Elisha A. KOMOLAFE

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Research Interests

Rehabilitation Robots, Reinforcement Learning, Robotics, Control Engineering, Brain-Computer-Interface, Machine Learning

Professional Summary

Electronic and Electrical Engineer from Obafemi Awolowo University in Ile-Ife, Nigeria with experience in reinforcement learning for robotics. Contributed to the development of the first Rehabilitation robot designed for Sub-Saharan Africa. Interested in the intersection of machine learning, Biosignal control, Reinforcement learning and control for robot design in rehabilitation tasks and virtual simulations.

Education

Obafemi Awolowo University (O.A.U.), Ile-Ife, Nigeria 2016 – 2022
Bsc. Electronic and Electrical Engineering. — GPA 3.97/5.00
Relevant Coursework: Control Systems Engineering I & II, Introduction to Modern Control, Intelligent Control and Instrumentation Engineering.

- **Dissertation Topic: "Design and development of a small scale bilateral rehabilitation robot for stroke rehabilitation and a low-cost force-torque sensor".** Supervised by Dr. K.P. Ayodele

Neurological Association of South Africa, EEG Online May 2020 – Nov 2020
Diploma in Clinical Electroencephalography (EEG)
Relevant Coursework: Principles of Electroencephalography, Application of Encephalography in Clinical Practice

Neuromatch Academy – Computational Neuroscience Course July 2020
Online Summer School

Neuromatch Academy – Deep Learning Course July 2022
Online Summer School

IBRO-SIMONS Computational Neuroscience Imbizo Aug 2022 – Sep 2022
Cape Town, South Africa

Research Experience

Biosignal Processing, Instrumentation and Control Lab 2017-Present
Undergraduate Research Assistant to Dr. K.P. Ayodele

- **Control scheme for a remote weather station.** Completed the initial design of the timing diagram and flowchart for the wireless weather station.
- **Robotic hand orthosis for rehabilitation.** Assisted with the testing and usability testing of a 3D printed hand orthosis.
- **Design and development of laboratory boards for electronic labs.** Created a resistor board for the EEE 291 laboratory practicals.
- **Assembly of Signal Generators for electronics lab** Assembled a signal generator kit that can produce different signal types for electronics labs.
- **Autofocusing microscope.** Created a motor system to control the focusing knobs of a microscope for autofocusing on a sample.
- **Subtractive Manufacturing with a CO2 laser cutter.** Operated and supervised the operation of the Laser cutter.

Gilead Biomedical Engineering Sep 2019 – Jan 2020
Research Assistant
Projects:

- **Applications of Reinforcement Learning for Robotic control in a virtual environment.** Implemented Reinforcement learning methods to train robots in the virtual environment on a task.
- **Repair of a faulty wheelchair car lift** Collaborated with other student interns to repair a faulty Hamar Al600 car lift.
- **Data collection from a load cell using I2C, Hx711 amplifier and Labview DAQ board.** Co-produced a data-acquisition system to collect data from a loadcell to LabVIEW using I2C protocol.

Applied Artificial Intelligence and Robotics Research Lab 2019- Present
Research Assistant

- **Rehabilitation robots**
  Assisted during the development of the PULSR robotic rehabilitation platform
- **Bilateral rehabilitation robots review**
  Completed a Literature review on upper-limb rehabilitation robots for an updated state of the art review.

Summer school project July 2020
Neuromatch Academy Computational Neuroscience Course
Title: Decoding of the Visual Cortex using Kay-Gallant Dataset. To decode seen images from brain activation data using edge detection and machine learning techniques.

Summer school project July 2020
Neuromatch Academy Deep Learning Course
Title: Multi Agent Reinforcement Learning in Gambling and the effect on Group fMRI readings. To utilize reinforcement learning to create a multi-agent simulation from single-person brain activation data.

Summer school project Aug 2022 – Sep 2022
IBRO-SIMONS Computational Neuroscience Imbizo

- **Mini project: "Exploring generic decoding of seen objects using visual features."** To explore if linear regression decode objects from the brain activity in different regions.
- **Project: "Learning to walk in a simulation."** Implementing Reinforcement learning methods in training a bipedal agent to walk

Conferences

Nigerian Federation For Neurorehabilitation, Sub-Saharan Regional Conference 2018
Theme: Neurorehabilitation in Africa: Challenges and New Horizons

Faculty of Technology Conference 2019 2019
Theme: Diversification of Developing Economies: imperatives for sustainable environment and technological innovations.

Nigerian Society of Neurological Sciences (NSNS) Annual Scientific Conference 2022
Theme: Multidisciplinary Care and Collaboration in the Neurological sciences

Publications

A review on the structure and control techniques used in bilateral rehabilitation robots for stroke rehabilitation. *(In Preparation)*

Presentations

Ayodele, K.P, Komolafe, M.A., Olugbon, F.J., **Komolafe, E.A.** (2019). A Myoelectric Robotic Orthosis For Hand Neuro-rehabilitation of Stroke Patients in resource-poor settings. Oral presentation at NFNR 2018.

Professional Societies and Activities

WFNR (World Federation of Neurorehabilitation July 2022 – Present
Young WFNR Member

ICORR (International Consortium for Rehabilitation Robotics) Aug 2022– Present
Member

Black in AI Nov 2022 – Present

Work Experience

Faculty of Technology Conference OAUTekConf2019 Sep 2019
Assistant Technician

- **Performed projection for abstract presentation sessions and Implemented teleconferencing for remote participants.**
- **Teamed up with the technical team to deliver audio-visual support during the conference.**

Teaching Assistant Nov – Dec, 2021
Marked and Graded Laboratory reports of ∼200 year II engineering students for EEE 291.
EEE 291 – Fundamentals of Electronic and Electrical Engineering Laboratory I

Software, Programming, Languages and certificates

Software LaTeX, Rhino 3D, Matlab, Corel Draw, k40D, Diagrams.Net, V-REP

Programming Languages Python, C

Languages English, Yoruba

Certificates Cisco IT Essentials, CCNA Routing and Switching: Introduction to Networks