



## **CONFERENCE PROGRAM**

**The Fourth IASTED African Conference on  
Power and Energy Systems (AfricaPES 2012)**

**&**

**The Fourth IASTED African Conference on  
Modelling and Simulation  
(AfricaMS 2012)**

**&**

**The Fourth IASTED African Conference on  
Water Resource Management  
(AfricaWRM 2012)**

**&**

**The Second IASTED African Conference on  
Health Informatics  
(AfricaHI 2012)**

**September 3 – 5, 2012  
Gaborone, Botswana**

### **LOCATION**

**Gaborone International Convention Centre**  
Bonnington Farm, Molepolole Road  
Gaborone, Botswana

### **LOCAL ARRANGEMENTS CHAIR**

**Prof. George O. Anderson** – University of Botswana,  
Botswana

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**Prof. Thabo T. Fako** – Vice Chancellor,  
University of Botswana, Botswana

### **GUEST SPEAKER**

**Hon. Johnnie K. Swartz** – Minister of Infrastructure  
Science and Technology, Botswana

### **HOST ORGANIZATION**



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### **POWER AND ENERGY SYSTEMS (AfricaPES 2012)**

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**Prof. Thoko Majozi** – University of Pretoria, S. Africa

## INVITED SPEAKERS

**Prof. Komla A. Folly** – University of Cape Town, S. Africa

**Mr. Edward Rugoyi** – Botswana Power Corporation, Botswana

## TUTORIAL PRESENTER

**Mr. Sandeep Goyal** – Jodhpur Institute of Engineering and Technology, India

## INVITED PAPER

**Mr. Andrew Obok Opok** – University of Botswana

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**Dr. Mushtaque Ahmed** – Sultan Qaboos University, Oman

### **INVITED SPEAKER**

**Prof. Dominic Mazvimavi** – University of Western Cape, S. Africa

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# HEALTH INFORMATICS (AfricaHI 2012)

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**Dr. Naomi M. Seboni** – University of Botswana,  
Botswana

## KEYNOTE SPEAKER

**Prof. Paula Kotzé** – CSIR, Pretoria, Nelson Mandela  
Metropolitan University, Port Elizabeth, S. Africa

## INVITED SPEAKERS

**Dr. C.L. Onen** – Gaborone Private Hospital, Botswana

**Prof. Sandro Vento** – University of Botswana, Botswana

## SPECIAL PRESENTATION

**Dr. Dennis Otto-Odokonyero** – DEBSWANA, Botswana

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**F. Pinciroli** – Polytechnic of Milan, Italy

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**J. Richards** – Centers for Disease Control and Prevention,  
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**J. Serra-Sagrista** – Autonomous University of Barcelona,  
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**N. Shaw** – Algoma University / Health Informatics  
Institute, Canada

**P.L. Weiss** – University of Haifa, Israel

## PLEASE NOTE

- ❖ Paper presentations are 15 minutes in length with an additional 5 minutes for questions.
- ❖ Report to your Session Chair 15 minutes before the session is scheduled to begin.
- ❖ Presentations should be loaded onto the presentation laptop in the appropriate room prior to your session.
- ❖ End times of sessions vary depending on the number of papers scheduled.

## PROGRAM OVERVIEW

**Tuesday, September 4, 2012**

**Sunday, September 2, 2012**

17:30 – Registration  
(North Pre-Assembly Area)

18:30 – Welcome Reception  
(Tsodilo B1 and B2)

**Monday, September 3, 2012**

07:00 – Registration  
(North Pre-Assembly Area)

09:00 – Opening Ceremony  
10:00 (Tsodilo B1 and B2)

10:00 – Coffee Break  
10:20 (North Pre-Assembly Area)

10:20 – AfricaMS Session 1 – Mathematical Modelling  
(Tsodilo B1 and B2)

**Lunch Break**  
(Livingston's Restaurant)

12:00 – AfricaPES Invited Speaker – “Interconnected Electrical Power System Operations and Cross Border Electricity Trading: A Case Study of the Southern African Power Pool (SAPP)”  
– Mr. Edward Rugoyi  
(Tsodilo B1 and B2)

13:00 – AfricaWRM Session 1 – Water Technologies  
(Tsodilo B1 and B2)

14:20 – Coffee Break  
14:50 (North Pre-Assembly Area)

14:50 – AfricaWRM Session 1 Continued  
(Tsodilo B1 and B2)

16:00 – Tour Bus Departs for Trip to Nature Reserve  
(GICC Main Entrance)

08:30 – AfricaMS Keynote Speaker –  
Prof. Agostino Bruzzone  
(Tsodilo B1 and B2)

09:30 – AfricaHI Keynote Speaker – “Technical and Socio-technical Approaches to Health Informatics in Africa” – Prof. Paula Kotzé  
(Tsodilo B1 and B2)

09:30 – AfricaWRM Session 2 – Watershed Management Water Supply and Sustainable Use  
(Tsodilo B3 and B4)

10:30 – Coffee Break  
11:00 (North Pre-Assembly Area)

11:00 – AfricaWRM Session 2 Continued  
(Tsodilo B3 and B4)

11:00 – AfricaPES Invited Speaker – “Challenges in Implementing Smart Grid Technologies in Africa: The South African Case” – Prof. Komla A. Folly  
(Tsodilo B1 and B2)

**Lunch Break**  
(Livingston's Restaurant)

13:00 – AfricaPES Session 1 – Power Systems Generation and Distribution  
(Tsodilo B1 and B2)

13:00 – AfricaHI Special Presentation – “SMART PHONES: The Golden Opportunity to Leapfrog e-Health in LMICs”  
– Dr. Dennis Otto-Odokonyero  
(Tsodilo B3 and B4)

14:00 – AfricaMS Session 2 – Modelling and Simulation Methodologies  
(Tsodilo B3 and B4)

15:00 – Coffee Break  
15:30 (North Pre-Assembly Area)

15:30 – AfricaPES Session 1 Continued  
(Tsodilo B1 and B2)

15:30 – AfricaMS Session 2 Continued  
(Tsodilo B3 and B4)

19:00 – Dinner Banquet  
(Tsodilo A)



## Wednesday, September 5, 2012

08:30 – AfricaWRM Invited Speaker – “Climate Change Impacts on Water Supply and Demand for Selected Urban and Irrigation Water Supply Systems in Southern Africa”  
– Prof. Dominic Mazvimavi  
(Tsodilo B3 and B4)

08:30 – AfricaPES Tutorial Session – “Solar Thermal Collector and Solar Photovoltaic Module Manufacturing and System Integration” –  
Mr. Sandeep Goyal  
(Tsodilo B1 and B2)

