

# Lekan Molu

AI / Robotics / Control Systems

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## Publications

### Recent preprints

**Lekan Molu**, Namhoon Lee, and Venkatraman Renganathan. [Hopf-Lax Nonconvex Optimization of Reachable Sets on Non-viscous Hamilton-Jacobi PDEs](#). 2025.

Haoxiang You, **Lekan Molu**, and Ian Abraham. [Is the Bellman Equation Enough for Learning Control?](#) 2025.

### Published and Recently accepted

**Lekan Molu**. [Fast Whole-Body Strain Regulation in Continuum Robots](#). *IEEE American Control Conference*, Denver, Co. July 2025.

**Lekan Molu**. [LevelSetPy: A GPU-Accelerated Package for Resolving Hyperbolic Hamilton-Jacobi Partial Differential Equations](#). *ACM Transactions on Mathematical Software*. March 2025.

**Lekan Molu**. [The Python LevelSet Toolbox \(LevelSetPy\)](#). *IEEE Conference on Decision and Control (CDC)*. Milan, Italy. December 2024.

Anurag Koul\*, Shivakanth Sujit\*, Shaoru Chen, Ben Evans, Lili Wu, Byron Xu, Rajan Chari, Yonathan Efroni, Miro Dudik, **Lekan Molu**, John Langford, Alex Lamb. [PCLAST: Discovering Plannable Latent States](#). *International Conference on Machine Learning (ICML)*, Vienna, Austria, July 2024.

**Lekan Molu** and Shaoru Chen. [Structural Properties and Control of Soft Robots Modeled as Discrete Cosserat Rods](#). *IEEE Conference on Decision and Control (CDC)*, Milan, Italy. December 2024.

Shaoru Chen, **Lekan Molu**, and Mahyar Fazlyab. [Verification-aided Learning Neural Network Barrier Functions with Termination Guarantees](#). *American Control Conference (ACC)*, 2023.

Alex Lamb, Riashat Islam, Yonathan Efroni, Aniket Didolkar, Dipendra Misra, Dylan Foster, **Lekan Molu**, Rajan Chari, Akshay Krishnamurthy, John Langford. [Guaranteed Discovery of Control-Endogenous Latent States with Multi-Step Inverse Models](#). *Transactions in Machine Learning Research*. February 2023.

**Lekan Molu**. [Mixed H2/H-Infinity Policy Learning Synthesis](#). *World Congress, International Federation of Automatic Control*, Yokohama, Japan. July 2023.

Tengyang Xie, Akanksha Saran, Dylan J Foster, **Lekan Molu**, Ida Momennejad, Nan Jiang, Paul Mineiro, and John Langford. [Interaction-Grounded Learning with Action-inclusive Feedback](#). *Neural Information Processing Systems (Neurips)*., New Orleans, La. May 2022.

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**, and Rodney Wiersma. [A Real-Time Patient Head Motion Correction Mechanism for MRI-Linac Systems](#). (*AAPM/COMP Meeting*). July 2020.

**Olalekan Ogunmolu**, Xinmin Liu, and Rodney Wiersma. [Paths Replanning for Head and Neck Motion Correction in Robotic Stereotactic Radiosurgery](#). *AAPM/COMP Meeting*. July 2020.

**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 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**, 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.

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## Abstracts

**Olalekan Ogunmolu**, Xinmin Liu, and Rodney Wiersma. [Paths Replanning 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](#). *Medical Physics (AAPM)* 46 (6), E237-E237, San Antonio, TX, July 2019.

**Olalekan Ogunmolu**, Azar Sadeghnejad Barkousaraie, Nicholas Gans, Steve Jiang, and Dan Nguyen. [An Approximate Policy Iteration Scheme for Beam Orientation Selection in Radiation Therapy](#). *Medical Physics (AAPM)* 46 (6), E386-E386 San Antonio, TX, July 2019.

