

Lekan Molu

AI / Robotics / Control Systems

Full Legal Name: [Olalekan Ogunmolu](#).

Rerum Cognoscere Causas: To know the causes of things.

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Preamble Autonomous systems research scientist and engineer with experience in technology development, spanning control, planning, and machine learning, for robots. Experience in companies and universities across disciplines and industries (i) creating processes out of ambiguity; (ii) driving technical innovation via problem identification and crystallization, solution concepts ideation, team building and empowerment; and processes optimization for volume scale-up.

Skills, Tools, and Frameworks

Robotic systems Foundational knowledge of autonomous systems including (multi) rigid-body dynamics, semi-rigid, and flexible (or soft) robotic systems; mechanisms' kinematic geometry and kinetics: Euler-Lagrange, Newton-Euler, & Cosserat continua dynamical systems modeling, control, and safety verification; optimal state estimation; and signal processing.

Planning algorithms A*, RRT, PRM, MDPs, BlockMDPs, Kalman Filters, EKF, PreIntegration on IMU sensors etc.

Control systems Numerical techniques including LQR, policy optimization, DDP, MPC, nonlinear control, Lyapunov methods, PI/PD/PID control, singularly perturbed systems, nonlinear analysis and backstepping; differential games, safety in verification systems etc.

Software C++11/14/17; Python; ROS 1 and ROS 2; MoveIt! PyBullet; BulletPhysics; Point Cloud Library, OpenCV, Python-Control, Eigen, Docker, PyTorch. CVX optimization library (Python). Bash/Python Scripting, MATLAB, LabVIEW, Mathematica.

OS Unix systems: OSX. Linux: Debian, Ubuntu, Raspian. Windows.

Embedded Systems Designing and completing board layouts, assembling, testing, debugging, and integrating designs into opto-electro-mechanical systems. Communication protocols (e.g. TCP/IP, UDP, SPI, I^2C – in C/C++, and python), Linux/Python/Bash scripting. Enjoy being hands-on in the lab, rapid software prototyping; enjoy being in the details (soldering, oscilloscopes, data acquisition) and a thriving gusto for engineering.

Learning Deep networks, Azure cloud (blob storage, k8s) with tools internal to Microsoft Research, PyTorch, and CuPy. Foundation models evaluation including GPT-4o, GPT-4o1, Transformers, recurrent networks, convolutional neural networks, Data-driven Gaussian Processes, computer vision (SAM, DINO etc), ML object detection etc.

Prototyping Components selection (including design and control of soft actuators, programmable linear actuators, robot mechanism design, harmonic drives, 3D custom parts printing), microcontrollers integration (National Instruments, Raspberry Pi's, Arduinos).

CAD Solid Works, AutoDesk Inventor, Blender, Adobe Illustrator and After Effects.

Board Design Experience in board validation and with design tools (e.g. Eagle, schematic capture, layout tools, lab bring up and debug).

Professional Experience

Research

05/2021 - **Senior Researcher**, [Microsoft Research](#), New York, NY, USA.

Present

- Part of the NYC RL group that drove the reinforcement learning state space representation research efforts for decision-making: Contributed to the team's fiscal year 2022 DTR presentation to company's senior leadership; co-authored papers which were presented at ICLR, ICML, and Neurips with NYC Research and Engineer colleagues; earned one Microsoft patent award.
- Consistent contributor to advancing the state of research efforts across control theory, robotic, and machine learning with publications at the flagship conferences at these venues: TMLR, CDC, ACC, ICRA, IROS, Neurips, ICLR, ICML etc.
- Wrote the GPU-accelerated safety verification library for dynamical systems, levelsetpy (published in the 2025 ACM Transactions on Mathematical Software).
- Solid track record mentoring junior researchers including postdocs, interns, and external PhD candidates: former interns, postdocs, and externally mentored PhDs now (1) assistant professor at UMontreal, (1) postdoctoral scholar at MIT, (1) PhD student at Yale, (1) Cornell Tech PhD Student, (1) Caltech PhD Student with Aaron Ames, (1) research scientist at Reliant Robotics (Bay Area), (1) Embodied AI engineer at Wayve Technologies Ltd etc.
- Contributed to the reduced-order mathematical model of soft robot continua and devised the layered nonlinear backstepping singular perturbation theory technique for the fast control of soft embodied systems.
- Member of the global robotics steering team led by Timothy Chung spanning Redmond, Beijing, NYC, Cambridge, Zurich driving a new robotic foundation model for bimanual objects retrieval in MSFT data centers.
- Successfully led, coordinated, and executed back-to-back global research meetings in Redmond, WA (2023 – 2024) that unified research workstreams (reinforcement learning, agentic LLMs, AI4Science, robotics) across different company organizations – spanning Amsterdam, Madrid (Spain), Cambridge (UK), Redmond, and Montreal.

06/2018 - **Research Intern**, Robotics Team, [Preferred Networks](#), Otemachi, Chiyoda-ku, Tokyo, Japan.

