Curriculum Vitae

Name: Mugabarigira Bien Aime
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Status:

- **Associate Researcher.** Department of Computer Science and Engineering, Sungkyunkwan University, Republic of Korea
    - My research area includes Internet of Things (IoT), a networked system that interacts with physical, real environments, including Vehicular Networks, and the Future Internet. My current research comprises (i) Vehicular networking: routing and safety protocols. (ii) The support of the safe and efficient navigation services in transportation systems (e.g., road networks, air mobility); (iii) The efficient protection of pedestrians, drivers, and passengers in transportation systems (e.g., road networks and subways) in emergency situations (e.g., accidents and disasters); and (iv) The Urban Air Mobility (e.g., UAV navigation).
    - My recent research mainly focusses on Intelligent Transportation Systems ITS to enable the connected vehicles both terrestrial and aerial to navigate safely to their destinations.
    - I have been working as an associate researcher in IoT Lab at Sungkyunkwan University: http://iotlab.skku.edu/

Education:

- **Sungkyunkwan University,** Suwon, South Korea
  Department of Electrical and Computer Engineering
  Ph.D. - August 2025
  Thesis Title - Context-Aware Navigation for Safe and Efficient Maneuver Control of Moving Objects in Cyber-Physical Systems
  Advisor - Prof. Jaehoon (Paul) Jeong
- **National University of Rwanda**, Huye, Rwanda
  Department of Computer Science and systems
  B.S. - October 2012, Second Class Honours, upper Division
  Thesis Title - OSIS: Online Schedule Inquiry system

Research Experience:

- **2015.9-2025.08: Sungkyunkwan University, Republic of Korea**
    - **Research:** Vehicular Networking and Applications**.** In line with my Ph.D research, I worked for the vehicular networking and safe navigation applications for vehicular networks. The vehicular networking research includes IPv6 mobility management and the application protocol for the safety of vehicular driving. These vehicular networking protocols can be used to support the cooperation among self-driving vehicles for driving safety. I worked for the Internet Standardization for IPWAVE (IP Wireless Access in Vehicular Environments) in the IETF such as vehicular neighbor vehicular mobility management and context-aware navigation protocol for IP-based vehicular networks.
    - **Research:** Vehicular Cyber-Physical Systems for Road Networks. I researched on the development of a smart CPS platform for developing and operating intelligent CPS. Vehicular Cyber-Physical Systems for Road Networks, such as Road Sensor Networks and Vehicular Networks. Especially, I worked for effective data processing and data dissemination for the efficient data sharing in vehicular networks. Traffic Control Center

maintains the trajectories of the vehicles moving in road networks for the localization of vehicles. It allows the infrastructure nodes (i.e., APs and Relay Nodes) to be able to forward data packets to the moving vehicles clusters with their trajectory information.

- **Research:** Aerial Navigation Scheme**:** I researched on the Safety and Efficiency in Unmanned Aerial Vehicle. This project studied the safety preserving mechanism for the enhancements of the mission and service delivery in the Urban Air Mobility (UAM). It establishes a framework for future drone networks to have a safer flying environment and an efficient drone navigation suitable for drone micro- and macro-navigation. During the development of this project, we designed an efficient collision free drone micro-navigation framework that satisfies the demand of the future urban air-mobility. We also developed an advanced graphical neural network to enhance drone macro-navigation for efficient UAVs flights. We were able to publish a conference paper and a journal version of our research addressing our research findings is under review.

