Olalekan Ogunmolu

Robotics | Control Systems | ML

Rerum Cognoscere Causas: To know the causes of things.

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Education

2014–2019 **PhD in Electrical and Computer Engineering**, *University of Texas at Dallas*, Richardson, USA. *"A Multi-DOF Soft Robot Mechanism for Patient Motion Correction and Beam Orientation Selection in Cancer Radiation Therapy."* Advisors: Nick Gans (UTD) and Steve Jiang (UT Southwestern Medical Center.) | Committee Members: Drs. Mark Spong, Tyler Summers, Dinesh Bhatia, and Yonas Tadesse.

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

Publications

Premier IEEE Robotics and Automation Society, Algorithmic Foundations of Robotics, and Medical Physics publications (WAFR, IROS, NIPS, PhysMed, and ICRA) are highly selective venues for archival papers, similar to selective IEEE journals in visibility and strong scientific/engineering communications.

Published/Accepted Papers

Olalekan Ogunmolu, and Rodney Wiersma. A Real-Time Patient Head Motion Correction Mechanism for MRI-Linac Systems. Accepted at *The J.R. Cameron-J.R. Cunningham Young Investigator Symposium* (*AAPM/COMP Meeting*). July 2020.

Olalekan Ogunmolu, Xinmin Liu, and Rodney Wiersma. An iterative motion-planner for Head and Neck Motion Correction in Robotic Stereotactic Radiosurgery. Accepted to the *AAPM/COMP Meeting*. July 2020.

Azar Sadeghnejad Barkousaraie, **Olalekan Ogunmolu**, Steve Jiang, and Dan Nguyen. A Fast Deep Learning Approach for Beam Orientation Selection Using Supervised Learning with Column Generation on IMRT Prostate Cancer Patients. *The International Journal of Medical Physics Research and Practice*, 2020.

Olalekan Ogunmolu, Michael Folkerts, Dan Nguyen, Nicholas Gans, and Steve Jiang. Deep BOO: Automating Beam Orientation Selection in Intensity Modulated Radiation Therapy. *Algorithmic Foundations of Robotics XIII, International Workshop* (*WAFR*), Mérida, Mexico. December 2018.

Olalekan Ogunmolu, Xinmin Liu, Nicholas Gans, and Rodney Wiersma, Mechanism and Model of a Soft Robot for Head Stabilization in Cancer Radiation Therapy. *IEEE International Conference on Robotics and Automation (ICRA 2020)*, 2020.

Azar Sadeghnejad Barkousaraie, **Olalekan Ogunmolu**, Steve Jiang, and Dan Nguyen. Using Supervised Learning and Guided Monte Carlo Tree Search for Beam Orientation Optimization in Radiation Therapy. Appeared in *Artificial Intelligence in Radiation Therapy (AIRT). Lecture Notes in Computer Science, vol 11850. Springer Cham*, Presented at *International Conference on Medical Image Computing and Computer Assisted Intervention, XXII* (*MICCAI*), Shenzhen, China. 2019.

Olalekan Ogunmolu, A Multi-DOF Soft Robot Mechanism for Patient Motion Correction and Beam Orientation Selection in Cancer Radiation Therapy. *PhD Thesis, University of Texas at Dallas, UT Southwestern Medical Center* 2019.

Olalekan Ogunmolu, Nicholas Gans, and Tyler Summers. Minimax Iterative Dynamic Game: Application to Nonlinear Robot Control Tasks. *IEEE/RSJ International Conference on Intelligent Robots and Systems* (*IROS*), Madrid, Spain. October 2018. DOI: 10.1109/IROS.2018.8594037.

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, Dan Nguyen, Xun Jia, Weiguo Lu, Nick Gans, and Steve Jiang. Automating Beam Orientation Optimization for IMRT Treatment Planning: A Deep Reinforcement Learning Approach. *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.

Technical Reports

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

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

Experience

Research

Summer '19 - Present **Postdoctoral Scholar**, The University of Pennsylvania, Philadelphia, PA, USA.
Department of Radiation Oncology, Perelman School of Medicine, University of Pennsylvania.

Summer '19 **Visiting Postdoctoral Scholar**, The University of Chicago, Chicago, IL, USA.
Department of Radiation and Cellular Oncology, Pritzker School of Medicine, The University of Chicago.

