fuels, which are running out, in some spots on the planet, pretty much as fast as individuals can find them. Dissimilar to ethanol, a corn product, **waves are not limited by a season**. They require **no input from man to make their energy**, and they can **always be depended on**. Another huge



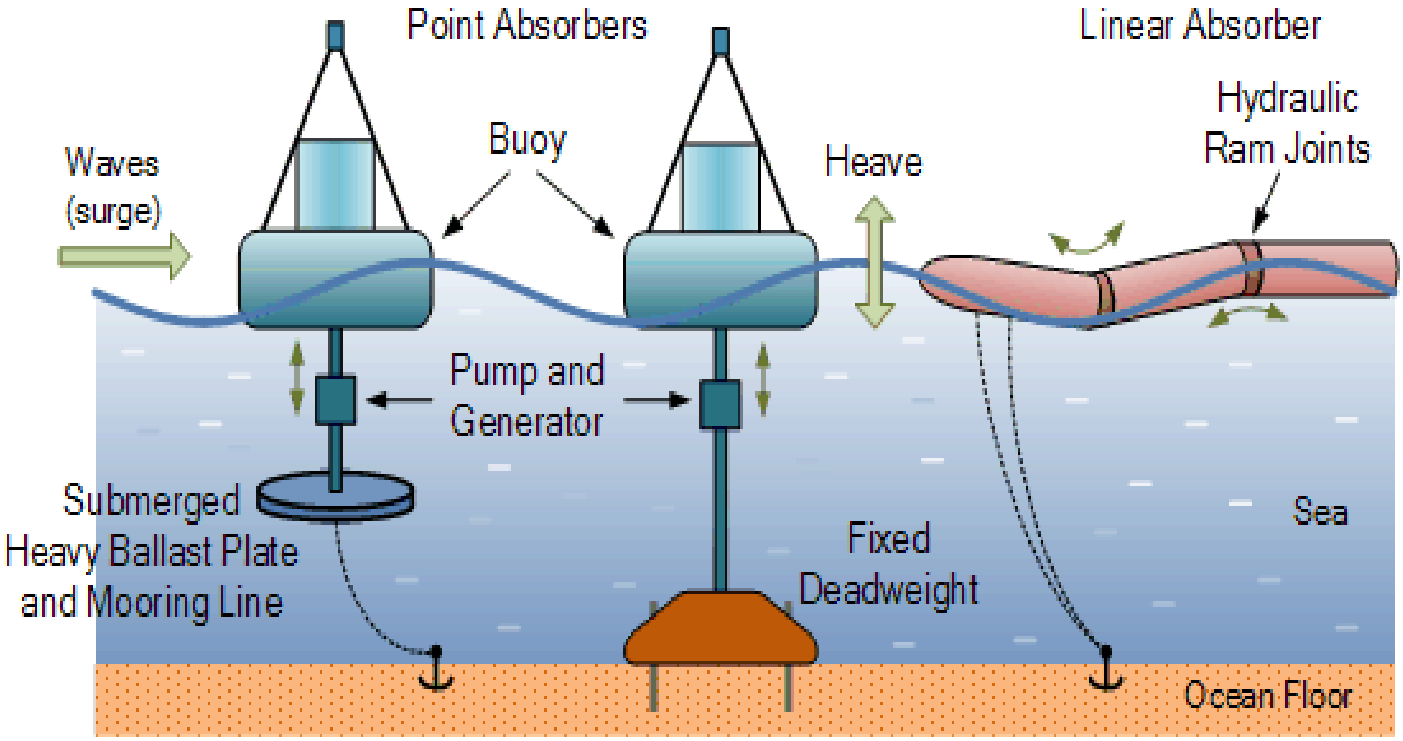


advantage is that wave energy is **environment friendly**. Unlike fossil fuels, making power from waves makes **no destructive and harmful side effects**, for example, gas, waste, and contamination of the area. The energy from waves can be taken **directly into electricity producing devices and used to power generators and energy plants in the near distance area**. Furthermore, the greatest advantage of wave power as against a large portion of the other energy sources is that it is **easily predictable and can be utilized to figure the sum that it can deliver.** The wave energy is **predictable and demonstrates to be much superior to any other different sources which are reliant on wind or sun exposure**. Also there are **plenty of ways to harness wave energy**. Current gathering methods and strategies range from **installed power plants with turbines to marine vessels equipped with enormous structures that are laid into the ocean to accumulate the wave energy.** Unlike fossil fuels, which cause enormous harm and damage to land as they leave holes while extracting the energy from them, **wave energy does not bring about any harm to earth**. It is **safe, clean and one of the favored techniques to concentrate energy from oceans**.