09:30 – AfricaWRM Keynote Speaker – “Climate Change and Water Management: Some Options for Water Stressed Countries” – Dr. Mushtaque Ahmed  
(Tsodilo B3 and B4)

10:30 – Coffee Break  
11:00 (North Pre-Assembly Area)

11:00 – AfricaMS Session 3 – Modelling  
(Tsodilo B3 and B4)

11:00 – AfricaPES Tutorial Session Continued  
(Tsodilo B1 and B2)

**Lunch Break**  
(Livingston’s Restaurant)

13:00 – AfricaHI Invited Speaker – “Type 2 Diabetes Mellitus: A Sweet World with a Bitter End” –  
Dr. C.L. Onen  
(Tsodilo B3 and B4)

13:00 – AfricaPES Keynote Speaker – “Power and Energy Optimization: A Process Systems Engineering Approach” – Prof. Thoko Majozi  
(Tsodilo B1 and B2)

14:00 – AfricaHI Invited Speaker – “Dose Reduction of Antiretrovirals: A Feasible Approach to Expand HIV Treatment in Low and Middle Income Countries?” – Prof. Sandro Vento  
(Tsodilo B3 and B4)

14:00 – AfricaPES Invited Paper – “Mitigation of System Disturbances in an Interconnected Power Grid for the Southern African Power Pool”  
– Mr. Andrew Obok Opok  
(Tsodilo B1 and B2)

14:30 – AfricaPES Session 2 – Renewable Energy  
(Tsodilo B1 and B2)

15:00 – Coffee Break  
15:30 (North Pre-Assembly Area)

15:30 – AfricaHI Session 1 – Health Informatics  
(Tsodilo B3 and B4)

15:30 – AfricaPES Session 2 Continued  
(Tsodilo B1 and B2)

## Sunday, September 2, 2012

### 17:30 – REGISTRATION

Location: North Pre-Assembly Area

### 18:30 – WELCOME RECEPTION

Location: Tsodilo B1 and B2

## Monday, September 3, 2012

### 07:00 – REGISTRATION

Location: North Pre-Assembly Area

### 09:00 – 10:00 OPENING CEREMONY

Chairman of the Opening Ceremony: Prof. Thabo T. Fako (Botswana)

Guest Speaker: Hon. Johnnie K. Swartz (Botswana)

Location: Tsodilo B1 and B2

### 10:00 – 10:20 COFFEE BREAK

Location: North Pre-Assembly Area

### 10:20 – AfricaMS SESSION 1 – MATHEMATICAL MODELLING

Chairs: Dr. Ilse Schoeman and Jimoh Pedro (S. Africa)

Location: Tsodilo B1 and B2

761-013

Intelligent Feedback Linearization-based Control of Half-Car Active Suspension Systems

John E.D. Ekoru and Jimoh O. Pedro (S. Africa)

761-014

Non-Linear Slip Control for Anti-Lock Braking System

Samuel John (Namibia) and Jimoh O. Pedro (S. Africa)

761-020

Well-Mixed Systems and the Approach to Equilibria in Spatial Hawk and Dove Game Simulations

Ken A. Hawick and Chris J. Scogings (New Zealand)

761-023

How to Minimize the Effect of the Global Financial Crisis on South Africa

Ilse M. Schoeman and Mark A. Petersen (S. Africa)

761-025

New Population Forecasting Techniques for Realistic Water Demand Management in Urban Centres of Botswana

Ditiro B. Moalafhi, Bhagabat P. Parida, and Kebuang P. Kenabatho (Botswana)

### LUNCH BREAK

Location: Livingston's Restaurant

### 12:00 – AfricaPES INVITED SPEAKER – “INTERCONNECTED ELECTRICAL POWER SYSTEM OPERATIONS AND CROSS BORDER ELECTRICITY TRADING: A CASE STUDY OF THE SOUTHERN AFRICAN POWER POOL (SAPP)”

Presenter: Mr. Edward Rugoyi (Botswana)

Location: Tsodilo B1 and B2

The Southern African Power Pool (SAPP) interconnection comprises up to 9 interconnected power systems of different sizes resulting in a large power system with generators of different sizes connected together via long transmission lines with high impedance. The power system is therefore susceptible to dynamic instability and hence small signal inter area oscillations with catastrophic consequences if system damping is lost or inadequate.

Further to the above stated constraint, the SAPP is expanding generation resources and transmission facilities in order to meet the increasing demand in the region to address the current supply – demand mismatch which if not adequately addressed renders the power system insecure due to lack of operating reserve margins.

The SAPP power utilities need to deal with power flow and frequency control of the interconnected power system through control area arrangements each equipped with automatic generation control facilities to enable control of the power system.

While depletion of surplus generation in the region has reduced cross border electricity trade somehow, the SAPP power market is expected to grow the bilateral contracts market and the Day Ahead Market (DAM) as members expand generation capacity in the next five to eight years.

**Engineer Edward Rugoyi** holds the position of Director Transmission with the Botswana Power Corporation. Engineer Rugoyi has over 20 years of experience in the electricity sector and has vast experience in power system control, interconnected power system operations, electricity trading including power purchase agreements, power utility management and power sector reforms.

In particular Engineer Rugoyi has been involved in the structuring and development of the Southern African Power Pool cross border electricity trade protocols, establishment of the Southern African Power Pool Co-ordination Center and has negotiated several power purchase agreements which include inter utility cross border agreements for power import and export.



### **13:00 – AfricaWRM SESSION 1 – WATER TECHNOLOGIES**

*Chair: Dr. Masengo Ilunga (South Africa)*

*Location: Tsodilo B1 and B2*

762-012

Breakthrough Characteristics and Flow-Rate Interaction in Water Defluoridation with a Bauxite-Gypsum-Magnesite Composite Filter

*Bernard Thole (Malawi), Felix W. Mtaló (Tanzania), and Wellington R.L. Masamba (Botswana)*

762-013

Rethinking Appropriate Technology for Rural Water Supply in Semi Arid Regions of Zimbabwe

*Onalenna Gwate (Zimbabwe)*

762-026

Irrigation Scheduling of Greenhouse Tomato based on Pan Evaporation and Tensiometer under Non-Pressure Irrigation

*Zhijie Shan, Weixia Zhao, Huanjie Cai, Wei Qin, and Zhaoyan Wang (PR China)*

762-037

Water Distribution Network Robustness and Fragmentation using Graph Metrics

*Ken A. Hawick (New Zealand)*

762-029

Hydrologic Information Transfer among Rainfall Stations of a Selected Quaternary Catchment of South Africa

*Masengo Ilunga (S. Africa)*

762-008

Assessing Soil Erosion Risk for Rhodes Island, Greece with a GIS-based Multi-Criteria Decision Analysis

*George N. Zaimis, Dimitrios Gounaridis, Valasia Iakovoglou, and Dimitrios Emmanouloudis (Greece)*

762-036

Regional Interpretation of Aeromagnetic Data for Groundwater Exploration in Capricorn District, Limpopo, South Africa

*Emmanuel Sakala, Abera Tessema, and Peter K. Nyabeze (S. Africa)*

### **14:20 – 14:50 COFFEE BREAK**

*Location: North Pre-Assembly Area*

### **14:50 – AfricaWRM SESSION 1 CONTINUED**

*Location: Tsodilo B1 and B2*

### **16:00 – TOUR BUS DEPARTS FOR TRIP TO NATURE RESERVE**

*Location: GICC Main Entrance*

## **Tuesday, September 4, 2012**

### **08:30 – AfricaMS KEYNOTE SPEAKER**

*Presenter: Prof. Agostino Bruzzone (Italy)*

*Location: Tsodilo B1 and B2*

Agostino Bruzzone is a Full Professor at the University of Genoa, Director of the M&S Net (34 centers worldwide), director of the Genoa Center of the McLeod Institute of Simulation Sciences (MISS, an institution with over 25 centers distributed worldwide), President of the Liophant Simulation, Vice President of MIMOS (Movimento Italiano di Simulazione), and a member of the Society for Modeling and Simulation International (SCS).

His field of interest is simulation-based applications for industrial plants, developing new methodologies and intelligent system integration techniques, data fusion, artificial intelligence, intelligent agents, genetic algorithms, artificial neural networks, fuzzy logic, interoperability. He gives lectures on Project Management, Logistics and Modeling & Simulation for Undergraduate, Graduate, PhD and Post Graduated classes. Prof. Bruzzone is the Project Manager and Scientific responsible of several R&D Projects in three main areas of activity: Virtual Simulation, Decision Support Systems and Defense Applications. R&D activities include Modelling & Simulation, Human Machine Interface, Engineering and Operational Research; research projects focus on development of innovative solutions, testing and experimentation on real plants, equipment for verification, validation and accreditation.

Currently, he leads a joint venture for a simulator devoted to investigate within unclassified environment the NATO NEC Command & Control Maturity Modeling (PANOPEA: Piracy Asymmetric Naval Operation Patterns, modeling for Education & Analysis) as well as projects focused on modeling Asymmetric Environments (PIOVRA: civil disorders and terrorism, CAPRICORN: CIMIC and PSYOPS, CGF C4 IT: communication issues versus asymmetric, IA-CGF: Simulator for Humanitarian Operation).

He is Editor for the “International Journal of Simulation and Process Modelling-IJSPM” and Associate Editor for “Simulation”, as well as General Chair of I3M International Multi-Conference.

**09:30 – AfricaHI KEYNOTE SPEAKER –  
“TECHNICAL AND SOCIO-TECHNICAL  
APPROACHES TO HEALTH INFORMATICS IN  
AFRICA”**

*Presenter: Prof. Paula Kotzé (S. Africa)*

*Location: Tsodilo B1 and B2*

Health informatics can be viewed as a purposeful collection of interrelated components, including information and communication technologies (ICTs), which work together to achieve better healthcare. Health informatics is therefore a discipline at the intersection of information science, computing and healthcare. Health informatics tools include not only computers but also clinical guidelines, formal medical terminologies, and information and communication systems.

Systems that include ICT software generally fall into two categories: technical computer based systems and socio-technical systems.

Technical computer-based systems are systems that include hardware and software components, but not procedures and processes (e.g. televisions, mobile phones, most personal computer software). Individuals and organisations use technical systems for some purpose, but knowledge of this purpose is not part of the system. In the ICT domain health informatics are almost always defined in this context: to encompass the capturing, processing and modelling of health-related information using computing equipment. It deals with the resources, devices, and methods to optimize the acquisition, storage, retrieval and use of information in healthcare. It can be applied to support the whole spectrum of healthcare, from nursing, clinical care, dentistry, pharmacy, public health, occupational therapy, through to biomedical research, but it almost always has a ‘technology push’ perspective: “we have this wonderful piece of technology that is going to solve all your problems...”.

But to be of real value health informatics should have a broader scope, namely that of socio-technical systems. Socio-technical systems include one or more technical systems but, crucially, also include knowledge of how the system should be, or can be used to achieve some broader objective. Socio-technical systems have specified operational processes, people are inherent parts of the system, are governed by organisational policies and norms, and may be affected by environmental constraints such as cultural influences, resource poverty, and national and international laws and regulations. Beyond a mere focus on devices and technology, a socio-technical systems’ approach requires a human factors perspective. Human factors practises employ knowledge about human behaviour, abilities and limitations in the design of interactive systems consisting of people, technology/equipment and the environment in which they

operate to ensure the systems’ effectiveness, efficiency, safety and satisfaction of use. Socio-technical systems can be leveraged in a constructive way to simultaneously achieve technical excellence and quality of life. It follows a ‘technology pull’ approach where a technology solution is designed that will support and fit the specific environment, the people involved, and the tasks, goals and needs of the people.

In this talk I will highlight the advantages and disadvantages of the two approaches and use examples to illustrate their applicability and adaptation to the African healthcare context.

**Prof Paula Kotzé** is a Chief Researcher and the Research Group Leader of the Enterprise Knowledge Engineering and Management Group at the Meraka Institute of the Council for Scientific and Industrial Research (CSIR); Adjunct Professor at the Nelson Mandela Metropolitan University and Extraordinary Professor at North-West University. Before she joined the CSIR, she was Professor in the School of Computing at the University of South Africa where she was Director of the Centre for Software Engineering and Director of the School of Computing. Her background is multidisciplinary combining computer science, information systems, psychology, and education. She specialises in human factors engineering and enterprise engineering, reflected in an extensive publication record (she has published over 70 research articles in the last 7 years) and is a regular speaker at international and national conferences. She holds a PhD in Computer Science with specialization in Human-Computer Interaction from the University of York (UK), which she obtained in 1997. She is an National Research Foundation (NRF) B rated scientist. She is Vice-President At Large of the Association for Computing Machinery (ACM) Specialist Interest Group in Computer Human Interaction (SIGCHI). She is also an Expert Member of the International Federation for Information Processing (IFIP) Technical Committee 13 on Human Computer Interaction and immediate past Chairperson of IFIP Working Group 13.1 on Human Computer Interaction Education. She is the current Vice-President of SAICSIT (The South African Institute of Computer Science and Information Technology) and has previously served for four years as President of this Institute. She is an Elected Member of the European Academy of Science and the recipient of various national and international awards (e.g. in 2007 she received an IFIP Silver Core Award from IFIP for outstanding service and development of the computing field over an extended period of time).

**09:30 – AfricaWRM SESSION 2 – WATERSHED MANAGEMENT WATER SUPPLY AND SUSTAINABLE USE**

*Chairs: Dr. Onu Izuchukwu (Nigeria) and Dr. Masengo Ilunga (S. Africa)*

*Location: Tsodilo B3 and B4*

762-007

Experiences in Mainstreaming Monitoring and Evaluation through Knowledge Management

*Chrispen Hanyane (Botswana)*

762-011

Planning for the Sustainable Development of the Agho-Mili-Drainage Basin in Anambra State of Nigeria

*Izuchukwu C. Onu (Nigeria)*

762-023

Effects of Land-use Change on Brooklyn Hydrology, Pretoria, South Africa

*Hosana H. Ndlovu and Julius M. Ndambuki (S. Africa)*

762-027

The Role of Public Participatory GIS in Rural Water Resources Mapping

*Raymond Aabeyir (Ghana) and Amos T. Kabobah (PR China, Ghana)*

762-028

Infilling Annual Rainfall using Pseudo Mac Laurin Generalized Feedforward Backpropagation Artificial Neural Networks

*Masengo Ilunga (S. Africa)*

762-003

Decision Support System for Operation of Malfunctioning Water Distribution

*Stephen Nyende-Byakika and Julius M. Ndambuki (S. Africa)*

**10:30 – 11:00 COFFEE BREAK**

*Location: North Pre-Assembly Area*

**11:00 – AfricaWRM SESSION 2 CONTINUED**

*Location: Tsodilo B3 and B4*

**11:00 – AfricaPES INVITED SPEAKER – “CHALLENGES IN IMPLEMENTING SMART GRID TECHNOLOGIES IN AFRICA: THE SOUTH AFRICAN CASE”**

*Presenter: Prof. Komla A. Folly (S. Africa)*

*Location: Tsodilo B1 and B2*

The basic structure of the electric power grid has remained unchanged for more than one hundred years. However, it has become increasingly evident that the grid of the 20th

century cannot cope with the electricity needs of the 21st century. The world is currently facing a very serious energy problem. Existing power generation infrastructure is not able to keep pace with the growing national demand of both developed and developing countries. The methods of power delivery to consumers are also outdated and extremely inefficient. The electric grid in its current state is falling behind 21st century technological advancements and energy demands. Smart grid has been proposed as a radical change to the design of the electric grid that has the potential to greatly improve the efficiency, reliability, security, and interoperability of the electrical grid. The goals of smart grid include the establishment of advanced digital technologies (i.e., microprocessor-based measurement and control, communications, computing, and information systems), the enabling of greater integration of renewable energy sources and energy storages, and the promotion of economic growth. The introduction of smart meters will make it possible for energy suppliers to charge variable electric rates to users so that charges would reflect the large differences in cost of generating electricity during peak or off peak periods. Such capabilities allow load control switches to control large energy consuming devices such as hot water heaters so that they consume electricity when it is cheaper to produce. To fully realize the benefits of smart grid, the utility industry will need to integrate a vast number of smart device systems and overcome a number of technical issues. Renewable energy will contribute significantly to the production of electricity in the future. Integration of these highly variable, widely distributed resources will call for new approaches to power system operation and control. With the abundant renewable energy resources on the African continent, Africa as whole can improve access to electricity services by adapting smart grid technologies to meet the electricity demand of the future. However, the current transmission and distribution infrastructures of most African countries are ill-suited for smart grid implementation. In South Africa, the government and Eskom are working hard to implement the smart grid concept in the next decades. The recent Integrated Resource Plan (IRP) 2010 for electricity suggests a 42% penetration of renewable energy into the grid by 2030. Can this be achieved without major changes in the current transmission and distribution infrastructure?

In this presentation, I will discuss the various issues and challenges facing African countries (in particular South Africa) in successfully implementing smart grid technologies. Strategies for success will also be addressed.

**Komla Agbenyo Folly** received his BSc and MSc Degrees in Electrical Engineering from Tsinghua University, Beijing, China, in 1989 and 1993, respectively. He received his PhD in Electrical Engineering from Hiroshima University, Japan, in 1997. From 1997 to 2000, he worked at the Central Research Institute of Electric Power Industry

(CRIEPI), Tokyo, Japan. He is currently an Associate Professor in the Department of Electrical Engineering at UCT. He was Fulbright Scholar at the Missouri University of Science and Technology, Missouri, USA in 2009. His research interests include: power system stability, control and optimisation, HVDC modelling, grid integration of renewable energy, application of computational intelligence to power systems and smart grid. He is member of the Institute of Electrical Engineers of Japan (IEEJ), the the South African Institute of Electrical Engineers (SAIEE) and a Senior Member of the IEEE. He is member of the advisory board for the International Journal of Innovations in Energy Systems and Power (IJESP).

## **LUNCH BREAK**

*Location: Livingston's Restaurant*

### **13:00 – AfricaPES SESSION 1 – POWER SYSTEMS GENERATION AND DISTRIBUTION**

*Chair: Prof. Jan Harm Pretorius (S. Africa)*

*Location: Tsodilo B1 and B2*

760-012

System Integrity Protection and Control based on Synchronized Measurement

*Srdjan Skok, Vedran Kirincic, and Dalibor Brnobic (Croatia)*

760-014

Importance of Fault Current Limiting Devices in Power Grid for Extending the Lifetime of Expensive Equipment

*Tshimbalanga Madiba, Abdul A. Jimoh, Willy M. Siti, and Kabeya Musasa (S. Africa)*

760-015

Power Generation in Botswana, Existing and Alternative Means the Socio-Environmental Impacts

*Leungo L. Tshwanela, Odirile B. Pitswe, Annah M. Jeffrey, and Rapelang R. Marumo (Botswana)*

760-016

Uncertainty Analysis of the Impact of Intermittent Wind Generation on Power System Oscillations

*Temitope R. Ayodele, Adisa A. Jimoh, Josiah L. Munda, and John T. Agee (S. Africa)*

760-018

Methodology of Supply Reliability Analysis of Medium Voltage Distribution Systems

*Pawel Sowa, Joachim Bargiel, and Tomasz Sierociński (Poland)*

760-023

Energy Savings Calculation in a System with Harmonics

*Yomi Akinsooto, Jan H. Pretorius, and Pierre van Rhyn*

*(S.Africa)*

760-024

The Study of Higher Education on Electrical Engineering based on Students

*Xu Zhang, Juan Wei, Dongying Zhang, Yanhua Liu, and Qun Gong (PR China)*

760-027

Day Ahead Load Forecasting using an Artificial Neural Network & Elman Recurrent Network

*Ellen Banda and Komla A. Folly (S. Africa)*

760-028

Improving Energy Usage through the Development of an Energy Monitoring and Targeting System (Case Study: X Phosphate Industries)

*Mohorosi Makhurane, Davison Zimwara, and Blessing Ngarakana (Zimbabwe)*

760-031

Wide-Area PSS Design for Damping Inter-Area Oscillations: A Two-Area System Case

*Sandip Ghosh and Komla A. Folly (S. Africa)*

760-036

Zesco Generation System Adequacy Assessment for the Period 2009-2030 using Probabilistic Approach

*Mabvuto Mwanza, Nabina Pradhan, and Navaraji Karki (Nepal)*

760-013

Implementation of an Energy Usage Optimization System on a Pharmaceutical Company

*Lungile Nyanga (Zimbabwe), Andre F. van der Merwe (S. Africa), Samson Mhlanga, and Bothwell Nhindiri (Zimbabwe)*

### **13:00 – AfricaHI SPECIAL PRESENTATION – “SMART PHONES: THE GOLDEN OPPORTUNITY TO LEAPFROG e-HEALTH IN LMICs”**

*Presenter: Dr. Dennis Otto-Odokonyero (Botswana)*

*Location: Tsodilo B3 and B4*

Mobile phones have been demonstrated as extremely useful tools in the collection and transmission of health data in Low-and Middle-Income Countries (LMICs). However, to date, the vast majority of these systems are based on the Short Messaging Service (SMS) platforms which by definition transmit short alphanumeric data strings. We propose to demonstrate the use of a smart phone application within the context of an appropriate Open Source Enterprise Framework. The MOH app system was developed for the Ministry of Health of Uganda based upon that Ministry's Ante-Natal Care standard and is deployed on the e-numer8 Data Services Cloud.



**Objectives:****Concept:**

The demonstration highlights various use-cases of this smart phone application; the collection of individualized data, potential use of such individualized data for telemedicine, the filtering of large datasets, and the overall usage of such data as a management resource. In the context of mHealth, this breadth of use-cases is not possible without the type of enhanced computing capability afforded by smart phones. Also demonstrated is the use of a centrally-controlled encoding system to identify mothers on the Ante-natal care program. The versatile QR (Quick Response) Coding System readable by smart phones offers a dynamic and accurate segregation method.

The MOH App system also has a web end that mirrors the mobile front end functions. This flexibility illustrates that within an appropriate framework, a hybrid of conventional computing and mobile applications can co-exist. Additionally, the MOH app system powers a centrally-controlled SMS Scheduling System showing that the use of smart phone-based systems is not restricted to sophisticated HTTP/S services.

**Conclusion:**

The rapid proliferation of cheap smart phones, their ease of connectivity to the internet coupled with the development of suitable software applications presents health managers in LMICs the “Leapfrog Technologies” to transmit text as well as richer multimedia data while advancing significant computing power to the forefront of data management. We argue that these technologies are the best fit-for-purpose and most cost-effective innovations for eHealth in the setting of LMICs today.

**Dr Dennis Otto-Odokonyero** is a Practicing Clinician and Medical Informatics Developer. He qualified from Makerere University (Uganda) with a Bachelor of Medicine and Bachelor of Surgery (MB, ChB) degree in 2003. He went on to acquire Membership to the College of Surgeons of East, Central and Southern Africa, MCS (ECSA) in 2006. He is a Certified Independent Medical Examiner (CIME) of the American Medical Association. Dr Otto-Odokonyero has designed websites and written web applications for over 15 years and developed his Medical Career contemporaneously.

He presently works at the Debswana Jwaneng Mine Hospital where his main clinical interest is Emergency Medicine and Trauma Surgery. His focus in Management is the optimisation of operational efficiencies and cost containment.

His Medical Informatics aspiration is for Africans to build “World Class, Third World Solutions”.

**14:00 – AfricaMS SESSION 2 – MODELLING AND SIMULATION METHODOLOGIES**

*Chairs: Dr. Leszek Koszalka (Poland) and Prof. Wilfrid Lefer (France)*

*Location: Tsodilo B3 and B4*

761-022

Modelling and Simulation of an User-Wheelchair-Environment System

*Ignace T. Toudjeu, Yskandar Hamam, Djouani Karim, Barend J. van Wyk (S. Africa), and Eric Monacelli (France)*

761-017

Post-Simulation Processing for Overlapping Grids

*Minh-Duc Huynh and Wilfrid Lefer (France)*

761-005

Strategy for Analysis and Design of a Digital Robust Controller for Nonlinear Control Systems

*Kamen M. Yanev, George O. Anderson, and Shedden M. Masupe (Botswana)*

761-007

Dynamic Simulation of Healthcare Manpower Systems: A Market-based Perspective

*Michael Mutingi (Botswana) and Charles Mbohwa (S. Africa)*

761-009

Path Finding in a Terrain with Obstacles: An Experimentation System and Algorithms Comparison

*Lukasz Gadek, Leszek Koszalka, Iwona Pozniak-Koszalka, and Andrzej Kasprzak (Poland)*

761-010

Simulation based Analysis of Expanding Square Strategy Efficiency for Task Allocation in Mesh Networks

*Iwona Pozniak-Koszalka, Bartosz Rabięga, Leszek Koszalka, and Andrzej Kasprzak (Poland)*

761-016

Simulation Models and Serious Games for Project Team Training in Engineering, Procurement, Construction & Commissioning

*Agostino G. Bruzzone, Marina Massei, and Enrico Bocca (Italy)*

763-004

Wearable Systems for e-Health: Telemonitoring and Telerehabilitation

*Daniilo De Rossi, Federico Lorussi, and Alessandro Tognetti (Italy)*

**15:00 – 15:30 COFFEE BREAK**

*Location: North Pre-Assembly Area*

**15:30 – AfricaPES SESSION 1 CONTINUED**

*Location: Tsodilo B1 and B2*

**15:30 – AfricaMS SESSION 2 CONTINUED**

*Location: Tsodilo B3 and B4*

**19:00 – DINNER BANQUET**

*Location: Tsodilo A*

**Wednesday, September 5, 2012**

**08:30 – AfricaWRM INVITED SPEAKER –  
“CLIMATE CHANGE IMPACTS ON WATER  
SUPPLY AND DEMAND FOR SELECTED URBAN  
AND IRRIGATION WATER SUPPLY SYSTEMS IN  
SOUTHERN AFRICA”**

*Presenter: Prof. Dominic Mazvimavi (S. Africa)*

*Location: Tsodilo B3 and B4*

Climate change projections indicate that most parts of southern Africa will experience a decrease in rainfall although models differ in the predicted magnitude of the change. Most water supply systems serving large urban areas and irrigation utilize water stored in large reservoirs. The predicted changes in rainfall and evaporation will affect the reliability with which current and future water supply systems will be able to meet the water demand. The expansion of water storage is a possible adaptation to climate change effects on water supply.

This paper investigates how the water supply to urban areas in Botswana and Windhoek in Namibia are likely to be affected by climate change. The paper also investigates climate change effects on water supply for sugar cane production on 25,000 hectares in Zimbabwe. Major urban areas in Botswana such as Gaborone, Francitown, Lobatse and other major villages are located in a semi-arid region receiving on average 400 – 550 mm/year of rainfall. These urban areas are supplied with water from several dams with a combined capacity of about 344 Mm<sup>3</sup> and linked by a 361 km pipeline called the North-South Water Carrier. Windhoek, the capital city of Namibia is also located in a semi-arid region receiving on average 360 mm/year of rainfall and depends on 3 dams with a total capacity of 155 Mm<sup>3</sup> plus groundwater and water recycling. Sugar cane production in the south-east of Zimbabwe depends on water supply from 5 dams with combined capacity of 1,898 Mm<sup>3</sup>. All 3 case studies examined are in semi-arid regions with low runoff coefficients and highly vulnerable to climate change induced changes in runoff.

Regional downscaled climate change projections for several climate models are used to determine the possible changes in rainfall and runoff. Use of several climate models is done to determine the sensitivity of each water supply system to climate change. Reservoir simulations using adjusted inflows, current and projected demand is carried out to assess climate change effects on meeting the water demand. The paper then examines the cost implications of expanding the water infrastructure as an adaptation to climate change.

**Dominic Mazvimavi** is the Professor of Water and Environmental Science in the Department of Earth Sciences, and Director of the Institute for Water Studies



which are both at the University of the Western Cape in Cape Town, South Africa. Prof. Mazvimavi obtained a PhD in Hydrology from the Wageningen University and the International Institute of Geo-information Science and Earth Observation in the Netherlands. From 2007 to 2010 he served as the Managing Guest Editor for an annual special issue of the Journal of the Physics and Chemistry of the Earth covering papers on water resources management. Prof. Mazvimavi has research interests on water resources planning and management, hydrological regionalization, effects of land-use change on runoff, and environmental flow assessment. He has previously worked at the Okavango Research Institute of the University of Botswana, and Department of Geography and Environmental Science of the University of Zimbabwe.

**08:30 – AfricaPES TUTORIAL SESSION – “SOLAR THERMAL COLLECTOR AND SOLAR PHOTOVOLTAIC MODULE MANUFACTURING AND SYSTEM INTEGRATION”**

*Presenter: Mr. Sandeep Goyal (India)*  
*Location: Tsodilo B1 and B2*

The electricity consumption in the whole world will increase day by day. We use electricity in almost all manners in our day to day life. But the generation of the electricity is done by the conventional method i.e. from fossil fuels. In developing countries the reserves of fossil fuel is limited, in fact, fossil fuel reserves are limited all over the world. So to conserve energy it's time to use a renewable source of energy and solar energy is the most common form of renewable energy. In general, solar energy is used for generating electricity and district heating. Solar thermal collector serves both the requirement heating and electricity generation process. Varieties of solar thermal collectors are used for different process like water heating system, air heating systems and power generation, while solar photovoltaic modules give direct conversion of solar energy to electric energy. The tutorial gives a detailed study on solar photovoltaic cells and solar thermal collectors, manufacturing of photovoltaic cells, different applications of photovoltaic cells, manufacturing of solar thermal collectors, detailed study on solar water heating systems, solar air heating system, solar power generation and the application of solar thermal collectors in various fields.

**Assistant Professor Sandeep Goyal** obtained his Master's Degree in Energy Engineering from Malaviya National Institute of Technology. He is currently an assistant professor in the Mechanical Engineering Department in Jodhpur Institute of Engineering and Technology. His research interests are in solar thermal collectors, solar photovoltaic and energy conservation techniques. He performs several energy audits in textile industries and

buildings. He is an associate member of ASHRAE and government certified consultant of cold storage.

**09:30 – AfricaWRM KEYNOTE SPEAKER – “CLIMATE CHANGE AND WATER MANAGEMENT: SOME OPTIONS FOR WATER STRESSED COUNTRIES”**

*Presenter: Dr. Mushtaque Ahmed (Oman)*  
*Location: Tsodilo B3 and B4*

Based on the findings of the Intergovernmental Panel on Climate Change (IPCC), it is evident that many countries of the world are vulnerable to the potential impacts of climate change, the most significant of which are increased average temperatures, less and more erratic precipitation, sea level rise (SLR) and desertification. The likely warmer climate induced by the climate change is set to alter the hydrological cycle and the shifting pattern of the rainfall would affect the spatial and temporal distribution of runoff, soil moisture, and surface and groundwater reserves. Melting of glaciers, snow and ice sheets further contributes to an increase in sea level. This would have worldwide impacts on ground and surface water supplies. Based on projections of the IPCC, it is clear that in the near future, some parts of the world, especially in the arid regions, will have a large number of people living under water stress and water crisis. These impacts will cause serious damage to the economies of water stressed countries, many of which already suffer from aridity, soil salinity, recurrent drought, and extreme water scarcity. This paper highlights the work being carried out and current knowledge and efforts being made in view of climate change challenges in arid countries with particular reference to Oman. Most of the arid countries are facing the challenge of ensuring an adequate supply of good quality water for various uses. When renewable surface and groundwater resources are not sufficient to meet the ever-increasing demands from agricultural, industrial, and domestic sectors, finding alternative water resources becomes a priority. Examples include the use of treated wastewater and greywater, managed aquifer recharge (MAR), recharge dams, storage dams, use of brackish water, fog collection, roof-top water harvesting, biosaline agriculture, and cloud seeding. In this paper these alternative sources of water are discussed in detail with particular emphasis on their use and potential in Oman.

**Dr. Mushtaque Ahmed** obtained his PhD from Iowa State University, USA in 1988. He is currently the Director of the Center for Environmental Studies and Research (CESAR) as well as an Associate Professor in the Department of Soils, Water and Agricultural Engineering at Sultan Qaboos University (SQU), Oman. He joined SQU in 1996. Prior to that, he worked for various organisations in Australia (Land and Water Conservation Department-NSW; CSIRO-Perth; Department of Water Resources-

Griffith, NSW). His current research interests are biosaline agriculture, managed aquifer recharge, climate change and adaptability, etc. He has published more than 120 scientific papers in peer reviewed refereed journals, book chapters, conference proceedings, and manuals, as well as serving as Editor of various publications. He is well experienced in organizing workshops, conferences and symposium at the national and international levels. He is a corporate member of the Institution of Engineers, Australia, and a member of the International Association of Hydrological Sciences and the Asia Oceania Geosciences Society.

### **10:30 – 11:00 COFFEE BREAK**

*Location: North Pre-Assembly Area*

### **11:00 – AfricaMS SESSION 3 – MODELLING**

*Chair: Mr. Oluwumi Adetan (S. Africa)*

*Location: Tsodilo B3 and B4*

761-006

Development of Predictive Model for Investigating Effect of Sodium Chloride on Soil Geotechnical Properties

*Gbenga M. Ayininuola and Oluwole A. Agbede (Nigeria)*

761-018

A Mathematical Model for Assessment of Physical Properties of Flyash-Sand-Cement Bricks

*Soraj K. Panigrahi (India), Kommula V. Parasuram, and Clever Ketlogetswe (Botswana)*

761-019

The Effect of Valve Control on a Motor Vehicle Engine Performance

*Ishmael Zibani, Joseph Chuma, and Rapelang R. Marumo (Botswana)*

761-026

Forward and Reverse Middle Ear Frequency Responses with Various Terminal Loads

*Tshegofatso Thejane, Tshilidzi Marwala, Jacoba E. Smit, and Fulufhelo V. Nelwamondo (S. Africa)*

761-027

Three-Parameter Raindrop Size Distribution Modeling for Microwave Propagation in South Africa

*Oluwumi Adetan and Thomas J. Afullo (S. Africa)*

### **11:00 – AfricaPES TUTORIAL SESSION CONTINUED**

*Location: Tsodilo B1 and B2*

### **LUNCH BREAK**

*Location: Livingston's Restaurant*

### **13:00 – AfricaHI INVITED SPEAKER – “TYPE 2 DIABETES MELLITUS: A SWEET WORLD WITH A BITTER END”**

*Presenter: Dr. C.L. Onen (Botswana)*

*Location: Tsodilo B3 and B4*

Dr. Churchill Lukwiya Onen Senior Consultant Physician Centre for Chronic Diseases, Gaborone Private Hospital Dr. Onen qualified from Makerere University, Kampala, Uganda with MBChB in 1979, and an M.Med (Internal Medicine) in 1984. He was the first black African to give the prestigious Lilly Lecture at the Royal College of Physicians of London in 2004. The following year, he was awarded a Fellowship to the Royal College of Physicians. Dr. Onen obtained an MD from Makerere University in 2010 based on a thesis on macrovascular complications of diabetes in adults in Botswana. He is the founder and president of Diabetes Association of Botswana. He was also Project Manager of MASA, the pioneering antiretroviral therapy programme in Botswana, which began in 2002.

Centre for Chronic Diseases is a private practice integrating a melting pot of interests including Diabetes, Cardiology, Cardiovascular diseases, Gastroenterology and Infectious Diseases, among others.

### **13:00 – AfricaPES KEYNOTE SPEAKER – “POWER AND ENERGY OPTIMIZATION: A PROCESS SYSTEMS ENGINEERING APPROACH”**

*Presenter: Prof. Thoko Majozi (S. Africa)*

*Location: Tsodilo B1 and B2*

The presentation will shed light on some of the recent achievements in the field of process integration with emphasis on steam system synthesis as well as heat integration and wastewater minimization of batch plants. In its traditional form, process integration has always been the privilege of continuous processes at steady state. Research mainly focused on minimization of external utilities through maximization of process-process heat transfer. Until recently, optimum design of external utility systems using a comprehensive and systematic methodology, has received very limited attention. The implicit assumption has been that processes that do not satisfy their energy requirements through process-process integration are directly linked to the utility supply, e.g. boiler or cooling tower. The presentation is aimed at demonstrating that this is not necessarily true. Work on direct and indirect heat integration, as well as wastewater minimisation in multipurpose batch plants using a continuous-time domain will also be presented. The continuous-time domain is based on a recipe representation known as the State Sequence Network (SSN).

**Thokozani Majozi** is a full professor in the Department of Chemical Engineering at the University of Pretoria (UP).

His main research interests lie in batch process integration. Prof. Majozi's major contributions to research include the development of a continuous-time framework for the synthesis of batch plants, and a novel technique for near zero-effluent batch chemical facilities, both of which have been adopted by industry. Prof. Majozi began his professional career as a junior process engineer at Unilever in 1994, and in 1996 was appointed as a senior process engineer and competency improvement specialist at Dow AgroSciences. In 2002 he joined Sasol Technology as a technology leader for optimization and integration. Prof. Majozi was appointed as an associate professor at UP in 2004 and promoted to full professor at the end of 2008. He has also been an associate professor of computer science at the University of Pannonia in Hungary since 2005. Prof. Majozi completed his BScEng in 1994 and his MScEng degree in 1998 at the University of Natal, both in the area of chemical engineering. In 2002 he completed his PhD in process integration at the University of Manchester Institute of Science and Technology in the United Kingdom. Prof. Majozi is a member of numerous scientific committees and organizations, including the European Symposium on Computer Aided Process Engineering (ESCAPE), the Process Systems Engineering (PSE) conference, the Professional Advisory Committee, where he is the Vice Chairman of the Engineering Council of South Africa, as well as being a member of the Academy of Sciences of South Africa (ASSAf). He is also a fellow of the Council for Scientific and Industrial Research (CSIR), Water Institution of Southern Africa and South African Academy of Engineering (SAAE). Prof. Majozi has received numerous awards for his research, including the Italian Zdenek Burianec Memorial Award in 2005, the National Science and Technology Forum Award for Distinguished Researcher in the Last Five to Ten Years in 2006, and the National Research Foundation (NRF) President's Award in 2007. Recently he won the prestigious Silver S2A3 British Association Medal, becoming the first black individual to receive the award since it was established in 1932. Prof. Majozi is author or co-author of more than 100 publications in refereed scientific publications, including the textbook, 'Batch Chemical Process Integration,' recently published by Springer.

**14:00 – AfricaHI INVITED SPEAKER – “DOSE REDUCTION OF ANTIRETROVIRALS: A FEASIBLE APPROACH TO EXPAND HIV TREATMENT IN LOW AND MIDDLE INCOME COUNTRIES?”**

*Presenter: Prof. Sandro Vento (Botswana)*  
*Location: Tsodilo B3 and B4*

Over 35 million people are living with HIV worldwide. Antiretroviral therapy (ART) has been scaled up considerably especially in sub-Saharan Africa, and at present 6.6 million people in low and middle-income

countries are receiving HIV treatment. The global economic crisis, the switch in emphasis of donors' priorities to global health, and the changes in the new WHO recommendations to initiate ART at a threshold of 350 CD4 cells/mm<sup>3</sup> will affect the ability of the health systems in developing countries to enrol new patients and to sustain patients on ART in the long term at the current cost of antiretrovirals. Drug costs indeed account for as much as 60% of antiretroviral treatment program costs in several countries, and the production costs of active product ingredient are the greatest driver of generic antiretroviral drug prices.

Dose reduction of different antiretrovirals needs to be urgently explored as one of the possible options to help and sustain ART roll-out in developing countries. Preliminary evidence suggests that stavudine, efavirenz, atazanavir, darunavir, lopinavir/ritonavir could all be used at reduced doses without compromising efficacy. Tenofovir might also be tested at reduced doses. In addition to decreasing costs and eventually allowing a wider access to anti-HIV therapy for populations in need, dose reduction would decrease adverse events, improve tolerability and favour adherence to treatment.

It is urgent to implement reasonably large, well-powered non-inferiority trials comparing lower doses versus the currently used ones.

**Professor Sandro Vento** is Head of the Department of Internal Medicine and Acting Head of the School of Medicine, University of Botswana. He is the Editor-in-Chief of The Open Infectious Diseases Journal and member of the International Advisory Board of The Lancet Oncology. Professor Vento has authored or co-authored over 160 publications in high impact factor, peer-reviewed medical journals. His research interests are in the areas of HIV infection, viral hepatitis, infections in patients with cancer, antibiotic therapy and autoimmune liver diseases.

**14:00 – AfricaPES INVITED PAPER – “MITIGATION OF SYSTEM DISTURBANCES IN AN INTERCONNECTED POWER GRID FOR THE SOUTHERN AFRICAN POWER POOL”**

*Presenter: Mr. Andrew Obok Opok (Botswana)*  
*Location: Tsodilo B1 and B2*

The paper presents mitigation measures and recommendations to overcome major power system disturbances in SAPP system following system disturbances and outcome of investigations during 2008. Power system consultants and specialists from SAPP power utility members conducted steady state, dynamic and small signal power system studies to determine the root causes of the disturbances. The main causes of the disturbances were traced to poor damping of power system oscillations, risks

and vulnerability of SAPP system to transient stability, and unsafe transfer limits through transmission corridors. Measures implemented to mitigate system disturbances were fitting or tuning PSS (Power Systems Stabilizers) and governors. For mitigating against future disturbances it was recommended that SVCs (Static Voltage Compensators) and FACTS (Flexible AC Transmission Systems) devices and equipment should be installed in transmission locations identified from the investigation. The paper offers significant insights into the root causes of system disturbances in large power grids; how to improve operation of large scale power grids; improving system performance through redesign and placement of desirable plant such as FACTS or PSS to improve system damping or transfer capability.

**Andrew Obok Opok** is a Senior Lecturer in the Department of Electrical Engineering at the University of Botswana. He holds an MSc in Electronic & Communication Engineering (University of Wales) an MSc in Electrical Power Engineering (UMIST) and an MBA (UCT) in Systems Management. Mr. Obok Opok holds memberships at IEEE, IEE and CIGRE. He has researched and published extensively in power systems operation and is currently undertaking research in transmission switching and FACTS control in a market environment. His areas of research and teaching are Power Systems Operation, Power Systems Economics, Transmissions Systems and FACTS controls. He is also a reviewer for ACTA Press Publications.

**14:30 – AfricaPES SESSION 2 – RENEWABLE ENERGY**

*Chairs: Prof. Peteris Shipkovs (Latvia) and Ms. Nonhlanhla Cele (S. Africa)*  
*Location: Tsodilo B1 and B2*

760-034  
 Comparison of the Wind Power Output of a Small Scale Turbine using Statistical and Feed-Forward Neural Network Techniques  
*Zaccheus O. Olaofe and Komla A. Folly (S. Africa)*

760-020  
 Use of Renewable Energy Resources for Reduction of Environmental Pollution  
*Peteris Shipkovs, Galina Kashkarova, Kristina Lebedeva, Ilze Purina, and Lana Migla (Latvia)*

760-029  
 Optical Properties of Flash Evaporated Amorphous  $\text{Se}_{100-x}\text{In}_x$  Thin Films for  $\text{CuInSe}_2$  Solar Cell Applications  
*Cosmas M. Muiva, Kelebogile Maabong, Stephen T. Sathiaraj (Botswana), and Julius M. Mwabora (Kenya)*

760-030  
 Nafion/Poly Vinylidene Fluoride (PVDF) Blends for Polymer Electrolyte Membranes Application  
*Nonhlanhla P. Cele (South Africa)*

760-033  
 Debottlenecking Technique for Cooling Water Systems with Multiple Cooling Sources: Pressure Drop Consideration  
*Khunedi V. Gololo and Thokozani Majazi (South Africa)*

760-038  
 Potentials of a 5kW Wind Energy System with Integrated Storage Bank for Home Energy Management  
*Zaccheus O. Olaofe and Komla A. Folly (S. Africa)*

760-017  
 Demand Side Management (DSM) in an Urban Household in Zimbabwe  
*Christinah Moyo, Francis Mafuratidze, and Joyce C. Mbudzi (Zimbabwe)*

**15:00 – 15:30 COFFEE BREAK**

*Location: North Pre-Assembly Area*

**15:30 – AfricaHI SESSION 1 – HEALTH INFORMATICS**

*Chair: Ms. Marlien Varnfield (Australia)*  
*Location: Tsodilo B3 and B4*

763-015  
 Tablet Computers for mHealth: Opportunities for Personal Healthcare  
*Anthony J. Maeder (Australia)*

763-003  
 An Improved QRS Detection Approach based on Two-Lead Bi-Referring  
*Honghai Zhu, Xiaojuan Hu, and Jun Dong (PR China)*

763-007  
 Experimental Evaluation of HIV/AIDS Ontology Construction Tools  
*Barbara Moeng, Yirsaw Ayalew, and Gontlafetse Mosweunyane (Botswana)*

763-013  
 On the Relevance of a Dynamic System and Cloud-based Security Framework for EHR Systems  
*Ekene Umoru, Isaac O. Osunmakinde, and Seleman Ngwira (S. Africa)*

763-019

Use of Mobile Phone based Health Applications in Home Care Delivery of Cardiac Rehabilitation

*Marlien Varnfield, Hang Ding, and Mohanraj Karunanithi (Australia)*

**15:30 – AfricaPES SESSION 2 CONTINUED**

*Location: Tsodilo B1 and B2*

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**IASTED would like to thank you for attending AfricaPES 2012, AfricaMS 2012, AfricaWRM 2012 & AfricaHI 2012. Your participation helped make this international event a success, and we look forward to seeing you at upcoming IASTED events.**

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**NOTES:**

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