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ACADEMIC POSITIONS

BARNARD COLLEGE, COLUMBIA UNIVERSITY: New York, NY

JULY 2022 – PRESENT

- Assistant Professor of Computer Science

EDUCATION

HARVARD UNIVERSITY: Cambridge, MA

AUG 2016 – MAY 2022

- PhD Engineering Sciences: Electrical Engineering with a focus in Robotics; GPA: 3.9/4.0
MAY 2022
 - Dissertation: “GPU Acceleration for Real-time, Whole-Body, Nonlinear Model Predictive Control”
 - Advisors: Vijay Janapa Reddi and Scott Kuindersma.
- MEng in Engineering Sciences: Electrical Engineering with a focus in Robotics; GPA: 3.9/4.0
MAY 2018
 - Thesis: “Parallel and Constrained Differential Dynamic Programming for Model Predictive Control”
 - Advisor: Scott Kuindersma

MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT): Cambridge, MA

AUG 2015 – JUNE 2016

- Advanced Study Non-Degree Student; GPA: 5.0/5.0

HARVARD UNIVERSITY: Cambridge, MA

AUG 2009 – MAY 2013

- B.A. Magna Cum Laude in Computer Science with a Minor in Economics; GPA: 3.9/4.0
 - Thesis: “Hacking the White House: Election Fraud in the Digital Age”
 - Advisor: Greg Morrisett

AWARDS AND RECOGNITION

- IEEE ICRA 2024 Best Paper in Automation
MAY 2024
- IEEE ICRA 2024 Best Conference Paper – Finalist
APRIL 2024
- IEEE ICRA 2024 Best Student Paper Award – Finalist
APRIL 2024
- Best Poster Award at the Workshop on Methods for Objective Comparison of Results in Intelligent Robotics
OCT 2023
- Research at the 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (iROS)
- Blue Ribbon TC Award given to the IEEE-RAS TC on Model-Based Optimization for Robotics while Co-Chair
SEPT 2023
- IEEE Micro Top Picks – Honorable Mention
JAN 2022
- Harvard Faculty of Arts and Sciences Certificate in Undergraduate Mentoring
APRIL 2021
 - Certificate given for completing three undergraduate mentorship trainings covering: Developing Research Projects with Undergraduates, Undergraduate Research Fellowships, Supporting Student Science Writing, Writing Recommendation Letters, Handling Challenges and Celebrating Successes, and Supporting Student Diversity and Inclusion
- The Derek Bok Center Distinction in Teaching Award
FALL 2017,18,19,20
 - Award given for achieving above a 4.5/5.0 in course evaluations
- The Derek Bok Center Teaching Certificate
DEC 2019
 - Certificate given for recognition of commitment to improving one’s teaching through enrollment in Bok Center teaching courses (Foundations of Teaching in STEM, Problems and P-Sets: Creating and Teaching Questions in STEM, Teaching and the Job Market), filmed teaching pedagogy reviews, and development of teaching materials
- National Science Foundation Graduate Research Fellowship (NSF GRFP)
APRIL 2018

GRANTS AWARDED

ACTIVE GRANTS

- Sole PI for the [National Science Foundation \(NSF\)](#) Computer and Information Science and Engineering Research Initiation Initiative (CRII) award: 2023 – 25
“CRII: OAC: RUI: Real-Time, Mixed-Integer Model Predictive Control via Learned GPU-Acceleration”
Award: [\\$174,957](#)
 - Additionally Awarded a Research Experiences for Undergraduates (REU) Supplement – \$24,000
 - Additionally Awarded a Career-Life Balance (CLB) Supplement – \$24,898

PAST GRANTS

- Co-PI for the [IEEE Computer Society](#) Diversity and Inclusion Fund award: 2022
“TinyML Outreach Workshop with the Navajo Nation”
Award: [\\$5,000](#) for stipends and hardware for workshop participants

TEACHING EXPERIENCE

BARNARD COLLEGE, COLUMBIA UNIVERSITY: New York, NY – *Instructor of Record*

FALL 2022 – PRESENT

- COMS BC 3159: Parallel Optimization for Robotics (Spring 2023, 24, Fall 24)
 - Designed a new 85 student course (increased from 30 and then 40 students in Spring 23, 24) at the intersection of robotics and both numerical optimization and computer architecture / systems exploring the use of parallel programming on CPUs and GPUs to accelerate numerical optimization algorithms through the lens of robot motion planning and control
 - Designed and gave lectures on computer system design, parallel programming on the CPU and GPU using (CUDA) C++, (nonlinear) (trajectory) optimization, and numerical optimal control
 - Developed written assignments and coding assignments in both python and (CUDA) C++ covering the core course topics as well as a hands-on, team-based, final project to enable students to integrate and apply their learnings from the semester and practice presenting and technical writing. Student project highlights include:
 - “Preconditioned Conjugate Gradient on the GPU” in Spring 2023 which led to an ICRA 2024 Publication
- COMS BC 3449: Applied Computing – Research and Industry Perspectives (Spring 2023, 24, Fall 24)
 - Designed a new 16 student course (reduced from 30 to increase attention to each student’s unique project) providing a unifying structure to support hands-on, computational student projects ranging from academic research to industry collaborations to independent passion projects (course ran as COMS BC 3997: New Directions in Computing rotating topics course in Spring 23, 24 and called Projects in Computer Science in Spring 23). Student project highlights include:
 - A multiple pivot LLM project in Spring 2024 which led to a \$250k pre-seed investment
 - Designed lectures on: performance engineering, cyber security, web development, and technical writing and presentation
 - Recruited guest speakers from academia and industry to present on topics including: responsible AI, startup engineering, accessible user interface design, working with legacy software systems, and the business of technology
 - Mentored student projects with one-on-one writing and presenting support, high level direction, and technical debugging
- COMS BC 3997 – F22: New Directions in Computing: Introduction to Robotics Engineering from Bits to Electrons (Fall 2022)
 - Designed a new 20 student course providing a hands-on introduction to computational robotics for computer scientists
 - Designed and gave lectures covering algorithms for perception, mapping and localization, planning, control, and learning
 - Developed written assignments and coding assignments in python as well as a hands-on final project using physical robot hardware to connect the algorithms learned in class into the physical world and reinforce their tradeoffs