Although, there are many advantages of wave energy, unfortunately has its **drawbacks** as well. Firstly, **it's only suitable to certain locations.** Only **power plants and towns near the ocean will benefit directly from it**. On account of its source, wave energy is **not a suitable energy hotspot for everybody**. Landlocked countries and urban areas long way from the ocean need to discover alternative sources of power, so wave energy is not the perfect clean and renewable energy answer for everybody. As clean as wave energy seems to be, it still **creates dangers for a portion of the animals close it**. Vast machines must be put close and in the water to collect energy from the waves. These machines disrupt the ocean bottom, change the natural surroundings of close shore animals and make noise that aggravates the ocean life around them. There is additionally a **peril of lethal chemicals that are utilized on wave energy platforms spilling and polluting**

the water close them. Another drawback is that it **irritates business and private vessels. Power plants that accumulate wave energy must be set by the coastline to carry out their job, and they must be close urban cities and other populated regions to be of much use to anyone**. In any case, **these are spots that are significant lanes for cargo ships, journey ships, recreational vehicles and beach goers.** These individuals and vessels will be **upset by the establishment of a wave energy gathering source.** This implies government authorities and privately owned businesses that want to invest and put resources into wave energy sources need to **consider and account the necessities of those they might be disturbing.**

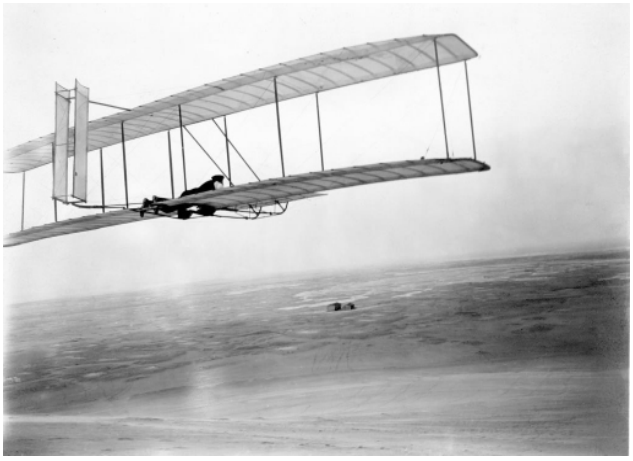
Nevertheless, **wave energy harness is a viable and renewable energy that must be taken under serious consideration as an alternative power source**. The worldwide resource of wave energy **has been estimated to be greater than 2 TW**. This means that is **an excellent solution to the energy problem** this era is facing and **even with its drawbacks is still preferable that the alternative**.



DO YOU KNOW...

...the first airplane?

by Ioanna Boutziona

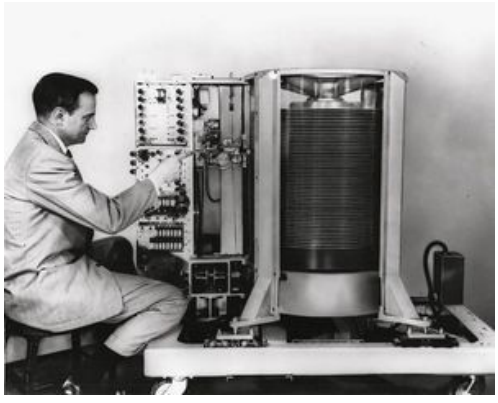


The first airplane that actually flew successfully was invented and of course built, by the Wright Brothers, Orville and Wilbur. They were credited for achieving the first successful human flight, on December 17 of 1903. This flight occurred at North Carolina, 4 miles south of Kitty Hawk. To be more precise, Wright Brothers were the first to invent aircraft controls and fixed-wing powered flights. Orville was the pilot and the one who flew an airplane with propels which used gasoline as combustible. That plane stayed up to the sky for 12 seconds and traveled for 36.58 meters or 120 feet at its first flight although it was heavier than a usual aircraft. That day they achieved to lift it up 4 times, and at 52 feet or 15.85 meters in just 59 seconds which was a record for such a thing. They knew that much more hard work would be needed to create a propulsion system and that was exactly what they did. They stayed in the history for their achievement of flying for the first time.

...the first Disk Drive?

by Aristotelis Farmakis

Once upon a time, back in the year of 1956, IBM showcased the world's first hard drive, the IBM 350 disk storage unit, introducing a massive, for the time, storage capacity, that of 3.75 MB in 5 million, 6-bit characters. One single unit weighted 971 kg - or nearly a ton - and costed the equivalent of US$234,000! It might be worth mentioning for comparison, that today, one can find an MP3 music file compressed in less than 3.75 MB, and that a 2001, first generation iPod could hold "up to" 1000 songs (in 160-Kbps MP3 format), in less than 185 grams, for US$399. The above picture shows Wesley E. Dickinson pointing to the servo-driven access mechanism on an IBM 350 disk storage unit in development.



...the world's longest power transmission lines?

by Eleni Bouloukosta

As all know electricity is one of the most important blessings that science has given to humanity, it has become a part of modern life and no one can think of a world without it. Transmission lines, with different voltage levels, carrying energy for consumption for many miles usually. In this article presented some of the world's longest operational power transmission lines and data are particularly interesting.

The **Rio Madeira transmission link in Brazil**, with an overhead length of 2.385 km/1481.97 miles , is the world's longest power transmission line. The 600 kV high-voltage direct current bipolar line was brought into commercial operation in November 2013 and is capable of transmitting 7.1 GW of power.

China's 1298.67 miles or 2,090 km-long **Jinping-Sunan transmission link (China),** an 800 kV ultra high-voltage direct current transmission line, is the second longest power transmission line in the world. The 7.2 GW transmission link is owned by State Grid Corporation of China and was put into operation in December 2012. The AC voltage at both ends of the line is 525 kV.

The **Xiangjiaba-Shanghai transmission line (China),** with an overhead length of 1,980km, is the world's third longest transmission line. The 800 kV, 7.2 GW line, owned by SGCC, is the world's first ever ultra high-voltage direct current transmission line and started commercial operation in July 2010.