Teaching:

- Teaching Assistant: **Infrastructure Networks and Security (ESW5025-41)** Computer Science and Engineering, Sungkyunkwan University, Spring 2021. A graduate course covering computer networks and network infrastructures security.
- Teaching Assistant: **Wireless and Wireless Communications and Computer (WIS5059-41)** Computer Science and Engineering, Sungkyunkwan University, Spring 2020. Graduate level course that introduces computer networks and some state-of-the-arts advanced topics in computer networks.
- Teaching Assistant: **Computer Networks (SWE3022-42)** Computer Science and Engineering, Sungkyunkwan University, Fall 2020. Undergraduate level course that introduces knowledge about wired and wireless communications that are used by computers and computing devices for various services though cloud.
- Teaching Assistant: **Creative Design Project**, Department of Interaction Science, Sungkyunkwan University, Fall 2015. Undergraduate level course that introduces knowledge the design principles for a computer science projects.
- High School teacher: **2012.09-2015.08:** I served as a high school teacher of computer science courses in the Parents High School ("Groupe Scolaire des Parents, GSP"), Huye, Rwanda. After bachelor completion, I worked as a teacher in a high school from 2012 where I taught computer science related courses such as Operating System, Computer Maintenance, Networking and Database.

Related Courses:

- **Graduate Courses**
  - **MS/Ph.D. Courses:** Writing IT Technical Papers in English and Research Ethics, Real Time System Special Topics, Special Topics on Information Security Theory, Ubiquitous Computing, Wired and Wireless Communication and Computer, Human Computer Interaction Design, Advanced Database, Estimation Theory, Advanced Digital Communications, Advanced Probability and Random Processes, Operating System Design, Advanced Artificial Intelligence, and Computer Network Security.
- **Undergraduate Courses**
  - Fundamental of Computer Science and Programming, Data Structure and Algorithms, Advanced Programming (JAVA), UNIX and Operating System, Database Management Systems, Web Design and Development Tools, Software Engineering and Project Management, Data Communication and Networks, Parallel and Distributed Systems, Cryptography and Information Security, Embedded Systems and Mobile Computing, Applied Mathematics, etc.

Technical/Special Skills:

- **OS:** Windows, Linux

- **Programming:** C/C++, Python, Lua, Java, Java Script, Latex and HTML.
- **Network Simulation and Math Package:** OMNeT++, SUMO, Matlab, Coppeliarobotics (VREP).
- **Network Protocols:** NETCONF/YANG, IEEE 802.11 a/b/g/p, Cloud Computing, TCP/IP, IPv6, IPsec, MIPv6, MANET, etc.
- **Languages:** English, French, and Kinyarwanda.

Professional Activities:

- **2008-Present:** IETF Standardization, especially IPWAVE WG, 6MAN WG, and CATS WG

Awards:

- Science, Technology, Engineering, and Medical department (STEM) Scholarship: Sungkyunkwan University, 2015-2018.

Publications:

Journal Papers

1. Bien Aime Mugabarigira, Yiwen (Chris) Shen, Jaehoon (Paul) Jeong, Tae (Tom) Oh, and Han-You Jeong, "Context-Aware Navigation Protocol for Safe Driving in Vehicular Cyber-Physical Systems", IEEE Transactions on Intelligent Transportation Systems, CNP supplemental material, Vol. 24, No. 1, pp. 128-138, January 2023.
2. Hamayoun Shahwani, Bien Aime Mugabarigira, Yiwen (Chris) Shen, Jaehoon (Paul) Jeong,and Jitae Shin, "DAPF: Delay-Aware Packet Forwarding for Driving Safety and Efficiency in Vehicular Networks", IET Communications, January 2020.

Patents

1. Jaehoon Paul Jeong, Bien Aime Mugabarigira, and Yiwen (Chris) Shen, "Apparatus and method for providing basic support for ipv6 networks operating over 5g vehicle-to-everything communications", US patent pending, August 2024.
2. Jaehoon Paul Jeong, Bien Aime Mugabarigira, and Yiwen (Chris) Shen, " Context-aware navigation protocol for safe driving ", US patent Granted, September 2023.

Conference Papers

1. Yiwen Shen, Bien Aime Mugabarigira, and Jaehoon (Paul) Jeong, "A Deep Reinforcement Learning Framework for Connected Vehicle Route Planning in Urban Environments", KICS-2025-Winter, Pyeongchang, Korea, February 5 to February 7, 2025.
2. Bien Aime Mugabarigira, and Jaehoon (Paul) Jeong, "Context-Aware Navigation Protocol for Safe Flying of Unmanned Aerial Vehicles", KICS-2024-Winter, Pyeongchang, Korea, January 31 to February 2, 2024.
3. Junhee Kwon, Bien Aime Mugabarigira, and Jaehoon (Paul) Jeong, "Web-Based Car Control and Monitoring for Safe Driving of Autonomous Vehicles", International Conference on Information Networking (ICOIN), Jeju, Korea, January 12-15, 2022.
4. Bien Aime Mugabarigira,Yiwen (Chris) Shen, Daegeun Choe, and Jaehoon (Paul) Jeong, "Context-Aware Navigator for Road Safety in Vehicular Cyber-Physical Systems", The Third International Conference On Consumer Electronics (ICCE) Asia, Jeju, Korea, June 24-26, 2018.
5. Daegeun Choe, Yiwen (Chris) Shen, Bien Aime Mugabarigira, and Jaehoon (Paul) Jeong, "Extensible Intelligent Simulator Architecture for the Development of Cyber-Physical Systems", The Third International Conference On Consumer Electronics (ICCE) Asia, Jeju, Korea, June 24-26, 2018.
6. Hamayoun Shahwani, Bien Aime Mugabarigira, Jitae Shin, and Jaehoon Paul Jeong, "An Effective Data Processing and Data Dissemination in Vehicular Networks", The 12nd ACM International Conference on Ubiquitous Information Management and Communication (IMCOM), Langkawi, Malaysia, January 2018.
7. Bien Aime Mugabarigira, Yiwen (Chris) Shen, Jaehoon (Paul) Jeong, Tae (Tom) Oh, and Sang Hyuk Son, "Design and Implementation of Vehicular Network Simulator for Data Forwarding Scheme

Evaluation", 31th International Conference on Advanced Information Networking and Applications Workshops - Device Centric Cloud (DC2), Taipei, Taiwan, March 27-29, 2017.

8. Yiwen (Chris) Shen, Bien Aime Mugabarigira, and Jaehoon (Paul) Jeong, "IPv6 Vehicular Communications over IEEE 802.11-OCB Wireless Link", KICS-2020-Winter, February 2020.

- Internet Drafts
  1. Jaehoon Paul Jeong and Bien Aime Mugabarigira, "Applicability of Computing-Aware Traffic Steering to Intelligent Transportation Systems", draft-jeong-cats-its-use-cases-02, November 2024.
  2. Jaehoon Paul Jeong, Bien Aime Mugabarigira, Yiwen (Chris) Shen, Alexandre Petrescu, and Sandra Cespedes, "Basic Support for IPv6 Networks Operating over 5G Vehicle-to-Everything Communications", draft-jeong-6man-ipv6-over-5g-v2x, April 2024.
  3. Jaehoon Paul Jeong, Bien Aime Mugabarigira, Yiwen (Chris) Shen, and Zeung Il Kim, "Context-Aware Navigation Protocol for IP-Based Vehicular Networks", draft-jeong-ipwave-context-aware-navigator, March 2024.
  4. Jaehoon Paul Jeong, Bien Aime Mugabarigira, and Yiwen (Chris) Shen, "Vehicular Mobility Management for IP-Based Vehicular Networks", draft-jeong-ipwave-vehicular-mobility-management, February 2024.

References:

Name	Affiliation	Position	Email	Telephone
Jaehoon (Paul) Jeong (Ph.D Advisor)	Sungkyunkwan University	Professor	pauljeong@skku.edu	+82-31-299-4957
Jitae Shin (Ph.D Committee Chair)	Sungkyunkwan University	Professor	jtshin@skku.edu	+82-31-290-7153
Yiwen (Chris) Shen (Research Collaborator)	Ajou University	Assistant Professor	chrisshen@ajou.ac.kr	+82-31-219-2547