Diploma

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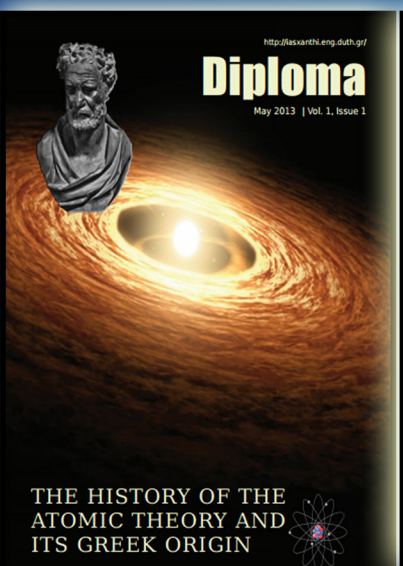
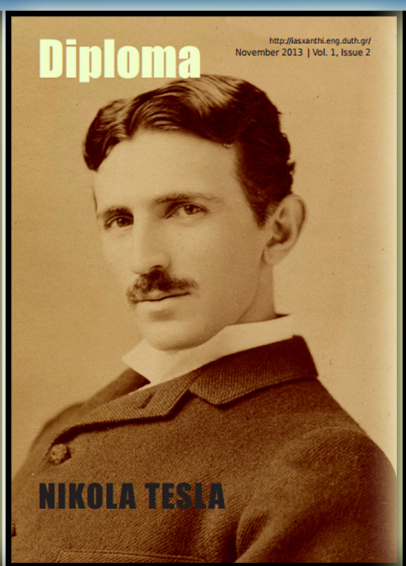
Celebrating 50 Years IAS

3 Years IAS DUTH

5 Issues of DIPLOMA





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

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ias

SBC·DUTH

Letter from the Advisor

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

Another issue of our Diploma Magazine is ready. This year, IEEE Industry Applications Society celebrates 50 years of existence, while our Student Branch Chapter only three. Nevertheless, we are proud to believe that this Chapter became a live cell of this big organization from its first steps, from its first activities. Those activities were highly appreciated and supported from the IAS Chapters and Membership Development Department and to this aspect the printed edition of our Magazine is financially supported from CMD and distributed during the last two IAS Annual Meetings. The feedback from the scientific and professional community that participated in these Annual Meetings and read our Magazine is so encouraging that will certainly motivate our Student Members to produce more issues in the future.

Prof. Athanasios Karlis

Chapter's Advisor

ALL PRINTING EXPENSES ARE COVERED BY IAS CMD

DIPLOMA

On the cover: Celebrating 50 Years IAS, 3 Years IAS DUTh, 5 Issues of DIPLOMA

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IAS CMD AWARDS AND CONTESTS

by Christina - Panagiota Malliou, DUTh SB IAS Chapter Financial Manager

Outstanding IAS Chapters 2015

Outstanding Student Branch Chapter

• **University of Wollongong (UOW) SB IAS Chapter**, New South Wales Section, Australia, Chair : Yingjie Tan, Advisor: Kashem Mohammad Muttaqi

• **Vimal Jyothi Engineering College SB IAS Chapter**, Kerala Section, India, Chair: Jyothis Joseph, Co-Chair: Sneha Ramakrishnan, Advisor: Nikhil Valsan K

Continued Performance Outstanding Student Branch Chapter

• **Budapest University of Technology and Economics (BUTE) SB PES/IAS Chapter**, Hungary Section, Chair 2014: Beáta Polgári, Chair 2015: Ákos Baldauf, Advisor: Richard Cselko

Outstanding Small Chapter

• **Universidad Nacional (UNAL) De Colombia Sede Bogotá SB IAS Chapter**, Colombia Section, Chair 2014: Julio César Chinchilla Guarin, Chair 2015: Jairo Andrés Caballero Peña, Advisor: Javier Rosero Garcia

Outstanding Small Joint Chapter

• ***University of Calgary SB PES/IAS Chapter***, Southern Alberta Section, Canada, Chair: Bradley Ether Coleman, Advisor: Seyed Pouyan Jazayeri

Continued Performance Outstanding Small Chapter

• **Kolkata Section IAS Chapter**, India, Chair : Mainak Sengupta

Continued Performance Outstanding Large Chapter

• **Delhi Section PES/IAS Chapter**, India, Chair 2014: Sukumar Mishra, Chair 2015: Rachana Garg

Outstanding Large Joint Chapter

• **New York Section Joint PES/IAS Chapter**, USA, Chair 2014: Sharene Williams, Chair 2015: Neil Weisenfeld

Outstanding Large Chapter

• **Atlanta Section IAS Chapter**, USA, Chair 2014: Peter O. Andersen, Chair 2015: Pete Torres

• **Dhirubhai Ambani Institute of Information and Communication Technology (DA-IICT) SB IAS Chapter**, Gujarat Section, India, Chair 2014 : Vidhan Agarwal, Chair 2015 : Brijesh Kumar, Advisor: Rahul Dubey

Outstanding New Chapters

•**Fort Worth Section University of Texas at Arlington (UTA) SB Chapter,** Chair: Wang Xin (Wendy), Advisor: Wei-Jen Lee

•**St. Joseph's College of Engineering (SJCE) SB IAS Chapter**, Madras Section, India, Chair: Chidambaranathan T, Advisor: Jayarama Pradeep

Chapter Web Contest

1st Prize

• **Democritus University of Thrace**, Greece Section, Web master: Christos Pnevmatikos, Chair: Aristotelis Farmakis, Advisor: Athanasios Karlis
http://iasxanthi.eng.duth.gr

2nd Prize

• **Amrita Vishwa Vidyapeetham (AVV) University SB IAS Chapter**, Kerala Section, India, Web master: Aneesh Rajeev, Chair: Preethy V Warrier, Advisor: Srikanth Vasudevan P.
http://ias.amrita.ac.in/

Joint 3rd Prize

• **Vimal Jyothi Engineering College (VJEC) SB IAS Chapter**, Kerala Section, India, Web master: Mohammed Ameen, Chair: Jyothis Joseph, Advisor: Nikhil Valsan K
http://ias.vjec.ac.in/

• **Muslim Educational Association (MEA) Engineering College SB IAS Chapter**, Kerala Section, India, Web master: Akhil Raj, Chair 2014: Ashfak Chemban, Chair 2015: Fawad Rasheed KM, Advisor: K T Ajmal
http://ias.meaieeesb.org/

Graduate Student Thesis Contest 2015

Category: PhD Thesis

1st Prize

• **Abhra Roy Chowdhury**, M.Tech, PhD Student, National University of Singapore (NUS), Thesis title: **Modeling and Control of a Bioinspired Robotic Fish Underwater Vehicle and its Propulsion Mechanism**, Thesis Advisor: **Sanjib Kumar Panda**, PhD Associate Professor & Area Director Power and Energy Group, Department of Electrical & Computer Engineering, National University of Singapore

2nd Prize

• **Ali Mohammadi**, PM. Tech, PhD, Post doc in UTBM, Université de Technologie Belfort-Montbéliard (UTBM), France, Thesis title: **Analysis and Diagnosis of Faults in the PEMFC for Fuel Cell Electrical Vehicles**, Thesis Advisor: **Dr. Abdesslem Djerdir** , Associate Professor, Institute of Research on Transportation, Energy and Society, Université de Technologie BelfortMontbéliard

