Olalekan Ogunmolu

Robotics | Control Systems | ML

Rerum Cognoscere Causas: To know the causes of things.

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Education

2014–Present   **PhD in Electrical and Computer Engineering** , *University of Texas at Dallas*, Richardson, United States.
Advisers: Nick Gans (UTD) and Steve Jiang (*UT Southwestern Medical Center*) | Design and prototype of a medical soft robot for automated patient positioning in Intensity Modulated Radiation Therapy (IMRT) | Beam Angle Optimization in IMRT.

2011–2012   **Master of Science in Engineering in Control Systems**, *The University of Sheffield*, Sheffield, United Kingdom.
Advisor: Tony J. Dodd. Thesis: "Autonomous Navigation of a Rotorcraft Unmanned Aerial Vehicle using Machine Vision."

2000–2005   **Bachelor Of Science in Physics & Electronics**, *Adekunle Ajasin University*, Akungba, Nigeria.
Senior thesis advised by Ademola Amusa (*MS, Columbia University, PhD UIUC*). | Dissertation Grade: 85% ≡ A+ | Graduated Magna Cum Laude.

Research Interests

Optimal/Adaptive Control • System Identification • Dynamic Programming • Game Theory • Deep/Reinforcement Learning

Experience

Research:

Summer '18   **Research Intern**, Preferred Networks, Tokyo, Japan.
Research Intern within the Robotics Team. Worked on stable learning of complex robot motion-planning/manipulation tasks.
Implemented Khansari-Zadeh's CLF-DM on the Tokyo Robotics 7-DoF Arm. Proposed a DP approach for better complex robot trajectory imitation.

Fall '17 - Present   **Visiting Research Student**, Medical Aritificial Intelligence and Automation Laboratory, Division of 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.

Summer - Fall '17   **Research Assistant**, Dr. Tyler Summers, Mechanical Engineering, UT Dallas.
Dynamic Programming, Decision Theoretic Control, Machine/Reinforcement Learning.
Developed a conservative controller for mitigating the lack of robustness in multi-stage decision policies.

Fall '14 - Now   **Research Assistant**, Dr. Nick Gans, Electrical Engineering, University of Texas at Dallas.
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 '16   **Hardware Integration Intern**, Amazon Robotics LLC.
SLAM, Software and Hardware Integration.
Helped integrate the hardware and software for the P3-DX robot used as a recreational robot in the Amazon Robotics office.

Spring '16	**Hardware Integration Intern**, Advanced Robotics Lab, Amazon Robotics LLC.

Spring '16   **Hardware Integration Intern**, Advanced Robotics Lab, Amazon Robotics LLC.
Computer Vision, *Hardware Integration*.
Wrote the codebase for the line scanners used in tracking objects in amazon warehouse assembly lines.

Teaching:

Fall '14 - '16   **Teaching Assistant, Introduction to Robotics**, *University of Texas at Dallas*.
Guided students during laboratories in programming the Robai Cyton 300R2 Robot and graded homeworks.

Spring '15   **Teaching Assistant, Linear Systems (M.S. Class)**, *University of Texas at Dallas*.
Responsible for helping Masters students with linear control theory applications; graded homeworks and midterms.

Spring '14   **Instructor, Analysis and Design of Digital Systems**, *Adekunle Ajasin University*.
Developed course modules, sole instructor for sophomore students, graded homeworks, designed and graded exams.

Summer '14   **Instructor, Digital Logic Design**, *Adekunle Ajasin University*.
Co-developed course modules, joint-instructor for junior students, graded homeworks, designed and graded exams.

Miscellaneous:

2009–2011   **Warehouse Manager, Apapa Plant**, *Coca-Cola Hellenic Bottling Company Plc*, Lagos.

2007–2008   **Banking Assistant**, *First Bank of Nigeria Plc*, Lagos.

2005–2007   **System Engineer**, *DMT Technologies Limited*, KD, Nigeria.

Publications

Peer-Reviewed:

Olalekan Ogunmolu. Deep BOO: Automating Beam Orientation Selection in Intensity Modulated Radiation Therapy. Part I: Methodologies. Under review at: *The 13th International Workshop on the Algorithmic Foundations of Robotics* (*WAFR*), Mérida, Mexico. December 2018.

