

Stephen Gerald McGill, Jr.

Education

- Doctor of Philosophy**, Electrical Engineering. May, 2016
University of Pennsylvania, Philadelphia, PA
Dissertation: *Scaled Autonomy for Networked Humanoids*. Advisor: Daniel D. Lee
- Master of Science in Engineering**, Robotics. May, 2011
University of Pennsylvania, Philadelphia, PA
- Bachelor of Science in Engineering**, Double Major in Electrical Engineering and Computer Science. May, 2010
University of Pennsylvania, Philadelphia, PA
Graduated *Cum Laude*, Dean's List 2009-10

Academic Experience

- Visiting Professor**, Swarthmore College, Swarthmore, PA September 2017 – December 2017
Mobile Robotics undergraduate course instructor
- Research Assistant**, University of Pennsylvania. Advisor: Daniel D. Lee August 2010 – May, 2016
Software Team Leader, Team THOR, DARPA Robotics Challenge October 2012 – May 2016
Challenge Finals: 13th of 24, Challenge Trials: 9th of 16
- Team Leader**, Team DARwIn and Team THORwIn, RoboCup January 2010 – July 2016
Louis Vuitton Cup Winner 2015; First place 2011-2015
- Research Fellowship**, Sapienza University of Rome December 2013 – July 2014

Industry and Policy Experience

- Manager**, Toyota Research Institute, Cambridge, MA January 2020 – Present
- Research Scientist**, Toyota Research Institute, Cambridge, MA. June 2016 – January 2020
Driver intent prediction and risk estimation for parallel autonomy vehicles
- Technology Disclosure Fellow**, UPenn Center for Technology Transfer May 2012 – September 2013
- Machine Learning Software Intern**, Capital IQ, New York, NY May 2010 – August 2010
- Technology Policy Research Intern**, IEEE-USA, Washington, DC June 2009 – August 2009
- Hardware and Grant Writing Intern**, Dragonfly Pictures, Essington, PA December 2008 – January 2009
- Network Equipment Intern**, Communications Test Design, West Chester, PA June 2006 – August 2007

Honors and Awards

- Erasmus Mundus, Transatlantic Partnership for Excellence in Engineering, 2014
- NSF GRFP Honorable Mention, 2011
- Ashton Fellowship, 2010
- Engineering Alumni Society E. Stuart Eichert, Jr. Award, 2009

Publications

Journals

- J1. Huang, Xin and **McGill, Stephen G.** and DeCastro, Jonathan A. and Fletcher, Luke and Leonard, John J. and Williams, Brian C. and Rosman, Guy. *CARPAL: Confidence-Aware Intent Recognition for Parallel Autonomy*. IEEE Robotics and Automation Letters, vol. 6, no. 3, pp. 4433-4440, July 2021.
- J2. Xin Huang, **Stephen McGill**, Jonathan DeCastro, Brian Williams, Luke Fletcher, John J. Leonard, Guy Rosman. *DiversityGAN: Diversity-Aware Vehicle Motion Prediction via Latent Semantic Sampling*. IEEE Robotics and Automation Letters, vol. 5, no. 4, pp. 5089-5096, Oct. 2020.
- J3. **Stephen McGill**, Guy Rosman, Teddy Ort, Alyssa Pierson, Igor Gilitschenski, Brandon Araki, Luke Fletcher, Sertac Karaman, Daniela Rus, John J. Leonard. *Probabilistic Risk Metrics for Navigating Occluded Intersections*. IEEE Robotics and Automation Letters, vol. 4, no. 4, pp. 4322-4329, Oct. 2019.
- J4. **Stephen G McGill**, Seung-Joon Yi, Hak Yi, Minsung Ahn, Sanghyun Cho, Kevin Liu, Daniel Sun, Boram Lee, Heejin Jeong, Jinwook Huh, Dennis Hong, Daniel D. Lee. *Team THOR's Entry in the DARPA Robotics Challenge Finals*. Journal of Field Robotics, Volume 34, Issue 4, June 2017.
- J5. Seung-Joon Yi, **Stephen McGill**, Dennis Hong and Daniel Lee. *Hierarchical Motion Control for a Team of Humanoid Soccer Robots*. International Journal of Advanced Robot Systems. January, 2016.
- J6. Seung-Joon Yi, **Stephen G McGill**, Larry Vadakedathu, Qin He, Inyong Ha, Jeakweon Han, Hyunjong Song, Michael Rouleau, Byoung-Tak Zhang, Dennis Hong, Mark Yim, Daniel D. Lee. *Team THOR's Entry in the DARPA Robotics Challenge Trials 2013*. Journal of Field Robotics, Volume 32, Issue 3, 2015.
- J7. **Stephen G McGill**. *Government Applications of Robotics*. WISE Journal of Engineering and Public Policy, 2009.