Category: Master Thesis / Diploma Thesis

1st Prize

• **Devendra R Patil**, M. Tech PhD Student, University of Texas at Dallas, TX USA, Thesis title: **Multi-input DC-AC converter for renewable energy source and low frequency ripple reduction circuit for battery charger application**, Thesis Advisor: **Dr. Vivek Agarwal**, Professor, Department of Electrical Engineering, Indian Institute of Technology Bombay

• **Libin Varghese**, M.Tech. Research Engineer, Resnova Technologies Pvt. Ltd, Thesis title: **A Cost Efficient FPGA Based Brushless DC Motor Driven Special Assistance Rollchair for the Mobility Impaired**, Thesis Advisor: **J.T. Kuncheria,** Professor, EEE Dept., Rajagiri School of Engineering and Technology

3rd Prize

• **Kafalis Konstantinos**, Dipl. Eng. Postgraduate Student, Department of Electrical and Computer Engineering, Democritus University of Thrace (DUTh), Greece Thesis title: **Modeling – Simulation of an Elevator's Electric Drive System,** Thesis Advisor: **Dr. Athanasios D. Karlis**, Assistant Professor, Department of Electrical & Computer Engineering, Democritus University of Thrace

4th Prize

• **Lorenzo Chiavaroli**, M.Tech. Trainee, Siemens Transformers S.p.A., Trento, Italy, Thesis title: **Analysis of the Energetic Performances of an Energy Storage System in a Real Micro-grid Application**, Thesis Advisor: **Prof. Ing. Maria Carmen Falvo**, Assistant Professor Department of Astronautics, Electrical and Energetics Engineering

5th Prize

• **David Balango**, M.Sc. El. Eng. PhD Student, Group of High Voltage Technology and Equipment, Department of Electric Power Engineering University of Technology and Economics, Thesis title: **Modelling Dynamic Rating of Power Lines**, Thesis Advisor: **Bálint Németh**, Senior Lecturer, **Richard Cselko**, Assistant Lecturer, Department of Electric Power Engineering, Budapest University of Technology and Economics

6th Prize

• **Pavol Štefanec**, Ing. PhD Student Faculty of Electrical Engineering, University of Zilina, Zilina, Slovakia, Thesis title: **PLC Control system Design for Vehicle Tire Molds Preheating**, Thesis Advisor: **Michal Frivaldsky**, Associate Professor Faculty of Electrical Engineering, University of Zilina

Most Happening Chapter Contest 2015

1st Prize

• **Democritus University of Thrace (DUTh) Student Branch IAS Chapter,** Greece Section, PR Manager: Emmanouil Matzouranakis, Chair 2014: Galini Kondyli, Chair 2015: Aristotelis Farmakis, Advisor: Athanasios Karlis

2nd Prize

• **University of Sarajevo (UNSA) Student Branch IAS Chapter,** Bosnia and Herzegovina Section, Public Affairs Chair: Azer Dedović, Chair 2014: Tarik Hubana, Chair 2015: Almedin Kavaz, Advisor: Vedad Becirovic

3rd Prize

• **Pandit Deendeyal Petroleum University (PDPU) Student Branch IAS Chapter,** Gujarat Section, India, Chair and PR Manager: Sumit Chhabria, Advisor 2014: Nishant Parikh, Advisor 2015: Anil Markana

Outstanding Chapter and CMD Officers 2015

Outstanding Chapter Project Organizer

• **Nathalie Gosset** , IEEE Buenaventura Section Chair, Buenaventura Section RAS/ IAS Chapter Member, R-6, USA

Outstanding Chapter Chair

• **Habib M. Kammoun**, Tunisia Section IAS Chapter Chair, R-8, Tunisia

Outstanding Student Branch Chapter Chair

• **Yingjie Tan**, University of Wollongong (UOW) SB IAS Chapter Chair, R-10, New South Wales Section, Australia

Outstanding Student Branch Chapter Advisor

• **Giuseppe Parise**, Sapienza University of Rome SB IAS Chapter Advisor, R-8, Italy

Outstanding Student Branch Chapters Area Chair

• **Srikanth Vasudevan P.**, IAS SB Chapters Area Chair R10 South Asia, R-10 Kerala Section, India

Outstanding IAS CMD Officers

• **Christina - Panagiota Malliou**, CMD Chapter and Member Promotion and Support Committee Chair & PR Subcommittee Chair, R-8, Greece

• **Megha Tak**, CMD Membership Development Chair & YPP Subcommittee Chair, R-10, India

NEW IEEE IAS PROGRAM: INTERNSHIP AND JOB BOURSE

by Edina Livnjak, Internship and Job Bourse Subcommittee Chair, Christina - Panagiota Malliou, Chapter and Member Promotion and Support Committee Chair

IEEE Industry Applications Society Internship and Job Bourse Subcommittee has recently started working! **Our main goal is the advancement of the practice of electrical engineering and the promotion of any internship programs and job opportunities for IAS member.**

• If you are a student:
By joining our Facebook group you will be able to **get information and news about any available internship programs** or **job openings** as well as to **connect with firms and industries worldwide.**

• If you are a company:
When you join our Facebook group you will have the change to **promote any internships programs** you have, **find the suitable candidates for a position** and **get in contact with enthusiastic and innovative students and engineers all over the world**.

If you would like to help us develop this project or you have some suggestions, you can contact us: edinalivnjak@gmail.com and christina.p.malliou@ieee.org.

Scan the QR code below and join our Facebook group!

50 YEARS IAS
3 YEARS DUTH IAS SBC

by Giannis Semertzis, DUTh SB IAS Chapter member and
Christina - Panagiota Malliou, DUTh SB IAS Chapter Financial Manager

On the occasion of the **50th anniversary of the IEEE Industry Applications Society**, we would like to present **the history of our organization** and **the history of our chapter**, which celebrates this year **three years**, having published **5 DIPLOMA** magazines.

Actually, one might consider this to be the **70th anniversary of IAS**, since it was created from two different technical divisions of **American Institute of Electrical Engineers** (AIEE), the **Industry Division and the General Applications Division, which merged into the Industry and General Applications (I & GA)** in 1964. The Institute of Radio Engineers (IRE) and the AIEE merged in 1963 to form IEEE.

The **IEEE Industry Applications Society was formed in 1964 as the Industry and General Applications Group, and changed its name to the IEEE Industry Applications Society on December 3, 1971.**

Starting in **February 1995**, IAS upgraded its ten-year-old newsletter into a bimonthly technical magazine and **published the first issue of IEEE Industry Applications Magazine, with John H. Kassebaum as its editor-in-chief.**

Past Society Presidents assembled around IEEE President Troy Nagle (1994).

In the 90s, **the IEEE was in a state of transition, trying to redefine its role as a large professional institute to better serve the needs of its U.S**. – or North America-based membership while establishing its presence globally through transnational organizational changes. **The technical Societies were being encouraged to reach out beyond the U.S and create opportunities for increasing membership worldwide, establishing joint conferences, sharing technical publications, and defining a presence in parts of the world where engineers could directly benefit and identify with IEEE.**

The IAS Executive Board voted to explore opportunities for intersociety cooperation between IAS and the European Electrical Engineering Societies while conducting their own formal business meeting and a strategic planning retreat on 22-24 May 1995 in Monselice, Italy. This decision officially established a dynamic change in the role that IAS would play henceforth in developing cooperative relationships and signed agreements with many European and Asian technical societies. **To clearly set the framework for the future presence of the IAS in Region 8, particularly Europe, a proposal was made to consider conducting the 35th Annual Meeting in Rome, Italy, in 2000. It was the first time the IAS Annual Meeting was held outside North America.** In 1996, the IAS Executive Board approved the proposition, with Paolo Tenti, who was vice president of the Society at the time, as the general chair.