...the tallest building in the world?

by Konstantinos Papatheologou

Burj Dubai, known as Burj Khalifa after its inauguration, is a skyscraper in Dubai, United Arab Emirates and it is the tallest structure in the world standing at 829.8 meters. Development of Burj Khalifa started in 2004, with the outside finished in 2009. The essential structure is fortified cement. The building was opened in 2010 as a feature of another improvement called Downtown Dubai. It is intended to be the centerpiece of extensive scale, blended use improvement. The choice to construct the building is purportedly taking into account the administration's choice to differentiate from an oil-based economy, and for Dubai to increase universal acknowledgment. The configuration of Burj Khalifa is gotten from designing frameworks encapsulated in Islamic engineering, fusing social and recorded components specific to the area, for example, the winding minaret. The Y-molded arrangement is intended for private and lodging utilization. A buttressed center basic framework is utilized to bolster the stature of the building, and the cladding framework is intended to withstand Dubai's late spring temperatures. An aggregate of 57 lifts and 8 elevators are introduced with a limit of 12 to 14 travelers for each lodge. Until now it’s the world’s tallest building and utilizes cutting edge technology.

...the latest methane gas sensor?

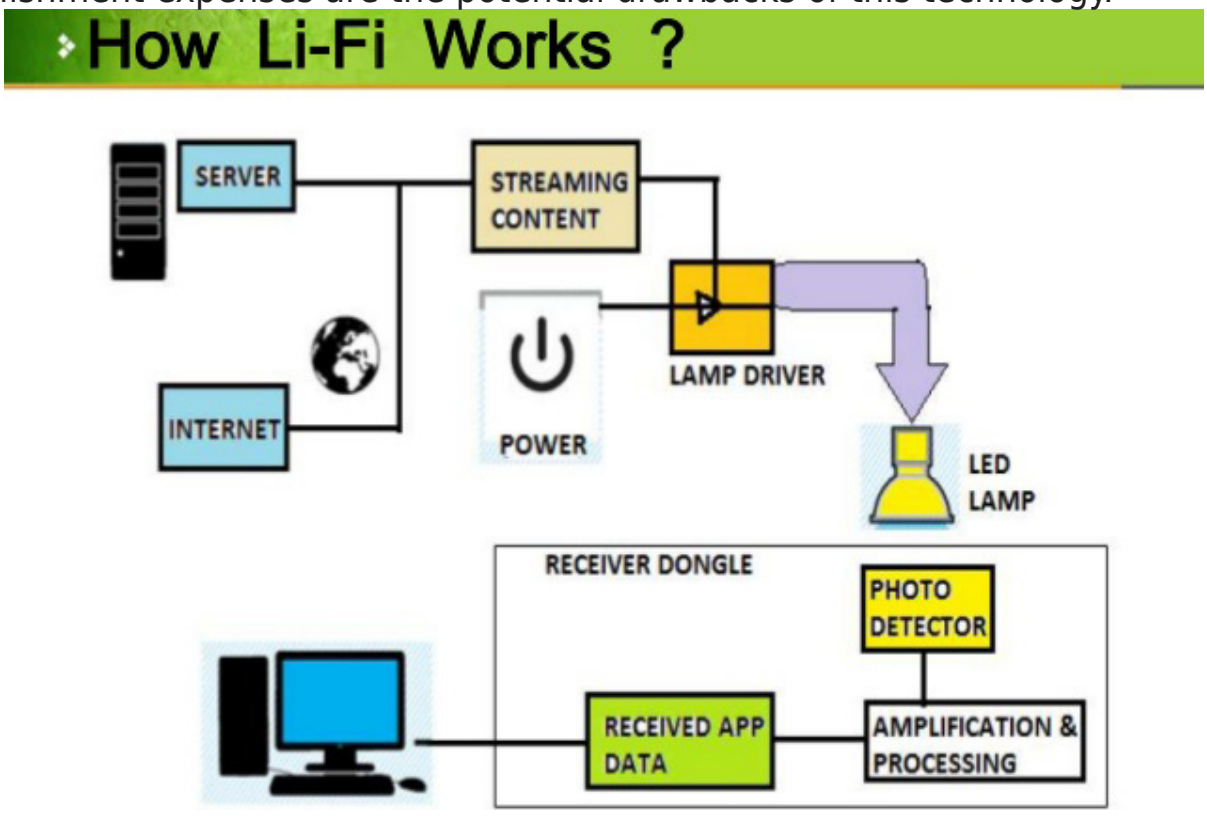
by Elemi Papadopoulou

NASA' s Open Path Laser Spectrometer (OPLS) sensor is the latest effort in a methane testing and demonstration program conducted on various platforms since 2014. The particularity of this sensor in relation to the previous one, is that it has the ability to detect methane with greater sensitivity. This project was funded by Pipeline Research Council International (PRCI), as part of a project to improve safety in the energy pipeline industry. The ability of the sensor to detect methane in parts per billion by volume could help the pipeline industry to identify with greater accuracy the methane leaks from pipes. NASA' s Jet Propulsion Laboratory' s and Mechatronics, Embedded Systems and Automation Lab' s researchers, at the end of February 2016, flew an unmanned aerial system equipped with a miniature OPLS sensor at various distances from methane-emitting gas sources. The tests were conducted in central California at the Merced Vernal Pools, in a controlled location to test the accuracy and robustness of the system. In the future, further development of OPLS sensor, could help to detect and identify methane gas sources.