Submitted

- J8. Xin Huang, Guy Rosman, Igor Gilitschenski, Ashkan M. Jasour, **Stephen McGill**, John Leonard, Brian Williams. *HYPER: Learned Hybrid Trajectory Prediction via Factored Inference and Adaptive Sampling*. IEEE Robotics and Automation Letters. Submitted.

Conference Proceedings

- C1. Xin Huang, **Stephen McGill**, Brian Williams, Luke Fletcher, Guy Rosman. *Uncertainty-Aware Driver Trajectory Prediction at Urban Intersections*. IEEE-RAS International Conference on Robotics and Automation, 2019.
- C2. **Stephen G McGill**, Seung-Joon Yi, Daniel D. Lee. *Low Dimensional Human Preference Tracking for Motion Optimization*. IEEE-RAS International Conference on Robotics and Automation, 2016.
- C3. **Stephen G McGill**, Seung-Joon Yi, Daniel D. Lee. *Team THOR's Adaptive Autonomy for Disaster Response Humanoids*. 15th IEEE-RAS International Conference on Humanoid Robots, 2015.
- C4. Seung-Joon Yi, **Stephen McGill**, L. Vadakedathu, Qin He, Inyong Ha, M. Rouleau, D. Hong and D.D. Lee. *Modular low-cost humanoid platform for disaster response*. IEEE/RSJ International Conference on Intelligent Robots and Systems, 2014.
- C5. Seung-Joon Yi, **Stephen G McGill**, Byoung-Tak Zhang, Dennis Hong, Daniel D. Lee. *Active stabilization of a humanoid robot for real-time imitation of a human operator*. IEEE-RAS International Conference on Humanoid Robots, 2012.
- C6. **Stephen G McGill** and Daniel D. Lee. *Cooperative humanoid stretcher manipulation and locomotion*. 11th IEEE-RAS International Conference on Humanoid Robots, 2011.

Submitted

- C7. Xin Huang, Guy Rosman, Ashkan Jasour, **Stephen G. McGill**, John J. Leonard, Brian C. Williams. *TIP: Task-Specific Motion Prediction for Intelligent Systems*. IEEE-RAS International Conference on Robotics and Automation, 2022. Submitted.
- C8. Yen-Ling Kuo, Xin Huang, Andrei Barbu, **Stephen G. McGill**, Boris Katz, John J. Leonard, Guy Rosman. *Trajectory prediction with language representations*. IEEE-RAS International Conference on Robotics and Automation, 2022. Submitted.

Book Chapters

- B1. Seung-Joon Yi, and **Stephen G. McGill**, Hak Yi, Sanghyun Cho and Hong, Dennis and Lee, Daniel D. "RoboCup 2015 Humanoid AdultSize League Winner." In RoboCup 2015: Robot World Cup XIX, pp. 94-105. Lecture Notes in Computer Science, vol 9513. Springer, Cham.
- B2. Seung-Joon Yi, **McGill, Steve** and He, Qin and Vadakedathu, Larry and Yi, Hak and Cho, Sanghyun and Hong, Dennis and Lee, Daniel D. "RoboCup 2014 Humanoid AdultSize League Winner." In RoboCup 2014: Robot World Cup XVIII, pp. 94-105. Springer Berlin Heidelberg, 2015.
- B3. **Stephen G. McGill**, Seung-Joon Yi, Yida Zhang, and Daniel D. Lee. "Extensions of a RoboCup soccer software framework." In RoboCup 2013: Robot World Cup XVII, pp. 608-615. Springer Berlin Heidelberg, 2014.
- B4. Daniel D. Lee, Seung-Joon Yi, **Stephen G. McGill**, Yida Zhang, Larry Vadakedathu, Samarth Brahmhatt, Richa Agrawal, and Vibhavari Dasagi. "RoboCup 2013 Humanoid Kidsize League Winner." In RoboCup 2013: Robot World Cup XVII, pp. 49-55. Springer Berlin Heidelberg, 2014.
- B5. Daniel D. Lee, Seung-Joon Yi, **Stephen McGill**, Yida Zhang, Sven Behnke, Marcell Missura, Hannes Schulz, Dennis Hong, Jeakweon Han, and Michael Hopkins. "RoboCup 2011 humanoid league winners." In RoboCup 2011: Robot Soccer World Cup XV, pp. 37-50. Springer Berlin Heidelberg, 2012.