edX Inc: Cambridge, MA – *Teaching Staff Lead*

SUMMER 2020 – SUMMER 2022

- HarvardX Professional Certificate in Tiny Machine Learning (TinyML) MOOC [[Course 1-3 Link](#) [Course 4](#)]
 - Co-designed a free, hands-on, project-based professional certificate taught through three 6-week courses (and an optional fourth course) on the EdX platform covering the emerging field of Tiny Machine Learning (deploying machine learning onto microcontrollers for machine learning at the edge) with the aim of democratizing access to this developing field
 - Almost 90,000 students from over 190 countries enrolled as of July 2023 since the four courses launched in September 2020, December 2020, February 2021, and March 2022 respectively
 - Served as the laboratory instructor both co-designing hands-on exercises as well as recording video walkthroughs
 - Managed the 10-person course staff to ensure that content was created, reviewed, and produced in a timely manner
 - Led and managed external relations for the course team coordinating with edX, Google, and Arduino
 - Co-designed course materials including video lectures, readings, code walkthroughs, assessments, and discussion forums
 - Released all course materials open-source to enable global adaptation for further access to TinyML education [[link](#)]

HARVARD UNIVERSITY: Cambridge, MA – *Head Teaching Fellow (Head TA)*

FALL 2017-20

- CS 249r - Special Topics in Edge Computing - Autonomous Machines (Fall 2019) and Tiny Machine Learning (Fall 2020)
 - Co-designed 40-50 student courses at the intersection of artificial intelligence (robotics and machine learning) and computer architecture / embedded systems
 - Designed and gave lectures for the introduction to robotics and introduction to machine learning sections of the courses
 - Co-developed hands-on project-based assignments (e.g., training TinyML models with Google Colab and deploying on Arduinos) and course infrastructure/tools (e.g., online paper discussion forum)
 - Mentored student teams pursuing research-based final projects
- CS 182: Introduction to Artificial Intelligence (Fall 2017-2018)
 - Managed a team of 11 teaching fellows supporting the 150 student course to ensure sections and office hours were held, exams and homework assignments were graded, and student questions on the online forum were answered.
 - Designed and gave lectures: “Introduction to Robotics and Path Planning I/II” and the related assignment/exam questions
 - Co-Designed and gave a new set of weekly recitations that mapped the weekly course content to cross-cutting themes
 - Co-developed course coding and written (theoretical) assignments, and course infrastructure/tools (e.g., autograders)
 - Mentored student teams pursuing research-based final projects

MIT / HARVARD UNIVERSITY: Cambridge, MA – *Teaching Assistant*

FALL 2017,18,19,21

- Harvard’s 15 student section of MIT’s MAS.863: How to Make Almost Anything
 - Gave recitations: “Introduction to Embedded Programming”, “Introduction to Electronics Fabrication and Design”
 - Held office hours, led introductory sessions for course tools, aided students in lab work, machine usage, and project design

- RACECAR Mini Grand Prix Challenge: a hands-on, intensive, residential, project-based, free to attend, 4-week program for high school students interested in studying STEM
 - Worked with 9-12 teams of 4-6 students to teach programming concepts and robotic algorithm design through the completion of fast autonomous navigation tasks using 1/10 scale racecars using Python/ROS
 - Co-designed weekly challenges to ensure all teams developed the technical skills needed for the final race
 - Co-designed and co-built the final race track spanning an entire ice hockey rink

PREPRINTS

- S. Schoedel, K. Nguyen, E. Nedumaran, **B. Plancher**, Z. Manchester, “Code Generation for Conic Model-Predictive Control on Microcontrollers with TinyMPC,” arXiv, March 2024.
- R. Ghosal, E. Sacher, P. Samaratunga, S. M. Neuman, **B. Plancher**, V. Janapa Reddi, “Studying the Samplers: Workload and Performance Analysis of the Computational Bottlenecks in Sampling-Based Motion Planning,” March 2024.
- S. M. Neuman, **B. Plancher**, V. Janapa Reddi, “Invited: The Magnificent Seven Challenges and Opportunities in Domain-Specific Accelerator Design for Autonomous Systems,” March 2024.
- M. Stewart, E. Moss, P. Warden, **B. Plancher**, S. Kennedy, M. Sloane, V. Janapa Reddi, “Materiality and Risk in the Age of Pervasive AI Sensors,” arXiv, February 2024.
- M. Stewart, P. Warden, Y. Omri, S. Prakash, J. Santos, S. Hymel, B. Brown, J. MacArthur, N. Jeffries, **B. Plancher**, V. Janapa Reddi, “Datasheets for Machine Learning Sensors,” arXiv, June 2023.

JOURNAL ARTICLES

- B. Boroujerdian, H. Genc, S. Krishnan, P. Bardienus, B. Duisterhof, **B. Plancher**, K. Mansoorshahi, M. Almeida, A. Faust, V. Janapa Reddi. “The Role of Compute in Autonomous Aerial Vehicles.” in IEEE Transactions on Computers, 2022.
- V. Janapa Reddi, **B. Plancher**, S. Kennedy, L. Moroney, P. Warden, A. Agarwal, C. Banbury, M. Banzi, M. Bennett, B. Brown, S. Chitlangia, R. Ghosal, S. Grafman, R. Jaeger, S. Krishnan, M. Lam, D. Leiker, C. Mann, M. Mazumder, D. Pajak, D. Ramaprasad, J. E. Smith, M. Stewart, D. Tingley, “Widening Access to Applied Machine Learning with TinyML,” in Harvard Data Science Review, 2022.
- **B. Plancher**, S. M. Neuman, T. Bourgeat, S. Kuindersma, S. Devadas, V. Janapa Reddi, “Accelerating Robot Dynamics Gradients on a CPU, GPU, and FPGA,” in IEEE Robotics and Automation Letters (RA-L), January 2021.
 - Additionally dual-accepted under the RAL+ICRA option for presentation at the IEEE International Conference on Robotics and Automation (ICRA), Xi’an China and Virtual, June 2021.

