

RESEARCH: The silent contribution of practicing Engineers

The English dictionary has two very interesting definitions of the term "research". One reads as follows: Scholarly or scientific investigation or inquiry. The second definition is: A systematic investigation to establish facts or principles or to collect information on a subject. The former definition is quite what is commonly attributed to our general understanding of this term. Perhaps with reason, when we think of research, academic institutions are the first thing that comes to mind. However, are we justified in this thinking? Is research contribution only achieved through registration as a postgraduate student at a tertiary institution or employment as an R & D Engineer or academic? If without hesitation your answer is yes, then I'd like to challenge your perception. If it is a hesitant yes, perhaps you may allow me the opportunity to sway your thinking on the matter.

South Africa is ranked 2nd in Engineering research in Africa behind Egypt (Global Research Report Africa, Thomson Reuters, April 2010). Whilst this may seem impressive, we are competing on a global scale and must therefore be measured at that level. Globally South Africa is ranked 42nd and Egypt 29th, thus accentuating its superiority within Africa in this field (South Africa Research in the context of Africa and globally, Pouris and Jeenah, October 2008). Our trade partners in the BRICS bloc, Brazil and India are also ranked higher globally in the field. What we do not know is that each of us could be positively contributing in-

sureing that South Africa becomes a global engineering research powerhouse. The big question is HOW?

As a practicing (actively working in the profession) Engineer (Electrical, electronic etc.), you have core functions that you are required to execute as part of your daily duties. In the majority of instances although to a varying degree, the level of responsibility and complexity of these daily tasks are only influenced by your experience, level and area of expertise. Beyond these factors, this would normally happen irrespective of your professional registration status. As engineers we are exposed to and process a huge volume of raw data (theoretical literature and operational) as we go about our daily tasks. The scholarly value of this data lies in its orderly and systematic analysis with an aim to simply report on, investigate, prove or disprove our professional "guess" (hypothesis). In essence, we embark on a systematic investigation to establish facts or principles or collect information on a subject to solve an engineering problem. You'd have to agree with me in that this qualifies as research. There are a lot of topics or niche areas that are of great interest within the global engineering fraternity. Thorough harvesting and synthesis of all this raw data could potentially lead to meaningful scholarly contributions with a measurable research output.

Therefore, that unique harmonic filtering design solution that you recently provided in your processing plant's main incomer



Zola Ntshangase is the author of this guide. He is a SAIEE KZN Centre Committee Member.

substation, those unlikely leakage current readings you discovered, those unexplained dips and swells you managed to innovatively rid of on your network is what the world wants to know about. Your silent contribution in the world of engineering research needs to be made known! Whether you are Plant engineer or consulting engineer your contribution will feed to South Africa's research baseline. With a bit of assistance from a colleague, superior or an academic in the art of scholarly finesse, your article should be "good-to-go". There are a number of magazines and journals affiliated or approved by the SAIEE that would appreciate your technical article submission.

To name, but a few that you can visit the following websites:

1. **KZN SAIEE Recharge newsletter**
www.saiee.org.za
2. **Engineering News magazine**
www.engineeringnews.co.za
3. **SAIEE Africa Research Journal**
www.saiee.org.za
4. **WATTNOW magazine**
www.wattnow.co.za
5. **Construction World magazine**
www.crown.co.za
6. **IEEE** (Transactions, journals, magazines, newsletters and letters)
www.ieee.org

KZN SAIEE Centre newsletter

THIS IS YOUR NEWSLETTER and we invite you to make suggestions and submit items of interest and photographs.

Advertising is welcomed and we are considering a "vacancy" column.

For adverting opportunities contact Gill Nortier at saiee@iafrica.com

CARDIAC MRI

Synopsis of a
SAIEE KZN Centre
Presentation by
Yarish Brijmohan:
see Page 3



Zola Ntshangase Profile



ZOLA NTSHANGASE is a registered Professional Electrical Engineer with ECSA and an SAIEE KZN Committee elected member. He currently runs ZML Africa Projects, a multi-discipline consulting engineering firm that he founded. Zola has over 10 years in the field of electrical engineering, varying from the minerals sector, teaching and research and building services.

He currently holds a B.Sc (Eng) degree in electrical engineering from UCT and an M.Sc (Eng) degree in Electric Power and Energy Systems from UKZN specializing in HVDC systems. He recently received an Eskom-NRF Black Researchers/Academic Development (BRAD) programme scholarship to pursue a PhD degree in Electrical Engineering at UKZN under the supervision of Professor Ijumba. His research topic is titled: *The Characterization of the Electric Field and Ion Current Environment of HVDC Overhead Transmission Lines*. He will study the interaction of electric fields of HVDC overhead lines of different tower geometry and the resultant ionic currents thereof on the ground plane.

He started his career as a trainee engineer for De Beers Kimberley Mines. Later, he moved to UKZN as a Research Assistant and subsequently joined MUT and DUT as a Lecturer. He has also worked as Senior Electrical consultant for TFMC who have a facilities and infrastructure services contract with Telkom. While with TFMC he gained valuable knowledge in MV/LV systems design and project management. He has presented a number of peer reviewed papers at national and international conferences.

