

Yash Vardhan Pant

CONTACT INFORMATION	545 Cory Hall, Berkeley, CA 94705, USA	E-mail: yashpant@berkeley.edu Homepage: yashpant.github.io	Phone: +1-267-563-0011
RESEARCH INTERESTS	Control Theory, Formal Methods, Machine Learning and Optimization with applications in Control and Planning for Autonomous Robots and other Cyber-Physical Systems (CPS).		
EDUCATION	Doctor of Philosophy (Ph.D.) in Electrical Engineering Sep 2012 - Aug 2019 University of Pennsylvania (UPenn) Thesis Title: Robust Predictive Methods for Planning and Control of Autonomous Systems Committee: Profs. George Pappas (Chair), Manfred Morari, Georgios Fainekos & Jyo Deshmukh Advisor: Prof. Rahul Mangharam Master of Science (M.S.) in Electrical Engineering Sep 2010 - May 2012 University of Pennsylvania Thesis Title: AutoPlug: A Testbed for Automotive Control Software/Hardware Diagnostics and Remote Recalls Management Advisor: Prof. Rahul Mangharam Bachelor of Technology (B.Tech) in Electronics & Telecom. Engineering Aug 2006 - Jun 2010 College of Engineering Roorkee, India		
EXPERIENCE	Postdoctoral Fellow: NSF VeHICaL Project October 2019 – Department of Electrical Engineering and Computer Sciences, University of California, Berkeley, CA Mentors: Prof. Sanjit Seshia, Prof. Bjoern Hartmann, Prof. Richard Murray (Caltech) Description: Conduct research to model and develop strategies for safe Human-Robot Interaction, especially in the context of autonomous and semi-autonomous vehicles, using elements of Formal Methods, Machine Learning and Control Theory. Research Intern, Control Systems May 2014 – Aug 2014 Lit Motors, San Francisco, CA Supervisor: Dr. Berenice Mettler Description: Develop and implement the control algorithms to balance and steer the C-1 self-balancing electric motorcycle by: 1) designing experiments on the C-1 prototype to identify the system dynamics, 2) using the identified model to develop a novel controller for roll control and lateral control of the C-1 model, 3) implementing the controller on the Embedded Electronic Control Units (ECUs) on the C-1. Doctoral Researcher September 2012 – Aug 2019 Electrical and Systems Engineering, University of Pennsylvania Advisor: Prof. Rahul Mangharam Description: Conduct research on safe autonomy, with focus on: 1) Predictive Planning and Control Algorithms for Multi-Robot Systems with Temporal Logic objectives, 2) Robust Model Predictive Controllers for linear and non-linear systems with uncertain state and disturbance estimation Graduate Research Assistant , Real-Time and Embedded Systems Lab Jun 2011 – Aug 2012 Electrical and Systems Engineering, University of Pennsylvania Advisor: Prof. Rahul Mangharam Description: Conduct research to develop algorithms for fault detection and fault tolerance in Electronic		

Control Units (ECU) in Automotive Systems by developing a hardware-in-the-loop Automotive ECU simulator to run experiments and implement algorithms on.

Undergraduate Research Intern

May 2008 – Jul 2008, May 2009 – Jul 2009

Networked Control Systems Lab,

Electrical Engineering, Indian Institute of Technology, Kanpur

Advisor: Prof. Ramprasad Potluri

Description: Design Embedded Microcontroller-based circuit boards for different applications like LED Display control and DC motor control, and implement basic control algorithms on them to be later used for classroom/lab teaching.

HONORS AND AWARDS	Best Paper in Session: AIAA/IEEE Digital Avionics Systems Conference (DASC)	USA, 2020
	Best Student Paper Award: IEEE NAECON	Dayton, Ohio, USA 2018
	Student Travel Grant: IEEE CCTA	Big Island, Hawaii, USA 2017
	Student Travel Grant: ACC	Portland, USA 2014
	Richard K. Dentel Memorial Prize for outstanding research in Urban Transportation	UPenn 2013
	Top-10 finish, Intel Cornell Cup competition	Orlando, USA 2013
	Third place, World Embedded Software Competition	Seoul, South Korea 2013
	Student Travel Grant: ACM HiCoNS (CPS Week)	Beijing, China 2012
	Second place, the Embedded System Competition	Indian Institute of Technology Roorkee, India 2009