CONFERENCE PROCEEDINGS

- **B. Plancher**, “Parallel Optimization for Robotics: An Undergraduate Introduction to GPU Parallel Programming and Numerical Optimization Research,” IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW), San Francisco, CA, USA, May 2024.
- **B. Plancher**, M. Zennaro, M. Rovai, V. Janapa Reddi, S. Buttrich, J. Ellis, N. Goveas, L. Kazimierski, J. Lopez Sotelo, M. Lukic, D. Mendez, R. Nordin, A. Oliva Trevisan, M. Pavan, M. Roveri, M. Rub, J. Tum, M. Verhelst, S. Abdeljabar, S. Adebayo, T. Amberg, H. Aworinde, J. Bagur, G. Barrett, N. Benamar, B. Chaudhari, R. Criollo, D. Cuartielles, J. A. Ferreira Filho, S. Gizaw, E. Gousev, A. Grande, S. Hymel, P. Ing, P. Manandhar, P. Manzoni, B. Murmann, E. Pan, R. Paskauskas, E. Pietrosemoli, T. Pimenta, “TinyML4D: Scaling Embedded Machine Learning Education in the Developing World,” AAAI 2024 Spring Symposium on Increasing Diversity in AI Education and Research, San Francisco, CA, USA, March 2024.
 - Invited to be Presented as an Extended Session at the Symposium [\[Link\]](#).
- E. Adabag, M. Atal, W. Gerard, **B. Plancher**, “MPCGPU: Real-Time Nonlinear Model Predictive Control through Preconditioned Conjugate Gradient on the GPU,” in the IEEE International Conference on Robotics and Automation (ICRA), Yokohama, Japan, May 2024.
- X. Bu and **B. Plancher**, “Symmetric Stair Preconditioning of Linear Systems for Parallel Trajectory Optimization,” in the IEEE International Conference on Robotics and Automation (ICRA), Yokohama, Japan, May 2024.
- L. Grossman and **B. Plancher**, “Differentially Encoded Observation Spaces for Perceptive Reinforcement Learning,” in the IEEE International Conference on Robotics and Automation (ICRA), Yokohama, Japan, May 2024.
- A. Alavilli, K. Nguyen, S. Schoedel, **B. Plancher**, Z. Manchester, “TinyMPC: Model-Predictive Control on Resource-Constrained Microcontrollers,” in the IEEE International Conference on Robotics and Automation (ICRA), Yokohama, Japan, May 2024.
 - IEEE ICRA 2024 Best Paper in Automation
 - IEEE ICRA 2024 Best Conference Paper – Finalist
 - IEEE ICRA 2024 Best Student Paper – Finalist
- V. Mayoral-Vilches, J. Jabbour, Y. Hsiao, Z. Wan, A. Martínez-Fariña, M. Crespo-Álvarez, M. Stewart, J. Reina-Muñoz, P. Nagras, G. Vikhe, M. Bakhshalipour, M. Pinzger, S. Rass, S. Panigrahi, G. Corradi, N. Roy, P. B. Gibbons, S. M. Neuman, **B. Plancher**, V. Janapa Reddi, “RobotPerf: An Open-Source, Vendor-Agnostic, Benchmarking Suite for Evaluating Robotics