Olalekan Ogunmolu. Deep BOO: Automating Beam Orientation Selection in Intensity Modulated Radiation Therapy. Part II: Initial Results. Under review at: *The 13th International Workshop on the Algorithmic Foundations of Robotics* (*WAFR*), Mérida, Mexico. December 2018.

Olalekan Ogunmolu, Nicholas Gans, Tyler Summers. Minimax Iterative Dynamic Game: Application to Nonlinear Robot Control Tasks. To appear in: *IEEE/RSJ International Conference on Intelligent Robots and Systems* (*IROS*), Madrid, Spain. October 2018.

Olalekan Ogunmolu, Dan Nguyen, Xun Jia, Weiguo Lu, Nick Gans, and Steve Jiang. Automating Beam Orientation Optimization for IMRT Treatment Planning: A Deep Reinforcement Learning Approach. *Selected for Oral Presentation at the John R. Cameron Young Investigators Symposium – 60th Annual Meeting of the American Association of Physicists in Medicine, Nashville, TN* (*AAPM*). July 2018.

Yara Almubarak, Joshi Aniket, **Olalekan Ogunmolu**, Xuejun Gu, Steve Jiang, Nicholas Gans, and Yonas Tadesse, Design and Development of Soft Robots for Head and Neck Cancer Radiotherapy. *SPIE: Smart Structures + Nondestructive Evaluation*, Denver, CO, U.S.A. March 2018.

Olalekan Ogunmolu, Adwait Kulkarn, Yonas Tadesse, Xuejun Gu, Steve Jiang, and Nick Gans. Soft-NeuroAdapt: A 3-DOF Neuro-Adaptive Pose Correction System For Frameless and Maskless Cancer Radiotherapy. *IEEE/RSJ International Conference on Intelligent Robots and Systems* (*IROS*), Vancouver, BC, Canada. September 2017. DOI: 10.1109/IROS.2017.8206211.

Olalekan Ogunmolu, Xuejun Gu, Steve Jiang, and Nick Gans. Vision-based control of a soft-robot for Maskless Cancer Radiotherapy. *IEEE Conference on Automation Science and Engineering (CASE)*, Fort-Worth, Texas, August 2016. DOI: 10.1109/CoASE.2016.7743378.

Olalekan Ogunmolu, Xuejun Gu, Steve Jiang, and Nick Gans. A Real-Time Soft-Robotic Patient Positioning System for Maskless Head-and-Neck Cancer Radiotherapy. *IEEE Conference on Automation Science and Engineering (CASE)*, Gothenburg, Sweden, August 2015. DOI: 10.1109/CoASE.2015.7294318.

Olalekan Ogunmolu, Autonomous Navigation of a Rotor-craft unmanned aerial vehicle using machine vision. .
MS Thesis, August. 2011. Advisor: Tony J. Dodd, University of Sheffield, England.

Olalekan Ogunmolu, Single Fractional Parentage Coefficients in the sd-Shell Nuclei .
BS Thesis, Nov. 2004.   Advisor: Ademola Amusa, Adekunle Ajasin University, Nigeria.

Abstracts:

Olalekan Ogunmolu, Nicholas Gans, Tyler Summers. Minimax Iterative Dynamic Game: Application to Nonlinear Robot Control Tasks. *IEEE International Conference on Robotics and Automation, Machine Learning for Planning and Control Workshop Extended Abstract (ICRA 2018)*, Madrid, Spain. October 2018.

Olalekan Ogunmolu, Nicholas Gans, Tyler Summers Minimax Iterative Dynamic Game: Application to Nonlinear Robot Control Tasks., *IEEE International Conference on Robotics and Automation, Late Breaking Result Abstract* Brisbane, Australia, May 2018.

Yara Almubarak, Joshi Aniket, **Olalekan Ogunmolu**, Xuejun Gu, Steve Jiang, Nicholas Gans, and Yonas Tadesse, Design and Development of Soft Robots for Head and Neck Cancer Radiotherapy. *SPIE: Smart Structures + Nondestructive Evaluation*, Denver, CO, U.S.A. March 2018.

Tyler Summers, **Olalekan Ogunmolu**, Nicholas Gans. Robustness Margins and Robust Guided Policy Search for Deep Reinforcement Learning". *IROS 2017 Abstract Only Track*, Vancouver, BC, Canada. September 2017.