Azar Sadeghnejad Barkousaraie, **Olalekan Ogunmolu**, Steve Jiang, and Dan Nguyen. [A Reinforcement Learning Application of Guided Monte Carlo Tree Search Algorithm for Beam Orientation Selection in Radiation Therapy](#). *Medical Physics (AAPM)* 46 (6), E236-E236, San Antonio, TX, July 2019.

**Olalekan Ogunmolu**, Nicholas Gans, and 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, and 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**, and 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, and 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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## Invited Talks and Organized Workshops

Cornell Tech	<a href="#">Towards Safe Autonomous Systems: Between Bellman and Isaacs</a> . Cornell Tech, New York, New York. 2025.
Princeton University	<a href="#">Numerical algorithms for verification in autonomous systems..</a> Princeton, New Jersey. 2025.
Microsoft Research (Global)	<a href="#">A Collision-Free Engine for Autonomous Systems</a> . Microsoft Research Annual TechFest (Project Green) Lead Workshop Organizer, Redmond, Greater Seattle Area, 2025.
McGill University	<a href="#">Emerging mathematical modeling and control tools for deformable robots and animated characters..</a> MILA and McGill University. Nov 2024.
Microsoft Research (Global)	<a href="#">Towards structured representations in deep models and policies: symmetries, compactness, and vector homomorphisms</a> . Microsoft Research Annual TechFest (Project Green) Lead Workshop Organizer, Redmond, Greater Seattle Area, 2024.
Yale University	<a href="#">Mixed <math>H_2/H_\infty</math> stochastic RL policy optimization analysis..</a> Yale University, New Haven, Conn, USA. Nov 2023.
Open Robotics	<a href="#">Soft-Robotic Position Correction Mechanisms in Intensity-Modulated Radiation Therapy</a> . <b>Open Robotics Foundation</b> , 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.

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## Research Mentoring

### Postdoctoral Scholars at MSR

- 2024 - 2025 Taylor Webb, Princeton Neuroscience PhD, UCLA and MSR Postdoc. Resuming as Assistant Professor at University de Montreal, 2025.
- 2023 - 2024 Shaoru Chen (UPenn ECE PhD co-advised by George Pappas); advised as MSR Postdoc. Now Senior Machine Learning Engineer at LinkedIn, 2024 - Present.
- 2023 - 2024 Anurag Koul (Oregon State PhD); advised as MSR Postdoc. Now Senior Applied Scientist II at Amazon NYC, 2024 - Present.
- 2022 - 2024 Akanksha Saran (UT Austin CS PhD); advised as MSR Postdoc. Now Research Scientist at Sony AI, Bay Area.
- 2022 - 2023 Hosein Hasanbeig (Oxford PhD advised by Alessandro Abate); advised as MSR postdoc. Now Senior Researcher at Microsoft Experiences+Devices Management, Washington D.C.

### Research Interns at MSR

- Summer 2024 [Abulikemu Abuduweili](#), CMU Robotics PhD Student. Incoming Research Scientist at Reliant Robotics, Bay Area.
- Summer 2022 [Leilei Cui](#), NYU PhD Student. Now Postdoctoral scholar at Massachusetts Institute of Technology (MIT).
- Summer 2023 [Harley Wiltzer](#), McGill PhD Student; advised by Marc Bellemare and David Meager.
- Summer 2023 [Thomas C.K. Zhang](#), UPenn 5th-year PhD Student advised by Nikolai Matni.
- Summer 2023 [Etiosa Omeike](#), Princeton CS BA, MSR undergraduate intern; now PhD student with Prof. Marynel Vázquez at Yale.

## External PhD Students

- 2024 - [Will Sharpless](#), UCSD Mechanical and Aerospace Engineering PhD Student; advised by Prof. [Sylvia Herbert](#).
- 2023 - [Gilbert Bahati](#), Caltech Mechanical Engineering PhD student, advised by Prof. [Aaron Ames](#).
- 2024 - [Haoxiang You](#), Yale Mechanical Engineering PhD Student; advised by Prof. [Ian Abraham](#).
- 2025 - [Promise Ekpo](#), Princeton Masters student; now PhD student at CornellTech Airlab (advised by Prof. [Angelique Taylor](#)).