Zola has a passion for personal development and research and is planning to sit for his PMP exam soon and thereafter submit for professional project manager (PrCPM) with the SACPCMP. He says he joined SAIEE because he believes it is his role and responsibility to change lives through the dissemination of information.

He spends most of his free time at home with his family. He is an avid tennis and squash player and dares you to challenge him!



SAIEE 2013 Proposed Programme KZN CENTRE

Date	Presentation / Tutorial / Visit
October	
17/10/13	Presentation: Introduction to Fibre Optic Communication by Subhash Jagannath
November	
? /11/13	CPD Course: *date & title to be confirmed
21/11/13	Breakfast/Morning Seminar: Lightning and Surge Protection by Tony Rayner



Ramble Malone Electrical Engineers are presently involved in a project in Rwanda, in Central Africa. During our investigation into the power supply required for the project we came across an article which we thought would be of interest to the SAIEE members. It is interesting to know what is going on in Africa beyond our borders

Article sourced and contributed by Chris Ramble (SAIEE KZN Centre Past Chairman)

ABUNDANT ENERGY OPPORTUNITIES

Perfect Policy and Legal Framework in Rwanda's Energy Sector – Realities Behind the “1 000 MW Dream”

Diversified Energy Sources

Despite the energy shortage, research indicates that Rwanda is endowed with abundant energy sources, the majority of which remains untapped. Over the past few years, the Government of Rwanda has invested a lot of effort and resources to create a conducive investment environment in the energy sector. On the legal platform, in July 2011, the new Electricity Law was passed. It governs the activities of electric power production, transmission, distribution and trading both within and outside the national territory of Rwanda. The law liberalizes the electricity sector and brings about harmonious development of power in the country. The Electricity Law gives the Ministry of Infrastructure the rights to provide concession agreements to private investors, and provides the legal basis for the Rwanda Utilities Regulatory Agency (RURA) to approve and grant licenses for the production, transmission, distribution and sale of electricity, the conditions for licensing, and addresses the rights and obligations of the license holders. Reforms of liberalisation and privatisation led to the creation of RURA as an independent institution for ensuring non-discriminatory treatment of all players in the liberalized market. RURA has a legal personality and autonomy in the manage-

ment of its finances, assets and employees and has its own official seal. Energy is one of the public utilities regulated by RURA. The law specifies that the energy market of Rwanda shall be single market based on free and open third party access to the transmission and distribution networks. The new law authorizes the issuance of an International Trade License for the import and export of electric power across the borders of Rwanda, and for the supply and sale to eligible customers. It also provides for a “Universal Access Fund” to provide greater access to rural and other unserved areas. On the policy platform, the Ministry of Infrastructure has developed the energy policy aimed at : developing the energy sector progressively to support economic development and the National Access Roll Out Program, enhancing household energy requirements and gender dimensions, bringing down the cost of electricity, enhancing participation of both private and public sectors in energy developments in EAC. In a bid to ensure that the policy works, Rwanda’s electricity strategy has been developed to increase access to modern energy and to meet the ever increasing power demand for economic development of the country. The target is to accelerate electricity generation mix

Continued overleaf

SAIEE KZN CENTRE PRESENTATION BY YARISH BRIJMOHAN:

“3D Modelling, Segmentation, Quantification and Visualization of Cardiac MRI”

Synopsis

The human heart is a powerful muscular organ that maintains blood circulation through the body. Imbalances in the circulation system lead to various cardiovascular diseases. In routine clinical medical practice, images in the form of magnetic resonance imaging (MRI) are produced in large quantities on a daily basis to assist in diagnosis of internal bodily ailments. Interpretation of the images is often still performed visually due to lack of automatic tools for extracting quantitative measures from images.

Intelligent computer vision algorithms aim to extract essential information from images, for quantitative assessment of a disease, pattern recognition (automated

diagnosis), segmentation, enhancement, motion and shape analysis. Segmentation of the medical image distinguishes between different organs, tissues, vessels, blood flow, etc. A precise segmentation allows not only a better visualization of the image data but also makes it possible to quantify that particular area of interest and provide further meaningful information.

This talk provided an overview of current techniques used by these computer vision algorithms. Thereafter focus will be the research work performed by the author as a part of his PhD study. Covered in the presentation were the newly derived modelling and segmentation techniques which are used to quantify left and right ventricular functions.



Veer Ramnarain (SAIEE KZN Centre Chairman), Yarish Brijmohan (Presenter)

Speaker Profile – Yarish Brijmohan:

Yarish graduated from the University of Natal in 2002 specialising in signal processing. Thereafter he completed his MSc, focussing on Image and video compression. Yarish is currently pursuing his PhD in Cardiac MRI modelling.

His work experience extends over 8 years, through a variety of companies, specialising in hardware and software development on various platforms relating to the communications field. He also has a patent in watermarking a HD video data stream.

