Clinton Enwerem

Academic CV

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Research Interests

Optimization & Control for Safe Autonomy, Risk-Aware RL, Motion Planning.

Education

2021-Date **PhD, Electrical & Computer Engineering**, *University of Maryland*, College Park, MD, USA.
Expected Spring 2026. Advisors: Professor John S. Baras and Professor Calin Belta.

Relevant Coursework: Decision-Making for Robotics, Network Control Systems, Decision Making Under Uncertainty, Random Processes, Advanced Digital Signal Processing, Nonlinear Control Systems, Optimal Control, System Theory, Convex Optimization.

2014-2018 **B.Eng., Electrical Engineering**, *University of Nigeria*, Nsukka, Enugu, Nigeria.
GPA: 3.84/4 (*First-Class Honors*). Emphasis: Control Theory.

Selected Publications

Preprints/Articles In Review

2024 [P3] **Clinton Enwerem**, Aniruddh G Puranic, John S Baras, and Calin Belta. Safety-Aware Reinforcement Learning via Risk-Sensitive Quantile Regression Deep Q-Networks, 2024.

2024 [P2] **Clinton Enwerem**, Erfaun Noorani, John S. Baras, and Brian M. Sadler. Robust Stochastic Shortest-Path Planning via Risk-Sensitive Incremental Sampling, 2024. *To appear in the Proceedings of the 2024 Conference on Decision and Control (CDC)*. arXiV Link.

2023 [P1] **Clinton Enwerem**, John S. Baras, and Danilo Romero. Distributed Optimal Formation Control for an Uncertain Multiagent System in the Plane. *arXiv*, 2023. arXiV Link.

In Conference Proceedings

2024 [C2] **Clinton Enwerem** and John S. Baras. Safe Collective Control under Noisy Inputs and Competing Constraints via Non-Smooth Barrier Functions. *In the Proceedings of the 2024 European Control Conference*, 2024.

2023 [C1] **Clinton Enwerem** and John S. Baras. Consensus-Based Leader-Follower Formation Tracking for Control-Affine Nonlinear Multiagent Systems. *9th International Conference on Control, Decision and Information Technologies*, 2023.

Journal Articles

2024 [J1] **Clinton Enwerem** and John S. Baras. Formation Tracking for a Class of Uncertain Multiagent Systems: A Distributed Kalman Filtering Approach. *IEEE Control Systems Letters*, volume 8, 2024.

Research Experience

8/2021-Date **Graduate Research Assistant**, ***Institute for Systems Research***, **University of Maryland**, **College Park**

Research Foci Safety-Critical Control, Robust Motion Planning, Physics-Informed Deep Reinforcement Learning.

Duties
- Work closely with PI, post-doctoral scholars and doctoral researchers to develop novel robust motion planning algorithms for autonomous ground robots and autonomous vehicles.
- Develop ROS(2)-compliant software (`Python`, `C++`) implementations of the aforesaid planning algorithms.
- Validate planning algorithms via simulative experiments on high-fidelity simulators (`Isaac Sim` and `Gazebo`) and sandboxes (`OpenAI Gym` and `Safety Gymnasium`).
- Prepare conference and journal papers, technical reports, and presentations to summarize research findings.

9/2018-3/2021 **Research Assistant**, ***Electrical Engineering Department***, **University of Nigeria**, **Enugu, Nigeria**

Research Topics Robust Control, Observer-Based Compensator Design, Feedback Linearization

Accomplishments
- Developed software for robust motor control via the active disturbance rejection control technique.
- Collaborated with faculty to co-write and publish a journal paper summarizing research findings.

8-10/2017 **Undergraduate Research Assistant**, ***Electrical Engineering Dept.***, **University of Nigeria**, **Nigeria**

Research Topics Feedback Control, Time-Delayed Systems, System Identification.

Accomplishments
- Designed a feedback-control algorithm to regulate first-order plus dead-time processes. An implementation of the algorithm and the accompanying paper are available online.