...about Li-Fi Internet?

by Konstantinos Papatheologou

Li-Fi (stands for light fidelity) is a bidirectional high speed and networked wireless communication similar to Wi-Fi. Li-Fi, which was initially created by Harold Haas of the University of Edinburgh in 2011, utilizes noticeable light correspondence (VLC) to send information at to a great degree high speeds. Basically, this works like a staggeringly quick flag light, blazing on and off keeping in mind the end goal to transfer messages in twofold code (1s and 0s). In past lab-based investigations, the innovation could transmit up to 224 gigabits for each second. To place this in context, Wi-Fi is fit for achieving rates of around 600 megabits for every second. Li-Fi has the upside of being valuable in electromagnetic sensitive regions, for example, in air ship lodges, healing facilities and atomic force plants without bringing on electromagnetic interference. Both Wi-Fi and Li-Fi transmit information over the electromagnetic range, yet while Wi-Fi uses radio waves, Li-Fi utilizes noticeable light. While the US Federal Communications Commission has cautioned of a potential range emergency since Wi-Fi is near full limit, Li-Fi has no restrictions on capacity. The visible light range is 10,000 times bigger than the whole radio recurrence spectrum. Researchers have achieved information rates of more than 10 Gbit/s, which is much speedier than regular quick broadband. Li-Fi is expected to be ten times less expensive than Wi-Fi. Although short range, low dependability and high establishment expenses are the potential drawbacks of this technology.



SILICON CARBIDE POWER TRANSISTORS: MOVING THE FUTURE POWER ELECTRONICS TOWARDS THREE DESIGN DIRECTIONS

by Dimosthenis Peftitsis,
Associate Professor, Norwegian University of Science and Technology

Several decades of pioneering research achievements in semiconductor materials, which was initiated in the early era of the 20th century, ended up in the invention of the first transistor in 1947 by Shockley, Bardeen and Brattain. In acknowledgement of this revolutionary achievement, these three Bell Lab's scientists were awarded the 1956 Nobel Prize in Physics. The following 60 years are usually considered as the digital-world revolution. Indeed, the quality improvement of the Silicon (Si) material along with the development of more robust transistor designs have contributed towards digitalization of telecommunications, consumer and industrial electronics. Moreover, the development of larger-area Si wafers, have paved the way to design and fabricate high-voltage and high-current Si transistors. Considering that Si power transistors are the heart of *Power Electronics Converters*, a new era in *Energy Conversion* was also initiated 5 decades ago.

If a power electronics system is examined from a system-perspective, various challenges can be listed. In particular, high efficiency, high power density, high-temperature operation, control robustness, high degree of reliability and compatibility against electromagnetic interference (EMI) count as the most crucial challenges. Even though the last three challenges have, to some extent, been treated successfully by several highly-qualified scientists, there is still some room for improvements in the three first challenges. A very promising alternative to Si power transistors which can be found beneficial in terms of higher efficiency, operation at elevated

temperatures and using higher switching frequencies is the so-called *Silicon Carbide (SiC)* power-transistors technology. Considering the most crucial material properties of Si and SiC, summarized in Table I, the advantageous characteristics of SiC power transistors can be identified.

Table I: Material properties of Si and SiC

	Si	SiC
Bandgap energy [eV]	1.1	3.2
Breakdown electric field [MV/cm]	0.3	3.0
Thermal conductivity [W/cm K]	1.5	5.0

As can be seen from this table, the bandgap energy of SiC is almost 3 times higher than the corresponding energy of Si. Thus, SiC power transistors are capable of operating at temperatures exceeding 250oC, while the corresponding maximum temperatures for Si-based transistors must be usually kept lower than 150oC. Moreover, the higher thermal conductivity of SiC compared to silicon, enables higher current densities for SiC power devices. This also results in smaller chip areas for a given load current. Finally, lower specific on-state resistances and higher blocking voltages for the same chip size can both be reached because of the higher breakdown electric field. In addition to these, the thickness of the drift layer, which is almost 10 times lower for SiC, enables faster switching speeds. If these superior characteristics of SiC power transistors are reflected to a system-perspective, the three potential design directions of power electronics converters are revealed. As shown in Fig. 1, these are the high-efficiency caused by the low conduction and switching power losses, high-temperature and high switching frequency enabled by the very fast switching speeds.

Depending on the targeted application of the SiC-based power electronics converters, one or more of the aforementioned design directions might be followed. A three-phase inverter operating in an electric vehicle, for instance, requires high efficiency and reliable operation at elevated temperatures. The potential design area of such a system is basically shown with the yellow circle in Fig. 1.

