

# EAI INTER SOL 2023

6<sup>th</sup> EAI International Conference on Innovations and  
Interdisciplinary Solutions for Underserved Areas  
September 16-17, 2023

**Middlesex University Mauritius**



## Preface

In a rapidly evolving world, the disparities between well-served and underserved regions remain stark. The need for innovative, interdisciplinary approaches to address these challenges has never been more crucial. This conference, focused on "Interdisciplinary Solutions for Underserved Areas", aims to bridge this gap, bringing forth a nexus of academia, technology, and community-centric initiatives to illuminate the path ahead.

Our selected papers delve into a myriad of challenges and solutions specific to underserved regions. From the "InSightHub", which aids the work-from-home environment, to the "VITAL" project, which leverages modern platforms for legal aid, we explore how digital solutions can reshape traditional problems. The "Microbial fuel cell for the recovery of sludge from the treatment of effluents by electrocoagulation" project emphasizes innovative solutions in waste management and environmental sustainability. Meanwhile, discussions on "Solar Energy in Africa" shed light on sustainable energy solutions tailored for the African continent.

The role of technology is further emphasized in endeavors such as the "Networked Micro-Services", aiming to empower local micro-enterprises, and the exploration of blockchain's potential to revolutionize patient medical record management and vehicle fitness recording. As we delve into security, from home safety to digital data protection, and from analyzing malicious URLs to detecting false data injection attacks, it is evident that the safety of individuals and their data remains paramount.

The challenges brought forth by climate change, as seen in the hydroclimate projections over Senegal, and the agricultural challenges in Côte d'Ivoire, remind us of the vast interconnectedness of our world. Furthermore, the global impact of the Covid-19 pandemic has resulted in a swift digital transformation, pushing educators and learners to adapt, as seen in the adoption of e-learning platforms in the post-Covid era.

One standout initiative, "Prof Pi", encapsulates the essence of this conference - using technology, in this case, Whatsapp Bots and GPT-4, to bring quality education to underserved areas.

In this conference, we hope to inspire, inform, and ignite change, fostering a collaborative spirit to uplift and empower underserved communities globally. Let us embark on this journey together, envisioning a world where 'underserved' is a term of the past.

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# About

## INTERSOL

Interdisciplinary Solutions (InterSol) is an international conference dedicated to the advancement of interdisciplinary research that addresses needs in 'underserved areas'. Working in Africa, InterSol's central objectives are to: establish an interdisciplinary research and development community, encourage education in Africa and around the world, and incentivize members of the community to start trans-/interdisciplinary research projects with real-world decision-making impact.

## EAI

European Alliance for Innovation (EAI) is a non-profit organization and a professional community empowering the global research and innovation, promoting cooperation between European and International ICT communities around the globe.

EAI's mission is to create environments for improving research and to transform best ideas into commercial value proposition through community cooperation.

EAI's guiding community principles are transparency, objectivity, equality, and openness. Through a unique cooperation methodologies EAI creates an environment that rewards excellence transparently, and builds recognition objectively regardless of age, economic status or country of origin, where no membership fees or closed-door committees stand in the way of research careers.

Through these shared values, EAI leads the way toward advancing the world of research and innovation, empowering individuals and institutions for the good of society to fully benefit from the digital revolution.

## Organizing committee

Amar Seeam	Visham Ramsurrun	Jeroen Steenbeek
Suraj Juddoo	Assane Gueye	Aditya Santokhee
Girish Bekaroo	Amreesh Phokeer	Mrinal Sharma

## Saturday 16 September

### Track 1 : Intelligent Systems and Security

1. An Analysis of Key Tools for Detecting Cross-Site Scripting Attacks on Web-Based Systems
2. Enhancing Home Security with Pressure Mat Sensors: A Multi-Modal IoT Approach
3. Distracker: An Intelligent Assistant for Real-Time Distracted Driving Detection and Mitigation
4. InSightHub: Intelligent Notification and Status Indicator for Streamlined Work-from-Home Environments
5. Modern Detection Techniques of False Data Injection Attacks in V2X Communication: A Critical Analysis
6. Characterization of malicious URLs using Machine Learning and Feature Engineering