Olalekan Ogunmolu, Nick Gans, Steve Jiang, Xuejun Gu. An Image-Guided Soft Robotic Patient Positioning System for Maskless Head-And-Neck Cancer Radiotherapy: A Proof-of-Concept Study. *American Association of Physicists in Medicine (AAPM)* Annual Meeting, Annaheim, CA, USA. July 2015.

Tech Reports:

Olalekan Ogunmolu, Nicholas Gans, Tyler Summers. Robust Zero-Sum Deep Reinforcement Learning. *arxiv PrePrints, arxiv ID:1710.00491*, Oct 2017.

Olalekan Ogunmolu, Xuejun Gu, Steve Jiang, Nicholas Gans. Nonlinear Systems Identification Using Deep Dynamic Neural Networks". *arxiv PrePrints, arxiv ID:1610.01439*, Oct 2016.

Olalekan Ogunmolu. Review of "Continuous Finite-Time Stabilization of Translational and Rotational Double Integrators". *arxiv PrePrints, arxiv ID: 1612.01607v2*, May 2015.

Invited Talks
Presentations:

ATR CNS Labs	Minimax Iterative Dynamic Game. Department of Brain Robot Interface, Computational Neuroscience Labs, ATR, Osaka, Japan. August 2018.
Preferred Networks	Neural Networks and Adaptive Control. Preferred Networks Tech. Talk, Chiyoda-ku, Tokyo. Japan. August 2018.
Google	SoftNeuroAdapt: A 3-DoF Neuro-Adaptive Healthcare System. *Work presented by Nick Gans*, Google Robotics, Mountain View, CA. USA. September 2017.
EFSC'17, Vancouver	Soft Robotic Modules as Position Correcting Mechanisms in Cancer RT. *3rd Entrepreneurship Forum & Start-up Competition, EFSC'17,* Vancouver, BC, Canada. September 2017.

UTSW, Dallas, TX	A 3-DOF Neuro-Adaptive Patient Pose Correcting System For Frameless and Maskless Cancer Radiotherapy, *Physics Research Seminar Series, Radiation Oncology Department, UT Southwestern Medical Center,* Dallas, TX, USA. March 2017.
IEEE Arlington, TX	Towards automated accurate patient positioning in maskless cancer radiotherapy. *IEEE Computational Intelligence Society,* UT Arlington, TX, USA. December 2015.

Poster Presentations:

ICRA '18	**Minimax Iterative Dynamic Game: Application to Nonlinear Robot Control Tasks.,** *IEEE International Conference on Robotics and Automation* Brisbane, Australia, May 2018.
NIPS '17	**An iterative dynamic game for robust deep reinforcement learning,** *Neural Information Processing Systems* Long Beach, CA, December 2017.
IROS '17	**Robustness Margins and Robust Guided Policy Search for Deep Reinforcement Learning,** *International Conference on Intelligent Robots and Systems* Vancouver, BC, Canada. September 2017.
Texas Systems Day	**A 3-DOF Neuro-Adaptive Pose Correction System For Frameless and Maskless Cancer Radiotherapy,** *Texas Systems Day, Texas A & M University,* College Station, TX, USA. March 2017.

Awards and honors

○ **IEEE RAS/IROS Travel Award**	August 2018
○ Finalist at the 3rd Entrepreneurship Forum and Startup Competition Sponsored by IEEE Robotics and Automation Society, KUKA AG, and Univ. Hamburg	August 2017
○ **NSF Doctoral Consortium Award**	August 2017
○ **Mary and Richard Templeton Graduate Fellowship** (UTD)	August 2017
○ **ROSCon Scholarship** (Open Software for Robotics Foundation)	July 2017
○ President's **Teaching Excellence Award** for Teaching Assistants (UTD)	Nom. Feb. 2017
○ **Golden Key International Honour Society**	Inducted Dec. 2016
○ **IEEE RAS/ISAM Travel Award**	August 2016
○ **Ericsson Graduate Fellowship**	2015 - 2016
○ **Jonsson Scholarship**	2014 - 2015
○ **Achievement Award, University of Florida** *(Declined)*	Fall 2014
○ **PTDF Overseas Scholarship Award, £25,500+ *for one year*.** (~1.7% acceptance)	2011
○ **Federal Government (of Nigeria) Scholarship** (~3.6% acceptance)	2002
○ **Ondo State (Nigeria) Scholarship** (~10% acceptance)	2004

