Dr. Madhur Behl

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Professional appointments

2017   **Assistant Professor in the Department of Computer Science**,
University of Virginia.

2017   **Assistant Professor in the Department of Engineering Systems & Environment**,
University of Virginia.

2016 - '17   **Post-Doctoral Researcher**,
University of Pennsylvania.

2016 - '18   **Co-Founder at flexergy.ai (Formerly Expresso Logic)**,
NSF SBIR small business.

Education

2015   **Ph.D. in Electrical & Systems Engineering**,
University of Pennsylvania, USA.

2012   **M.S. in Electrical Engineering**,
University of Pennsylvania.

2009   **B.E. in Electronics & Communication Engineering**,
PEC University of Technology, India,
Graduated *summa cum laude.*

Honors and Awards

2022   **IEEE Senior Member**.

2021   **UVa Research Award**,
Honored for research contributions.

2021   **NSF CAREER** ,
For "Safe and Agile Autonomous Cyber-Physical Systems",
National Science Foundation..

2021   **Best Paper Award** ,
For "Forecasting Groundwater Table in a Flood Prone Coastal City with Long Short-term Memory and Recurrent Neural Networks",
Journal of Water.

2020   **Best Paper Award** ,
For "DeepRacing AI: Agile Trajectory Synthesis for Autonomous Racing",
International Conference on Intelligent Robotics and Systems (IROS): Workshop on Perception, Learning, and Control for Autonomous Agile Vehicles.,
Online.

2019 **Best Poster Award** ,
For "Autonomous Electric Vehicle Charging System",
IEEE Systems and Information Engineering Design Symposium SIEDS'19,
Virginia.

2018 **Best Poster Award** ,
For "Trust Me, My Neighbors Say It's Raining Outside",
5th Conference on Systems for Built Environments, BuildSys '18,
Shenzhen, China.

2017 **Best Energy Systems Paper Award** ,
For "Data Predictive Control for Building Energy Management",
American Control Conference (ACC '17),
Seattle, USA.

2016 **1st prize winner ($50K)** , *DoE EERE's Allegheny Region Cleantech University Prize,*
Carnegie Mellon University,
Pittsburgh, USA.

2015 **Best Paper Award** ,
For "Sometimes, Money Does Grow on Trees: Data-Driven Demand Response with DR-Advisor,
Internet of Things Session at the Semiconductor Research Corporation's (SRC) TECHCON,
Austin, USA.

2012 **Best Demo Award at BuildSys**,
4th ACM Workshop On Embedded Systems For Energy-Efficiency In Buildings,
Toronto, Canada.

2011 **School of Engineering and Applied Science Student Award**,
Richard K. Dentel Memorial Prize in Urban Transportation,
University of Pennsylvania, Philadelphia, USA.

2010 **First prize *(Award of Excellence)* in World Embedded Software Contest**,
Korean Ministry of Knowledge Economy and Electronics and Telecommunications Research Institute (ETRI),
Seoul, South Korea.

2009 **Award for excellence in Robotics**,
Highest honor for consistent performance and contribution,
PEC University of Technology,
Chandigarh, India.

2007 **First runner up at the Young Business Development (YBD) Competition**,
Said Business School,
University of Oxford, UK.

Publications

Refereed Journal Papers

[1] Johannes Betz, Hongrui Zheng, Alexander Liniger, Ugo Rosolia, Phillip Karle, Madhur Behl, Venkat Krovi, and Rahul Mangharam. Autonomous vehicles on the edge: A survey on autonomous vehicle racing. *IEEE Open Journal of Intelligent Transportation Systems*, 2022. [Impact Factor: 4.277].

[2] Suresh Babu, Varundev and Madhur Behl. Threading the needle—overtaking framework for multi-agent autonomous racing. *SAE International Journal of Connected and Automated Vehicles*, 5(1), Jan 2022.

[3] Alexander B. Chen, Madhur Behl, and Jonathan L. Goodall. Assessing the trustworthiness of crowdsourced rainfall networks: A reputation system approach. *Water Resources Research*, 57(12):e2021WR029721, 2021. [Impact Factor: 4.36].

[4] Shraddha Praharaj, T Donna Chen, Faria T Zahura, Madhur Behl, and Jonathan L Goodall. Estimating impacts of recurring flooding on roadway networks: a norfolk, virginia case study. *Natural Hazards*, pages 1–25, 2021. [Impact Factor: 2.254].

[5] Benjamin D. Bowes, Arash Tavakoli, Cheng Wang, Arsalan Heydarian, Madhur Behl, Peter A. Beling, and Jonathan L. Goodall. Flood mitigation in coastal urban catchments using real-time stormwater infrastructure control and reinforcement learning. *Journal of Hydroinformatics*, 23(3):529–547, 10 2020. [Impact Factor: 2.376].

[6] Benjamin D Bowes, Arash Tavakoli, Cheng Wang, Arsalan Heydarian, Madhur Behl, Peter A Beling, and Jonathan L Goodall. Flood mitigation in coastal urban catchments using real-time stormwater infrastructure control and reinforcement learning. *Journal of Hydroinformatics*, 2020. [Impact Factor: 2.376].

[7] Faria T. Zahura, Jonathan L. Goodall, Jeffrey M. Sadler, Yawen Shen, Mohamed M. Morsy, and Madhur Behl. Training machine learning surrogate models from a high-fidelity physics-based model: Application for real-time street-scale flood prediction in an urban coastal community. *Water Resources Research*, n/a(n/a):e2019WR027038. [Impact Factor: 4.36].

[8] Gina L O'Neil, Jonathan L Goodall, Madhur Behl, and Linnea Saby. Deep learning using physically-informed input data for wetland identification. *Environmental Modelling & Software*, 126:104665, 2020. [Impact Factor: 4.807].

[9] Jeffrey M Sadler, Jonathan L Goodall, Madhur Behl, Benjamin D Bowes, and Mohamed M Morsy. Exploring real-time control of stormwater systems for mitigating flood risk due to sea level rise. *Journal of Hydrology*, 583:124571, 2020. [Impact Factor: 5.722].

[10] Jeffrey M Sadler, Jonathan L Goodall, Madhur Behl, Mohamed M Morsy, Teresa B Culver, and Benjamin D Bowes. Leveraging open source software and parallel computing for model predictive control of urban drainage systems using epa-swmm5. *Environmental Modelling & Software*, 120:104484, 2019. [Impact Factor: 4.807].

[11] Benjamin D Bowes, Jeffrey M Sadler, Mohamed M Morsy, Madhur Behl, and Jonathan L Goodall. Forecasting groundwater table in a flood prone coastal city with long short-term memory and recurrent neural networks. *Water*, 11(5):1098, 2019. [**2021 Best Paper Award**][Impact Factor: 3.103].