### Track 2 : Blockchain and Machine Learning Algorithms

1. Comparative performance evaluation of random forest, extreme gradient boosting and linear regression algorithms using Nigeria's gross domestic products
2. Blockchain based mobile-patient medical records management system
3. A Mobile/Tablet app-based Patient Records Management System using Blockchain
4. Enhancing Vehicle Fitness Recording and Integrity through Blockchain-Based Decentralised Application in Mauritius
5. XGBoost Algorithm to predict a patient's risk of stroke
6. On the use of Machine Learning technique to appraise thermal properties of novel earthen composite for sustainable housing in Sub-Saharan Africa

## **Sunday 17 September**

### **Track 3 : Sustainable Technologies and Environmental Impact**

1. Solar Energy in Africa- an Overview, with a focus on Egypt
2. AMETHYST: Advanced Microbial Eradication Through High-intensity Yielding Sterilization Technology - A Multipurpose Decontamination Chamber using 405nm HINS Light
3. Cotton plant pests and phenology knowledge management in Côte d'Ivoire using Semantic Web Technologies
4. Microbial fuel cell for the recovery of sludge from the treatment of effluents by electrocoagulation
5. Projected hydroclimate changes of over Senegal (West Africa)

### **Track 4 : Digital Learning and Social Adoption**

1. Covid-19 Contact Tracing Application Adoption: A Technology Readiness Model Perspective
2. Secondary school teachers' adoption of e-learning platforms in post Covid-19: A Unified Theory of Acceptance and Use of Technology (UTAUT) perspective
3. Prof Pi: Using Whatsapp Bots and GPT-4 for Tutoring Mathematics in Underserved Areas
4. VITAL: Virtual Interactive Telegram Assisted Law clinic

### **Track 5 : Networking Technology for Social Impact**

1. Assessing data protection perspectives among the residents of Rumphu and Karonga in Northern Malawi regarding the use of Unmanned Aerial Vehicles (drones) for humanitarian intervention
2. Study of the Rewiring Factor in an Unstructured P2P
3. Networked Micro-Services: Empowering Local Micro-Enterprises in a South African Township through Community Wireless Networks (CWNs)
4. Fundamental limitations in high speed and low cost architecture Free Space Optical (FSO) networks for rural populations
5. F4PW: Fog Computer For Pregnant Women

# Keynote speakers

## Dr. Xavier Bellekens

**Title:** Bridging the Cybersecurity Gap: Empowering Underserved Populations and Emerging Countries for a Safer Digital Future

### Abstract

Drawing from a decade of experience in academia and hands-on leadership as a CEO, Dr. Bellekens will explore the unique challenges and opportunities facing Africa, with a particular focus on Mauritius. He will emphasize the importance of digital literacy, public-private partnerships, and affordable access to technology. By sharing success stories and outlining practical strategies, his keynote aims to empower stakeholders and inspire a collaborative approach to bridge the digital divide and bolster cyber-resilience.

### Bio

Dr. Xavier Bellekens is the CEO and co-founder of Lupovis.io, a cyber-deception startup. He is a former Nonresident Senior Fellow of the Scowcroft Center for Strategy and Security at the Atlantic Council and a former Assistant Professor Chancellor's Fellow in the Institute for Signals, Sensors and Communications with the Department of Electronic and Electrical Engineering at the University of Strathclyde. Additionally, Dr. Bellekens serves as the Chair of the Cyber-Security Group and is a former Chair of the Blockchain Group for IEEE UK and Ireland.

## Dr. Theophilus A. Benson

### Bio

Theophilus A. Benson is a Professor of Electrical and Computer Engineering at Carnegie Mellon University. He earned his B.S. from Tufts University, Ph.D. from the University of Wisconsin-Madison, and completed a post-doctorate at Princeton University. Prof. Benson's research focuses on improving the performance and availability of computer networks. He collaborates with a broad set of cloud providers and content distribution networks to refine their infrastructures and has recently been developing initiatives to address the digital divide in the global south. He has received numerous awards, including the SIGCOMM Test of Time Award, NSF CAREER Award, NEC Faculty Award, Google Faculty Award, Facebook Faculty Award (twice), and Faculty Research and Engagement Program (twice).