Traditionally, IAS volunteers did almost all of the administrative tasks for the Society. By the 2000, **it was clear that the IAS needed to find a way to help the volunteers and Myers-Smith are hired for administrative support.** The results were generally satisfactory, but by 2007 the Executive Board had decided that the IAS might be better served by an administrator who was a member of IEEE staff. **In April 2007, Lynda Bernstein was hired as a part-time IAS administrator.**

I**n the wake of 2007-2008 despite the financial crisis and the accompanying economic slowdown, IAS activities and conferences were not seriously affected.** A few of the conferences lost money, but most did very well.

IAS presidents at a strategic planning session in Atlanta. Back row, from left: Rob-ert D. Lorenz, Barry Brusso, S. Mark Halpin, Kevin Peterson, Thomas A. Nondahl, and Bruno Lequesne. Front row, from left: R. Mark Nelms, Blake Lloyd, Carlton E. Speck, Eugene J. Fagan, and H. Landis “Lanny” Floyd.

ABOUT US

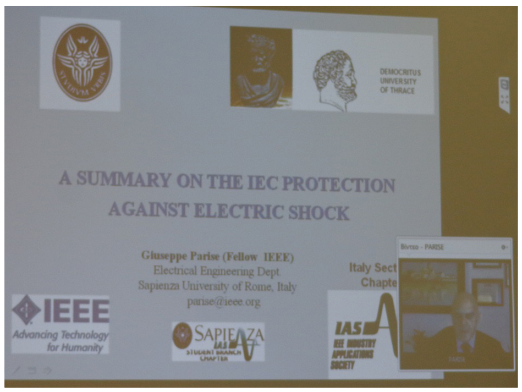
A lot of technical committees within the scope of IAS have been in existence longer than the Society itself. At the 2009 Annual Meeting, IAS celebrated the 100-year anniversary of two committees: **the Power System Engineering Committee, established in 1908** as the AIEE Committee on General Power Applications, and **the Industrial Lighting and Displays Committee, established in 1909** as the AIEE Electric Lighting Committee.

Lately, **most IEEE Societies are experiencing a slow decline** and some had heralded the digital age as making the Societies superfluous. **On the other hand, IAS membership levels have remained fairly flat around 10,000 members.** As of May 2014, **IAS has 142 regular Chapters (there were 120 in 2008) and 72 Student Chapters (up from just two in 2009)**. Chapters are formed mostly outside of North America, although there have been exceptions. **One of these Chapters is our Chapter, DUTh SBC located in Xanthi, Greece.**

The history of DUTh SB IAS Chapter begins in 2012. On March 21st **Dr. Peter Magyar, an IEEE fellow and IAS Chapters and Membership Development Department Chair, and Dr. Mark Halpin, an IAS Past President and Alabama Distinguished Professor gave us an extremely motivational speech**. After their powerful lecture that we all attended with great interest, Dr. Magyar gave us a tremendous opportunity, to form a new IAS Student Branch chapter, **the first and until today the only IAS Chapter in Greece**. A few days later, **in cooperation with our Chapter's Advisor Prof. Athanasios Karlis**, assistant professor of the Electrical Machines Laboratory, Division of Energy Systems, Department of Electrical and Computer Engineering, Faculty of Engineering, Democritus University of Thrace, **our Chapter was founded.**

From our inauguration **our vision was and is to provide knowledge to our members with the cooperation of distinguished professors, to give them the opportunity to become acquainted and work with experts in the field of industry, to inform them about the latest technological and industrial applications and help them to create a connection with industry professionals**.

In order to fulfill our vision and succeed our goals we always try to be as active as possible. **Our activity starts on June 6th 2012, one month before our official inauguration** with a **live broadcast from NTUA's lecture on "Smart Market for a Smart Grid" given by Professor Shmuel Oren**. Since that first lecture a great amount of lectures, seminars and workshops followed along with our Annual Presentations.

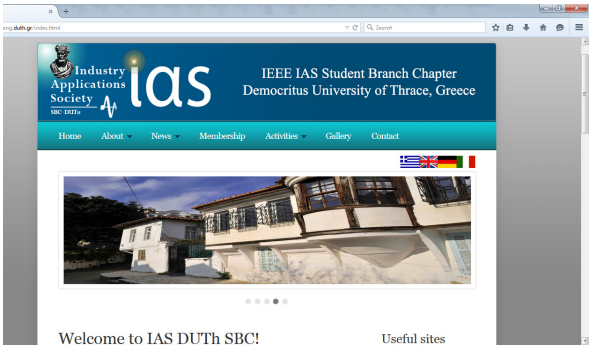


Some of our chapter's activities, that include lectures, workshops, seminars and academic visits.

In addition to our activities, **since November 2012 each year we apply for hosting the IAS Executive Board Meeting in conjunction with technical conferences**.

Moreover, **since our formation our members have the chance to attend and participate to international conferences** such as **SBC Madrid** 2012 (25 - 29 July 2012), **IAS Annual Meeting 2012** held in Las Vegas (7 – 11 October 2012), **IAS Annual Meeting 2013** that took place in Orlando (6-11 October 2013), **1st Region 8 Mediterranean Student Branch IAS Chapter Workshop** in Rome (14-15 December 2013), **IAS Day at Sarajevo** (26-29 September 2014) and **IAS Annual Meeting 2014** held in Vancouver (5-9 October 2014).

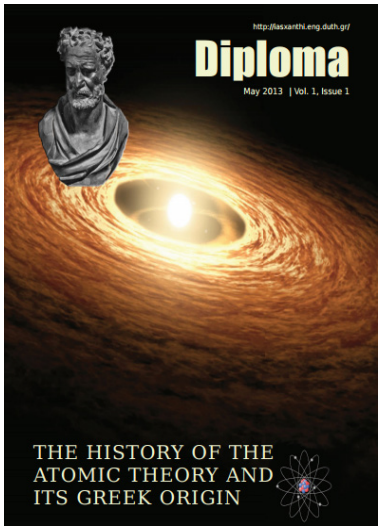
Our Chapter has also received a lot of awards for our efforts. During IAS Annual Meeting 2012 our presentation for the **Multicultural Event and Contest won the 2nd Price Award**. For the activities and our progress during IAS Annual Meeting 2013, our chapter has received the **"2013 IAS Outstanding New Student Branch Chapter Award", the "2013 IAS Chapter Web Contest, 1st Prize Award", "The Most Happening IAS Chapter Contest 2013, 2nd Prize Award" as well as the 3rd Prize Award in the Inter-Cultural Event and Contest**, while during the 1st Region 8 Mediterranean Student Branch IAS Chapter Workshop that took place in Rome our presentation for the **Inter-Cultural Contest won the 2nd prize award**. During the IAS Annual Meeting 2014 our chapter has received the **"2014 IAS Continued Performance - Outstanding Student Branch Chapter Award"** for continuing the good work we started less than two years ago, **"The Most Happening IAS Chapter of the Year 2014, 1st Prize Award"** for all the activities we have organized in the past year, for all the great work that our members and our webmaster (Christos Pnevmatikos) have done we received the **"2014 IAS Chapter Web Contest, 1st Prize Award"**.