- Computing System Performance,” in the IEEE International Conference on Robotics and Automation (ICRA), Yokohama, Japan, May 2024.
- S. M. Neuman, R. Ghosal, T. Bourgeat, **B. Plancher**, V. Janapa Reddi, “RoboShape: Using Topology Patterns to Scalably and Flexibly Deploy Accelerators Across Robots,” in the International Symposium on Computer Architecture (ISCA), Orlando, FL, USA, June 2023.
 - L. Grossman and **B. Plancher**, “Just Round: Quantized Observation Spaces Enable Memory Efficient Learning of Dynamic Locomotion,” in the IEEE International Conference on Robotics and Automation (ICRA), London, UK, May 2023.
 - J. Blanchard, J. R. Hott, V. Berry, R. Carroll, B. Edmison, R. Glassey, O. Karnalim, **B. Plancher**, S. Russell, “Stop Reinventing the Wheel! Promoting Community Software in Computing Education,” in the 2022 Working Group Reports on Innovation and Technology in Computer Science Education (ITiCSE-WGR), Dublin, Ireland, December 2022.
 - V. Mayoral-Vilches, S. M. Neuman, **B. Plancher**, V. Janapa Reddi, “RobotCore: An Open Architecture for Hardware Acceleration in ROS 2,” in the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Kyoto, Japan, October 2022.
 - S. M. Neuman, **B. Plancher**, B. P. Duisterhof, S. Krishnan, C. Banbury, M. Mazumder, S. Prakash, J. Jabbour, A. Faust, C.H.E. de Croon, V. Janapa Reddi, “Tiny Robot Learning: Challenges and Directions for Machine Learning in Resource-Constrained Robots,” in the IEEE International Conference on Artificial Intelligence Circuits and Systems (AICAS), Incheon, Korea, June 2022.
 - **B. Plancher**, S. M. Neuman, R. Ghosal, S. Kuindersma, V. Janapa Reddi, “GRiD: GPU-Accelerated Rigid Body Dynamics with Analytical Gradients,” IEEE International Conference on Robotics and Automation (ICRA), Philadelphia PA, May 2022.
 - B. Boroujerdian, R. Ghosal, J. Cruz, **B. Plancher**, V. Janapa Reddi, “RoboRun: A Robot Runtime to Exploit Spatial Heterogeneity,” in the Design Automation Conference (DAC), Virtual, December 2021.
 - S. M. Neuman, **B. Plancher**, T. Bourgeat, T. Tambe, S. Devadas, V. Janapa Reddi, “Robomorphic Computing: A Design Methodology for Domain-Specific Accelerators Parameterized by Robot Morphology,” in the ACM International Conference on Architecture Support for Programming Languages and Operating Systems (ASPLOS), Virtual, April 2021.
 - IEEE Micro Top Picks 2022 – Honorable Mention
 - **B. Plancher**, C. Brumaar, I. Brumar, L. Pentecost, S. Rama, D. Brooks, “Application of Approximate Matrix Multiplication to Neural Networks and Distributed SLAM,” in the IEEE High Performance Extreme Computing Conference (HPEC), Waltham, MA, September 2019.
 - **B. Plancher** and S. Kuindersma, “A Performance Analysis of Parallel Differential Dynamic Programming on a GPU,” in the Workshop on the Algorithmic Foundations in Robotics (WAFR), Merida, Mexico, December 2018.
 - **B. Plancher**, Z. Manchester, S. Kuindersma, “Constrained Unscented Dynamic Programming,” in the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Vancouver, Canada, September 2017.
 - S. Karaman, A. Anders, M. Boulet, J. Connor, K. Gregson, W. Guerra, O. Guldner, M. Mohamoud, **B. Plancher**, R. Shin, J. Vivilecchia, “Project-based, collaborative, algorithmic robotics for high school students: Programming self-driving race cars at MIT,” in the IEEE Integrated STEM Education Conference (ISEC), Princeton, NJ, March, 2017.

MAGAZINE ARTICLES AND COLUMNS

- E. Fields, C. Ho, M. J. Kim, Z. Wu, **B. Plancher**, “Underrepresentation of Women in Robotics Research [Women in Engineering],” IEEE Robotics and Automation Magazine (RAM), March 2024.
- M. Zennaro, **B. Plancher**, M. Stewart, V. Janapa Reddi, “AI in the developing world: how ‘tiny machine learning’ can have a big impact,” The Conversation, February 2024.
- S. Prakash, M. Stewart, C. Banbury, M. Mazumder, P. Warden, **B. Plancher**, V. Janapa Reddi, “Is TinyML Sustainable? Assessing the Environmental Impacts of Machine Learning on Microcontrollers,” Communications of the ACM (CACM), November 2023.
- P. Warden, M. Stewart, **Brian Plancher**, S. Katti, V. Janapa Reddi, “Machine Learning Sensors: A Design Paradigm for the Future of Intelligent Sensors,” Communications of the ACM (CACM), November 2023.

TECHNICAL REPORTS

- P. Warden, M. Stewart, **B. Plancher**, C. Banbury, S. Prakash, E. Chen, Z. Asgar, S. Katti, and V. Janapa Reddi, “Machine Learning Sensors,” arXiv preprint, June 2022.

POSTERS, ABSTRACTS, AND OTHER

- S. Prakash, M. Stewart, C. Banbury, M. Mazumder, P. Warden, **B. Plancher**, V. Janapa Reddi, “Is TinyML Sustainable? Assessing the Environmental Impacts of Machine Learning on Microcontrollers,” Workshop on Ethical System and Architecture Design (HotEthics) at the 2024 ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), San Diego, CA, USA, May 2024.
- V. Mayoral-Vilches, J. Jabbour, Y. Hsiao, Z. Wan, A. Martínez-Fariña, M. Crespo-Álvarez, M. Stewart, J. Reina-Muñoz, P. Nagras, G. Vikhe, M. Bakhshalipour, M. Pinzger, S. Rass, S. Panigrahi, G. Corradi, N. Roy, P. B. Gibbons, S. M. Neuman, **B. Plancher**, V. Janapa Reddi, “RobotPerf: An Open-Source, Vendor-Agnostic, Benchmarking Suite for Evaluating Robotics

Computing System Performance,” Workshop on Methods for Objective Comparison of Results in Intelligent Robotics Research at the IEEE/RSJ International Conference on Intelligent Robots and Systems (iROS), Detroit, MI, USA, October 2023.

