

Patrick Grady

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Education

Georgia Institute of Technology

PhD Robotics

Atlanta, GA

2018-Dec 2023 est.

Georgia Institute of Technology

MS Computer Science - Machine Learning

Atlanta, GA

2018-2020

Duke University

BS Computer Science, BS Electrical and Computer Engineering

Durham, NC

2014-2018

Publications

- *Visual Contact Pressure Estimation for Grippers in the Wild* - Jeremy A. Collins, Cody Houff, **Patrick Grady**, Charles C. Kemp, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* 2023
- *Visual Estimation of Fingertip Pressure on Diverse Surfaces using Easily Captured Data* - **Patrick Grady**, Jeremy A. Collins, Chengcheng Tang, Christopher D. Twigg, James Hays, Charles C. Kemp, *arXiv* 2023
- *Force/Torque Sensing for Soft Grippers using an External Camera* - Jeremy A. Collins, **Patrick Grady**, Charles C. Kemp, *IEEE International Conference on Robotics and Automation (ICRA)* 2023
- *BodyPressure - Inferring Body Pose and Contact Pressure from a Depth Image* - Henry M. Clever, **Patrick Grady**, Greg Turk, Charles C. Kemp, *IEEE Transactions on Pattern Analysis and Machine Intelligence (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, *IEEE/RSJ International Conference on Intelligent Robots and Systems (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, *European Conference on Computer Vision (ECCV)* 2022, **Oral**
- *ContactOpt: Optimizing Contact to Improve Grasps* - **Patrick Grady**, Chengcheng Tang, Christopher D. Twigg, Minh Vo, Samarth Brahmbhatt, Charles C. Kemp, *Conference on Computer Vision and Pattern Recognition (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, *Ubiquitous Computing/International Semantic Web Conference (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, *IEEE Robotics and Automation Letters (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, *IEEE Vehicle Power and Propulsion Conference (VPPC)* 2019, **Oral**

Technical Experience

Meta Reality Labs

Research Intern with Chengcheng Tang

Summer 2020, Summer 2021, Summer 2022

- Developed methods for estimating hand pressure from single RGB images. Designed multi-view camera cages, collected a dataset of diverse participants manipulating force-sensitive objects, developed deep models
- Developed methods for inferring hand-object contact for grasps and optimization methods to enforce physical

consistency and achieve high-quality poses

Healthcare Robotics Lab

Graduate Research Assistant with Dr. Charlie Kemp

2019 - cur

- Developed closed-loop robotic grasping and manipulation algorithms using visually inferred tactile information
- Collected data and developed methods for visual inference of contact and pressure for human hands
- Generated high-quality 3D human mesh model fits from depth imagery
- Transferred deep RL policies from sim-to-real for robot-assisted dressing

Duke Electric Vehicles

President (2016-2018), Electrical Lead (2014-2016)

2014 - 2018

- **Guinness World Record:** Most efficient electric vehicle: 27,482 MPGe (battery-electric). Previous record, 2016 TU Munich
- **Guinness World Record:** Most fuel-efficient vehicle: 14,573 MPG (hydrogen fuel cell). Previous record, 2005 ETH Zurich
- Led team of 15 undergraduates to design battery and fuel cell powered vehicles for the Shell Eco-Marathon
- Led two year initiative to push the team past Eco-Marathon competition, to seek and achieve two World Records
- Vehicle designer, high level architect of vehicle powertrain and aerodynamics. Justified with extensive simulation and real-world testing

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
- Designed setup for characterization of SRAM devices in high-radiation environments

Invited Talks

- *Sensing Touch from Vision for Humans and Robots*. Amazon Lab126 August 2023
- *Sensing Touch from Vision for Humans and Robots*. Carnegie Mellon University May 2023
- *14,500 MPG: Design of the World's Most Fuel Efficient Vehicle*. Duke University Feb 2019

Graduate Teaching Assistant

- CS 6601 - Artificial Intelligence Fall 2020
- CS 7463 - Deep Learning Spring 2020
- CS 6476 - Computer Vision Fall 2019
- ECE 3072 - Electrical Energy Fall 2018

Undergraduate Teaching Assistant

- ECE 110 - Fundamentals of Electrical and Computer Engineering Spring 2016
- ECE 230 - Microelectronic Devices and Circuits, Projects Lab Fall 2016

Teaching Experience

Visiting Lecturer

Politeknik Brunei, Brunei

Mar 2019

- Invited to host tutorial on design and integration of BLDC motor drives

Selected Projects

Inertial Variometers for Glider Aircraft

Mid-Georgia Soaring Association

2020

- Developed RTK-INS for high-precision sensing of aircraft orientation and velocity
- Integrated INS into a high-performance glider, collected 30 hours of flight data

- Designed sensor fusion filters to exceed performance of current-gen barometric variometers

Online Imitation Learning for Warm-Starting of DQN

CS 8803 Class Project [Link]

2019

- Developed RL agent to play OpenAI Gym car racing environment
- Leveraged experience of an oracle agent to accelerate training of Deep Q Network
- Achieved human-level performance with 6x fewer training episodes

EasyController2 BLDC Motor Drive

Duke Electric Vehicles

2019

- Released open source design of BLDC motor controller, PCB and code
- Supported 7 international teams using the EasyController2 as a reference design

Awards

Reviewer: CVPR, ECCV, ICCV, ICRA, IROS, TPAMI

Finalist: Meta PhD Research Fellowship

2022

Guinness World Record: Most efficient electric vehicle, 27,482 MPG

2019

Guinness World Record: Most fuel efficient vehicle, 14,573 MPG

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

Georgia Tech CreateX: Idea2Prototype grant

2019

HackMIT: Winner

2016

HackDuke: Winner

2015

Microsoft Code Competition: Winner. Best of 30 teams

2015, 2017

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

2015

FAA Private Pilot: Glider, Airplane

2014, 2021

Soaring Records: Holder of 11 Georgia state soaring records

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