Workshop Papers

- W1. **Steve McGill**, Seung-Joon Yi, Qin He, Heejin Jeong, Dennis Hong, and Daniel D. Lee. "Language Defined Behavior for Humanoid Control." How to Make Best Use of a Human Supervisor for Semi-Autonomous Humanoid Operation. Workshop at 2014 IEEE-RAS International Conference on Humanoid Robots. Madrid, Spain. 2014.
- W2. Seung-Joon Yi, **Steve McGill**, Qin He, Dennis Hong and Daniel D. Lee. "Walk and Kick Motion Generation for a General Purpose Full Sized Humanoid Robot." In The 9th Workshop on Humanoid Soccer Robots, Madrid, Spain. 2014.
- W3. Yi, Seung-Joon, **Stephen McGill**, and Daniel D. Lee. "Improved online kick generation method for humanoid soccer robots." In The 8th Workshop on Humanoid Soccer Robots. Georgia, USA. 2013.
- W4. **Stephen G. McGill**, Yida Zhang, Larry Vadakedathu, Aditya Sreekumar, Seung-Joon Yi, and Daniel D. Lee. "Comparison of Obstacle Avoidance Behaviors for a Humanoid Robot in Real and Simulated Environments." In The 7th Workshop on Humanoid Soccer Robots. Osaka, Japan. 2012.
- W5. **Stephen G McGill**, Jordan Brindza, Seung-Joon Yi, and Daniel D Lee. "Unified humanoid robotics software platform." In The 5th Workshop on Humanoid Soccer Robots. Tennessee, USA. 2010.
- W6. Belgiovine, Matthew and DeLiso, Mike and **McGill, Steve**. "Myovox: A Plug And Play Device Emulating A Mouse And Keyboard Using Speech And Muscle Inputs." In CMU Sphinx Users and Developers Workshop. 2010.

Technical Reports

- T1. **Stephen McGill**, Seung-Joon Yi, Larry Vadakedathu, Qin He, Dennis Hong and Daniel D. Lee. "Team THORwIn Team Description for Humanoid AdultSize League of RoboCup 2014."

- T2. Nicholas McGill, William McGill, **Stephen McGill**, Dean Wilhelmi, Dan Lee and Dennis Hong. “Team DARwIn-XOS Team Description for Humanoid TeenSize League of RoboCup 2012”
- T3. **Stephen McGill**, Seung Joon Yi, Yida Zhang, Aditya Sreekumar and Dan Lee. “Team DARwIn Team Description for Humanoid KidSize League of RoboCup 2012”
- T4. Taylor Pesek, Bryce Lee, **Stephen McGill**, Seung Joon Yi and Dan Lee. “Team DARwIn Team Description for Humanoid KidSize League of RoboCup 2011”
- T5. Jaekweon Han, Robert Nguyen, **Stephen McGill**, Dinesh Thakur, Dennis Hong and Dan Lee. “Team DARwIn Team Description for Humanoid KidSize League of RoboCup 2010”