[12] Achin Jain, Francesco Smarra, Madhur Behl, and Rahul Mangharam. Data-driven model predictive control with regression trees—an application to building energy management. *ACM Transactions on Cyber-Physical Systems*, 2(1):1–21, 2018. [Impact Factor: 3.20].

[13] Madhur Behl, Francesco Smarra, and Rahul Mangharam. Dr-advisor: A data-driven demand response recommender system. *Applied Energy*, 170:30–46, 2016. [Impact Factor: 9.746].

Refereed Conference Papers

[1] Jingyun Ning, Benjamin Bowes, Jonathan Goodall, and Madhur Behl. Data-driven model predictive control for real-time stormwater management. In *American Control Conference (ACC)*, 2022. 8 Pages, [Accepted - To Appear][Acceptance Rate: 56%].

[2] Harder, Aron, Ranjit, Jaspreet, and Madhur Behl. Scenario2vector: scenario description language based embeddings for traffic situations. In *Proceedings of the ACM/IEEE 12th International Conference on Cyber-Physical Systems*, pages 167–176, 2021. 10 Pages, Acceptance Rate 24%.

[3] Varundev SureshBabu and Madhur Behl. F1tenth.dev - An Open-Source ROS Based F1/10 Autonomous Racing Simulator. In *IEEE 16th International Conference on Automation Science and Engineering (CASE)*. IEEE, Aug 2020. 8 pages, Acceptance Rate 58%.

[4] Argush, Gabriel, Holincheck, William, Krynitsky, Jessica, McGuire, Brian, Scott, Dax, Tolleson, Charlie, and Madhur Behl. Explorer51–Indoor Mapping, Discovery, and Navigation for an Autonomous Mobile Robot. In *2020 Systems and Information Engineering Design Symposium (SIEDS)*, pages 1–5. IEEE, 2020.

[5] Trent Weiss and Madhur Behl. Deepracing: An end-to-end framework for autonomous racing. In *Design, Automation, and Test in Europe Conference (DATE)*, March 2020. Paper length: 6 Pages; Acceptance Rate 25%.

[6] Varundev Suresh Babu and Madhur Behl. ROS F1/10 Autonomous Racecar Simulator. *ROSCon*, October 2019. Paper length: 6pages; Acceptance (For full oral presentation) <7%.

[7] J. DuBro, T. Flynt, I. Hameed, G. Lang, F. Park, and M. Behl. Autonomous Electric Vehicle Charging System. In *2019 Systems and Information Engineering Design Symposium (SIEDS)*, pages 1–6, April 2019. [**Best Systems Design Paper Award**].

[8] Jeffrey M. Sadler, Jonathan L. Goodall, Madhur Behl, and Mohamed M. Morsy. Leveraging Open Source Software and Parallel Computing for Model Predictive Control Simulation of Urban Drainage Systems Using EPA-SWMM5 and Python. In Giorgio Mannina, editor, *New Trends in Urban Drainage Modelling*, pages 988–992, Cham, 2019. Springer International Publishing.

[9] Alexander B. Chen, Madhur Behl, and Jonathan L. Goodall. Trust Me, My Neighbors Say It's Raining Outside: Ensuring Data Trustworthiness for Crowdsourced Weather Stations. In *Proceedings of the 5th Conference on Systems for Built Environments*, BuildSys '18, pages 25–28, New York, NY, USA, 2018. ACM. [**Accompanying by a Best Poster Award**], [Acceptance Rate: 30%].

[10] Arash Tavakoli, Amir Ashrafi, Arsalan Heydarian, and Madhur Behl. The internet of wasted things (iowt). In *Proceedings of the 8th International Conference on the Internet of Things*, IOT '18, pages 39:1–39:3, New York, NY, USA, 2018. ACM. [Acceptance Rate: 33%].

[11] A. Jain, M. Behl, and R. Mangharam. Data Predictive Control for building energy management. In *2017 American Control Conference (ACC)*, pages 44–49, May 2017. [**Best Paper Award - Energy Systems**][Acceptance Rate: 56%].

[12] Achin Jain, Rahul Mangharam, and Madhur Behl. Data Predictive Control for Peak Power Reduction. In *Proceedings of the 3rd ACM International Conference on Systems for Energy-Efficient Built Environments*, BuildSys '16, pages 109–118, New York, NY, USA, 2016. ACM. [**Best Presentation Award**][Acceptance Rate: 30%].

[13] Rahul Mangharam, Houssam Abbas, Madhur Behl, Kuk Jang, Miroslav Pajic, and Zhihao Jiang. Three challenges in cyber-physical systems. In *2016 8th International Conference on Communication Systems and Networks (COMSNETS)*, pages 1–8. IEEE, 2016.

[14] M. Behl, A. Jain, and R. Mangharam. Data-Driven Modeling, Control and Tools for Cyber-Physical Energy Systems. In *2016 ACM/IEEE 7th International Conference on Cyber-Physical Systems (ICCPS)*, pages 1–10, April 2016. Acceptance Rate 25%.

[15] Madhur Behl and Rahul Mangharam. Sometimes, Money Does Grow On Trees: Data-Driven Demand Response with DR-Advisor. In *Proceedings of the 2Nd ACM International Conference on Embedded Systems for Energy-Efficient Built Environments*, BuildSys '15, pages 137–146, New York, NY, USA, 2015. ACM. Acceptance Rate 30%.

[16] Madhur Behl and Rahul Mangharam. Sometimes, Money Does Grow on Trees: DR-Advisor, A Data Driven Demand Response Recommender System. *Semiconductor Research Corporation (SRC) TECHCON*, 2015. [**Best Paper Award**].

[17] Willy Bernal, Madhur Behl, Truong Nghiem, and Rahul Mangharam. Campus-Wide Integrated Building Energy Simulation. *14th International Conference of the International Building Performance Simulation Association (IBPSA) - Building Simulation Conference 2015 (BS2015)*, December 2015.

[18] M. Behl, T. X. Nghiem, and R. Mangharam. Model-IQ: Uncertainty propagation from sensing to modeling and control in buildings. In *2014 ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS)*, pages 13–24, April 2014. Acceptance Rate 25%.

[19] M. Behl, T. X. Nghiem, and R. Mangharam. IMpACT: Inverse model accuracy and control performance toolbox for buildings. In *2014 IEEE International Conference on Automation Science and Engineering (CASE)*, pages 1109–1114, Aug 2014. [Acceptance Rate: 58%].

[20] M. Behl, T. X. Nghiem, and R. Mangharam. Green Scheduling for Energy-Efficient Operation of Multiple Chiller Plants. In *2012 IEEE 33rd Real-Time Systems Symposium*, pages 195–204, Dec 2012. Acceptance Rate: 22%.

