Olalekan Ogunmolu

Robotics | Control Systems | AI

Rerum Cognoscere Causas: To know the causes of things.

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Education

2014–Present **PhD in Electrical Engineering** , *University of Texas at Dallas*, Richardson, United States.
Advisor: Prof. Nick Gans. Design and prototype of a medical soft robot for automated patient positioning during cancer radiotherapy.

2011–2012 **Master of Science in Engineering in Control Systems**, *The University of Sheffield*, Sheffield, United Kingdom.
Advisor: Prof. Tony J. Dodd. Thesis: "Autonomous Navigation of a Rotorcraft Unmanned Aerial Vehicle using Machine Vision." | Committee Members: Drs. George Panoutsos and Robin Pursehouse. | Dissertation reviewed by Prof. Mahdi Mahfouf.

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

Research Interests

Optimal Control • Adaptive Control • Model Predictive Control • Reinforcement Learning • System Identification • Deep Learning • Dynamic Programming • Applications to modeling of complex systems

Publications

Peer-Reviewed:

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.

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:

Yara Almubarak, **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:

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:

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

- Finalist at the 3rd Entrepreneurship Forum and Startup Competition — August 2017
  Sponsored by IEEE Robotics and Automation Society, KUKA AG, and Univ. Hamburg
- **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

Jounals/conferences peer reviewing activities

2017 **Reviewer**, *IEEE International Conference on Robotics and Automation (ICRA) 2018*, Deep Learning for Pose Estimation Track.

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.

Select services and leadership

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

2017 **Presenting Robust Deep Reinforcement Learning at the Black in AI Workshop**, *NIPS 2017*, Long Beach, CA, U.S.A.

2017 **Attending the Nvidia GPU Technology Conference**, Washington, D.C., U.S.A.

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.

Experience

Research:

Fall '17 - Now **Research Assistant**, Dr. Steve Jiang, Barbara Crittenden Professorship in Cancer Research, UT Southwestern, Dallas, TX.
Dynamic Programming, Convex Optimization, Decision Theoretic Control, Reinforcement Learning. Applications to Radiation Oncology of Human Body Tumors.

Summer '17 **Research Assistant**, Dr. Tyler Summers, Mechanical Engineering, UT Dallas.
Dynamic Programming, Decision Theoretic Control, Machine/Reinforcement Learning.

Fall '14 - Now **Research Assistant**, Dr. Nick Gans, Electrical Engineering, University of Texas at Dallas.
Control Systems, Systems Identification, State Estimation and Computer Vision.

Summer '16 **Hardware Integration Intern**, Amazon Robotics LLC. Dr. Tye Brady (CTO).
SLAM, Software and Hardware Integration.

Spring '16 **Hardware Integration Intern**, Advanced Robotics Lab, Amazon Robotics LLC. Dr. Andy Stubbs (Sr. Systems Manager).
Computer Vision, Hardware Integration.

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.

Mentoring

Undergraduate mentoring:

Summer 2017 Rachael Thompson. MIT Freshman.

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 at 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, and kinetic distros. Xacro, urdfs, pr2 robot packages, gazebo, urdfdom-py, ros-control, message filters, eigen, tf, tf2, hector-quadrotor, kdl, slam-gmapping, rviz, rqt, amcl, orocos, controller-manager, geometry-msgs, rosaria, ros-arnl, sensor-msgs, nav stack. Familiar with staubli TX-90 and ur10 robot packages.

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)
An all-convolutional network	Source codes for my entry in the Kaggle 2016 data science competition in identifying and segmenting ultrasound images of the human neck. Codes available upon request.