Patrick Grady

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Education

Georgia Institute of Technology — **Atlanta, GA**
PhD Robotics — *2018-Aug 2023 est.*

Georgia Institute of Technology — **Atlanta, GA**
MS Computer Science - Machine Learning — *2018-2020*

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

Publications

- *Force/Torque Sensing for Soft Grippers using an External Camera* - Jeremy A. Collins, **Patrick Grady**, Charles C. Kemp, *under review*
- *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)***
- *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) 2021*
- *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 RGB-D camera cage, 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*

- Generation of hand-object grasp contact maps from soft-body physics simulation

- Simulation-to-real transfer of Deep RL policies for robot-assisted dressing
- Generation of high-quality fits of human body meshes to depth imagery from SLP dataset

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

Cummer Lab
Undergraduate Research Assistant *2017 - 2018*

- Developed 4D imaging of lightning strikes using wide-bandwidth interferometry

Teaching Experience

Visiting Lecturer
Politeknik Brunei, Brunei *Mar 2019*

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

Invited Talks
- *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*

Selected Projects

Next-gen Variometers for Gliders using Inertial Sensing
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, Single Engine Airplane *2014, 2021*
Soaring Records: Holder of 11 Georgia state soaring records
Media Coverage: [Clean Technica] [News and Observer] [Killer Innovations] [Duke Chronicle]