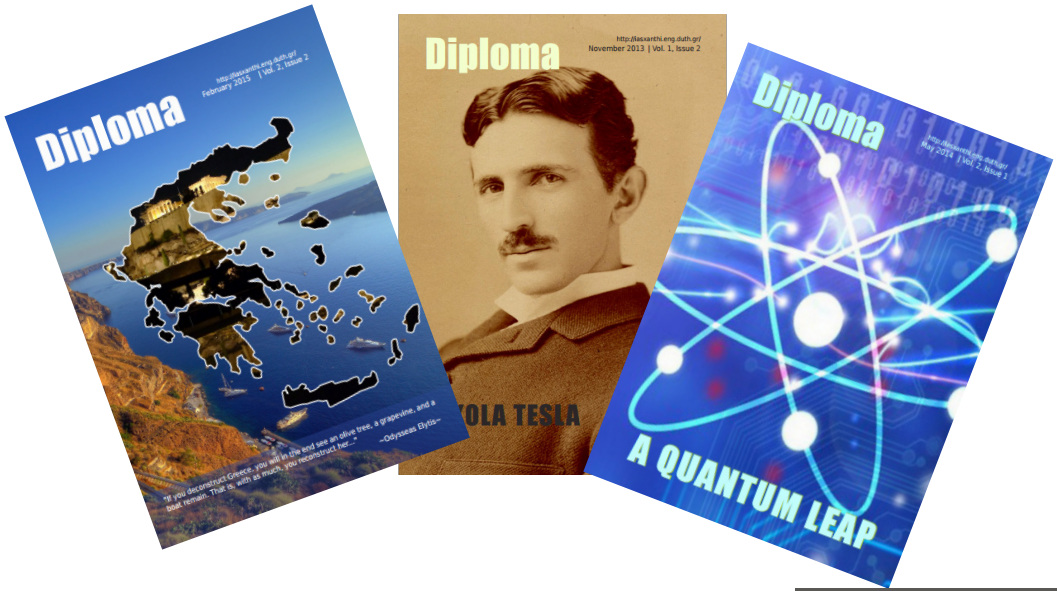
In addition to this, our past chairs **Ms. Christina – Panagiota Malliou and Ms. Galini Kondyli received the 2013 and 2014 "Outstanding Student Branch Chapter Chair" for their successful leadership of our Chapter**.

Even though our site has been awarded several times since the creation of our Chapter and it's a great way to inform our students **about IAS, our Chapter, our university and our activities, along with the membership form that we have created, one of the best activities is the magazine that you are reading right now!**

The idea for DIPLOMA came in one of our past Chair, Christina Panagiota Malliou and our Chapter's Advisor, Prof. Athanasios Karlis regular meetings in May 2013. The design of our magazine was created by our past Chair and the articles since that first issue are written solely by our chapter's member. Each of the 4 issues that have been published along with this 5th issue include information about IAS, about our chapter and technical articles. The greatest breakthrough is the **"Get Connected" section**, which includes articles by other Chapter worldwide. **Until today we have hosted articles from 15 Chapters and we plan to invite more Chapters**.

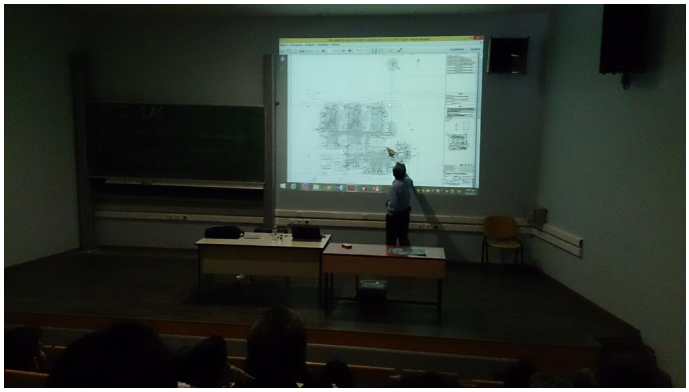


All pas issues of DIPLOMA are available in our webpage!



IAS DUTH SBC ACTIVITIES

by Helen Bouloukosta and Ioanna Boutziona, DUTh SB IAS Chatper Members



Our first activity was a **lecture on "Installation of new Mesimvria compressor station, at the main pipeline of the national natural gas transmission system (nngts) between Russia and Turkey". Mr Maravelia**, the man responsible to oversee and supervise the construction came to our university to talk about this construction and explain us the **full experience of this project** as well as the **plans and the designs** very analytically. We were able to **understand every step of this installation** which is located next to the Operation & Maintenance Center of Northern Greece at the main pipeline of the National Natural Gas Transmission System (NNGTS) (kilometric position 414). There the pipeline's changes diameter from 36" to 30". We had the opportunity to learn how to **manage and oversee such a project as engineers and what exactly is our role**. Finally we understood **the complexity of such a tremendous task, the opportunities and experiences that we will be able to live as Electrical Engineers**!

Except from this unprecedented activity, we also get to an **educational visit to "Raycap"**. This company is known for its **advanced products for telecommunication, energy networks and electrical protection.** Their most known product is called s**trikesorb and it is sold all around the world in to multinational companies and more.** We learned **its operation and saw its production**, and not just that. We also saw how many tests they are doing to make sure that **no product is defective**. We were pretty excited

after visiting their **vast photovoltaic park**. This is controlled with the use of **12 string boxes which contained monitoring cards**. There were also **protected with strikesorbs except from the anti-lighting system they had**. Last but not least, we visited also their enormous storage, which contains a huge amount of ready-to-go products and **uses photocells so as to save energy**.

Our last, but not least event for the academic year was a **workshop on "Electromobility: current situation and prospects" and an International «Eco-Rally» for Electric, Hybrid Electric and Alternative Energy Vehicles, with start and finish at the city of Xanthi.** Distinguished speakers from the **Hellenic Institude of Electric Vehicles (HEL.I.E.V), the Companies Systems SUNLIGHT S.A., HEL.PE. and the Department of Electrical and Computer Engineering, Democritus Univercity of Thrace** shared their knowledge about eco-mobility to the public, who was attending the seccions.

The second day was dedicated to the race 'lovers'. **A race of accuracy attracted crews from Athens, Kavala and Xanthi. We also had the honor to have a crew from Bulgaria participating**. The combination of the great cooperation between participants and organizers and the excellent sightseeing of the trip rewarded both. **The members of the DUTh IAS SBC were extremely helpful on the accomplishment of the entire event.** Its very important to mention the basic organizers, HE.L.I.E.V, the Municipalities of Xanthi and Abdera, the Automobile Club of Xanthi, the Professional Repairers Accosiation 'Prophet Elijah' and the Chamber of Xanthi and was supported by the Region of Eastern Macedonia and Thrace.

WHAT'S NEXT?

by Christina - Panagiota Malliou, DUTh SB IAS Chapter Financial Manager

As always **our Chapter is particularly active**! First of all, since English is one of the most commonly used language among foreign language speakers and a lot of technical manuals are written in English we consider crucial to provide this knowledge to our members and we are planning to organize **a series of lectures on Technical English with the cooperation of our university's English Professor**.

Creativity and innovation is a focal point for any young engineer. Having this in mind we are organizing **a seminar dedicated to innovation in Greece in cooperation with the Department of Civil Engineering of Democritus University of Thrace**. Moreover, we are planning **academic visits to local companies** in order to link academia with industry.

Beside our regular activities that include lectures, seminars and academic visits after the great success of our **two day workshop on "Electric mobility: current situation and prospects" in conjunction with the international "Eco-Rally" race for electric, hybrid electric vehicles and alternative energy vehicle will take place**, we are planning to start a new tradition in our chapter and establish the Eco-Rally as an annual event.

Since 2015 is a year of celebration for all IAS members, we plan to organize **anniversary activities both for our chapter's members and in co-operation with other chapters worldwide**.