[21] T. X. Nghiem, M. Behl, G. J. Pappas, and R. Mangharam. Green scheduling for radiant systems in buildings. In *2012 IEEE 51st IEEE Conference on Decision and Control (CDC)*, pages 7577–7582, Dec 2012. Acceptance Rate: 53.4%.

[22] Willy Bernal, Madhur Behl, Truong X. Nghiem, and Rahul Mangharam. MLE+: A Tool for Integrated Design and Deployment of Energy Efficient Building Controls. In *Proceedings of the Fourth ACM Workshop on Embedded Sensing Systems for Energy-Efficiency in Buildings*, BuildSys '12, pages 123–130, New York, NY, USA, 2012. ACM. [Acceptance Rate: 30%].

[23] T. X. Nghiem, M. Behl, R. Mangharam, and G. J. Pappas. Scalable scheduling of building control systems for peak demand reduction. In *2012 American Control Conference (ACC)*, pages 3050–3055, June 2012. 8 Pages, [Acceptance Rate: 56%].

[24] Z. Li, P. Huang, A. K. Mok, T. Nghiem, M. Behl, G. Pappas, and R. Mangharam. On the Feasibility of Linear Discrete-Time Systems of the Green Scheduling Problem. In *2011 IEEE 32nd Real-Time Systems Symposium*, pages 295–304, Nov 2011. Acceptance Rate: 22%.

[25] Utsav Drolia, Z. Wang, Srinivas Vemuri, Madhur Behl, and Rahul Mangharam. AutoPlug - An Automotive Test-bed for ECU Testing, Validation and Verification. In *International Conference on Information Processing in Sensor Networks (IPSN)*, CPS Week 2011, Chicago, 2011.

[26] Madhur Behl and Rahul Mangharam. Pacer Cars: Real-Time Traffic Shockwave Suppression. In *In Proceedings of the 32nd IEEE Real-Time Systems Symposium*, San Diego, CA, USA, Nov 2010. Acceptance Rate: 22%.

Refereed Workshop Papers

[1] Trent Weiss, John Chrosniak, and Madhur Behl. Towards multi-agent autonomous racing with the deepracing framework. In *International Conference on Robotics and Automation (ICRA) - Workshop on Opportunities and Challenges with Autonomous Racing*, 2021. 6 Pages.

[2] Trent Weiss, Varundev Suresh Babu, and Madhur Behl. Bezier curve based end-to-end trajectory synthesis for agile autonomous driving. In *NeurIPS 2020 Machine Learning for Autonomous Driving Workshop*, 2020. 6 Pages.

[3] Trent Weiss, Varundev Suresh Babu, and Madhur Behl. Deepracing AI: Agile trajectory synthesis for autonomous racing. In *International Conference on Intelligent Robots and Systems (IROS) - Workshop on Perception, Learning, and Control for Autonomous Agile Vehicles*. IEEE/RSJ, Oct 2020. [**Best Paper Award**].

[4] Madhur Behl and Rahul Mangharam. Interactive analytics for smart cities infrastructures. In *Science of Smart City Operations and Platforms Engineering (SCOPE) in partnership with Global City Teams Challenge (GCTC)(SCOPE-GCTC), 2016 1st International Workshop on*, pages 1–6. IEEE, 2016.

Pre-Prints

[1] Johannes Betz, Hongrui Zheng, Florian Sauerbeck, Rosa Zheng, Joydeep Biswas, Venkat Krovi, Houssam Abbas, Madhur Behl, and Rahul Mangharam. Teaching hands-on autonomous systems – leveraging modular software and hardware in the f1tenth small-scale autonomous system. In *IEEE Transaction on Education*, 2022. [Under Review].

[2] Varundev Sukhil and Madhur Behl. Argos: an automaton referencing guided overtake system for head-to-head autonomous racing. In *IEEE Transactions on Robotics (T-RO)*, 2022. [Under Review].

[3] Aron Harder, Amar Kulkarni, and Madhur Behl. Safety architectures for high-speed autonomous racing. In *ACM Transactions on Cyber-Physical SYstems*, 2022. [Under Review].

[4] Trent Weiss and Madhur Behl. This is the way: Differential bayesian filtering for agile trajectory synthesis. In *2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022. [Under Review].

[5] Varundev Sukhil and Madhur Behl. Adaptive lookahead pure-pursuit for autonomous racing. *CoRR*, abs/2111.08873, 2021. 7 Pages.

[6] Cho, Hyun Jae and Madhur Behl. Towards automated safety coverage and testing for autonomous vehicles with reinforcement learning. *arXiv preprint arXiv:2005.13976*, 2020. 16 pages.

[7] Weiss, Trent and Madhur Behl. DeepRacing: Parameterized Trajectories for Autonomous Racing. *arXiv preprint arXiv:2005.05178*, 2020. **30 pages** [5+ citations].

[8] Matthew O'Kelly, <u>Varundev Sukhil</u>, Houssam Abbas, Jack Harkins, Chris Kao, Yash Vardhan Pant, Rahul Mangharam, <u>Dipshil Agarwal</u>, Madhur Behl, Paolo Burgio, and Marko Bertogna. F1/10: An Open-Source Autonomous Cyber-Physical Platform, 2019. arXiv:1901.08567, [40+ citations].

Posters and Demo Papers

[1] Jonathan L Goodall, Madhur Behl, Benjamin Bowes, Brad Campbell, Alex Chen, T Donna Chen, Jeffrey Sadler, Kyle Spencer, Michael Gorman, Shraddha Praharaj, et al. Nuisance flooding in coastal communities: Real-time modeling and decision support to improve transportation infrastructure resilience. In *EGU General Assembly Conference Abstracts*, page 11464, 2020.

[2] Benjamin Donald Bowes, Jonathan L Goodall, Jeffrey Michael Sadler, Mohamed M Morsy, and Madhur Behl. Toward forecasting groundwater table in flood prone coastal cities using long short-term memory and recurrent neural networks. *AGUFM*, 2018:H21J–1776, 2018.

[3] Alexander B. Chen, Madhur Behl, and Jonathan L. Goodall. Reputation System for Ensuring Data Trustworthiness of Crowdsourced Weather Stations: Poster Abstract. In *Proceedings of the 5th Conference on Systems for Built Environments*, BuildSys '18, pages 198–199, New York, NY, USA, 2018. ACM. [**Best Poster Award**].

[4] Jeff Sadler, Johnathan Goodall, and Madhur Behl. Assessing Current and Future Utility of Predictive Active Stormwater Controls for Reducing Flooding in Coastal Cities. *American Geophysical Union 2018 Fall Conference*, 2018.