## General Engineering Mentoring

- 2017 - 2018 Adwait Kulkarn. UT Dallas Mechanical Engineering Masters student. Currently Vice President of Engineering at Drov Technologies, MN.
- 2017 - 2018 Ajith Venkateswaran. UT Dallas Computer Engineering Masters student. Senior Robotics Software Engineer, Samsung Research, America; Now Software Tech Lead Embedded Automotive Platforms, Wayve, Bay Area.
- 2017 - 2019 Rachael Thompson. Plano High School Student. Currently an undergrad at MIT's CSAIL. Class of 2021. Now PhD Student at Brown.

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## Select Leadership

### Professional Organizations

- 2020 - **NYAS**, *The New York Academy of Sciences*, Member
- 2017 - **IEEE RAS**, *The IEEE Robotics and Automation Society*, Member
- 2017 - **IEEE CSS**, *The IEEE Control Systems Society*, Member
- 2020-2021 **AAPM**, *The American Association of Physicists in Medicine*, Junior Member, Member
- 2020-2021 **ASTRO**, *The American Society for Radiation Oncology*, Member

### Research community leadership and activities

- 2017-Present **Journals and Conference Papers Reviewing Activities**, *ASME*, *ICML*, *ICLR*, *IEEE ICRA*, *IROS*, *ACM*, *ACC*, *CDC*, and *IFAC* publications are top journals and proceedings in the fields of Mechanical Engineering, Machine Learning, Electrical Engineering, Computing machinery, and Automatic Control Engineering respectively, known for disseminating bleeding-edge research and cutting-edge technological advancements in robotics, machine learning and control systems
- '20 **ICLR**, *The International Conference of Learning Representations*, A 1% publication avenue for cutting-edge research on all aspects of deep learning used in the fields of artificial intelligence, statistics and data science, as well as important application areas such as machine vision, computational biology, speech recognition, text understanding, gaming, and robotics
- '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 - **ICML**, *International Conference on Machine Learning*
- '18 - **CDC**, *IEEE International Conference on Decision and Control*, Flagship Control and Decision-Making Control Conference Proceedings in the World
- 2017 - **DSCC**, *American Society of Mechanical Engineers (ASME) Dynamic Systems and Control Conference*, Conference Proceedings
- '17 - **ICRA**, *IEEE International Conference on Robotics and Automation*, Flagship IEEE Robotics and Automation Society Conference in the World
- '17 - **IROS**, *IEEE/Robotics Society of Japan (RSJ) International Conference on Intelligent Robots and Systems*, Flagship IEEE/RSJ Conference on Robotics
- '17 - **ACC**, *IEEE American Control Conference*, Premiere American Control Conference Venue

- '17 - **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 – Now **Member, IEEE Control Systems Society**
- 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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### Awards and honors

- 2011 PTDF Overseas Scholarship, £25,500+ for one year. (~1.7% acceptance).
- Oct. 2018 Google AI Travel and Conference Grant.
- August 2018 IEEE RAS/IROS 2018 Travel Award.
- August 2017 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 \(IROS 2017\)](#).
- August 2017 Mary and Richard Templeton Graduate Fellowship.
- July 2017 ROSCon Scholarship (Open Software for Robotics Foundation).
- Nom. Feb '17 President's Teaching Excellence Award.
- Dec. 2016 Golden Key International Honour Society.
- August 2016 IEEE RAS/ISAM Travel Award (CASE 2016).
- 2015 - 2016 Ericsson Graduate Fellowship.
- 2014 - 2015 Jonsson Scholarship.

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### Languages

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| English | Reads, writes, and speaks fluently | <i>Lived in Nigeria, United Kingdom and United States.</i> |
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