Patents

Grants

- P1. **Stephen G. McGill, Jr.**, Guy Rosman, John J. Leonard, Luke S. Fletcher, Yusuke Sawamura, Xin Huang. *Systems and methods for predicting vehicle trajectory*. US Patent 11126187.
- P2. **Stephen G. McGill, Jr.**, Guy Rosman, John J. Leonard, Luke S. Fletcher, Yusuke Sawamura, Xin Huang. *Systems and methods for predicting the trajectory of a road agent external to a vehicle*. US Patent 11126186.
- P3. **Stephen G. McGill, Jr.**, Luke S. Fletcher, Guy Rosman, Xin Huang. *Systems and methods for predicting vehicle trajectory*. US Patent 11126185.
- P4. **Stephen G. McGill**, Guy Rosman, Luke Fletcher. *Risk prediction on a peer-to-peer network*. US Patent 11008018.
- P5. **Stephen G. McGill**, John J. Leonard, Luke Fletcher. *Vehicles and methods of controlling a vehicle to accommodate vehicle cut-in*. US Patent 10926777.
- P6. John J. Leonard, Simon A.I. Stent, Luke S. Fletcher, **Stephen G. McGill**. *Systems and methods for incentivizing user-aided improvement of autonomous vehicle control systems and methods of operating a vehicle using the same*. US Patent 11079758.
- P7. **Stephen G McGill**. *Vehicle systems and methods for detecting and mitigating an incapacitated driver*. US Patent 10780890.
- P8. John J. Leonard, **Stephen G. McGill**, Luke S. Fletcher. *Vehicle systems and methods for providing turn assistance at an intersection*. US Patent 10752249.
- P9. **Stephen McGill**, Luke Fletcher, Kazunori Nimura, John Leonard, Gill Pratt. *Systems and Methods For Switching Between A Driver Mode And An Autonomous Driving Mode For A Vehicle*. US Patent 10633025.
- P10. **Stephen G McGill**. *Systems and methods for dynamically adjusting a vehicle trajectory according to deviations of a driver from expected inputs*. US Patent 10059336.

Filed Applications

- P11. Xin Huang, **Stephen G. McGill**, Jonathan A. DeCastro, Brian C. Williams, Luke S. Fletcher, John J. Leonard, Guy Rosman. *Methods and systems for diversity-aware vehicle motion prediction via latent semantic sampling*. US20210163038A1.
- P12. **Stephen G. McGill**, Guy Rosman, Luke S. Fletcher. *System and method for collection of performance data by a vehicle*. US20210124361A1, JP2021077362A, CN112712608A.
- P13. **Stephen G. McGill**, Guy Rosman, Luke S. Fletcher. *Dynamic map generation with focus on construction and localization field of technology*. US20210123764A1, JP2021076593A, CN112710316A.
- P14. **Stephen McGill**, Luke Fletcher, Kazunori Nimura, John Leonard, Gill Pratt. *Systems and Methods For Switching Between A Driver Mode And An Autonomous Driving Mode For A Vehicle*. US20200198701A1.
- P15. **Stephen G. McGill**, Guy Rosman, Luke S. Fletcher. *Dynamic and variable learning by determining and using most-trustworthy inputs*. US20210125431A1. JP2021091390A.
- P16. **Stephen G. McGill**, Guy Rosman, Luke S. Fletcher. *Methods and systems for predicting a trajectory of a road agent based on an intermediate space*. US20210056402A1.
- P17. **Stephen G. McGill**, Guy Rosman, Luke S. Fletcher. *Vehicles and methods for performing tasks based on confidence in accuracy of module output*. US20200361452A1.
- P18. **Stephen G. McGill, Jr.**, Guy Rosman, Moses Theodore Ort, Alyssa Pierson, Igor Gilitschenski, Minoru Brandon Araki, Luke S. Fletcher, Sertac Karaman, Daniela Rus, John Joseph Leonard. *Systems and methods for estimating the risk associated with a vehicular maneuver*. US20200086859A1.
- P19. **Stephen G. McGill**, Guy Rosman, Luke S. Fletcher. *Vehicles and systems for predicting road agent behavior based on driving style*. US20200369268A1.
- P20. **Stephen G McGill**. *Vehicles and methods for building vehicle profiles based on reactions created by surrounding vehicles*. US Patent Application US-2019205675-A1.