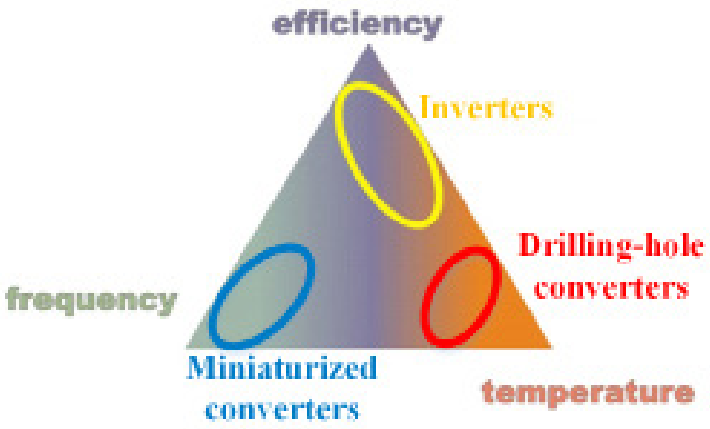


Fig. 1: The three potential design directions when SiC power transistors are employed. Potential future examples are also shown.

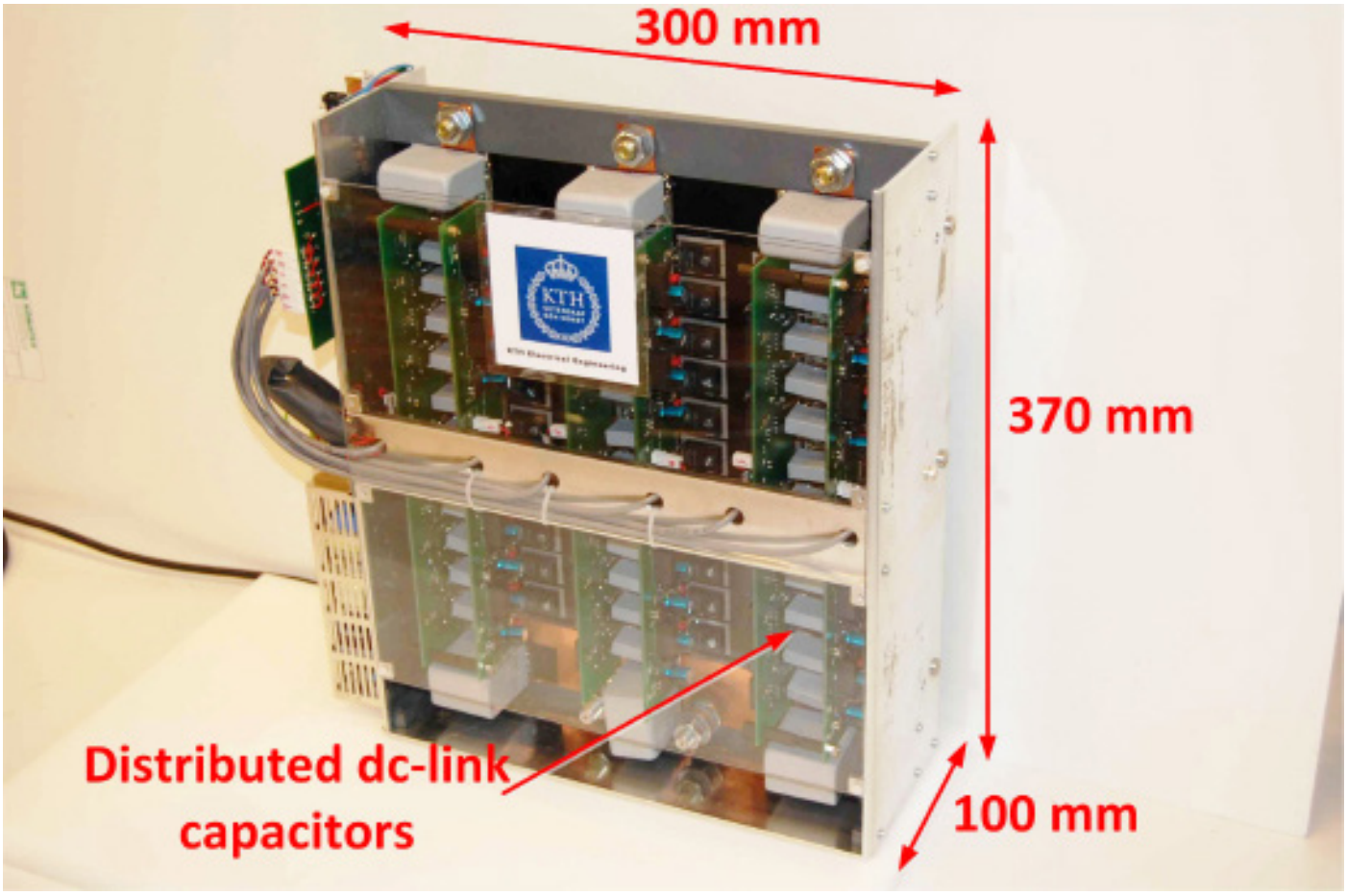


Fig. 2: Photo of a 40 kVA ultra-high efficiency three-phase SiC inverter.

A fully-SiC-based three-phase 40 kVA inverter having efficiency well above 99.6% is illustrated in Fig. 2. Similar considerations can be drawn for a variety of power electronics systems, where SiC power transistors are found to be beneficial (e.g. high temperature direction for drilling-hole applications, high frequency for miniaturized converters etc.).

Today, SiC metal-oxide-semiconductor field-effect-transistors (MOSFETs) rated at 1200 and 1700 V are commercially available, while SiC junction-field-effect transistors (JFETs) and bipolar-junction transistors (BJT) can be found as engineering samples from various manufacturers. In a foreseeable future, however, SiC transistors having higher blocking voltages (up to 20 kV or even higher) are also expected.