Select services and leadership

Jounals/conferences peer reviewing activities

2018	**Reviewer,** *Institute of Physics: Measurement Science and Technology (Journal).*
2018	**Reviewer,** *IEEE International Conference on Intelligent Robots and Systems (IROS) 2018.*
2018	**Reviewer,** *Neural Computing and Applications (Journal),* Neuro-Adaptive Control.
2017	**Reviewer,** *IEEE International Conference on Robotics and Automation (ICRA) 2018.*
2017	**Reviewer,** *American Control Conference (ACC),* Reinforcement Learning Track.
2017	**Reviewer,** *International Federation of Automatic Control World Congress (IFAC),* Switched Systems Track.
2017	**Open Reviewer,** *35th International Conference on Machine Learning (ICML),* OptNet: Differentiable Optimization as a Layer in Neural Networks.

Miscellaneous

2017   **Invited Contributor**, *IEEE/RSJ International Conference on Robots and Intelligent Systems (IROS)*, Abstract Only Track, Vancouver, BC, Canada.

2017 – Now   **Member**, **IEEE Robotics and Automation Society**.

2016–Now   **Member**, *IEEE Boston*, Greater Boston, USA.

2015 – 2016   **Science instructor**, *IEEE Dallas Shoulder of Giants Workshops*, Dallas, TX.
Participant at IEEE Dallas Young Professionals community outreaches in promoting STEM education and awareness in the Dallas/Fort-Worth Metroplex.

2015   **Summer Science Program**, *University of Texas at Dallas*, Richardson, TX.
Trained high-school kids in basic robots control and programming with the Berkeley Snap! kit and arduino.

2012   **Workshop participant**, *ILA Berlin Airshow*, Berlin, Germany.
Selected by Cassidian (an EADS company) for the *Aerospace Systems Engineering* workshop.

2012   **Workshop participant**, *Farnborough International Airshow*, NE Hampshire, England.
Selected by Airbus (an EADS company) among participants at the *UAV and Fighter Aircraft* workshop.

Mentoring

Undergraduate mentoring:

Summer 2017   Rachael Thompson. Plano High School Student. Currently an undergrad at MIT's CSAIL. Class of 2017.

2016 - Now   Alex Tomkovich. Computer Engineering Junior.

Spring 2015   Grant Carr. Computer Engineering Junior.

Masters mentoring:

2016 – 2017   Adwait Kulkarn. Mechanical Engineering Masters student (Currently at Drov Technologies, MN).

2015   Ajith Venkateswaran. Computer Engineering Masters student (Currently Senior Robotics Software Engineer, Samsung Research, America).

Computing

Programming   C++, Python, Lua, MATLAB, LabVIEW.

Libraries   Point Cloud Library, OpenCV, Torch7, Eigen, Docker, PyTorch, OpenAI Gym, MuJoCo, Numpy, SciPy, Scikit-Learn, C++11/14 standards.

OS   Ubuntu, Debian, Windows.

OSRF   ROS hydro, indigo, jade, kinetic, and melodic distros.

Web   HTML, Markdown, socket.io, node.js, and express.js.

Select OpenSource Projects

Lyapunov-Learner   Python Implementation of "Learning Control Lyapunov Functions for Dynamical Systems". (Available at https://github.com/lakehanne/LyapunovLearner)

Awesome-NeuroControl   A curated list of neural applications in control theory and practice. (Available at https://github.com/lakehanne/awesome-neurocontrol)

PCL   Fix for segfault in our-cvfh algorithm in the point-cloud library. (Available at PR 1827)

GPS   Catkinized version of Levine et. al's guided policy search algorithm in ROS Indigo (Available at https://github.com/lakehanne/gps). Dockerized version available at gps-docker.

Keyence   Minimal source code for retrieving profile map from the keyence LJV-7000 series line scanners. (Available at https://github.com/lakehanne/keyence)

RBN   Recurrent Batch Normalization of Neural Networks in Torch7. (Available at https://github.com/element-research/rnn)

DICE   Sørensen-Dice coefficients in Torch7. (Available at https://github.com/lakehanne/nn).

FARNNs Training of multilayer networks, simple recurrent neural networks, long short-term memory cells (with peep-hole connections), fast LSTMS, and recurrent batch normalized FastLSTMs to model the relationship between Borel measurable sets. (Available at https://github.com/lakehanne/FARNN)