[5] Alex Chen, Johnathan Goodall, and Madhur Behl. Bridging the Trust Gap in Crowdsourced Hydrological Sensor Networks: Data Trustworthiness of Personal Weather Stations. *American Geophysical Union 2018 Fall Conference*, 2018.

[6] Achin Jain, Madhur Behl, and Rahul Mangharam. Data predictive control for building energy management: Poster abstract. In *Proceedings of the 3rd ACM International Conference on Systems for Energy-Efficient Built Environments*, BuildSys '16, pages 245–246, New York, NY, USA, 2016. ACM.

[7] Baris Aksanli, Alper S. Akyurek, Madhur Behl, Meghan Clark, Alexandre Donzé, Prabal Dutta, Patrick Lazik, Mehdi Maasoumy, Rahul Mangharam, Truong X. Nghiem, Vasumathi Raman, Anthony Rowe, Alberto Sangiovanni-Vincentelli, Sanjit Seshia, Tajana Simunic Rosing, and Jagannathan Venkatesh. Distributed control of a swarm of buildings connected to a smart grid: Demo abstract. In *Proceedings of the 1st ACM Conference on Embedded Systems for Energy-Efficient Buildings*, BuildSys '14, pages 172–173, New York, NY, USA, 2014. ACM.

[8] Madhur Behl, Neel D. Shah, Larry Vadakedathu, Dan Wheeler, and Rahul Mangharam. Demo Abstract: EnergyLab: Building Energy Testbed for Demand-response. In *Proceedings of the 12th International Conference on Information Processing in Sensor Networks*, IPSN '13, pages 303–304, 2013.

[9] Willy Bernal, Madhur Behl, Truong Nghiem, and Rahul Mangharam. MLE+: A Tool for Integrated Design and Deployment of Energy Efficient Building Controls. In *Real-Time Systems Symposiuml Work in Progress (RTSS-Wip 2012)*, San Juan, Puerto Rico, December 2012. [**Best Demo Award**].

[10] Madhur Behl, Mansimar Aneja, Harsh Jain, and Rahul Mangharam. EnRoute: An Energy Router for Energy-Efficient Buildings. In *Demo and Poster at International Conference on Information Processing in Sensor Networks (IPSN)*, CPS Week 2011, Chicago, April 2011.

[11] Utsav Drolia, Z. Wang, Srinivas Vemuri, Madhur Behl, and Rahul Mangharam. AutoPlug - An Automotive Test-bed for ECU Testing, Validation and Verification. In *Demo and Poster at International Conference on Information Processing in Sensor Networks (IPSN)*, CPS Week 2011, Chicago, 2011.

[12] Madhur Behl and Rahul Mangharam. Pacer Cars: Real-Time Traffic Shockwave Suppression. In *In Proceedings of the 32nd IEEE Real-Time Systems Symposium (Work in Progress session - RTSS11-WiP)*, San Diego, CA, USA, Nov 2010.

[13] Madhur Behl, Willy Bernal, and Rahul Mangharam. From Control to Scheduling: An Elastic Execution Model. In *In Proceedings of the 32nd IEEE Real-Time Systems Symposium (Work in Progress session - RTSS11-WiP)*, San Diego, CA, USA, Nov 2010.

Technical Reports

[1] Madhur Behl and Rahul Mangharam. Evaluation of DR-Advisor on the ASHRAE Great Energy Predictor Shootout Challenge. Technical report, University of Pennsylvania, 2015.

[2] Madhur Behl, Truong Nghiem, and Rahul Mangharam. Uncertainty Propagation from Sensing to Modeling and Control in Buildings-Technical Report. Technical report, University of Pennsylvania, 2013.

Dissertation(s)

[1] Madhur Behl. *Data-driven modeling, control and tools for cyber-physical energy systems*. University of Pennsylvania, 2015.

[2] Madhur Behl. Mobility modeling of swarm robots. Technical report, ETH Zurich and PEC University of Technology, 2008.

Book Chapter

- Madhur Behl and Rahul Mangharam, "Chapter 9: Data-Driven Modeling, Control, and Tools for Smart Cities", Pg 243-272, *Book - Smart Cities: Foundations and Principles*, John Wiley & Sons Inc, ISBN: 978-1-119-22639-0, June 2017

h-index and citation count

- h-index = 15; I-10 index: 25, Citation Count (Mar 2022) = 865
- Google Scholar: https://scholar.google.com/citations?user=bj_imaYAAAAJ&hl=en

Graduate Student Mentoring

○ **PhD Students Advised**
1. Varundev Suresh Babu, CpE PhD - Expected Graduation: Aug 2022
2. Trent Weiss, CS PhD - Expected Graduation: Dec 2023
3. Jingyun Ning, CpE PhD -Started Fall 2018; Passed CpE PhD Quals Fall'19
4. Aron Harder, CS PhD - Started Fall 2018, Passed CS PhD Qual, Spring 21
5. Amar Kulkarni, CS PhD - Starting Aug 2022.

○ **MS Students Research**
1. Jaspreet Ranjeet - MCS - Independent Research Study - Secnario2Vector.
2. Ryan McCampbell - MCS - MS Thesis - Towards Bayesian Perception and Planning for Autonomous Vehicles; Now at Google Research.
3. Hyun Jae (Derek) Cho - MCS - Non-Topical Research, Masters (Independent Study) - Autonomous Vehicle Simulation; Now a PhD student in CS at UVA.
4. Felix J. Park - MCS - Independent Research Study - Autonomous EV Charging Robot - Will Join Facebook, Menlo Park, CA (Software Engineer).
5. Mengmeng Ye - MCS - Independent Research Study - Semantic Segmentation
6. Hongnan Lin - MCS - Independent Research Study - F1/10 Autonomous Racing
7. Dipshil Agrawal - MCS - Graduated - Independent Research - Now at Walmart AI Labs.
8. Jia Zheng - MCS - Independent Research Study - Autonomous EV Charging Robot
9. Sanatkumar Kondhol - MCS - Independent Research Study - Sustainability Impacts of Cryptocurrency Mining.
10. Shriraj Kodoor - MCS - Independent Research Study - Project: Fly-by-pixels; Now at Facebook.

