Patrick Grady

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Education

Georgia Institute of Technology **Atlanta, GA**
PhD & MS Robotics, Computer Science, Advised by Charlie Kemp and James Hays *2018-2023*
Thesis: Sensing Touch from Vision for Humans and Robots

Duke University **Durham, NC**
BS Computer Science, BS Electrical and Computer Engineering *2014-2018*

Technical Experience

Meta Reality Labs
Senior Research Scientist (Tech Lead) *2024-cur*

- Founded and led Surface Touchpad from initial research ideation through on-device deployment and customer beta release. [Forbes][Gizmodo][UploadVR]
- Led end-to-end model development, including data collection, model architecture, training, and on-device deployment
- Owned full-stack iteration loop from data collection through closed-loop user studies. Drove improvements to real-time accuracy, improved task speed by 3x in user evaluations
- Presented to leadership and gave Zuckerberg-level demos, influenced product direction and shipping decisions

Healthcare Robotics Lab
Advised by Charlie Kemp, co-advised by James Hays *2018 - 2023*

- Developed PressureVision, a vision-based tactile sensing method for humans and robots, enabling contact estimation without physical sensors (ECCV 2022 Oral, WACV 2024)
- Demonstrated closed-loop manipulation using visio-tactile perception for contact-rich tasks (IROS 2022, ICRA 2023)
- Transferred RL policies from simulation (PyBullet) to the PR2 robot for assisted dressing
- Developed multi-modal 3D human pose estimation, fusing tactile and depth sensors for tracking under occlusion

Meta Reality Labs
Research Intern with Chengcheng Tang *2020-2022*

- Proposed ContactOpt, a differentiable optimization with learned contact models and physics constraints to improve pose accuracy (CVPR 2021 Oral)
- Built multi-view RGB camera cages for hand-object interaction. Captured 50 participants, released dataset as benchmark for vision-based tactile sensing

Duke Electric Vehicles
President (2016-2018), Electrical Lead (2014-2016) *2014 - 2018*

- Led a team of 15 students to build ultra-efficient vehicles and set two Guinness World Records.
- Progressed from electrical lead to president, drove the team to win the Shell Eco-Marathon for the first time in 2017, 2018
- Developed the team's first hydrogen fuel-cell vehicle, designed a novel hybrid fuel-cell/supercapacitor powertrain
- Modeled energy losses across the full vehicle system and performed extensive sim-to-real correlation, enabling a 10% improvement over prior world-records
- Contributed across electrical design, embedded software, mechanical design, machining, aerodynamics

NVIDIA Circuits Research Group
Research Intern *Summer 2017*

- Benchmarked high-speed signalling test chips for for next-gen memory-to-GPU communications
- Developed automatic optimization to minimize bit error-rate of 25 Gbps ground-referenced link

Selected Publications

- *PressureVision++: Estimating Fingertip Pressure From Diverse RGB Images* - **Patrick Grady**, Jeremy A. Collins, Chengcheng Tang, Christopher D. Twigg, James Hays, Charles C. Kemp, *WACV 2024*

- *Force/Torque Sensing for Soft Grippers using an External Camera* - Jeremy A. Collins, **Patrick Grady**, Charles C. Kemp, *ICRA 2023*
- *BodyPressure - Inferring Body Pose and Contact Pressure from a Depth Image* - Henry M. Clever, **Patrick Grady**, Greg Turk, Charles C. Kemp, *T-PAMI 2023*
- *Visual Pressure Estimation and Control for Soft Robotic Grippers* - **Patrick Grady**, Jeremy A. Collins, Samarth Brahmbhatt, Christopher D. Twigg, Chengcheng Tang, James Hays, Charles C. Kemp, *IROS 2022*
- *PressureVision: Estimating Hand Pressure from a Single RGB Image* - **Patrick Grady**, Chengcheng Tang, Samarth Brahmbhatt, Christopher D. Twigg, Chengde Wan, James Hays, Charles C. Kemp, *ECCV 2022, **Oral***
- *ContactOpt: Optimizing Contact to Improve Grasps* - **Patrick Grady**, Chengcheng Tang, Christopher D. Twigg, Minh Vo, Samarth Brahmbhatt, Charles C. Kemp, *CVPR 2021, **Oral***
- *Masked Reconstruction based Self-Supervision for Human Activity Recognition* - Harish Haresamudram, Apoorva Beedu, Varun Agrawal, **Patrick Grady**, Irfan Essa, Judy Hoffman, Thomas Ploetz, *UbiComp/ISWC 2020*
- *Learning to Collaborate from Simulation for Robot-Assisted Dressing* - Alexander Clegg, Zackory Erickson, **Patrick Grady**, Greg Turk, Charles Kemp, C. Karen Liu, *RA-L 2020*
- *A Study of Energy Losses in the World's Most Fuel Efficient Vehicle* - **Patrick Grady**, Gerry Chen, Shomik Verma, Aniruddh Marellapudi, Nico Hotz, *VPPC 2019, **Oral***

Teaching and Service

Invited Talks: Amazon Lab126 (2023), Carnegie Mellon University (2023), Boston Dynamics AI Institute (2024)

Teaching Assistant: Artificial Intelligence, Deep Learning, Computer Vision (2018-2020)

Reviewer: CVPR, ECCV, ICCV, ICRA, IROS, TPAMI, 3DV, WACV, UIST, TOG

Awards

Finalist: Meta PhD Research Fellowship *2022*

Guinness World Record: Most efficient electric vehicle, 27,482 MPG. Previously set in 2016 by TU Munich *2019*

Guinness World Record: Most fuel efficient vehicle, 14,573 MPG. Previously set in 2005 by ETH Zurich *2018*

Shell Eco-Marathon: First place battery-electric prototype. Best of 25 teams *2018*

Shell Eco-Marathon: First place hydrogen prototype. Best of 7 teams *2018*

Shell Eco-Marathon: First place battery-electric prototype. Best of 30 teams *2017*

ACM IC Programming Contest: 5th of 180 teams in Mid-Atlantic conference *2015*

FAA Private Pilot: Glider, Airplane *2014, 2021*

Gliding Records: Holder of 21 Georgia and Washington gliding records

Media Coverage: [Clean Technica] [News and Observer] [Killer Innovations] [Duke Chronicle]