A completely new era in Power Electronics had already been initiated with the introduction of SiC power transistors. However, this also brings a variety of new challenges which must also be solved by highly-skilled and strongly-motivated researchers around the world. Talented young graduates in electrical engineering can play a crucial role in establishment of the new reality in the power electronics world and obviously, they are always found in very high demand in the job market.

Short Bio

Dimosthenis Peftitsis (S'03–M'13–SM'15) was born in Kavala, Greece, in 1985. He received the **Diploma degree (Hons.) in Electrical and Computer Engineering from the Democritus University of Thrace**, Xanthi, Greece, in 2008 and the **Ph.D. degree from the KTH Royal Institute of Technology**, Stockholm, Sweden, in 2013. In 2008, he was with the **ABB Corporate Research**, Västerås, Sweden, for six months, where he was involved in the diploma thesis. From 2013 to 2014, he was a **Postdoctoral Researcher** involved in the research on SiC converters at the **Department of Electrical Energy Conversion, KTH Royal Institute of Technology.** Since 2014, he has been working as a **Postdoctoral Fellow at the Lab for High Power Electronics Systems, ETH Zurich**, where he is involved in dc-breakers for multiterminal HVDC systems. In May 2016, he will be with the **Norwegian University of Science and Technology in Trondheim**, Norway, as an **Associate Professor of power electronics at the Department of Electrical Power Engineering**. His current **research interests include SiC power converters design, gate and base driver design for SiC JFETs and BJTs, as well as dc-breaker concepts for HVDC systems.**

On behalf of DUTh SB IAS Chapter's members, we would like to thank Dr. Peftitsis for taking the time to participate in this issue of Diploma. His article provided a pioneering and innovative perspective about the evolution of power electronics, a field of interest that a lot of our members and our magazine's readers are focused on. Besides the helpful and interesting information that he shared with us, we were glad to see that our Department's alumnus excel in their area of expertise not only in Greece but all over the world as well. It was our honor to have Dr. Peftitsis' article on our magazine and we hope to have this chance again in the near future.

GET CONNECTED

by Konstantinos Kafalis

Nowadays, technology is developing more and more rapidly. This results in a great variety of information that an engineer should gather, where he want to be creative, competitive and keep himself thoroughly informed.

Just consider the difficulties that you may have to cope when you will try to capture an original idea. And thereafter, imagine yourselves being out of university's cycle, where you may be inspired by the ongoing investigations, be able to collaborate with your classmates or be under the guidance of a professor. Surely, you will understand then that **the ultimate weapons that an engineer should own are communication and interaction with other colleagues**, and take part in communities that will keep you up to date. One of these communities is **Industry Applications Society**, commonly known with the abbreviation IAS. IAS is a transnational organization and gives you the opportunity to **meet other students, scientists or businessmen from all over the world related to your scientific field, exchange knowledge and experiences with them, and under appropriate circumstances, to develop relationship and support each other in a collaboration**. This way you will become open-minded, extroverted and evolve your abilities and skills, and might maintain the above profits later, as a businessman.

Participation in IAS undercurrents much more aspects. Not only will you have the opportunity to **achieve rewards, like AMTGA which gives you the opportunity to travel aboard and take part in conferences like Annual meeting, but you may organize events, invite other colleagues and create friends, refreshing yourself and learning about their cultures**. Last but not least, you will have the chance to **volunteer to activities for engineering innovations and become, during your undergraduate years, active member of engineering world**.

To sum up, all the above positive implication of your participation in an organization like IAS, just converge to next conclusion.

Don't wait

AUBURN UNIVERSITY SB IAS CHAPTER

by Elizabeth Devore, SB IAS Chapter Co-Chair

The **Auburn University Student Branch Chapter (AU SB)** of IAS was approved on **20th January 2015**. The AU SBC was started by our **current Chair, Maria Arechavaleta, as a way to bridge what we learn in the classroom with real world applications to help better prepare students before entering industry**. Most engineering society and club meetings on Auburn's campus invite companies to speak about job opportunities. **The primary mission of the IAS SB chapter at Auburn is to provide activities throughout the year including on-campus speakers, off-campus tours, and social events for members** to attend; to **learn about real problems and solutions from experienced professionals**; and to **make connections** with people who can help students along their targeted career path.

During one of our meetings in spring 2015, we hosted **Mr. Bryan Seal, a public power marketer from Itron, Inc**. Mr. Seal provided us with **a brief history of metering technology** and discussed the **current market for SMART meters with regard to the SMART grid**, and the **forecast for growth in advanced metering infrastructure** (AMI) in the United States.

Further, Mr. Seal discussed **the smart grid as a service** and what we have to look forward to in **future metering capabilities**, such as data sharing between devices and localized decision making.

In July 2015, **a group of four students from the AU SB chapter and our faculty advisor, Dr. Mark Halpin, were able to tour the manufacturing plant in Seneca, South Carolina**. The tour allowed us to **view the assembly of several lines of electricity meters**. After the tour, we were invited to **meet with the director of research and development and a few other employees from the Seneca team**. A few of the students were able to **present and discuss research work and made a few relevant connections with the research and development team**.