- Winner of the Best Poster Award

- W. Xie, **B. Plancher**, “Can Large Language Models Reduce the Barriers to Entry for High School Robotics?” Robots for Learning Workshop at the IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN), Busan, South Korea and Remote, August 2023.
- **B. Plancher**, “Tiny Robot Learning: Expanding Access to Edge ML as a Step Toward Accessible Robotics,” Lowering Barriers for Robotics Research Workshop at the Robotics Science and Systems (RSS) Conference, Daegu, South Korea and Remote, July 2023.
- E. Adabag, M. Atal, W. Gerard, **Brian Plancher**, “Accelerating Nonlinear MPC with Warm Started Iterative Solvers on GPUs,” the IEEE-RAS Technical Committee on Model-Based Optimization for Robotics Virtual Poster Session, Remote, July 2023.
- M. Zennaro, **B. Plancher**, V. Janapa Reddi, “Bridging the Digital Divide: the Promising Impact of TinyML for Developing Countries,” at the UN 8th Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals, Remote, May 2023.
- C. Ho and **B. Plancher**, “Gender Diversity in Robotics Research,” Northeast Robotics Colloquium (NERC), Lowell, Massachusetts, October 2022.
- S. Kennedy and **B. Plancher**, “Voice Interfaces, Gender, and Race: An Intersectional Analysis,” in the Gendering Robots (GenR) Workshop at the IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), Naples, Italy, August 2022.
- J. Blanchard, J. R. Hott, V. Berry, R. Carroll, B. Edmison, R. Glassey, O. Karnalim, **B. Plancher**, S. Russell, “Leveraging Community Software in CS Education to Avoid Reinventing the Wheel,” in the ACM Conference on Innovation and Technology in Computer Science Education (ITiCSE), Dublin, Ireland, July 2022.
- J. Jabbour, S. M. Neuman, M. Mazumder, C. Banbury, S. Prakash, **B. Plancher**, and V. Janapa Reddi, “Closing the Sim-to-Real Gap for Ultra-Low-Cost, Resource-Constrained, Quadruped Robot Platforms,” in the Closing the Sim2Real Gap workshop at the Robotics Science and Systems (RSS) Conference, New York, New York, June 2022.
- M. Zennaro, **B. Plancher**, and V. Janapa Reddi, “TinyML: Applied AI for Development,” at the UN 7th Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals. Remote. May 2022.
- **B. Plancher** and V. Janapa Reddi, “The Tiny Machine Learning Open Education Initiative (TinyMLedu),” ACM Technical Symposium on Computer Science Education (SIGCSE), Providence, Rhode Island, March 2022.
- **B. Plancher** and S. Kuindersma, “Realtime Model Predictive Control using Parallel DDP on a GPU,” in the workshop Toward Online Optimal Control of Dynamic Robots at the International Conference on Robotics and Automation (ICRA), Montreal, Canada, May 2019.

DISSERTATIONS AND THESES

- **B. Plancher**, “GPU Acceleration for Real-time, Whole-Body, Nonlinear Model Predictive Control,” Harvard University, PhD Dissertation, April 2022.
- **B. Plancher**, “Parallel and Constrained Differential Dynamic Programming for Model Predictive Control,” Harvard University, MEng Thesis, May 2018.
- **B. Plancher**, “Hacking the White House: Election Fraud in the Digital Age,” Harvard University, Undergraduate Thesis, March 2013.

INVITED TALKS, SEMINARS, AND PANELS

- “Acceleration of (Nonlinear) Optimization for Robotics through Co-Design: from MCUs to GPUs,” INFORMS Annual Meeting, Seattle, WA, October 2024.
- “Panelist: Sustainable Robotics and Climate Change,” Workshop on Robots and Roboticians in the Age of Climate Change at the 2024 IEEE International Conference on Robotics and Automation, Yokohama, Japan, May 2024.
- “Responsible TinyML,” SciTinyML-24: Workshop on Machine Learning on Low-Power Devices: Applications and Advanced Topics, Remote, May 2024.
- “TinyML4D: Scaling Embedded Machine Learning Education in the Developing World - A Hands-On Workshop,” AAAI Spring Symposium on Increasing Diversity in AI Education and Research, San Francisco, CA, March 2024.
- “The Big Impact of TinyML: Embedded Machine Learning at the Extreme Edge,” 1st Morocco AI Summer School, Ifrane, Morocco, July 2023
- “ML Sensors and the Environmental Impact of TinyML,” EdgeMLUP-23: Workshop on Widening Access to TinyML Network by Establishing Best Practices in Education, Trieste, Italy, July 2023.
- “Launching TinyML edX and Long Term Support,” EdgeMLUP-23: Workshop on Widening Access to TinyML Network by Establishing Best Practices in Education, Trieste, Italy, July 2023.
- “Is TinyML Sustainable? Assessing the Environmental Impacts of Machine Learning on Microcontrollers,” SciTinyML-23: Workshop on Scientific Use of Machine Learning on Low-Power Devices: Applications and Advanced Topics, Remote, April 2023.

- “GPU Acceleration for Real-Time, Whole-Body, Nonlinear Model Predictive Control,” Columbia University Computer Science Faculty Seminar, New York, NY, April 2023.
- “GPU Acceleration for Real-Time, Whole-Body, Nonlinear Model Predictive Control,” University of Waterloo MME Departmental Seminar Series, Remote, November 2022.
- “Machine Learning for HPC,” Energy Efficient High Performance Computing Working Group, Remote, October 2022.
- “Keyword Spotting with Convolutional Neural Networks,” EASI-22: The 2022 Edge AI Summer Institute, Remote, July 2022.
- “Introduction to Artificial Intelligence and (Tiny)ML,” EASI-22: The 2022 Edge AI Summer Institute, Remote, July 2022.
- “Convolutions and Transfer Learning for Computer Vision,” SciTinyML-22 Latam: Latin America Regional Workshop on Scientific Use of Machine Learning on Low-Power Devices Workshop, Remote, July 2022.
- “The Future of Machine Learning is Tiny and Bright,” SciTinyML-22 Latam: Latin America Regional Workshop on Scientific Use of Machine Learning on Low-Power Devices, Remote, July 2022.
- “Data Pre-Processing for Hands-on Keyword Spotting,” SciTinyML-22 Africa: African Regional Workshop on Scientific Use of Machine Learning on Low-Power Devices, Remote, April 2022.
- “Convolutions for Hands-on Computer Vision,” SciTinyML-22 Africa: African Regional Workshop on Scientific Use of Machine Learning on Low-Power Devices, Remote, April 2022.
- “TinyMLedu: Widening Access to TinyML Education and Resources,” TinyML Toronto Meetup, Remote, January 2022.
- “Hardware Acceleration for Realtime Robotics,” Barnard College, New York, NY, December 2021.
- “Introduction to Robot Motion Planning,” Simmons College, Boston, MA, December 2021.
- “TinyMLedu Outreach: Embedded Machine Learning for the Navajo Nation,” TinyML for Good, Remote, November 2021.
- “Hands-on Embedded ML from Theory to Practice: Vision and Audio,” SciTinyML-21: Scientific Use of Machine Learning on Low-Power Devices Workshop, Remote, October 2021.
- “Robust Realtime Model Predictive Control through Co-Design,” CMU Robotic Exploration Lab, Remote, December 2020.
- “Custom Accelerator Chips (ASICs) for Robotics / Autonomous Systems,” Pillar VC, Boston, MA, April 2020.
- “Accelerating Real Time Model Predictive Control,” Optimus Ride, Boston, MA, October 2019.
- “GPU Acceleration for Robotics,” DUT/MIT Formula Student Driverless, Cambridge, MA, November 2018.