Teaching

Instructor, Mobile Robotics, Swarthmore College

Fall 2017

Lecture and Lab with Turtlebot simulation and hardware

Coursera Teaching Assistant, State Estimation and Learning for Robotics, UPenn

Fall 2015 – Spring 2016

Teaching Assistant, ESE650: Learning in Robotics, UPenn

Spring 2012 – Spring 2015

Teaching Assistant , ESE450, ESE 451: Senior Design, UPenn	McGill 4
Teaching Assistant , Introduction to Robotics Technology, UPenn Summer Academy in Applied Science and Technology	Fall, Spring 2013 – 2015 Summer 2013
Teaching Assistant , ESE410/510: Design of Mechatronic Systems, UPenn	Fall 2011
Teaching Assistant , CIS110: Introduction to Computer Programming (Java), UPenn	Spring 2009
Teaching Assistant , ESE116: C Programming in the Unix Environment, UPenn	Fall 2008
Residential and Teaching Assistant , Teaching Computer Science Basics, UPenn Summer Academy in Applied Science and Technology	Summer 2008

Professional Service

IEEE Conference on Computer Vision and Pattern Recognition
 IEEE International Conference on Robotics and Automation
 IEEE International Conference on Humanoid Robots
 IEEE/RSJ International Conference on Intelligent Robots and Systems
 IEEE/EMBS International Conference on Biomedical Robotics and Biomechanics
 IEEE Transactions on Cognitive and Developmental Systems
 MIT Press Book Reviewer
 Technical committee member of the RoboCup Humanoid League
 Program Manager of the RoboCup Symposium
 Program committee member of the Workshop on Humanoid Soccer Robots

Community Service

Camp Counselor , Muscular Dystrophy Association	June 2015 2016
FIRST Robotics Mentor , Team 1168: Malvern Robotics	November 2014 – March 2016
FIRST Lego League Judge , Philadelphia	2014 – 2016
High School Student Mentoring , GRASP Lab Robotics	June 2015 – August 2015
Computer Lab Installation in Ghana , Communitech, UPenn	August 2008

Invited Talks

Risk Aware Driving with Humans in the Loop , Network of Employers for Traffic Safety Conference, Virtual	October 2020
Industrial Research via Small Scale Prototyping , IEEE ICRA 2019 Conference Workshop. Autonomous RACECAR: 1/10-scale Autonomous Car Platform for Research and Education in Robotics. Montreal, Canada.	May 2019
Humans-in-the-Loop for Autonomous Driving Development , Network of Employers for Traffic Safety Conference, Frisco, TX	October 2018
Leveraging Semi-Autonomous Techniques to Achieve the Moonshot RoboCup goal , IEEE IROS 2018 Conference Workshop on the RoboCup Humanoid League, Madrid	October 2018
Humans-in-the-Loop for Autonomous Driving Development , Museum of Science, Boston, MA	May, October 2017
Human-in-the-Loop Perception, Planning and Control , MIT 2.12	November 2017
Motion and Perception for Humanoids in Field Robotics , Columbia University CS 6731	April 2016
Scaled Autonomy for Networked Humanoids , Temple University	February 2016
Robotics for the Insurance Industry and the Workforce , Wharton Executive Education	December 2015
Scaled Autonomy for Networked Humanoids , Bucknell University	October 2015
Human Interface Control of Next Generation Humanoids , TU Darmstadt, Germany	March 2014
Beyond DARwIn: Applying Concepts from Robot Soccer , TU Darmstadt, Germany	June 2012
Robots for Life: On the Path to Robotic Healthcare , TEDxColumbiaEngineering, New York	October 2012
Robotics and Energy , Young Researchers Transatlantic Academy, Aachen, Germany	June 2012
Team DARwIn , TEDxPhoenixville, Pennsylvania	September 2011

Selected Press

MIT News. *Better autonomous reasoning at tricky intersections*. Article Interview. November 2019
 Adam Savage's Tested. *DARPA Robotics Challenge: Team THOR*. Video Interview. July 2015.
 NPR. *At DARPA Challenge, Robots (Slowly) Move Toward Better Disaster Recovery*. Article Interview. June 2015.
 Wharton Business Radio. *THORwIn champion of international soccer*. Live interview. 2015.
 University of Pennsylvania Spotlights. *Penn's THORwIn Takes Home Gold at RoboCup*. Article Interview. August 2015.
 University of Pennsylvania Penn Today News. *Robotics Education*. Article Interview. 2015.
 Penn Engineering Magazine. Various Interviews. Spring 2010, Fall 2013, Fall 2014, Spring 2015

The Verge. *Real steel: the broken robot necks and baby steps of RoboCup 2012*. Article Interview. September 2012
Penn Engineering News. *Team DARwIn takes First Place at RoboCup 2011*. Article Interview.
BBC News. *UK robot World Cup hopes dashed*. Video Interview. July 2011.