This is just **one example of the work we plan to do** with our SB chapter at Auburn. We already have plans for f**uture plant tours and speakers** to help expand our SB chapter at Auburn. **We're also looking forward to connecting with other SB chapters in the future**!

Chapter Chair: Maria Arechavaleta (mza0036@auburn.edu)
Chapter Faculty Advisor: Dr. s. Mark Halpin (halpsim@auburn.edu)

UCET IUB BAHAWALPUR SB IAS CHAPTER

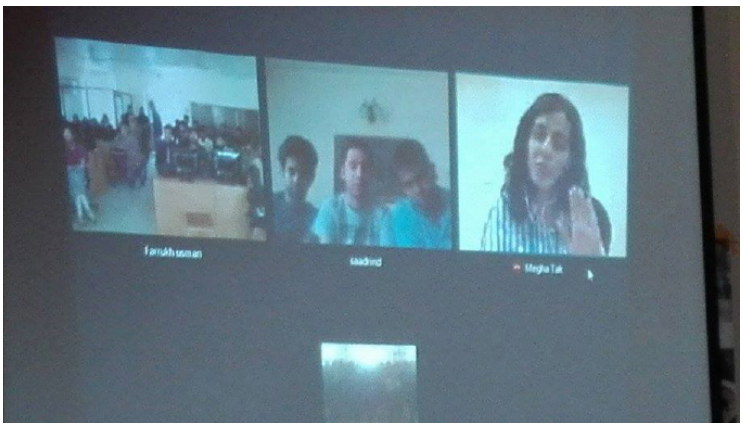
by Saad Rind, Chair of UCET IUB Bahawalpur SB IAS Chapter

IEEE IAS UCET IUB is one of active chapter in Lahore section Pakistan. The chapter has launched in **30-June 2015**. In very short time, the chapter achieved **national and international recognition**, Chair **Saad Rind won the Myron Zucker award** and awarded first attendee from Pakistan in AGM 2015, and r**ecently chapter nominated best outstanding small chapter 2016.**

Following are **some glimpse of IAS UCET IUB SBC ACTIVITES**:

IEEE APEX was the outstanding event organized on November 24, 2015 by the IEEE IAS UCET IUB Bahawalpur. The event include **40 projects of the students of Electrical, Electronics, Telecom and Computer system departments Including 3 research paper published in the international conferences.** The event was of a day and was visited by more than 800 visitors including the students enrolled in the Islamia University of Bahawalpur.

On **3-Feb-2016**, IEEE IAS UCET IUB organized **two day the Industrial visit** to Fauji Fertilizer Company limited (FFC-Sadiqa Abad) on 1st and 2nd December for IEEE Members an Non IEEE Members. Total **95 students and 5 staff** visited the Company. The students got benefited in terms of the technical details provided by the company on an important part of its Production Facilities included.



On **15-Dec-2015** International Speaker Miss Megha from INDIA and **Associate Product Manager Procto** given seminar at "**How It Is in Industry After Engineering**" event organized by IEEE IAS UCET IUB. The IAS UCET BZU Multan Chapter also participated in event through Skype. The objective of event to **educate undergraduates for the industry challenges faced by the engineers and how it is in industry after engineering.**

IAS UCET IUB SBC **future projects:**

Electricity is one of the key factors which contribute on the way to improvement of rural areas in world. Pakistan is country having 62% of population living in rural areas deprived of proper access of electricity. IEEEE IAS UCET IUB volunteers **working hard to innovate models/Systems which will contribute in provision of electricity via decentralized energy solutions for advancement in a socio-economic condition in rural areas of Pakistan.**

About 80% communicable diseases in rural area of Pakistan are related to unsafe water, according to the UN . While there are many technologies out there than can effectively remove salt from water to make it drinkable, most are expensive and rely heavily on electricity rendering them all but useless in remote, off-grid villages. That's why a group of IAS volunteers from UCET IUB, backed by IEEE Lahore section, researching on a **system that relies on solar energy to bring clean drinking water** to rural areas in Pakistan. This project will be executed in the end of 2016.

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS SBC

by Istvan Taczi, BUTE SBC Chapter Chair

Main activities

Our main activity is organizing public lectures, forums for our members, school students and anyone interested, regularly. We invite national and international experts or ask some of our experienced past or present members to hold a lecture. Our events in cooperation with the BUTE High-Voltage Laboratory, the Renewable Energy Laboratory and exhibition booths are popular not only at local chapter events but also at national technical events e.g. the Night of Museums cultural occasion.

Our members participate regularly at international IEEE conferences and student paper contests. This year David Balango, chapter member won the Master Thesis Category's 5th prize at the IAS Graduate Student Thesis Contest for his work titled A New Method for Modelling and Calculating Dynamic Line Rating.

