

# 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%  $\equiv$  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 Kulkarni, 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 Rotorcraft 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*, Anaheim, 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.

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## 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, Soft Robotic Modules as Position Correcting Mechanisms in Cancer RT.  
Vancouver [3rd Entrepreneurship Forum & Start-up Competition, EFSC'17](#), Vancouver, BC, Canada. September 2017.

UTSW, [A 3-DOF Neuro-Adaptive Patient Pose Correcting System For Frameless and Maskless Cancer Radiotherapy](#),  
Dallas, TX *Physics Research Seminar Series, Radiation Oncology Department, UT Southwestern Medical Center, Dallas, TX, USA. March 2017.*

IEEE [Towards automated accurate patient positioning in maskless cancer radiotherapy](#).  
Arlington, TX *IEEE Computational Intelligence Society, UT Arlington, TX, USA. December 2015.*

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## 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 [A 3-DOF Neuro-Adaptive Pose Correction System For Frameless and Maskless Cancer Radiotherapy](#),  
Systems Day *Texas Systems Day, Texas A & M University, College Station, TX, USA. March 2017.*

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## 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

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## Journals/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](#).

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## Select services and leadership

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

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## Experience

### Research:

- Fall '17 - **Research Assistant**, Dr. Steve Jiang, Barbara Crittenden Professorship in Cancer Research, UT Southwestern, Dallas, TX.  
Now 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 - **Research Assistant**, Dr. Nick Gans, Electrical Engineering, University of Texas at Dallas.  
Now 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.

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## 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).

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## 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.

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## 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.