Last but not least, **a few months ago DUTh Women in Engineering Student Branch Affinity Group has been revitalized**. Since a lot of the members that helped to re-activate the Student Branch Affinity Group are also members of our IAS Chapter **we plan to organize common activities.**

REINFORCED CONCRETE

by Amastasia Koulma

A standout amongst the most importan material for the structural designer work is Reinforced concret (PC). It has numerous points of interest in development, for example, simplicity of needing to come to fruition molds, substantial compressive quality, sturdiness, imperviousness to flame and the generally ease. An extra focal point is the moderately low vitality utilization for the creation of which has brought about a lower ecological effect.Fortified cement have numerous positivem, however it has got a major inconvenience it has the low rigidity.

Reinforced concrete or reinforced concrete is a composite material got by fortifying the cement with some other material more noteworthy resistance called armature. As fundamental fortification material usually utilized steel as bars or filaments and seldom glass strands, polymeric materials and others. The objective of building today is to consolidate the properties of these materials in another covering the needs of the development.

To cover the affectability of the cement, the material of the armature must have high elasticity. Likewise to have the capacity to work with cement at the point when changing the temperature should also have comparable warm development coefficient. Steel is very important material because has both properties as said above. Steel downside is that rust on fire. Rust is the result of oxidation. Concrete forming alkaline environment which prevents oxidation of the steels and sufficient thickness as to protect from high temperatures of the fire. So the two materials cover the shortcomings of the other.

The armature comes to concrete,either as fibers intermingled mixture of or eithe, as rods at selected positions resulting from static analysis of the structure. The rods are placed mainly at the positions shown tensile stresses or more generally where the strength of concrete is not enough. Because of the higher expense for reinforcement, endeavoring just be utilized where it is essential. In the rafters usually placed and other reinforcement for seismic reasons, construction, limiting cracking, resistance to vertical forces and other.

The support in a RC structure, for example, a steel bar, needs to experience the same strain or misshapening as the encompassing solid so as to counteract brokenness, slip or detachment of the two materials under burden. Keeping up composite activity obliges exchange of burden between the cement and steel. The direct stress is transferred from the concrete to the bar interface so as to change the tensile stress in the reinforcing bar along its length, this load transfer is achieved by means of bond (anchorage) and is idealized as a continuous stress field that develops in the vicinity of the steel-concrete interface.

Since the genuine bond stress fluctuates along the length of a bar moored in a zone of pressure, current worldwide codes of determinations utilize the idea of advancement length as opposed to bond stress. The fundamental prerequisite for wellbeing against security disappointment is to give a sufficient expansion of the length of the bar past the point where the steel is obliged to add to its yield anxiety and this length must be at any rate equivalent to its improvement length. Nonetheless, if the genuine accessible length is deficient for full advancement, extraordinary harbors must be given, for example, machine gear-pieces or snares or mechanical end plates. The

same idea applies to lap join length said in the codes where joins (covering) gave between two nearby bars to keep up the obliged coherence of anxiety in the graft zone. In wet and cool atmospheres, strengthened cement for streets, extensions, stopping structures and different structures that may be presented to

deicing salt may advantage from utilization of consumption safe support, for example, uncoated, low carbon/chromium, epoxy-covered, hot plunge aroused or stainless steel rebar. Great outline and a well-picked solid blend will give extra assurance to numerous applications. Uncoated, low carbon/chromium rebar seems to be like standard carbon steel rebar because of its absence of a covering; its very consumption safe highlights are characteristic in the steel microstructure. It can be distinguished by the one of a kind ASTM indicated plant checking on its smooth, dim charcoal completion. Epoxy covered rebar can undoubtedly be distinguished by the light green shading of its epoxy covering. Hot plunge excited rebar may be brilliant or dull dark relying upon length of presentation, and stainless rebar shows an average white metallic sheen that is promptly discernable from carbon steel strengthening bar. Reference ASTM standard determinations A1035/A1035M Standard Specification for Deformed and Plain Low-carbon, Chromium, Steel Bars for Concrete Reinforcement,A767 Standard Specification for Hot Dip Galvanized Reinforcing Bars, A775 Standard Specification for Epoxy Coated Steel Reinforcing Bars and A955 Standard Specification for Deformed and Plain Stainless Bars for Concrete Reinforcement.

An alternate, less expensive method for ensuring rebars is covering them with zinc phosphate.Zinc phosphate gradually responds with calcium cations and the hydroxyl anions exhibit in the bond pore water and structures a stable hydroxyapatite layer. Infiltrating sealants commonly must be connected eventually in the wake of curing. Sealants incorporate paint, plastic froths, movies and aluminum thwart, felts or fabric mats fixed with tar, and layers of bentonite earth, now and again used to seal roadbeds. Erosion inhibitors, for example, calcium nitrite [Ca(NO2)2], can likewise be added to the water blend before pouring cement. By and large, 1–2 wt. % of [Ca(NO2)2] regarding concrete weight is expected to anticipate consumption of the rebars. The nitrite anion is a mellow oxidizer that oxidizes the dissolvable and versatile ferrous particles (Fe2+) present at the surface of the eroding steel and makes them encourage as an insoluble ferric hydroxide (Fe(OH)3). This causes the passivation of steel at the anodic oxidation locales. Nitrite is a significantly more dynamic erosion inhibitor than nitrate, which is a less intense oxidizer of the divalent iro.

A beam bends under bending moment, resulting in a small curvature. At the external face of the curve the solid encounters tractable anxiety, while at the internal face it encounters compressive anxiety.

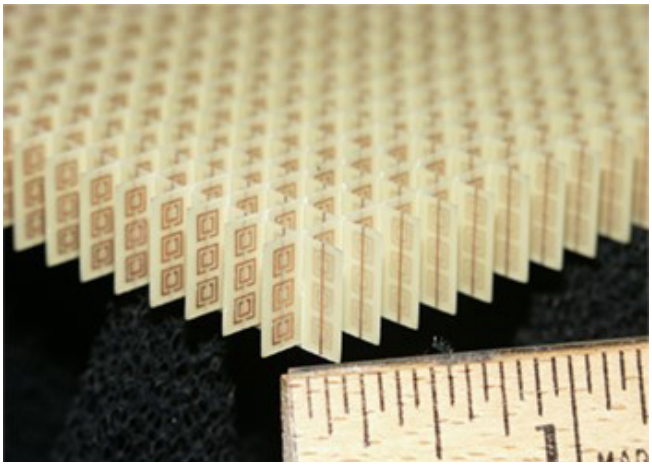
- singly reinforced
- doubly reinforced
- under-reinforced

- ver-reinforced
- balanced-reinforced
- characteristic strength
- design strength or nominal strength
- ultimate limit state

Fortified solid structures are regularly outlined by and regulations or proposal of a code, for example, ACI-318, CEB, CP110 or the like. WSD, USD or LRFD strategies are utilized as a part of configuration of RC structural individuals. Investigation and outline of RC individuals can be done by utilizing straight or non-direct methodologies. At the point when applying wellbeing components, construction laws typically propose straight methodologies, yet for a few cases non-direct methodologies. To see an illustration of a non-direct estimation visit reference