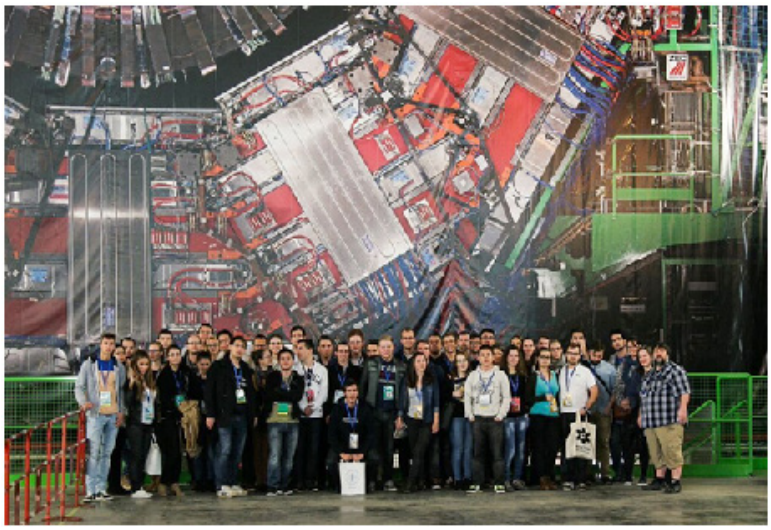
Delegates of the chapter used to be attendees of the IAS Annual Meetings continuously. In addition, IEEE Day events were organized regularly – we hosted the Hungarian IAS Day 2014, as well.

In 2015 we also participated in the IEEE Day Photo Contest and we won the Best Technical Photo award with a picture that was captured in the High Voltage Laboratory of BUTE.

Our chapter won numerous awards in the past years. **The Industry Applications Society gave the "Continuously Outstanding Student Branch Chapter Award" in 2014 and 2015, and the "Outstanding Small Chapter Award in 2016. We also won the competition for the "High Performing Student Branch Chapter" award.**

Site visit of CERN

In 2015, the BUTE SBC organized its longest trip ever by **travelling almost 3000 km over four countries (Austria, Germany, Switzerland and France) visiting the European Organization for Nuclear Research (CERN) incl. the CMS detector,** the data center and the antimatter factory. We visited the **Tokamak**



Laboratory at the University of Lausanne, which is a research fusion reactor. We also visited the **German Museum of Technology in Munich** and the **Ybbs-Persenbeug hydro power plant in Austria**.

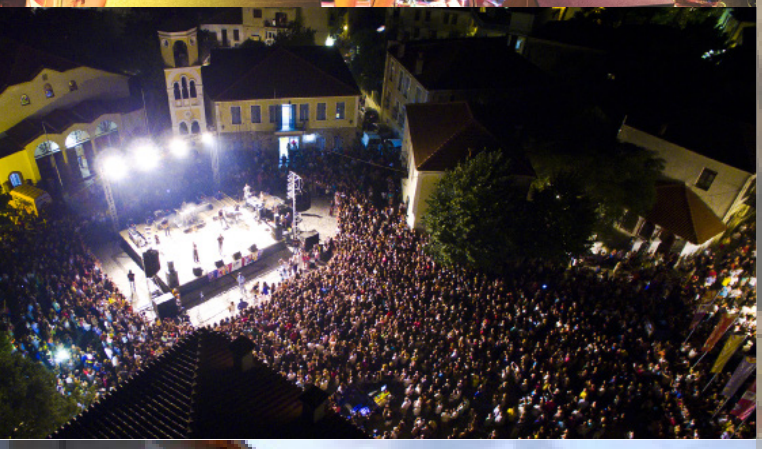
Summer Academy of Energy:

We proud to announce the **3rd Summer Academy on Energy (SAE2)**, which will be held between **14th-19th August, 2016**. The participants can enjoy the amazing SAE atmosphere through **lectures from professionals, power plant and site visits**. The location is again in the heart of Middle-Europe, **Budapest, Hungary**. With various social events the attendees can also **discover the beauty of the city**.

The Organizing Committee of SAE2 is encouraging **undergraduate and MSc students from all over the world to apply for SAE2**. The registration will be open soon, as well as the availability of the program. **Until then go and check out the official promo video of the 3rd Summer Academy on Energy** - made of the last year's pictures: https://youtu.be/plUbpfisBX4

International Youth Conference of Energy (IYCE):

Our chapter organize the IYCE series since 2007. The aim was to establish a series of student-led energy-related conference biannually. From year to year more and more participants published their papers from over 25 countries. All of the events were supported by international organizations such as AEE, CIGRÉ, ENEN. Since 2009 the professional standard of the event was raised by the technical co-sponsorship of IEEE IAS and PES and young professionals also had the opportunity to publish their papers in the IEEE Xplore. After 5 successful conference, the next IYCE – the 10th year jubilee – will be held in Hungary at the end of June, 2017.



In our city, there is a kind of custom called **Old Town Festival**.

This Festival **was introduced for the first time in 1991** and since then we keep on preserving this tradition. **Xanthi's Old Town Festival takes place at the beginning of September** and it lasts **for exactly one week**. The name of the festival comes from the fact that those are placed at the Old town of Xanthi. **Every day during this week we have a different artist, specifically a singer who entertains people as well as various parallel events.**

A unique aspect of the festival is that there are placed at a very special area, the Old Town of Xanthi, **which is made of slate roads and narrow streets**. The residents of Xanthi, and not just them, are well provided with f**ood and drinks taken from stands of the different cultural societies**, which are located on those streets.

This is a huge festival that **gathers people from all over the world, who enjoy themselves with dances, food, drinks and of course new contacts**.

Although we can't compare those celebrations with the carnivals of Xanthi, it is still an ideal event for anybody to rest and at the same time have a lot of fun.

by Ioanna Boutziona