

# 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%  $\equiv$  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 - **Visiting Research Student**, Medical Artificial 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 - **Research Assistant**, Dr. Tyler Summers, Mechanical Engineering, UT Dallas.  
Fall '17 *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 - **Research Assistant**, Dr. Nick Gans, Electrical Engineering, University of Texas at Dallas.  
Now *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.  
*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.

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## Publications

### Peer-Reviewed:

**Olalekan Ogunmolu**. [Deep BOO: Automating Beam Orientation Selection in Intensity Modulated Radiation Therapy](#). To appear 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](#). To appear on: *Springer Proceedings in Advanced Robotics (SPAR)*, 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 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. 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.

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## 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*, Anaheim, CA, USA. July 2015.

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## 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:

ATR CNS [Minimax Iterative Dynamic Game.](#)

Labs Department of Brain Robot Interface, Computational Neuroscience Labs, ATR, Osaka, Japan. August 2018.

Preferred [Neural Networks and Adaptive Control.](#)

Networks 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, 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:

- 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.

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## Awards and honors

- IEEE RAS/IROS Travel Award August 2018
- 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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## Relevant Coursework

Convex Optimization  
Nonlinear systems  
Optimization theory and practice  
Signal Processing and Estimation  
Intelligent Systems  
Robotics and Multisensor Systems

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## Select services and leadership

### [Journals/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.

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## 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).

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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, kinetic, and melodic distros.

**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>)

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## Languages

English	Reads, writes, and speaks fluently	<i>Lived in Nigeria, United Kingdom and United States.</i>
Japanese	Basic proficiency	<i>Lived in Japan for 3 months.</i>
Yoruba	Reads, writes, and speaks fluently.	<i>Native Nigerian Language. Spoken at home.</i>
German	Basic proficiency	

Last updated: September 05, 2018