INVISIBILITY AND EDITING EVENTS USING META-MATERIALS

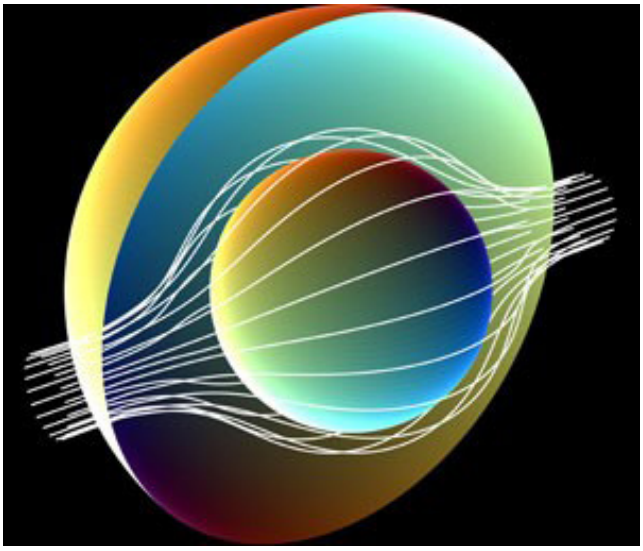
by Konstantinos Papatheologou, IAS DUTh SBC Member



Meta-materials are artificial materials designed to have properties that have not yet been found in nature. They are congregations of various individual components formed from customary materials, for example, metals or plastics, yet the materials are generally built into rehashing examples, frequently with microscopic structures. Meta-materials derive their properties not from the compositional properties of the base materials, but from their exactingly-designed structures. Their precise shape, geometry, size, orientation and arrangement can affect waves of light (electromagnetic radiation) or sound in a manner not observed in natural materials. These meta-materials accomplish desired impacts by consolidating structural components of sub-wavelength sizes, i.e. features that are actually smaller than the wavelength of the waves they influence.

Invisibility

To achieve the feat of “cloaking” an object, scientists have developed meta-materials that can bend electromagnetic radiation, such as light, around an object, giving the appearance that it isn’t there at all. The first examples only worked with long-wavelength radiation such as microwaves. One small device that made small objects invisible to near-infrared radiation and worked in three dimensions was unveiled by physicists from the UK and Germany. Researchers at Boston University and Tufts University claim that they have come up with an invisibility cloak that works within the terahertz band



the radiation between infrared and radio wavelengths – but could be modified to work with visible light.The meta-materials utilized as a part of endeavors to make invisibility are comprised of a cross section with the dispersing between components not exactly the wavelength of the light we wish to bend. The silk-based shroud as of late declared uses "split ring resonators" – concentric sets of rings with parts at inverse closures. 10,000 gold resonators were at first joined to an one-centimeter-square bit of silk.

Editing events

Now suppose you could "shroud" an occasion, make it disappear in time. It is one thing to make an item imperceptible, a concept now a reality courtesy of “meta-materials,” but another to make an event disappear, though the event cloak (space-time cloak) idea uses similar ideas of gaming particles of light to create an illusion of perception.

By tweaking the ways of light particles, you are ready to bend them around an item, concealing it. Shrouding an occasion is somewhat diverse, notwithstanding. The light isn't bended, space-time is. (Consider time a space that can be bowed and molded by fiddling with the pace of light.) Imagine in the event that you had a room in which light voyaged slower than its top speed, which is essentially any room that isn't a total vacuum. To make the shroud, you would need to speed the light up from the period before the occasion and afterward you would need to back the light off for the time of time after the occasion.

The catch is this that with our at present just envisioned meta-materials, you could just get a small amount of nanosecond of shrouding. Which is awful for plots, however inevitably useful for computing, insofar as you could make an "interrupt without interrupt" function.

APEC 2015

by Galimi Kondyli, DUTh SB IAS Chapter Vice Chair

The **Applied Power Electronics Conference and Exposition (APEC) 2015** took place in Charlotte North Carolina, March 15-19. The venue chosen for the conference was the Charlotte Convention Center, an **impressive convention center** with many rooms, ballrooms and halls for the convention.

My experience of the APEC 2015 was one of the best! I got to attend many **sessions** and take part in **expanding IAS globally** while **meeting new people and socializing**. At this conference I was one of the **Information Desk Volunteers** and one of the **organizers of the joint IAS/PELS Young Professionals Program (YPP) event**.

The first day of the conference was Sunday, March 15th. On this day, I got to **meet my old friends** that I had met in previous conferences and some **new people and arrange the details regarding the Information Desk and the YPP event**. I first visited the **Convention Center, the Exhibition Hall and the venue of the YPP event**. I set up the **IAS Information Desk in the Exhibition Hall**. I also attended some **seminars regarding Power Electronics** which were very informative.

In the evening I attended the **50th Anniversary Celebration - Cake Cutting & Reception** at the Hotel Westin, followed by dinner with Dr. Peter Magyar, Tamas Ruzsanyi and other IAS members (Srikanth Vasudevan, Samira Janghorban and Roozbeh Kabiri-dehkordi).

On the second day (Monday 16th), I had a **brief discussion with the IAS and PELS representatives regarding the organization of the YPP event**. After consulting with the IAS representatives we arranged the last details on the IAS Information Desk, and at 5pm, the Exhibition Hall was officially open.

Many people visited our booth and wanted to get information on IAS. People interested in IAS could learn more from our information leaflets, brochures and magazines. We were also giving away **IAS Shirts and T-Shirts with the 50th Anniversary logo, along with IAS pens, pins and IAS transactions containing papers.** Many attendees got interested and took our brochures and promotional material with them. Thanks to the **"Best Things in Life are Free"** campaign that was going on during the conference, many people got to try IAS for a year for free. We had our laptops on the spot and we assisted all attendees in becoming members of IEEE and IAS.

On Monday evening, we got to attend the **Micromouse Contest**. This was a very interesting contest, where attendees had their **small robots compete in a maze**. **The winning robot had to finish the maze fast, without hitting on the walls.** The robots were small, just like mice. It was fun watching the robots run through the maze!

On Tuesday, I attended some of the **technical sessions**, regarding the **transportation power electronics and machines**. After the sessions I had to be at the Information Desk. **Thanks to IAS president Dr. David Durocher and his speech, many people were informed about IAS and came looking for us in the Exhibition Hall, in order to become members or just get more information**.