○ **PhD committees**.
I meet with, mentor, and work closely with all the students on whose committee I serve:
1. *Rahul Peddi*: Systems and Information Engineering - *Research focus:* Robotics
2. *Krista Rand*: Systems and Information Engineering - *Research focus:* Disaster Recovery
3. *Jeff Sadler*: Civil and environment engineering - *Research focus:* Predictive control for stormwater management
4. *Zafer Vatansever*:Electrical and Computer Engineering - *Research focus:* Localization using visible light communication.
5. *Masoud Bashiri*: Systems and Information Engineering - *Research focus:* Autonomous intersection management.
6. *Elahe Soltanaghaei*: Computer Science - *Research focus:* Wireless Multipath: From a Challenge to an Opportunity for Sensing and Localization.
7. *Gina O Neil*: Civil and Environmental Engineering - *Research focus:* Using LiDAR Topographic Data and Machine Learning Techniques to Identify Near-Surface Soil Saturation for Improved Environmental Planning-Scale Wetland Mapping
8. *Yiling Jia*: Computer Science - *Research focus:* Active Tensor Completion on Time-Series Data for Energy Breakdown.
9. *Shraddha Praharaj*: Department of Civil & Environmental Engineering - *Research focus:* Using crowdsourced datasets to assess and mitigate impacts of recurrent flooding on the roadway network

Undergraduate Student Mentoring

○ 2020-2021 Undergraduate Research:
  ○ **Cavalier Autonomous Racing team**
    1. John Chrosniak - Engineering Undergraduate - Computer Science
    2. Arvind Anand - Engineering Undergraduate - Computer Science
    3. Emory Ductoe - Engineering Undergraduate - Computer Science
    4. John Link - Engineering Undergraduate - Computer Science

○ 2019-2020 Undergraduate Research:
  ○ **Explorer51: Autonomous Indoor Navigation Robot:**
    1. Jessica Marie Krynitsky - Engineering Undergraduate - Systems Engineering (BS)/Computer Science (Minor)
    2. William Michael Holincheck -Engineering Undergraduate - Systems Engineering (BS)/Mathematics-Prob & Stats(BA-2mj)
    3. Gabriel Alexander Argush - Engineering Undergraduate - Systems Engineering (BS)/Engineering Business (Minor)
    4. Brian Samuel Mcguire - Engineering Undergraduate - Systems Engineering (BS)
    5. Dax Scott - Engineering Undergraduate - Systems Engineering (BS)/Computer Science (Minor)/Design Integration (Minor)
    6. Charlie Tolleson - Engineering Undergraduate - Computer Science (BS)/Systems Engineering

○ 2018-2019 Undergraduate Research:
  ○ **Autonomous Electric Vehicle Charging Robot:**
    1. Grace Lang - Engineering Undergraduate - Mechanical Engineering (BS)/Design Integration (Minor) - Graduating in May 2019 - Will join the Appian Corporation, Tysons Corner Virginia, as a Quality Engineer.
    2. Imaan Hameed - Engineering Undergraduate - Systems Engineering (BS)/Computer Science (Minor)/Design Integration (Minor) - Graduating May 2019 - Joining Lockheed Martin's Orion Spacecraft Docking Team.
    3. Jackson Dubro - Engineering Undergraduate - Electrical Engineering (BS)/Design Integration (Minor)
    4. Taylor Flynt - Engineering Undergraduate - Computer Science (BS)/Design Integration (Minor) - Graduating May 2019 - Will be working for a technical consulting company called CapTech in their Charlotte, NC office.
    5. Ajay Patel - Engineering Undergraduate - Computer Science (BS)/Engineering Business (Minor)
    6. Elliot Kim - Engineering Undergraduate - Computer Science (BS) - Graduating May 2019 - Joining Booz Allen Hamilton. Northern VA/DC. Software engineer.
    7. Cherokee Toole - Engineering Undergraduate - Computer Science (BS)/Engineering Business (Minor) - Will be a software engineer at Capital One in Richmond, VA
    8. Karan Dhillon - Engineering Undergraduate - Computer Science (BS)/Engineering Business (Minor)
    9. Shabad Sobti -Will Join Levvel LLC, Charlotte, as a consultant.
    10. Ani Sridhar - Engineering Undergraduate - Computer Science (BS)/Entrepreneurship (Minor) - Graduating May 2019 - Joining Capital One, New York City, Software Engineer.

- 2018-2020 Undergraduate Research:
  - **The Internet of Wasted Things**
    1. Sonali Luthar - Engineering Undergraduate - Computer Science (BS)/Systems Engineering (Minor)
    2. Brandon Peck - Engineering Undergraduate - Computer Science (BS) - Graduating May 2019 - Will join Microsoft, Redmond WA, as a Data and Applied Scientist
    3. Owen Gentry - Engineering Undergraduate - Computer Science (BS)
  - **Sustainability Impacts of Cryptocurrency Mining**
    1. Katherine Yan - Engineering Undergraduate - Computer Science (BS)
    2. Aadil Abbas - Arts & Sciences Undergraduate - INTER-Cognitive Science (BA)
  - **Trust in Autonomous Vehicles:** Charles Yu - Engineering Undergraduate - Computer Science (BS)
  - **F1/10 Autonomous Racing** - Hua Uehara - Engineering Undergraduate - Computer Engineering (BS)

Software Artifacts and Test-beds

- **F1/10 Autonomous Racing**, An open-source 1/10 autonomous vehicle platform for research and education in perception, planning, and control.
  http://f1tenth.org
- **ROS Autonomous Racing Simulator**, An open-source autonomous racing simulator.
  http://f1tenth.dev
- **MLE+**, An open-source Matlab/Simulink toolbox for co-simulation with the whole-building energy simulator EnergyPlus. Listed as an official third party tool for EnergyPlus by the U.S. Department of Energy.
  https://github.com/mlab-upenn/mlep_v1.1

- **DR-Advisor**, A data-driven demand response recommender system Matlab toolbox.
  http://expresso-logic.com/

- **MotionView**, Responsive, Intuitive, touch free control for medical images
  http://www.motionview.co/

Research Funding

○ Total: **$3.58M** My Share: **$1.49M**

○ **Awards Granted**:

2022 Research Gift - Nuro AI, Cavalier Autonomous Racing, Role: PI, Start Date: June 2022, Total Award: $100,000.00,

2021 NSF CAREER, Safe and Agile Autonomous Cyber-Physical Systems, Role: PI, Start Date: Mar 2021 Total Award: $546,791.00,

2021 Research Gift, Cavalier Autonomous Racing, Role: PI, Start Date: Feb 2021, Total Award: $100,000.00,

2020 Jefferson Trust Foundation, Cavalier Autonomous Racing, Role: PI, Start Date: Feb 2020, Total Award: $50,000.00 (My share: $50K)

2020 Commonwealth Cyber Initiative, Increasing Trust in AI Enabled Autonomous Cyber-Physical Systems Operating in Uncertain Environments, Role: PI, Start Date: June 2020, Total Award: $50,000.00 (My share: $50K)