UNIVERSITY COMMITTEES

Barnard College, Columbia University:

- | | |
|--|----------------|
| • Barnard College Summer Research Institute Department Representative for Computer Science | 2022 – PRESENT |
| • Barnard Center for Research on Women (BCRW) Faculty Advisory Board | 2022 – PRESENT |
| • Barnard College Tenured Faculty Search Committee | 2023 |

Harvard University:

- | | |
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| • Harvard Women in STEM ENVISION Proposal-Writing Competition Judges Panel | 2021-2022 |
| • SEAS Committee on Diversity, Inclusion, and Belonging: Post-Baccalaureate Outreach Working Group | 2021 |
| • Harvard i3: The Harvard College Innovation Challenge Judges Panel | 2021 |

OUTREACH AND PROFESSIONAL SERVICE

Co-Chair:

- The Tiny Machine Learning Open Education Initiative (TinyMLedu): A group of academics and industry professionals working to increase global access to low-cost embedded machine learning education and research – 2021 to Present. [\[Link\]](#)

Associate Co-Chair:

- IEEE RAS Technical Committee on Model-Based Optimization for Robotics – 2022 to Present. [\[Link\]](#)
 - Won the “Blue Ribbon TC Award” in 2023 (formerly the “Most Active TC Award”)

Co-Organizer:

- SciTinyML 2021-24: Scientific Use of Machine Learning on Low-Power Devices: a 5-day hands-on, virtual workshop for university students and professors exploring real-world applications of TinyML and their impact on the developing world. 2021 was run globally with 216 participants from 48 countries, 2022 was run regionally for Africa (187 from 29), Asia (100 from 8), and Latin America (200 from 17), 2023-24 were run globally (418 from 76 and 201 from 44). [\[Link-21, 22, 23, 24\]](#)
- Workshop on TinyML for Sustainable Development 2024. An in-person, 5-day, hands-on workshop co-organized and hosted by IBM in Sao Paulo, Brazil focused how TinyML can be leveraged for the benefit of all globally [\[Link\]](#).
- RoboARCH 2022-23: Workshop on Robotics Acceleration with Computing Hardware. An IEEE/ACM International Symposium on Microarchitecture (MICRO) Workshop. [\[Link-22, 23\]](#)
- Workshop on Leveraging Models for Contact-Rich Manipulation. An IEEE/RSJ International Conference on Intelligent Robots and Systems (iROS) 2023 Workshop. [\[Link\]](#).
- EdgeMLUP 2023: An in-person, 5-day, hands-on workshop at ICTP for university level educators, focused on the global south, to develop and expand access to embedded machine learning curricula and research programs [\[Link\]](#).
- 3rd On-Device Intelligence Workshop. A Conference on Machine Learning and Systems (MLSys) 2023 Workshop. [\[Link\]](#)
- Building Approachable, Hands-On Embedded Machine Learning Curriculum Using Edge Impulse and Arduino. An AAAI 2023 Conference on Artificial Intelligence Tutorial and Lab Forum. [\[Link\]](#)

- Mind the Gap: Opportunities and Challenges in the Transition Between Research and Industry. A Robotics Science and Systems (RSS) 2022 Workshop. [\[Link\]](#)
- EASI 2022: the Edge AI Summer Institute. A 3-day, hands-on workshop for high school teachers and students serving the Navajo Nation exploring artificial intelligence through hands-on examples of TinyML. This program was a collaboration between Harvard University, Navajo Technical University and Barnard College, Columbia University. [\[Link\]](#)
- CRESTLEX 2021: CReating Effective STem Learning Experiences. A 4-day, hands-on workshop for high school teachers and students serving the Navajo Nation exploring artificial intelligence through hands-on examples of TinyML. This program was a collaboration led by Harvard and Navajo Technical University with support from Google and Edge Impulse. [\[Link\]](#)

Associate Editor:

- IEEE Robotics and Automation Letters (RAL) – Humanoids and Animaloids – 2024

Associate Program Chair:

- ACM Technical Symposium on Computer Science Education (SIGCSE TS) – Posters Track – 2024

Session Chair

- Reinforcement Learning I at the IEEE International Conference on Robotics and Automation (ICRA) – 2024

Grant Panelist

- NSF CISE Panel – 2024

Reviewer:

- IEEE Transactions on Robotics (T-RO) – 2023
- IEEE Transactions on Control Systems Technology (TCST) – 2023
- IEEE Robotics and Automation Letters (RAL) – 2019
- IEEE Micro – 2023
- IEEE International Conference on Robotics and Automation (ICRA) – 2021-23
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) – 2020, 22-24
- Robotics Science and Systems (RSS) – 2023-24
- IEEE Conference on Decision and Control – 2024
- IFAC Conference on Nonlinear Model Predictive Control (NMPC) – 2024
- Conference on Neural Information Processing Systems (NeurIPS): Datasets and Benchmarks Track – 2023, 24
- ACM Innovation and Technology in Computer Science Education (ITiCSE) – 2022-24
- ACM Technical Symposium on Computer Science Education (SIGCSE TS) – Posters Track – 2023
- IEEE International Conference on Advanced Motion Control (AMC) – 2022
- IEEE Integrated STEM Education Conference (ISEC) – 2018
- UN IATT STI Forum – 2023