Summer '18 **Research Intern**, Preferred Networks, Otemachi, Chiyoda-ku, Tokyo, Japan.
"Preferred Networks is one of a tiny handful of Japanese 'unicorns', or technology startups valued at more than $1 billion." – The Wall Street Journal, 10/15/2018
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 - Spring '19 **Research Assistant**, 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 - Spring 19 **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 Intern.
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.
Hardware Integration Intern.
Wrote the codebase for the line scanners used in tracking objects in amazon warehouse assembly lines.

Teaching:

January 20 - **Adjunct Instructor, RBOT 250- Robot manipulation, planning and control**, *Brandeis University*.
Designing course outlines and 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.

Invited Talks

Open Robotics Soft-Robotic Position Correction Mechanisms in Intensity-Modulated Radiation Therapy.
Open Robotics Foundation, Mountain View, CA, USA. January 2019.

Stanford University Robotic Radiotherapy: Automating Position Correction in Intensity-Modulated Radiation Therapy.
Department of Energy Resources Engineering, **Stanford University**, Stanford, CA, USA. November 2018.

UChicago Robotic Radiotherapy: Automating Position Correction in Intensity-Modulated Radiation Therapy.
Department of Radiation and Cellular Oncology, **The University of Chicago**, Chicago, IL, USA. November 2018.

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.

UTARI, Fort Worth, TX A Wearable Soft Robotic Modular System for Head and Neck Motion Correction in Intensity-Modulated Radiation Therapy.
University of Texas at Arlington Research Institute, Fort Worth, Texas, USA. May 2019.

EFSC'17 Vancouver, BC 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.

Awards and honors

- **Google AI Travel and Conference Grant** — October 2018
- **IEEE RAS/IROS Travel Award (IROS 2018)** — 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 (IROS 2017)** — August 2017
- **Mary and Richard Templeton Graduate Fellowship** — August 2017
- **ROSCon Scholarship** (Open Software for Robotics Foundation) — July 2017
- President's **Teaching Excellence Award** for Teaching Assistants — Nom. Feb. 2017
- **Golden Key International Honour Society** — Inducted Dec. 2016

- **IEEE RAS/ISAM Travel Award (CASE 2016)** 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

Select Leadership

Professional Organizations

2020-Present **NYAS**, *The New York Academy of Sciences, Member.*

2017-Present **IEEE RAS**, *The IEEE Robotics and Automation Society, Member.*

2020-Present **AAPM**, *The American Association of Physicists in Medicine, Junior Member, Member.*

2020-Present **ASTRO**, *The American Society for Radiation Oncology, Member.*

Peer Reviewing Activities (Research)

'19 **JBHI**, *An IEEE Journal of Biomedical and Health Informatics Access.*

'19 **External Grants Reviewer**, *AI for Species Discovery, National Geographic Society*.

'18,'19 **Automatica**, *The International Federation of Automatic Control (IFAC)*.

'17, '18, '19 **Access**, *IEEE Access Journal.*

'17, '18, '19 **NCAA**, *Springer's Neural Computing and Applications* .

'17, '20 **ICML**, *International Conference on Machine Learning* .

'18,'19,'20 **CDC**, *IEEE International Conference on Decision and Control*, Flagship Control and Decision-Making Control Conference Proceedings in the World.

2017-Present **DSCC**, *American Society of Mechanical Engineers (ASME) Dynamic Systems and Control Conference*, Conference Proceedings.

'17-'20 **ICRA**, *IEEE International Conference on Robotics and Automation*, Flagship IEEE Robotics and Automation Society Conference in the World.

'17-'20 **IROS**, *IEEE/Robotics Society of Japan (RSJ) International Conference on Intelligent Robots and Systems*, Flagship IEEE/RSJ Conference on Robotics.

'17, '18,'19 **ACC**, *IEEE American Control Conference*, Premiere American Control Conference Venue.

'17, '18 **The IFAC World Congress**, *The International Federation of Automatic Control*, A worldwide, interdisciplinary congress of scientists and engineers to share up-to-date, complete and universal view of control and analysis techniques.

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 2021

2013-2014 Blessing K. Currently a PhD student at Tufts University.

2016 - 2017 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

OS OSX, Debian, Ubuntu, Windows.

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

CAD Solid Works, Blender, Adobe Illustrator.

ROS Hydro, Indigo, Jade, Kinetic, and Melodic, Bouncy Bolson distros.

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

Web HTML, Markdown.

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