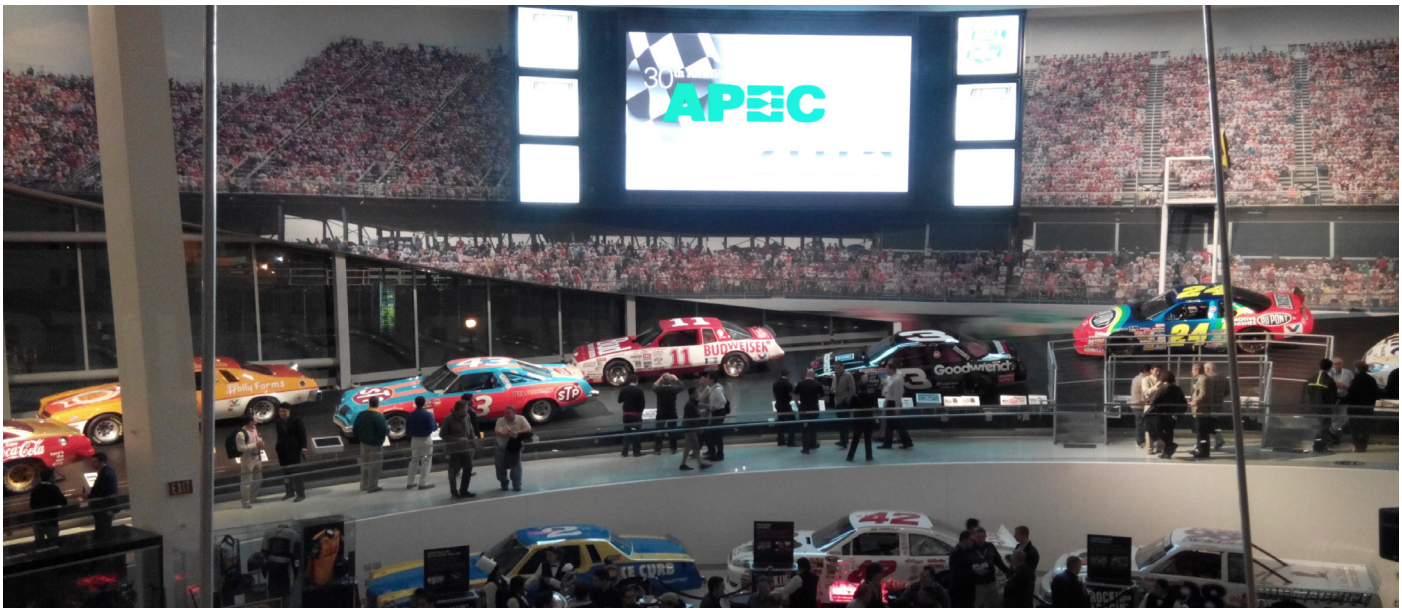
In the evening there was the YPP event. The joint IAS/PELS YPP event took place in the "Strike City", a bowling alley. In this event, the attendees were mainly **young professionals and students.** There was a panel discussion, with **4 panelists,** where the attendees got to ask questions regarding their life and profession and got advice from the panelists. During the event there was a buffet dinner, and the attendees got to socialize with each other, while having a good time having drinks, playing on the pool tables or bowling. There was also an **IAS 50th Anniversary Celebration, where the attendees sang "Happy Birthday IAS", and then took a slice of the huge delicious cake**! In the end, we gave away IAS T-shirts to all the attendees!

On Wednesday morning, I was in the information desk. Many attendees came even in the last day, asking about IAS. In the afternoon, the Exhibition was over, so we packed everything and sent it away. I had some free time, so I had a walk around Charlotte for a couple of hours, before attending the Social event on that night. I found that **Charlotte is a very interesting city, full of skyscrapers and other beautiful buildings**.

In the evening, I attended the Dinner & Social Event, which took place in the "Nascar Hall of Fame". It was a unique experience, unlike other social events, I've been to. The "Nascar Hall of Fame", is a museum of the Nascar auto racing sports events, with a theater and interactive attractions and rides. As part of this event, there were food, drink and dessert stands in the venue, and attendees could admire the museum in their own pace, while having food and drinks. We got to ride a NASCAR car simulator and view many NASCAR classic cars, while meeting new people!

On Friday morning, after sharing breakfast with my new friends, I had to fly back to Greece.

Even though I had been to previous conferences, I believe that APEC was one of the best. I got to attend sessions and seminars on my field of interest and also got to volunteer and participate actively in the conference, while meeting old friends and making new ones! It was a great experience!



GETTING CONNECTED

by Christos Pnevmatikos, DUTh SB IAS Chapter Webmaste and MD Officer

One of the main aspects of human life, that made it possible to evolve and flourish, is communication. By definition communication is the main activity through it information about the needs, desires, perceptions of life, knowledge are transmitted from one individual to another.

It would not be an exaggeration to say that whatever mankind has achieved is the product of communication whether that was expressed through lucrative dialogue between people or if it was due writings and knowledge that passed from one generation to another. For instance if it would not been for Democritus and Leucippus that first imagined the atomic theory and gave that knowledge to mankind then historically more possible there would be another outcome until Rutherford and his colleagues described the so called Rutherford nuclear model of atom. And although communication through writings may take centuries, a new era has risen with the invention of internet something that lead this exchange of information to become extremely fast in a worldwide scale only with the touch of a button.

Although understanding the importance of communication between people and nations is easy enough, overcoming the imaginary differences that society has created is another issue. What is more, it is difficult in the daily life to come in touch with people from different counties all over the world but in a manner of you can truly communicate, but with the right opportunity given, people could eventually understand that they share common thoughts, fears, hopes for the future they want to create and furthermore find out ways and share ideas with each other in order to achieve that.

In a nutshell taking all into consideration, if imagined that the connection of information between cell brains is actually one human's consciousness and personality, it would be a common sense to think that only with the right communication, and humans can work as a unit, connecting their thoughts and feelings and take the next step to the scale of evolution.

UNIVERSITY OF CALGARY SB PES/IAS CHAPTER

by Bradley Ether Coleman, University of Calgary SB PES/IAS Chapter Chair

The **University of Calgary is located in Calgary, Alberta, Canada** in the foothills of the majestic Canadian Rocky Mountains. This year was the **inaugural year for the IAS/PES student branch** of the UofC, together **with the IEEE-SB at the UofC it comprises about 200 registered members.**

Working together with the IEEE-SB **our focus is on networking opportunities, facility tours and social events.** This year we held an **IAS/PES industry mixer at the university just before the Christmas break.** It was attended by a couple of dozen **industry representatives and around a hundred students (both undergraduate and graduate students)**. Early this year we **toured a hydroelectric facility in Canmore** just outside Banff National Park with about **30 students and 2 professors from the faculty of electrical engineering.**

We have **another tour planned for a high voltage substation just outside Calgary, and are currently rounding out the end of the year with exams. The new executive has been elected for next year as we will be handing over the reins in the summer.** Additionally, the **IAS 51st Annual Industrial and Commercial Power Systems conference will be held in Calgary this May, and some student members will be supervising the membership booth and taking in some of the conference highlights.**

Our members are a good group of students, all hard working and benefit from positive social ties outside of school as well. The IAS and the IEEE-SB at the UofC provide a **solid professional and technical outlet for students, aside from studying and a night or two in the campus pub.**

UNIVERSITY OF PICARDIE JULES VERNE

by Alin Pantea, UPJV IAS SBC Chair

The **IEEE Student Branch and IEEE IAS Student Branch Chapter of University of Picardie Jules Verne (UPJV)** are located in North of France in Amiens, Picardy Region. The IEEE Student Branch was **officially formed the 5th of October 2005,** while the IAS Student Branch Chapter **started its activities the 18th of March 2013**. Its main purpose is to **organize technical events and workshops which are focused on the wind turbines, electrical machines, power electronics and drives.**

The IAS SB was **promoted at the UPJV in order to attract new members and create a network which helps students and professionals develop their technical capabilities**. The volunteers in the organization team were involved in **the organization of some conferences in the field (The International Conference on Electrical Machines (ICEM), Power Electronics, Drive Systems & Technologies Conference (PEDSTC), International Conference on Renewable Energy Research and Applications (ICRERA)).**

Amongst some of the organized IEEE and IAS events by our SB we can mention the **IEEEXtreme completion, IEEE France Section meetings and IAS events like IAS Inauguration meeting of IEEE SB and IAS Student Chapter in France, at the University of Technology of Belfort-Montbéliard, in Belfort and University of Lorraine in Nancy.**

To inform our student members, a technical visit of **a wind farm in the Picardy Region supported by IAS CMD was organised, during which a specialist explained how a wind turbine works**, and how **the supervision and control of a wind farm** takes place. They also got the rare chance to actually **enter in the wind turbine and observe its main components.** During the academic year some sportive activities were organised for the members to **encourage team work, team bonding and also to enjoy and relax.**

Our student branch was **awarded by IEEE France Section for its activities at the 50th anniversary of the Section** and some of the members were awarded for **Outstanding IAS Student Volunteer.** Other awards were received by members for their valuable contribution in the organizing committee at **International Conference on Electrical Machines.**

The main challenge today remains to attract students into the branch, to insure its continuity and to organize technical events and workshops.