2020 US DOT/FHWA/Leidos, CARMA 1T: Scaled Platforms for Cooperative Driving Automation , Role: PI, Start Date: Dec 2020, Total Award: $63,000.00 (My share: $63K)

2019 The Mitre Corporation, Capstone: Indoor Mapping and Navigation for an Autonomous 3D Printed Robot, Role: PI, Start Date: 09/30/2019 End Date: 05/01/2020, Total Award: $10,000.00 (My share: $10K)

2019 UVA Sustainability Research Development Grant, Role PI, Date: 01/01/2019-12/31/2019, Total Award: $8,000.00 (My share: $8K)

2018 The Mitre Corporation, FPV autonomous drone flight, Role: PI, Start Date: 08/13/2018 End Date: 12/30/2018, Total Award: $52,000.00 (My share: $26K)

2018 UVA Research Innovation Award, Automated Risk Assessment for Cyber-Physical Systems, Role: Co-PI, Date: 09/01/2018-08/31/2019, Total Award: $60,000.00 (My share: $20K)

2018 Leidos Industry Gift, Role: PI, F1/10 Autonomous Racing, 8/31/2018-8/31/2019 Total Award Amount: $50,000 (My share: $25K)

2017 National Science Foundation, CRISP Type 2: dMIST: Data-driven Management for Interdependent Stormwater and Transportation Systems, Role: Co-PI, Award Period Covered: 9/1/2017 - 8/31/2021 Total Award Amount: $2,499,323.00 (My share: 1 full CS GRA for 48mos + summer support)

Invited Talks

○ [2022] **UIUC Safe Autonomy Lecture**', 'Bringing AI Up to Speed' Apr 2022

○ [2021] **TWiML Podcast**', 'Bringing AI Up to Speed with Autonomous Racing' Jun 2021, Online

○ [2021] **K-12 Data Science Conference**, 'Autonomous Racing for Everyone', May 2021, Online

○ [2020] **Data Science Connect (DSC)**, 'How Data Science & AI are Driving the Automotive Industry', July 2020, Online

○ [2019] **MathWorks CPS Research Summit - (Invite Only Event)**, 'DeepRacing: Teaching Autonomous Vehicles to Handle Edge Cases in Traffic', June 2019, Boston, MA

○ [2019] **Autonomous Vehicle Software Symposium**, 'DeepRacing: Teaching Autonomous Vehicles to Handle Edge Cases in Traffic', May 2019, Sttutgart, Germany

○ [2019] **Nvidia GTC** , 'F1/10 Autonomous Racing: 1/10th the Scale, 10 Times the Fun!', Mar 2019, San Jose, CA

○ [2018] **Embedded Systems Week (ES-Week)**, 'F1/10 Autonomous Racing Competition and Tutorials', October 2018, Torino, Italy

- [2017] **Chesapeake Large-Scale Analytics Conference (CLSAC)**, 'Bridging Machine and Control in Cyber-Physical Systems', October 2017
- [2017] **Los Alamos National Lab**, 'The foundations of Data Predictive Control for Cyber-Physical Systems', June 2017
- [2016] **DoE Building Technologies Office**, 'Data Predictive Control', Nov 2016
- [2015] **University of California San Diego (UCSD), Invited talk**, 'Data-Driven Cyber-Physical Energy Systems', October 2015
- [2015] **Electric Power Research Institute (EPRI)**, 'Data-Driven Modeling, Control and Tools for Cyber-Physical Energy Systems', Palo Alto, CA, October 2015
- [2015] **Stanford University**, 'Data-Driven Modeling, Control and Tools for Cyber-Physical Energy Systems', October 2015
- [2015] **IEEE Philadelphia Section Night**, 'Data-Driven Modeling, Control and Tools for Cyber-Physical Energy Systems', October 2015
- [2015] **Texas Instruments**, 'Data-Driven Modeling, Control and Tools for Cyber-Physical Energy Systems', Dallas, TX, September 2015
- [2015] **Texas A&M University**, 'Data-Driven Modeling, Control and Tools for Cyber-Physical Energy Systems', September 2015
- [2015] **SRC TECHCON**, 'Sometimes, Money Does Grow On Trees: Data-driven demand response with DR-Advisor', Austin, September 2015
- [2014] **Honeywell Automation and Control Labs**, 'Low-cost inverse modeling for buildings', Golden Valley, MN, July 2014
- [2012] **Young Researchers Transatlantic Academy**, 'Green Scheduling for Peak Power Reduction', Aachen, June 2012

Other Talks

- [2022] **IEEE Smart Cities Week**', 'Learn to Drive (and Race!) Scaled Autonomous Vehicles' Mar 2022, Online
- [2021] **Consumer Electronics Show (CES)**, 'Indy Autonomous Challenge Racecar Reveal - University Team Interview', Jan 2021, Online
- [2019] **Cyber-Physical Systems - Internet of Things Week (CPS-IoT Week)**, 'F1/10 Autonomous Racing Competition and Tutorials', April 2019, Montreal, Canada
- [2018] **Datapalooza - UVA Data Science Institute**, 'DeepRacing: Teaching Autonomous Vehicles to Handle Edge Cases in Traffic', Nov 2018
- [2018] **Cyber-Physical Systems Week (CPS-Week)**, 'F1/10 Autonomous Racing Competition and Tutorials', April 2018, Porto, Portugal
- [2017] **Conference on Embedded Networked Sensor Systems (SenSys)**, 'Build, drive, and race a 1/10 scale autonomous F1 car', November 2017
- [2016] **Embedded Systems Week, Invited talk**, 'F1/10-The Autonomous Racing Platform', October 2016
- [2016] **Cyber-Physical Systems Week**, 'F1/10-3 Day Tutorials', April 2016
- [2015] **Penn iTalks finals**, 'Sometimes, Money Does Grow On Trees', TED style research talk, March 2015
- [2015] **StarNet e-Workshop**, 'Low cost model capture in buildings for model based control', January 2015
- [2014] **Data Aware Energy Use Workshop**, Mathematics of Planet Earth Initiative, UCSD 'Low-cost building inverse modeling', September 2014

- [2014] **Conference on Automation Science and Engineering**, 'Inverse Model Accuracy and Control Performance Toolbox for Buildings', Taipei, August 2014

Leadership and Service

- **Department level**
  - Link-Lab Leadership Council, Representing Autonomous Systems, Smart Cities, and Computer Science Department (Since 2018)
  - CS Faculty Search Committee (2021-22)
  - CS Graduate Admissions Committee (2021-22)
  - Rice Hall Building Zone Committee (2020-21)
  - Link-Lab Research Ramp Up (2020-21)
  - CS Undergraduate Curriculum Committee (2018-2020)
  - CpE Undergraduate Curriculum Committee (2018-2020)
  - CS Space Committee (Since 2018)
  - Link Lab P3 (PhDs Practicing Presenting) Seminar Organizer (Since 2018)
  - Link Lab P4 (PhDs Preparing for Professorship Positions) Seminar Series Organizer (Since 2018)
  - Manage the hardware lab within Link Lab.
  - Autonomous Systems track organizer for the 2019 Link Lab Open House

- **SEAS level**
  - SEAS Research Ramp Up committee - Rice Hall and Link Lab (2020-21)
  - SEAS Cyber-Physical Systems TT Faculty Search Committee (2018)
  - Demos at 2018/2019 SEAS Open House
  - Demo at the 2019 Regional National Academy Of Engineering Meeting hosted by SEAS, and the Link Lab.