Member:

- Institute of Electrical and Electronics Engineers (IEEE)
- IEEE Robotics and Automation Society (IEEE-RAS)
- IEEE-RAS Technical Committee (TC) on Model-Based Optimization for Robotics (TCOptRob), TC on Humanoids, TC on Performance Evaluation & Benchmarking, TC on Robot Learning, TC on Robot Ethics
- IEEE Computer Society (IEEE-CS)
- IEEE Women in Engineering (IEEE-WiE)
- Association for Computing Machinery (ACM)
- ACM Special Interest Group on Computer Science Education (ACM-SIGCSE)
- Association for the Advancement of Artificial Intelligence (AAAI)
- Women in AI & Robotics

ADVISING

UNDERGRADUATE THESIS ADVISOR

- | | |
|---|----------|
| • Dhilan Ramaprasad: Highest Honors
<i>Teaching Embedded Systems Programming</i> | MAY 2022 |
| • Lev Jacob Grossman: Highest Honors
<i>Reinforcement Learning to Enable Robust Robotic Model Predictive Control</i> | MAY 2020 |
| • John Alex Keszler: Honors
<i>FPGA Acceleration of Motion Planning Algorithms For Robotics Applications</i> | MAY 2019 |

MASTERS THESIS COMMITTEE

- | | |
|--|----------|
| • Basel Nitham Hindi
<i>Computer Vision-Powered Applications for Interpreting and Interacting with Movement</i> | DEC 2023 |
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MENTOR

- | | |
|---|-------------|
| • National Science Foundation Research Experiences for Undergraduates (NSF REU)
▪ Alex Du, Alice Lin: <i>Constraints and Learning for MPCGPU</i> | SUMMER 2024 |
|---|-------------|

- Barnard College Summer Research Institute (SRI)
 - Aliya Tang: *Perception, Mapping, and Localization on Embedded Systems* SUMMER 2024
 - Nicole Ineza, Khadija Siddiqui, Annie Wang, Catherine Zhao: *Constrained Parallel Differential Dynamic Programming*
 - Yana Botvinnik, Xian Jiang: *GPU Acceleration of Block-Cholesky Factorizations for KKT Systems* SUMMER 2023
 - Claudia Lihar, Anagha Ram: *Constrained Parallel Differential Dynamic Programming*
 - Allyce Chung, Merrick Wolfley, Julianna Yu: *Accessibility, Retention, & Diversity in Introductory CS and Cybersecurity*
 - Emily Burnett, Neasha Mittal, Chau Nguyen, Kimiya Shahamat: *GPU Acceleration of Robot Dynamics Algorithms*
 - Aliya Tang, Elvina Wibisono: *Perception, Mapping, and Localization on Embedded Systems*
 - Britney Aparicio, Tramy Dong: *Learning Sensors for Low-Cost Robots*
 - Susannah Abrams: *GPU Acceleration of Robot Dynamics Algorithms* SUMMER 2022
 - Tara Bogavelli: *Sim-to-Real Reinforcement Learning for Low-Cost Walking Robots*
 - Chloe Ho: *Gender Diversity in Robotics Research*
- Columbia College Summer Funding Program
 - Danelle Tuchman: *GPU Acceleration of RBD* SUMMER 2024
- Columbia Engineering Summer Internship Program
 - Alice Diakova: *Learning Sensors for Low-Cost Robots* SUMMER 2023
 - Ena Selman-Housein: *Accessibility, Retention, & Diversity in Introductory CS and Cybersecurity*
- Egleston Scholars Summer Internship Program
 - Jonathan Nalikka: *Constrained Parallel Differential Dynamic Programming* SUMMER 2023
- Other Mentored Independent and Group Research Projects
 - Eric Feng: *Constrained Parallel DDP* SUMMER 2024
 - Nadim Kanazi: *Integrating Learning and Trajectory Optimization for MPCGPU and TinyMPC*
 - Yana Botvinnik: *GPU Acceleration of Block-Cholesky Factorizations for KKT Systems*
 - Abhinav Sharma, Zach Pestrikov, Kwamena Awotwi: *GPU Acceleration of RBD*
 - Merrick Wolfley, Ena Selman-Housein: *Women in Robotics and Cyber Undergraduate Education*
 - Eric Feng, William Gerard, Nagavasavi Jeepalyam, Yishen Zheng: *Constrained Parallel DDP* SPRING 2024
 - Emre Adabag, Alice Lin, Brennan McManus, Mikul Saravanan, Seyoung Ree: *Constraints and Learning for MPCGPU*
 - Catherine Ji, Carly Kiang, Chloe Nguyen, Kimiya Shahamat: *High Level Synthesis for GPU Acceleration*
 - Britney Aparicio, Tramy Dong, Barkha Seth, Nicholas Thevenin: *Learning Sensors for Low-Cost Robots*
 - Luci Feinberg, Aliya Tang, Elvina Wibisono: *Perception, Mapping, and Localization on Embedded Systems*
 - Yana Botvinnik, Heidi Yoon, Justin Haddad: *GPU Acceleration of Block-Cholesky Factorizations for KKT Systems*
 - Kwamena Awotwi, Naren Loganathan, Abhinav Sharma, Danelle Tuchman: *GPU Acceleration of RBD*
 - Anupam Bhakta, Justin Jian, Kevin Qiu, Shuo Sha: *Approximate Linear Algebra for Optimal Control*
 - Shobini Iyer, Jiayi Wang: *Benchmarking and Generative AI for Robot Motion Planning*
 - Chloe Ho, Merrick Wolfley: *Women in Robotics Undergraduate Education*
 - Khushi Tyagi: *Fall Detection for the Elderly with Embedded Systems*
 - William Gerard: *Constrained Parallel DDP* FALL 2023
 - Britney Aparicio, Alice Diakova, Tramy Dong, Barkha Seth: *Learning Sensors for Low-Cost Robots*
 - Luci Feinberg, Aliya Tang, Elvina Wibisono: *Perception, Mapping, and Localization on Embedded Systems*
 - Catherine Ji, Carly Kiang, Chloe Nguyen, Kimiya Shahamat, Abhinav Sharma, Danelle Tuchman: *GPU Acceleration of RBD*
 - Elizabeth Fields, Chloe Ho, Min Jie Kim, Zixuan Wu: *Gender Diversity in Robotics Research*
 - Yana Botvinnik, Heidi Yoon: *GPU Acceleration of Block-Cholesky Factorizations for KKT Systems*
 - Ena Maria Selman-Housein: *Accessibility, Retention, & Diversity in Introductory CS and Cybersecurity*
 - Leyi Cui: *Injury Prevention in Dance through an Automated Coach*
 - Emre Adabag, William Gerard: *MPCGPU: GPU Accelerated Solvers for Optimal Control* SUMMER 2023
 - Xueyi Bu: *Proving the Optimality of the Symmetric Stair Preconditioner*
 - Emre Adabag, Miloni Atal: *GPU Accelerated Conjugate Gradient Solvers for Optimal Control* SPRING 2023
 - Antonio Aranda, William Gerard, Avigayil Helman, Nick Luo, Annie Song: *Constrained Parallel DDP*
 - Samarth Agrawal, Catherine Ji, Chloe Nguyen, Kimiya Shahamat, Danelle Tuchman: *GPU Acceleration of RBD*
 - Xueyi Bu, Jennifer Luo, Bonnie Yang, Jessica Zhang: *Proving the Optimality of the Symmetric Stair Preconditioner*
 - Elizabeth Fields, Min Jie Kim, Zixuan Wu: *Gender Diversity in Robotics Research*
 - Yana Botvinnik, Srishti Srivastava, Heidi Yoon: *GPU Acceleration of Block-Cholesky Factorizations for KKT Systems*
 - Luci Feinberg, Aliya Tang, Elvina Wibisono: *Perception, Mapping, and Localization on Embedded Systems*
 - Alexander Du, Malik Endsley: *Hardware Acceleration of Linear Algebra with Groq*
 - Eris Gao, Kevin Luo, Habeeba Mansour, Nolan Tremelling: *Tiny Robot Learning and State Estimation*
 - Donghan Kim: *Fast Optimization Methods for SLAM Algorithms*
 - Rachel Peng: *Profiling the Energy Consumption of Datacenter GPUs*
 - Kofi Meighan: *Developing a Low-Cost Self-Driving Car Platform for STEM Education*
 - Han Lin, William Xie: *Generative AI for Robot Motion Planning and Code Generation*
 - Alekhya Maram: *Design for Digital Wellbeing*
 - Emre Adabag, Miloni Atal: *GPU Accelerated Conjugate Gradient Solvers for Optimal Control* FALL 2022