Yarish is currently a part of a dynamic team of engineers at eThekweni Electricity's Communication Networks branch. His focus area is to expand utility communications using a variety of new techniques.



SAIEE members and visitors present at the Presentation on 15 August'

ABUNDANT ENERGY OPPORTUNITIES

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proposed in the “Electricity Development Strategy 2011-2017”, projecting to generate 1,000MW from both the indigenous energy resources and from shared energy resources with neighbouring countries.

In regard to effective implementation of policy and strategy for electricity in the country, the Rwanda Energy, Water and Sanitation Authority (EWSA) was established in 2011 as 100 percent publicly owned utility. EWSA is responsible for the planning and implementation of power projects in the country. Created by Law no 45/2010 of 07/12/2010, EWSA ensures adequate and quality electricity, water and sanitation services in Rwanda at the smallest cost through effective planning, investment, contracting, supply, operations and maintenance. Meanwhile, EWSA, the na-

tional electricity supplier and energy strategy implementing agency, has set a target of 1.4 million electricity connections by 2017. The anticipated raise represents a 70 percent increase in electricity connections, currently a 304,800.

This comes as more projects to generate more power are being put in place. According to the parastatal, 28 more megawatts are expected to be loaded onto the national grid this year, which represents an increment of 20 percent.

In 2006 EWSA had over 70,000 connections and by July last year, the connection had increased to over 320,000 connections generating annual turnover of \$65 million, which is 79 percent of EWSA's total revenue.

With various innovations that EWSA introduced recently such as electronic billing and payment of utilities, EWSA is now at 95 percent revenue collection efficiency.

Mr. Yves Muyange, the Director General of EWSA, says that the current status of electricity is 100.5 MW installed On-Grid capacity and exactly 87.5 MW available capacity. Projections put Rwanda's energy demand at 641 MW in 2017. Out of the available 87.5 MW capacity today, 15.7 percent is imported, 57.4 percent is locally generated from Hydro, and 38.7 percent locally generated from Thermal. Bigger plans are underway to phase out thermal from the grid because it is so costly as it is generated from expensive heavy diesel.

* The article goes on to discuss:

- Methane Gas Basket;
- Geothermal Power Basket;
- Peat-to-Power Projects;
- Solar Energy; and
- Waste-to-Power.

The complete article can be sourced from Chris Ramble on info@ramblemalone.co.za



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THINK.LEARN.DO.

The Faculty of Engineering and the Built Environment (FEBE) has more than 6 500 students enrolled across the departments of Chemical Engineering, Civil Engineering and Survey, Construction Management and Quantity Surveying, Electrical Power Engineering, Electronic Engineering, Industrial Engineering, Town and Regional Planning, Architecture and Mechanical Engineering. All our programmes are fully accredited by the relevant professional councils.

FEBE offers National Diploma, BTech, MTech and DTech courses with focused research in areas including Membrane Technologies for Water Purification, Chemical Thermodynamics, Applied Computational Intelligence, Bio-composites/Nano-materials, Technology Station in Reinforced and Moulded Plastics, the Inlebe Radio Telescope, Real Time Power System Simulation, Renewable Energy, Transportation, Engineering Education, Sustainable Development and Human Settlement.

Our illustrious alumni include Silver Tusk Award recipients, Chemical Engineering graduate Vanitha Engelbrecht, Mechanical Engineering graduate Gordon Murray and Electronic Engineering graduate, Sharoda Rapeti.

Engelbrecht is the first South African Breweries (SAB) employee to receive the prestigious international award for excellence in the Master Brewer examination. She is also the recipient of the Master Brewer-JS Hough Award from the Institute for Brewing and Distilling in the United Kingdom. Engelbrecht completed her BTech in Chemical Engineering Cum Laude from the former Technikon Natal.

Gordon Murray received his honorary doctorate from the Durban University of Technology in April 2011. He is a Mechanical Engineering graduate from the former Natal Technical College. In 1969 Murray left the shores of Durban for Britain, to follow his passion for motor racing and automotive design. What began as a hobby developed into a four decade career in the automotive industry. Murray began working for Formula One racing and car design as a Technical Director of the Brabham Grand Prix Team. As Chief Designer of the Formula One Brabham Team, Murray's cars totalled 22 Grand Prix wins. After leaving McLaren he embarked on his own business venture and established the Gordon Murray Design Consultancy and unveiled the T25 Low-Carbon City Car in June 2010.

Rapeti graduated with a Higher National Diploma in Electronic Engineering from ML Sultan Technikon. She has 21 years experience in the Technology, Media and Telecommunications industry in South Africa and has earned a multitude of awards. She also holds an MBA and is currently a partner and the director of Technology, Media and Telecommunications at Deloitte Consulting.

Another notable alumni is Dr Vincent Ndinisa who began his undergraduate studies at ML Sultan Technikon. He spent 14 years service as an academic and left DUT to join Tongaat Hulett's Technology and Engineering Group.

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