# Timetable

## Saturday, 16 of September

9:00–9:30	Registration and Welcome
9:30–9:45	Opening Insights by the Campus Director, Prof Mari Jansen Van Rensburg
9:45–10:15	Keynote Talk: Prof Theophilus Benson

### Track 1: Intelligent Systems and Security

10:15–10:40	An Analysis of Key Tools for Detecting Cross-Site Scripting Attacks on Web-Based Systems
10:40–11:00	Coffee Break
11:00–11:25	Enhancing Home Security with Pressure Mat Sensors: A Multi-Modal IoT Approach
11:25–11:50	Distracker: An Intelligent Assistant for Real-Time Distracted Driving Detection and Mitigation
11:50–12:15	InSightHub: Intelligent Notification and Status Indicator for Streamlined Work-from-Home Environments
12:15–13:15	Lunch Break
13:15–13:40	Modern Detection Techniques of False Data Injection Attacks in V2X Communication: A Critical Analysis
13:40–14:05	Characterization of malicious URLs using Machine Learning and Feature Engineering

### Track 2: Blockchain and ML

14:05–14:30	Comparative performance evaluation of random forest, extreme gradient boosting and linear regression algorithms using Nigeria's gross domestic products
14:30–14:50	Coffee Break
14:50–15:15	Blockchain based mobile-patient medical records management system
15:15–15:40	A Mobile/Tablet app-based Patient Records Management System using Blockchain
15:40–16:05	Enhancing Vehicle Fitness Recording and Integrity through Blockchain-Based Decentralised Application in Mauritius
16:05–16:30	XGBoost Algorithm to predict a patient's risk of stroke
16:30 – 16:55	On the use of Machine Learning technique to appraise thermal properties of novel earthen composite for sustainable housing in Sub-Saharan Africa
18:30	Conference Gala Dinner @ Anelia Resort



## Sunday, 17 of September

9:30-10:00	Keynote Talk 2: Dr. Xavier Bellekens
<i>Track 3 : Sustainable Tech</i>	
10:00-10:25	Solar Energy in Africa- an Overview, with a focus on Egypt
10:25-10:50	AMETHYST: Advanced Microbial Eradication Through High-intensity Yielding Sterilization Technology - A Multipurpose Decontamination Chamber using 405nm HINS Light
10:50-11:05	<b>Coffee Break</b>
11:05-11:30	Cotton plant pests and phenology knowledge management in Côte d'Ivoire using Semantic Web Technologies
11:30-11:55	Microbial fuel cell for the recovery of sludge from the treatment of effluents by electrocoagulation
11:55-12:20	Projected hydroclimate changes of over Senegal (West Africa)
12:20-13:40	<b>Lunch Break</b>
<i>Track 4 :Digital Learning</i>	
13:40-14:05	Covid-19 Contact Tracing Application Adoption: A Technology Readiness Model Perspective
14:05-14:30	Secondary school teachers' adoption of e-learning platforms in post Covid-19: A Unified Theory of Acceptance and Use of Technology (UTAUT) perspective
14:30-14:55	Prof Pi: Using Whatsapp Bots and GPT-4 for Tutoring Mathematics in Underserved Areas
14:55-15:15	<b>Coffee Break</b>
15:15-15:40	VITAL: Virtual Interactive Telegram Assisted Law clinic
<i>Track 5 :Networking Technology</i>	
15:40-16:05	Assessing data protection perspectives among the residents of Rumphi and Karonga in Northern Malawi regarding the use of Unmanned Aerial Vehicles (drones) for humanitarian intervention
16:05-16:30	Study of the Rewiring Factor in an Unstructured P2P
16:30-16:55	Networked Micro-Services: Empowering Local Micro-Enterprises in a South African Township through Community Wireless Networks (CWNs)
16:55-17:20	Fundamental limitations in high speed and low cost architecture Free Space Optical (FSO) networks for rural populations
17:20 - 17:45	F4PW: Fog Computer For Pregnant Women
17:45 - 18:00	<b>Closing Remarks and Best Paper Award Ceremony</b>