09/218 Developed and implemented a stable imitation learning policy of nonlinear trajectory tracking on the Tokyo Robotics manipulation arm. Introduced the deep learning robotics team to nonlinear backstepping control methods for data-driven robot behavior enhancement. Made two technical presentations about my work to company senior leadership.

09/2017 - **Research Assistant**, Medical Artificial Intelligence and Automation Laboratory, Division of
05/2019 Medical Physics and Engineering, Radiation Oncology Department, UT Southwestern Medical Center.

Research Assistant for Dr. Steve Jiang, Barbara Crittenden Professor of Cancer Research, UTSW Department of Radiation Oncology.

Developed a multidisciplinary approach (spanning Deep learning, optimal control, dynamic programming, and game theory) in order to solve the classic beam orientation optimization (BOO) problem.

06/2017 - **Research Assistant**, Dr. Tyler Summers, Mechanical Engineering, UT Dallas.

09/2017 *Dynamic Programming, Decision Theoretic Control, Machine/Reinforcement Learning.*

Developed a game-theoretic controller for mitigating the lack of robustness in multi-stage decision policies on physical robots (P3DX).

09/2014 - **Research Assistant**, Dr. Nick Gans, Electrical Engineering, University of Texas at Dallas.

05/2019 *Control Systems, Systems Identification, State Estimation and Computer Vision.*

Conceived the prototypical testbed, procured hardware, integrated components to simulate soft robot compensating systems for patients in intensity modulated radiotherapy.

Summer 2016 **Hardware Integration Intern**, Amazon Robotics LLC.
SLAM, Software and Hardware Integration Intern for Tye Brady, Chief Technology Officer.
Integrated the sensing and control components and software stack for the navigation of a mobile robot (Adept's Pioneer 3-DX) used as a recreational robot in the Amazon Robotics' North Reading, MA office.

Spring 2016 **Hardware Integration Intern**, Advanced Robotics Lab, Amazon Robotics LLC.
Hardware Integration Intern for Dr. Andy Stubbs, Senior Hardware Systems Engineer.
Computer vision (point cloud, depth, and RGB) integration for objects sorting, and pick and place line scanners at a prototype fulfillment center (later adopted for the Cataret, NJ fulfillment center). Collaborated closely with the robotic manipulation team: helped with emerging fulfillment centers end-of-arm-tooling (EOAT) design reviews, amazon robotics 2016 challenge problems design, helped other interns on their projects etc.

Teaching

01/2020 - **Adjunct Instructor, RBOT 250- Robot manipulation, planning and control**, *Brandeis University*
11/2021

- *Teaching Impact:* Developed course modules in core robotics concepts including common robot configurations, kinematic geometry of mechanisms, position and velocity kinematics, and force and torque kinetic control of (non)-holonomic robotic systems. Pfeiffer constraints, Paden-Kahan subproblems in IK computation; continuum mechanics for soft robotic systems; reduced Cosserat partial-integro-differential equations for deformable continua (towards their tractable computing).
- *Practical Impact:* Conceived, procured, and assembled the robot form factor used to teach our Masters students; shipped the built robots to remote students during the pandemic; integrated the NVIDIA Isaac Sim software system for easy programmability for students with little engineering background. Taught the course back-to-back for three semesters.

09/2014 - **Teaching Assistant, Introduction to Robotics**, *University of Texas at Dallas*

09/2016 Guided students during laboratories in programming the Robai Cyton 300R2 Robot and graded homework.

01/2015 - **Teaching Assistant, Linear Systems (M.S. Class)**, *University of Texas at Dallas*

05/2015 Responsible for helping Masters students with linear control theory applications; graded homework and midterms.

Miscellaneous

08/2009 - **Supply Chain Manager, Apapa Plant**, *Coca-Cola Bottling Company*, Lagos, Nigeria.

09/2011 Minimized glass breakages by 40%, assured efficiency in supply chain operations by coordinating with the Ikeja/Head Office Logistics teams, supervised 3 Coca-Cola mega warehouse managers leading to a reduction in waste by 35% after a 9-month stint at Apapa mega-plant. Introduced new standard operating procedures company-wide and country-wide to formalize waste minimization processes, and improve production supply chain processes. This led to the Apapa plant being the highest selling plant for all Coca-Cola products for two consecutive quarters

Education

2019 - 2021 **Postdoctoral Scholar**, [The University of Pennsylvania](#), Philadelphia, PA, USA.

2014 - 2019 **PhD in Electrical and Computer Engineering**, *University of Texas at Dallas*, Richardson, USA.

2011 - 2013 **Master of Science in Engineering in Control Systems**, *The University of Sheffield*, Sheffield, United Kingdom.

Addendum

Epilogue Please see my [web presence](#) and this [resume addendum](#) for a full delineation of up-to-date publications, invited workshops, awards and honors, community service and leadership.