IEEE STUDENT BRANCH UNIVERSITY OF WESTERN MACEDONIA

by George Stefanidis, IEEE SB UoWM Chair

University of Western Macedonia

IEEE Student Branch

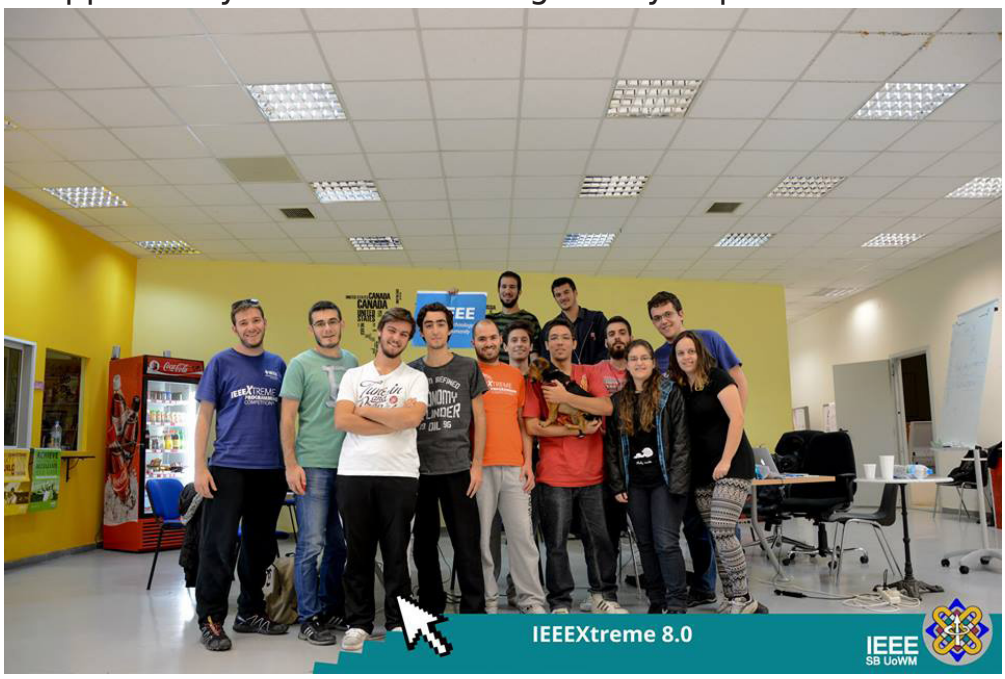
IEEE SB UoWM is located at the facilities of Department of Computer and Telecommunications Engineering at University of Western Macedonia. The branch was formed at April 2010. Dr. Georgios Papadopoulos proposed the idea to start the branch a month before the formation. Immediately after the proposal there was an open call to all students of the university to engage and put the idea into action. Since then we count a lot of events, actions and participations in conferences and competitions.

You may wonder what are the main goals of the branch? There are identical to those of IEEE, promote technology in favour of humanity. We want our members and students of the department to excel in technology and to participate in the development of new trends.

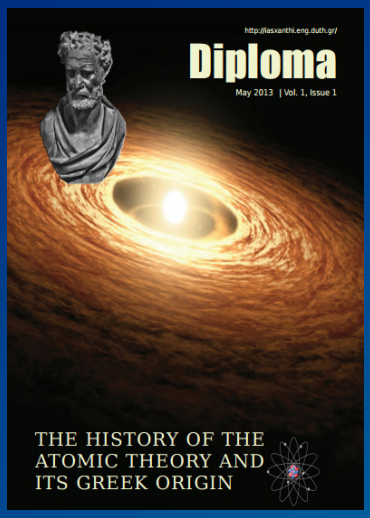
How it is possible to do that? Events, the main solution is to organise events. During those years we've organised various events. Most of our events were workshops where students and members had the chance to see new technologies and also to participate in the making. Also workshops and not just presentations are more attractive and engage participants in demos of various technologies like coding, virtual reality etc.

Except events we organise visits to conferences or technical sites. We've visited 4th, 5th, 6th, 7th and 8th Panhelenic Conference of Electrical And Computer Eng Students. Also Coal - Steam Power Plant of PPC and control and distribution centre. Also we've visited several times technical infrastructure like the technical department of OTE telecommunications company.

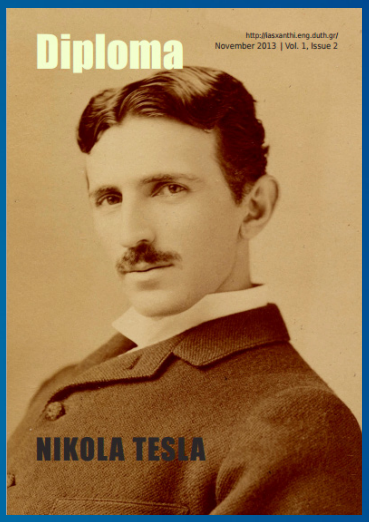
How about our members? We are at the pleasant position to claim that our alumni members are recognised scientists in various fields of Computer and Telecommunication Eng., you may visit our website and see their CV. Our current members are students of the department who are curious and want to evolve technology, game designers, virtual reality specialists and penetration testers whom through the activities of our branch had the opportunity to learn new things or try to pass their knowledge to others through the workshops.



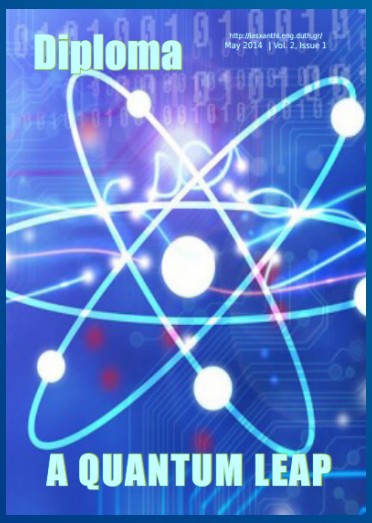
The future? Nobody knows the future, only thing we can do is to make plans. Currently the plans are to do as much as possible events for our member and general public and then motivate our members to take initiatives and organise eventsorvisitstheylike.



DIPLOMA stands for **D**emocritus **I**ndustrial ap**PL**icati**O**ns **MA**gazine. It is a magazine published semiyearly by the students of Democritus University of Thrace Student Branch IAS Chapter. We started DIPLOMA 2 years ago. The idea started from **Christina Panagiota Malliou**, our past Chapter Chair in a regular meeting with our Chapter Advisor **Prof. Athanasios Karlis.**



It is a **mean of communication between the members of DUTh SB IAS Chapter and IAS members all over the world**. From our chapter's inauguration **both our Advisor and our past Chair wanted to promote and establish connections between our chapter and other chapters worldwide**. In the last 2 years, 5 issues have been published and **more than 15 Chapters from all over the world have written their stories in DIPLOMA.**



This Magazine is attracting more and more students to write and actively take part in IAS. More than **26 writers have expressed their opinions**, hopes and interests in DIPLOMA's pages. **IAS Chapter and Membership Development has embraced the idea and is covering the Printing Expenses of this Magazine**, in order to be distributed in conferences, where DUTh SB IAS Chapter Members are attending.

This issue is a triple anniversary for the IAS members in DUTh IAS SBC! As all IAS members we celebrate the 50th Anniversary of IAS but we celebrate both our chapter's 3rd year anniversary and the 5th issue of DIPLOMA!