

EDWARD KWAO

Yuseong-gu, Daejeon-South Korea

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EDUCATION

Hanbat National University(HBNU)

MEng.Intelligence Media Engineering

August 2021 – Present

Yuseong-gu, South Korea

Kwame Nkrumah University of Science and Technology(KNUST)

BSc.Telecommunication Engineering

August 2016 – August 2020

Kumasi, Ghana

RELEVANT COURSEWORK/KNOWLEDGE

- Probability Theory
- Information Theory
- Wireless Data Communication Network
- Convex Optimization
- Signal Processing for Wireless Communications
- Wireless Communication(MIMO-OFDM, Detection etc.)
- Deep Learning
- Linear Algebra and Applications

RESEARCH INTERESTS

- Wireless Network Security
- Information and Coding Theory
- Random Access
- Optimization in Wireless Communication Systems
- Cellular Networks (4G, 5G and Beyond)
- Internet of Things (IoT)
- Application of Deep Learning in Wireless Communication Systems

SKILLS/EXPERTISE

Tools/Programming Language: Matlab, Python, C, HFSS, LaTeX/Overleaf, Microsoft(Word, Excel, PPT), Linux scripting, SDR(Ettus USRP) programming, wireshark, SRS Airscope.

Academic/Industrial: Machine learning, analysis, research, simulations, computer networking, wireless communication networks, and protocols

Libraries/Framework: Sci-kit Learn, TensorFlow, Keras, SciPy, Pandas, NumPy, Matplotlib, Seaborn

Interpersonal: Leadership, teaching, teamwork, active listening, responsibility, critical thinking, excellent written and oral communication skills in English Language.

RESEARCH AND TEACHING EXPERIENCE

Intelligent Communications and Information Security Lab

Graduate Student, Research Assistant

September 2021 – Present

Yuseong-gu, South Korea

- Review 4G, 5G and beyond network security research papers and communication systems papers in general.
- Studying application of deep learning concepts in wireless communication.
- Reproduce results in highly ranked research papers relevant to our work, *using matlab or python*.
- Assist undergraduate students with programming in MATLAB and Python.
- Reviewer: IEEE Vehicular Technology Conference Spring 2023.

Huawei Certified ICT Training Academy, KNUST

Tutor

June 2021 – August 2021

Kumasi, Ghana

- Guided enrolled students in grasping key computer networking concepts: Internet Switching, Routing Architecture, Network Security, Internet Protocols – IPV4, IPV6, DHCP, FTP, Telnet.

Faculty of Electrical and Computer Engineering, KNUST

Teaching and Research Assistant

September 2020 – August 2021

Kumasi, Ghana

- Designed and simulated printed/planar communication antennas.
- Reviewed papers and conducted literature reviews.
- Taught students Applied Electricity, Mobile and Satellite Communication, Digital Signal Processing, and Electromagnetism.
- Mentored final year undergraduate students in antenna design projects.

1 Signal Regiment, Ghana Military Headquarters

Intern

July 2019 – September 2019

Kumasi, Ghana

- Troubleshoot networks and configured VOIP phones on duty days(once a week).
- Information Technology tutor for Other Rank Soldiers: Gave lessons for an hour, twice a week.
- Taught Other Rank soldiers cellular network protocols and data communication networks
- Drone Inspection and Maintenance team member: Assigned to inspecting and maintaining two drones twice a week.

New Jerusalem International School

July 2015 – July 2016

Tutor *Accra, Ghana*

- Taught Junior High School Students integrated science and mathematics on the average of 18 hours/week.
- Students' Welfare committee assistant head: Engaged students in talks,twice every month with regards to hygiene and cleanliness.
- Initiated a weekly science and mathematics quiz competition among students and spearheaded the activity to promote the study of the subject matter.

PROJECTS

Vulnerability Analysis in Practical 4G and 5G Networks

August 2022 - March 2023

- We analyzed the 3GPP radio access network protocol specifications. *HBNU, South Korea*
- We explored vulnerabilities associated with how the protocols ensure synchronization between the network and user equipment.
- At the heart of our project is the Timing Advance Command sent by eNodeB to the user equipment during random access procedure and its involvement in ensuring synchronization between the two terminals.

Deep learning based Attack in Multiuser Communication Systems

Currently in Progress

- A deep learning based multiuser autoencoder is first trained in a way that produces similar bit error rate of users' signals. *HNBU, South Korea*
- We assume that one of the users has malicious intention and transmits an adversarial perturbation that destroys the signals of normal users while rendering its own signal immune to the effect of the perturbation.
- We seek to formulate the generation of the adversarial perturbation as an optimization problem.

High Gain Printed LPDA Design for UHF Applications

September 2019 – May 2020

- The log-periodic dipole antenna was designed and simulated with the HFSS software. *KNUST, Ghana*
- It has a high gain and good far field communication parameters.
- It operates from 440 MHz–690 MHz, thus for radio and TV broadcasting.

CERTIFICATIONS AND AWARDS

- Best Student (Semester 1,2,3) - Hanbat National University. **December 2021, June 2022, December 2023**
- Deep Learning Specialization: Coursera (taught by Prof. Andrew Ng). **February 2022 - March 2022**
- Huawei Certified ICT Associate (HCIA) - Routing & Switching. **July 2019 - July 2023**
- First Class Honors - Telecommunication Engineering (KNUST). **August 2020**
- Ghana Engineering Students' Association(GESA) Intellectual Competition Winner - KNUST. **November 2017**
- Ghana National Petroleum Corporation (GNPC) Scholarship Award. Tuition, accommodation, living expenses, learning materials and health screening - KNUST. **September 2017 - September 2020**
- Best Science and Mathematics Tutor - New Jerusalem International School. **December 2016**

PUBLICATIONS

Kwao Edward, Jaehun Lee, Jinmo Park, Byeongdo Hong, Taehoon Kim, Inkyu Bang, "Vulnerability in Random Access Procedure of Cellular Networks: Timing Advance Misalignment and Uplink Synchronization Failure". *IEEE Global Communications Conference (GLOBECOM) 2023* [Submitted]

EXTRACURRICULAR

- Member, Papa's Keep Fit Gym **2018, 2019, 2020**
- Captain, Wrontek Football Team **June 2019 - August 2019**
- Member, Perry's Foundation **November 2019 - 2021**

REFERENCES

** Available on request