- **University level**
  - VAST - Planning Group (Large scale autonomous systems experimental research facility at UVA),
  - Team Principal - Cavalier Autonomous Racing,

Editorial Board

- **Guest Editor:** Journal of Field Robotics, Special Issue on Opportunities and Challenges with Autonomous Racing
- **Associate Editor:** SAE International Journal of Connected and Automated Vehicles (SAE CAV 2018 onwards)
- **Associate Editor:** IEEE Robotics and Automation Society, ICRA 2021 Conference Editorial Board.

Professional Service

- **Organizer**

1. [2022] **General Chair:** Opportunities and Challenges with Autonomous Racing, Workshop at ICRA 2022.
2. [2022] **Organizing Committee - Web Chair:** International Conference on Cyber-Physical Systems, ICCPS, CPS-IoT Week 2022.
3. [2022] **Organizing Committee** National Science Foundation CPS - PI Meeting, 2022.
4. [2021] **General Chair:** Opportunities and Challenges with Autonomous Racing, Workshop at ICRA 2021.
5. [2020] **Co-Chair:** F1/10 Autonomous Racing Tutorial [IROS 2020, Las Vegas]
6. [2020] **General Chair:** 5th F1/10 International Autonomous Competition [ES Week 2020, New York].
7. [2019] **General Chair:** 4th F1/10 International Autonomous Competition [CPS Week 2019, Montreal]
8. [2018] **General Chair:** 3rd F1/10 International Autonomous Competition [ES Week 2018, Torino]
9. [2018] **General Chair:** 2nd F1/10 International Autonomous Competition [CPS Week 2018, Porto]
10. [2018] **Workshop Co-Chair:** First Human-in-the-loop Internet of Things Systems (Hil-IoT) workshop (IoT 2018).
11. [2018] **General Chair:** 3rd International Workshop on Science of Smart City Operations and Platforms Engineering at CPS Week 2018 (SCOPE 2018)
12. [2017] **Poster/Demo Chair:** 4th ACM International Conference on Systems for Energy-Efficient Built Environments (BuildSys 2017)
13. [2017] **Organizing Committee:** 1st ACM Workshop on the Internet of Safe Things, SafeThings SenSys 2017.
14. [2016] **Industry Chair:** 3rd ACM International Conference on Systems for Energy-Efficient Built Environments (BuildSys 2016)
15. [2016] **General Chair:** 1st F1/10 International Autonomous Competition [ES Week 2016, Pittsburgh]

- **Program Committees**

1. **Program Committee:** International Conference on Cyber Physical Systems, ICCPS 2017-2020
2. **Technical Program Committee:** Eighth ACM International Conference on Future Energy Systems, Hong Kong [ACM e-Energy 2017]
3. **Program Committee:** Second International Workshop on Science of Smart City Operations and Platforms Engineering (SCOPE) 2016, 2017.
4. **Program Committee:** 9th International Conference on CoMmunication Systems & NETworkS, COMSNETS 2017.
5. **Program Committee:** Workshop on Wild and Crazy Ideas on the interplay between IoT and Big Data, WACI 2017.

Peer Review

○ **Panelist**

1. Department of Energy (DoE) - 2017, 2018
2. National Science Foundation (NSF) - 2017-2022

○ **Journal Reviewer**
1. SAE Journal on Connected and Automotive Vehicles, 2018, 2019
2. ACM Transactions on Cyber-Physical Systems (TCPS) 2017, 2018
3. Journal of Applied Energy 2016, 2017, 2019
4. Energy and Buildings 2017
5. IEEE Transactions on Control Systems Technology 2017
6. Real-Time Systems Journal (2012, 2015)
7. ACM Foundations and Trends in Electronic Design Automation (2015)
8. IEEE Special Issue on CPS 2011,
9. ACM Computing Surveys 2010

○ **Conference Reviewer**
1. International Conference on Robotics and Automation (2016-2022)
2. IEEE/RSJ International Conference on Intelligent Robots and Systems (2019,2020,2022)
3. ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2013 to 2021),
4. IEEE International Conference on Cyber-Physical Systems, Networks, and Applications(CPSNA 2013, 2014),
5. International conference on future energy systems (ACM e-Energy) 2017
6. ACM/IEEE Conference on Information Processing in Sensor Networks (IPSN 2012 to 2015),
7. IEEE Real-Time Systems Symposium (RTSS 2015, 2012, 2011),
8. Design, Automation and Test in Europe (DATE 2012),
9. BuildSys (2012 to 2016),
10. American Control Conference (ACC 2012, 2013, 2014, 2015, 2017, 2018),
11. European Control Conference (ECC 2015),
12. IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON 2012),
13. IEEE Conference on Decision and Control (CDC 2011, 2012, 2013),
14. International Conference on Embedded Software (EMSOFT 2013),
15. International Conference on Automation Science and Engineering (CASE 2014),
16. European Wireless Sensor Networks Conference (EWSN 2014)