- PUBLICATIONS [1] A. Rodionova, **Y. V. Pant**, C. Kurtz, K. J. Jang, H. Abbas, R. Mangharam. Learning-‘N-Flying: A Learning-based, Decentralized Mission Aware UAS Collision Avoidance Scheme. *Accepted for publication at the ACM Transactions on Cyber-Physical Systems*, 2021.
- [2] **Y. V. Pant**, H. Abbas, K. Mohta, R. A. Quaye, T. X. Nghiem, J. Devietti, R. Mangharam. Anytime Computation and Control for Autonomous Systems. *IEEE Transactions on Control Systems Technology*, 2020.
Link: <https://yashpant.github.io/files/TCST20.pdf>
- [3] A. Rodionova*, **Y. V. Pant***, K. J. Jang, H. Abbas, R. Mangharam (*Co-first authors). Learning-to-Fly: Learning-based Collision Avoidance for Scalable Urban Air Mobility. *IEEE Conference on Intelligent Transportation Systems*, 2020.
Link: <https://arxiv.org/abs/2006.13267>
- [4] K. J. Jang, **Y. V. Pant**, A. Rodionova, H. Abbas, R. Mangharam. Learning-to-Fly Faster: Reinforcement Learning-based UAV Collision Avoidance. *AIAA/IEEE Digital Avionics Systems Conference (DASC) (to appear)*, 2020. **Best Paper in Session Award**
- [5] D. J. Fremont, E. Kim, **Y. V. Pant**, S. A. Seshia, A. Acharya, X. Bruso, P. Wells, S. Lemke, Q. Lu, S. Mehta. Formal Scenario-Based Testing of Autonomous Vehicles: From Simulation to the Real World. *IEEE Conference on Intelligent Transportation Systems*, 2020.
Link: <https://arxiv.org/pdf/2003.07739.pdf>
- [6] **Y. V. Pant**, R. A. Quaye, H. Abbas, A. Varre, R. Mangharam. Fly-by-Logic: A Tool for Unmanned Aircraft System Fleet Planning using Temporal Logic. *NASA Formal Methods Symposium*, 2019.
Link: <https://repository.upenn.edu/mlab-papers/118/>
- [7] K. J. Jang, **Y. V. Pant**, B. Zhang, J. Weimer and R. Mangharam. Robustness Evaluation of Computer-aided Clinical trials for Medical Devices. *ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS)*, 2019.
Link: <https://repository.upenn.edu/mlab-papers/116/>

- [8] H. Abbas, **Y. V. Pant**, R. Mangharam. Temporal Logic Robustness for General Signal Classes. *ACM International Conference on Hybrid Systems: Computation and Control (HSCC)*, 2019.
Link: <https://repository.upenn.edu/mlab-papers/117/>
- [9] **Y. V. Pant**, H. Abbas, R. A. Quaye, R. Mangharam. Fly-by-Logic: Control of Multi-Drone Fleets with Temporal Logic Objectives. *ACM/IEEE International Conference on Cyber-Physical Systems (ICCPs)*, 2018.
Link: <https://repository.upenn.edu/mlab-papers/107/>
- [10] M. Z. Li, W. R. Tan, S. M. Prakash, J. F. Kearney, M. S. Ryerson, D. Lee, **Y. V. Pant**. Design and implementation of a centralized system for autonomous unmanned aerial vehicle trajectory conflict resolution. *IEEE National Aerospace and Electronics Conference (NAECON)*, 2018. **Best Student Paper Award**.
Link: <https://ieeexplore.ieee.org/document/8556719>
- [11] **Y. V. Pant***, H. Abbas*, R. Mangharam (*Co-first authors). Smooth Operator: Control of systems using the Smooth Robustness of Temporal Logic. *IEEE Conference on Control Technology and Applications (CCTA)*, 2017. **IEEE CCTA Student Travel Award**.
Link: <https://repository.upenn.edu/mlab-papers/100/>
- [12] **Y. V. Pant**, H. Abbas, R. Mangharam. Robust Model Predictive Control for Non-Linear Systems with Input and State Constraints via Feedback Linearization. *IEEE Conference on Decision and Control (CDC)*, 2016.
Link: <https://repository.upenn.edu/mlab-papers/94/>
- [13] **Y. V. Pant**, H. Abbas, K. Mohta, T. X. Nghiem, J. Devietti, R. Mangharam. Co-design of Anytime Computation and Robust Control. *IEEE Real-Time Systems Symposium (RTSS)*, 2015.
Link: <https://repository.upenn.edu/mlab-papers/91/>
- [14] **Y. V. Pant**, H. Abbas, K. N. Nischal, P. Kelkar, D. Kumar, J. Devietti, R. Mangharam. Power-efficient algorithms for autonomous navigation. *IEEE Conference on Complex Systems Engineering (ICCSE)*, 2015.
Link: <https://yashpant.github.io/files/ICCSE15.pdf>
- [15] **Y. V. Pant**, T. X. Nghiem, R. Mangharam. Peak power reduction in hybrid energy systems with limited load forecasts. *American Control Conference (ACC)*, 2014. **ACC Student Travel Award**
Link: <https://repository.upenn.edu/mlab-papers/68/>
- [16] U. Drolia*, Z. Wang*, **Y. V. Pant***, R. Mangharam (*Co-first authors). Autoplug: An automotive test-bed for electronic controller unit testing and verification. *IEEE Intelligent Transportation Systems Conference (ITSC)*, 2011.
Link: <https://repository.upenn.edu/mlab-papers/37/>