- Antonio Aranda, William Gerard: *Constrained Parallel DDP*
- Catherine Ji, Kimiya Shahamat: *GPU Acceleration of RBD Algorithms*
- Harvard College Women in STEM Mentorship Program FALL 2021 – SPRING 2022
- Try AI: “A program designed to introduce early undergraduate students, particularly those identifying as women, Black, Latinx, and/or Indigenous, to research in Artificial Intelligence” FALL 2020

ADDITIONAL PROFESSIONAL EXPERIENCE

PILLAR VC: Boston, MA – *Venture Fellow* JAN 2020 - MAY 2020

- Assisted in sourcing and evaluating potential investments with a focus in robotics and AI

McKINSEY & COMPANY: Boston, MA – *Business Analyst* AUG 2013 - JULY 2015

- Offered promotion to senior associate (designation reserved for top ~5% of business analyst class)
- On multiple projects, played “junior engagement manager” role, project managing newer business analysts
- Led product development strategy for a software product, interfacing between multiple engineering teams and management at the business unit and corporate levels for a prime defense contractor
- Analyzed the value chain, market dynamics, and entry strategy for a new product for a high-tech materials manufacturer
- Led business case and market entry strategy development for a novel aircraft for a major aerospace manufacturer
- Designed a network deployment and capital planning strategy for a national wireless carrier
- Facilitated a culture transformation for a Fortune 500 company including a simultaneous worldwide conference
- Designed a comprehensive economic development and revitalization strategy for a rural area of the United States
- Performed the strategic due diligence that led to a successful large (>\$10Bn) deal between Fortune 500 companies

UNITED STATES DEPARTMENT OF DEFENSE: Fort Meade, MD – *Cryptologic Access Program* MAY 2012 - AUG 2012

- Led an internal consulting project on the use of Cloud-based solutions by developing a Map-Reduce Analytic backed GUI prototype and researching and presenting findings on possible use cases to division management
- Helped lead weekly meetings to coordinate a 15 person development team and ensure code reuse and efficient production
- Designed and built generic and reusable widgets in EXT-JS and the Ozone Widget Framework in order to aid leadership in analyzing current operational metrics and improve operational efficiency and oversight

US GREEN DATA: Cambridge, MA – *Senior Software Engineer* SEPT 2011 - MAY 2012

- Managed the tech team consisting of 4 Harvard Students and 4 professional web developers to ensure collaboration and production as lead web designer and developer in a Django / jQuery environment
- Evaluated the web development direction, product line and client requirements with the CEO and other company leaders
- Worked with the consulting team to create data models to improve data analysis efficiency and maximize client savings
- Provided system administrator function to maintain and improve the web architecture, security and design

REFERENCES

Vijay Janapa Reddi

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Zachary Manchester

Assistant Professor at the Robotics Institute, Carnegie Mellon University
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Patrick Wensing

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