Selected Media Coverage

- [2022] Startup Magazine - Racing Technology To Drive the Future of Autonomous Vehicle - 01-19-2022 - https://startupsmagazine.co.uk/article-racing-technology-drive-future-autonomous-vehicles
- [2022] WToP News - Indy Autonomous Challenge race at CES pushes limits of autonomous vehicles - 01-08-2022 - https://wtop.com/tech/2022/01/indy-autonomous-challenge-race-at-ces-pushes-limits-of-autonomous-vehicles/
- [2021] UVA Today - The Race is On - 10-21-2021, https://news.virginia.edu/content/race
- [2021] UVA Today - UVA Earns International Bragging Rights for Driverless Racing - 10-25-2021 - https://news.virginia.edu/content/uva-earns-international-bragging-rights-driverless-racing
- [2021] WVTF Radio - The Social Value of Racing Cars - 11-10-2021 - https://www.wvtf.org/2021-11-10/the-social-value-of-racing-cars
- [2020] Wall Street Journal - Autonomous Vehicles to Race at Indianapolis Motor Speedway, 7-20-2020, https://www.wsj.com/articles/autonomous-vehicles-to-race-at-indianapolis-motor-speedway-11595237401
- [2020] UVA Today - Autonomous Racing Students Get The Chance To Take It To The Track – At Indy – 07-29-2020 https://news.virginia.edu/content/autonomous-racing-students-get-chance-take-it-track-indy
- [2020] The Cavalier Daily - New club Cavalier Autonomous Racing receives $50,000 from Jefferson Trust – 02/27/2020 https://www.cavalierdaily.com/article/2020/02/new-club-cavalier-autonomous-racing-receives-50000-from-jefferson-trust
- [2020] Inside High Performance Computing (HPC) - Autonomous Vehicles to Race at Indy 500 Speedway – 07/20/2020 https://insidehpc.com/2020/07/autonomous-vehicles-to-race-at-indy-500-speedway/
- [2020] Dell Technologies - Will the Indianapolis 500 for Autonomous Cars Jump-Start the Self-Driving Economy? – 08/24/2020 https://www.dell.com/en-us/perspectives/will-the-indianapolis-500-for-autonomous-cars-jump-start-the-self-driving-economy/
- [2019] Association for Computing Machinery (ACM) Computers in Entertainment - Autonomous Vehicles Require Industry Cooperation, Not Laws – 07/25/2019
- [2018] Morning Consult - Americans Less Trusting of Self-Driving Safety Following High-Profile Accidents - - 04/05/2018 https://morningconsult.com/2018/04/05/americans-less-trusting-self-driving-safety-following-high-profile-accidents/
- [2018] CBS 19 News - New UVA Cyber Lab developing self-thinking cars – 02/22/2018
- [2018] Mashable - Tesla's Autopilot fails haven't shaken my faith in self-driving cars. Here's why. 04/12/2018 https://mashable.com/article/self-driving-cars-safety-autonomous
- [2018] UVA Today - TEACHING CARS TO 'THINK' FOR AN AUTONOMOUS FUTURE – 03/28/2018
- [2018] NEWSRADIO WINA - The Future of Autonomous Vehicles | Madhur Behl - 04/27/2018 https://wina.com/podcasts/the-future-of-autonomous-vehicles-madur-behl/
- [2018] American Society of Mechanical Engineers (ASME) - Autonomous Vehicle Industry Races to Fill Big Engineering Talent Gap – 12/05/2018 https://www.asme.org/topics-resources/content/autonomous-vehicle-industry-races-fill-big-talent
- [2018] ESPN – My F1/10 autonomous racing cars appear on prime time ESPN: https://www.youtube.com/watch?v=Rp8aUOytpno&
- [2016] NVIDIA News Center - NVIDIA Jetson Takes to the Course and Classroom – 10/11/2016 https://developer.nvidia.com/blog/nvidia-jetson-takes-to-the-course-and-classroom/

- [2016] Kleinman Center for Energy Policy (Univ. of Pennsylvania) - Penn Team Wins $50,000 Energy Innovation Prize https://kleinmanenergy.upenn.edu/news-insights/penn-team-wins-50000-energy-innovation-prize/
- [2016] Breaking Energy - Carnegie Mellon Launches Allegheny Region Cleantech University Prize – 03/22/2016
- [2016] Office of Energy Efficiency and Renewable Energy (EERE) - Carnegie Mellon Launches Allegheny Region Cleantech University Prize – 03/21/2016 https://www.energy.gov/eere/articles/carnegie-mellon-launches-allegheny-region-cleantech-university-prize
- [2016] UPenn Almanac - Winning Penn Team: Supporting Clean Energy Innovation – 03/29/2016 https://almanac.upenn.edu/archive/volumes/v62/n28/clean-energy-innovation.html
- [2015] Business Radio on Sirius XM – Knowledge at Wharton – Interview - How Tesla's Powerwall Will Shift Control to the Consumer https://knowledge.wharton.upenn.edu/article/how-teslas-powerwall-will-shift-control-to-the-consumer/

Videos About My Research and Teaching

- Cavalier Autonomous Racing - Indy Autonomous Challenge Complete Run: https://youtu.be/YBpdUr1t7$_o$
- Look Ma, No Hands Episode 5: Under the Hood: https://youtu.be/Bm5QAQIG3ds
- Look Ma, No Hands Episode 7: Drive to Learn: https://youtu.be/hTyeoMqzO48
- Look Ma, No Hands Episode 4: Making History: https://youtu.be/LwNfE$_i DYRM$
- F1/10 Online Video Lectures https://youtube.com/playlist?list=PL868twsx7OjdnroeAUFVBGlKGnFGi9txc
- Principles of Modeling for Cyber-Physical Systems [Complete Online Course] https://youtube.com/playlist?list=PL868twsx7OjeewCLEd-wcWnM63mOwqgTr
- ROS F1/10 Autonomous Racing Simulator: https://youtu.be/IXxNsMLHdeo
- F1/10 Undergraduate Course at UVA [Spring 2019 Highlights] https://youtu.be/RpEVCgt18P4
- F1/10 Undergraduate Course at UVA [Spring 2018 Highlights] https://youtu.be/ZQg61UNbr7Q
- 2nd F1/10 Autonomous Racing Competition 2018 - Porto, Portugal - CPS Week: https://youtu.be/ZwRGtrXYgmI
- 3rd F1/10 Autonomous Racing Competition 2018 - Torino, Italy - ES Week: https://youtu.be/VlE2Wb$_X hoQ$
- Student Testimonials
  1. Amar Kulkarni: https://youtu.be/8mt2OJPFOS4
  2. Aron Harder: https://youtu.be/GKFyiyU9fvs
  3. Varundev Suresh Babu: https://youtu.be/2PX$_4 WyOE4g$
  4. Jingyun Ning: https://youtu.be/g1yvdgsVJ9k
- DeepRacing AI - Autonomous Formula One Racing: https://youtu.be/abdOnoe2f0A
- The Internet of Wasted Things [IoWT]: https://youtu.be/7YtUIO-MpT8
- Scenario2Vector: Vector Embeddings for Traffic Situations: https://youtu.be/pFrGhAG1ePY

Affiliations

- Academic Advisory Council of the Partners for Automated Vehicle Education (PAVE)(Since Mar 2020)
- Association for Unmanned Vehicle Systems International Member
- Association for Computing Machinery Member
- IEEE Senior Member
- IEEE Power and Energy Society Future Directions (Long-Range Planning) subcommittee member. (Since 2016)
- IEEE Young Professionals (2013-Present)
- IEEE Control Systems Society (2013-2015)
- IEEE Robotics and Automation Society (2013-Present)
- Member at the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) (2012-2014)