SUBMITTED
AND IN
PREPARATION

- [17] **Y. V. Pant***, H. Yin*, M. Arcak, S. A. Seshia (*Co-first authors), Co-design of Planning and Control for multi-rotor UAVs with Temporal Logic Objectives, *Submitted to the American Control Conference (ACC)*, 2021.
- [18] Shormona Ghosh, **Y. V. Pant**, H. Ravanbakhsh, S. A. Seshia, Counterexample-Guided Synthesis of Perception Models and Control, *Submitted to the American Control Conference (ACC)*, 2021.
- [19] **Y. V. Pant**, M. Z. Li, R. A. Quaye, A. Rodionova, H. Abbas, M. Ryerson, R. Mangharam. FADS: Framework for Autonomous Drone Safety, *Submitted to the IEEE Transactions on Intelligent Transportation Systems*.
- [20] **Y. V. Pant**, H. Abbas, R. A. Quaye, R. Mangharam. Distributed planning for multi-drone fleets with Signal Temporal Logic objectives. *Under preparation*

WORKSHOP PAPERS, DEMO ABSTRACTS AND WORKS-IN-PROGRESS	<p>[21] D. J. Fremont, E. Kim, Y. V. Pant, S. A. Seshia, A. Acharya, X. Bruso, P. Wells, S. Lemke, Q. Lu, S. Mehta. Poster: Formal Scenario-Based Testing of Autonomous Vehicles. <i>Automated Vehicles Symposium (AVS)</i>, 2020.</p> <p>[22] Y. V. Pant, H. Abbas, R. Mangharam. Distributed planning of Multi-rotor drone fleets using the Smooth Robustness of Signal Temporal Logic. <i>Monitoring and Testing of CPS Workshop (MTCPS), CPS Week</i>, 2019.</p> <p>[23] Y. V. Pant, H. Abbas, R. Mangharam. Control with Temporal Logic Requirements (poster). <i>SRCTECHCON</i>, 2017.</p> <p>[24] Y. V. Pant, H. Abbas, R. Mangharam. Control using the Smooth Robustness of Temporal Logic. <i>Monitoring and Testing of CPS Workshop (MTCPS), CPS Week</i>, 2017.</p> <p>[25] K. N. Nischal, P. Kelkar, D. Kumar, Y. V. Pant, H. Abbas, J. Devietti, R. Mangharam. Hardware Optimizations for Anytime Perception and Control. <i>Work-in-progress, Real-Time Systems Symposium (RTSS)</i>, 2015.</p> <p>[26] P. Gurniak, Y. V. Pant. Demo: Low-cost Autonomous Navigation with Anytime Control and Computation. <i>University Transportation Center (UPenn-CMU) Annual Meeting</i>, 2014.</p> <p>[27] Y. V. Pant, T. X. Nghiem, R. Mangharam. Knock NOx: Model-based Remote Diagnostics of a Diesel Exhaust Control System. <i>Work-in-progress, IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)</i>, 2013.</p> <p>[28] Y. V. Pant, H. Jain, A. Mulay, R. Dutta. Protodrive: Rapid Prototyping and Simulation of Electric Vehicle Powertrains. <i>Final report: Intel Cornell Cup</i>, 2013. Award for Top-10 Finish</p> <p>[29] Y. V. