



# Sierra Leone Institution of Engineers

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The Executive Secretary  
Ghana Institution of Engineers  
Ghana

Dear Sir,

**INVITATION TO PRESENT A PAPER AT THE BIENNIAL CONFERENCE OF THE  
SIERRA LEONE INSTITUTION OF ENGINEERS (SLIE) - 22<sup>ND</sup> JUNE - 26<sup>TH</sup> JUNE 2020**

The Sierra Leone Institution of Engineers (SLIE) will be celebrating its Golden Jubilee this year and also hosting its Biennial Conference in Freetown from the 22<sup>nd</sup> June – 26<sup>th</sup> June 2020. The Theme for the Conference is: **Positioning Sierra Leone in the Technology and Innovation value chain**

**Sub-themes are:**

- Smart power grids
- Smart transportation systems
- Smart water management systems (including water harvesting)
- Resilient cities and advances in disaster management
- Africa, innovation and the SDGs
- IoT and engineering innovation
- Intrusive/Embedded Chip technology and human transactions.
- AI and engineering innovations – a threat or a welcome spring board for Africa's development

This year's Conference aims at situating Sierra Leone and by extension Africa in the landscape of technological and engineering innovation on the global conversation. Emerging technologies have significantly reduced the north-south digital divide, and a new development borders on south-south co-operation and pushing the frontiers of sustainable development through technology. The theme also anticipates discussions and reflections on our current report card and what engineers see as the future of Sierra Leone's development using technology as the vehicle to achieve these targets.

Eight sub-themes have been identified. These are only guidelines and other related spin-offs are possible that will enhance the debate.

**1. Smart power grids**

The need for developing efficient and intelligent monitoring systems in the operations and maintenance of national grids and by extension international efforts in the power sector under the West African Power Pool and its several cross-border initiatives such as the Cote d'Ivoire-Sierra Leone-Liberia-Guinea (CLSG), cannot be overstated as these networks become increasingly complex, thereby requiring both on-site and remote oversight such as provided by the SCADA platform. This then calls for an integration of engineering and software competences to effectively optimize the provisions of systems control and data acquisition management for a more efficient and responsive grid as district mini and micro grids are fully integrated for efficient operations and management of a national grid.

**2. Smart Transportation Systems**

Smart transportation is a key internet of things vertical application which refers to the integrated application of modern technologies and management strategies in transportation systems.

These technologies aim to provide innovative services relating to different modes of transport and traffic management and enable users to be better informed and make safer and 'smarter' use of transport networks; it also paves the way for the development of smarter infrastructure to meet future demands. Smart transportation includes the use of several technologies which can be discussed for application to enhance mobility in our cities. The evolution of intelligent transportation systems is providing a growing number of technology solutions for transportation managers as they seek to operate and maintain the systems more efficiently and improve performance.

### **3. Smart Water Management Systems**

Water is essential to our way of life and international water related issues include its short supply and uneven distribution. How to use water in a way that is in harmony with nature and the water cycle and how to reduce the emission of greenhouse gases associated with water treatment are also of concern. To resolve these issues and establish infrastructure for water that is safe and gives users easy access to water and confidence in its quality, we can use the concept of "intelligent water system" to perform comprehensive management of the water cycle at a regional or city level based on the ideas of harmony, sustainability, and self reliance by adopting more intelligent individual technologies including water recycling and other water treatment technologies, information technology, and monitoring and control technology.

### **4. Disaster Risk Management in the Transport Sector for a Resilient City.**

Natural hazards regularly impact the performance of transport systems and their ability to provide safe, reliable, efficient, and accessible means of transport for citizens during these emergency situations. Due to the frequency now of natural hazards and the threat of more variable weather as a result of climate change, there is need for a systematic approach to address natural disasters in the transport sector and discuss measures that transport professionals can implement in transport projects to address some of the issues of resilience of cities.

### **5. Africa, innovation and the SDGs**

The 17 SDGs offer a great opportunity for African countries to recast their development agenda guided by the principles of sustainability especially around the notion of sustainable consumption and production. The environment has to be placed at the Centre stage in defining Africa's development trajectory if future generations are to be catered for in terms of our shared natural resources. The accompanying targets assigned to the goals further expand the scope and direction which governments must take if they are to align their development agendas with international best practice and ensure the available natural resources are not depleted at the expense of future generations

### **6. IoT and engineering innovation**

The Internet of Things (IoT) is one of those technologies currently shaping up the industrial and consumer worlds. IoT applications are becoming increasingly ubiquitous, touching every aspect of life and business. Every business and consumer domain now has smart tech in them, employing the 4 components of the IoT Model: Sensors, Networks (Communications), Analytics (Cloud), and Applications; from healthcare to manufacturing, from smart cities to logistics, and so on.

Currently, IoT applications are primarily focused on using IoT devices to monitor and control spaces. There are however challenges in the effort to accelerate IoT adoption and bring it to a more refined level of development. A level at which the evolution of IoT will enable it to be able to predict events and conditions, prescribe actions and automate the processes with the necessary balance between cloud and edge activities. This needs to happen in a secure manner, ensuring scalability and maximum efficiency while maintaining a continuous focus on business values all along the IoT solution lifecycle. In order to achieve such, there is an inherent need to enhance the interaction between those intelligent spaces and the people who work within them. To do all that, the IoT will need to work together with other technological frameworks, such as Artificial Intelligence (AI) to produce the right intelligence based on data gathered; Distributed Ledger Technology (DLT) to support trust and decentralization; 5G to enable different connectivity applications and performance depending on needs; and

Augmented Reality (AR) to create a conducive relationship between humans and intelligent spaces.

#### **7. Intrusive/Embedded Chip technology, medical innovations and transactions**

Intrusive / embedded chips (Microchip implants) have been around for some time and are not new for humans. Procedures such as implanting heart pacemakers in humans for prosthesis are now considered commonplace. More recently, brain pacemakers for therapeutic purposes to combat illnesses such as epilepsy, Parkinson's disease, and severe depression, have been implanted in humans also. Microchips are even being embedded in prosthetic knees and hips during restorative procedures to help in the gathering of post-operative analytics that can aid rehabilitation further.

Even though medical innovations that utilize microchips abound, it is only in the last decade that we have started making use of the potential uses of microchip implants for non-medical devices in humans, namely for convenience, care applications and transactions. Most of these emerging applications utilise passive radio frequency identification (RFID) tags or transponders embedded in humans that store a unique identifier that is triggered when the device comes into range of a reader unit.

This sub theme looks at potential applications of embedded chips for both medical and non-medical uses that will enhance scientific and societal developments pertaining to risk, security, privacy, control and human rights.

#### **8. AI and engineering innovations – a threat or a welcome spring board for Africa's development.**

With the recent exponential rise of Artificial Intelligence (AI) technologies, a growing concern emerges as to what role AI will play in the overall development of nations, the future of work and industry as we know it and life, in general. Is AI set to become an enemy of the human worker, thereby creating unemployment for the large amount of unskilled and semi-skilled workers on the continent? Will AI become a panacea, catapulting nations into the path of sustainable development? Or will it just be an innovation like we have electricity or the internet? There is, however, the need to look at how African nations can balance between harnessing the potentials of AI technologies for its development and the somehow industry-destroying path that AI seems to be taking as we keep on just automating and eliminating much needed jobs.

#### **Guide to authors**

Abstracts are invited on the theme and any of the sub themes with a focus on Africa's development. Papers are particularly welcomed from colleagues in other African countries to provide a platform for a wider discussion on the theme. A short resume of authors not exceeding 150 words is required including their contact details and professional affiliations.

**Deadline for the submission of Abstracts: 20th March 2020.**

**Notification of Acceptance of abstracts: 31st March 2020.**

**Deadline for the submission of full papers: 30th May 2020.**

Please note that a book of Abstract is to be produced as part of the conference material to be supplied to registered delegates at the start of the conference.

You are hereby kindly invited to present a paper on any of the above Sub Themes.

May I on behalf of the Institution thank you in advance for your positive response and look forward to your contribution towards the success of the Conference.

Yours faithfully,



**R. R. Wilhelm**  
**EXECUTIVE SECRETARY**