Professional Experience

Jun.-Aug. 2023 **Summer Research Assistant**, ***Institute for Systems Research***, **University of Maryland**, **College Park**

Supervisor Professor John S. Baras

Accomplishments
- Formulated a multi-agent safety-critical control problem as a chance-constrained mathematical program.
- Proposed a novel solution based on Boolean-logical-composed control barrier certificates.
- Wrote software to validate approach, and prepared a research paper ([C2]) to summarize results.

6.-8/2022 **Research Intern**, ***MATRIX Lab***, **USM at Southern Maryland**, **California, MD**

Supervisor Dr. Danilo Romero. The *MATRIX Lab* is an ultra-modern hub for autonomous systems research.

Accomplishments
- Conducted system identification experiments to verify and validate a twelve-dimensional state-space linearized model of a Crazyflie 2.1 quadrotor.
- Developed a Lagrangian-based optimal swarm control algorithm for coordinating 10 Crazyflie quadrotors tasked with formation tracking under localization uncertainty.
- Wrote ROS-compliant and performant software (Python) implementing the control algorithm, and prepared a research paper ([P1]) and a technical report to summarize research findings.

3/2020-2/2021 **Robotics Trainee**, **Robotics & Artificial Intelligence Nigeria (RAIN)**, **Ibadan, Nigeria**

Supervisor Dr. Olusola Ayoola. *RAIN is Nigeria's premier robotics and AI research institute.*

Accomplishments
- Saw varied robotics and IoT projects through hardware and software development stages comprising computer-aided design, prototyping, sensor fusion and control firmware development, and product testing.

Honors & Awards

2024 IEEE CSS Student Travel and Workshop Support: Conference travel award to attend CDC'24.
2022 2022-2023 Microsoft Diversity in Robotics & Autonomy PhD Fellowship.
2022 ROSCon Diversity Scholarship: Travel grant to attend ROSCon 2022 in Kyoto, Japan.
2021 Finalist, Engineers' League, Pan-African Robotics Competition, Rwanda.
2021 CIT Dean's Fellowship, Carnegie Mellon University, Africa Campus, Kigali, Rwanda.
2021 Dean's Fellowship, University of Maryland, College Park, MD, United States.
2020 Scholar, Stanford Exposure to Research & Graduate Education, Stanford University, CA, USA.
2020 EducationUSA Opportunity Funds Program Scholarship, U.S. Consulate General, Lagos, Nigeria.
2020 Sole Recipient (Nationwide), Door Foundation Leadlight Scholarship, RAIN.
2016-2018 Agbami Science & Technology Scholarship, Chevron: Merit-based undergraduate scholarship.
2015-2018 MTN Foundation Scholarship: Nationwide merit-based undergraduate scholarship.

Technical Skills

Robotics Tools: ROS(2), Gazebo/Ignition, RViz2, Isaac Sim. Robots: Crazyflie 2.X, Turtlebot2, Husky, UR5.
Programming Python, Matlab, C++, Bash, LaTeX, Tk, R.
ML Packages Jupyter, TensorFlow, OpenCV, PyTorch.
Engineering MCUs, Prototyping, CAD, Simulink.
Dev-Ops Docker.
Optimization Gurobi, Pyomo, Mosek, cvxpy.
Web Dev HTML, CSS, JS, Markdown.
RL Sandboxes Safety Gymnasium, OpenAI Gym.
Source Control git, GitHub, GitLab.

Professional Training & Development

2020-2021 **Certificate in Robot Development & Automation**, ***Robotics & Artificial Intelligence Nigeria***, **Nigeria**
Completed graduate-level coursework and projects in robotics, control theory, machine learning, IoT, product design and development, and industrial automation.

Summer 2022/23 **Open Courseware**: Bayesian Statistics (*UCSD*, Coursera), Autonomous Navigation for Flying Robots (*TUM*, edX), Principles of Robot Autonomy I & II (*Stanford*).

Miscellaneous

Service *Peer Reviewer*, Heliyon, MED'23, ECC'24, ACC'25, L4DC'25.
Languages English (Fluent; TOEFL iBT: 110/120), Japanese (Conversational).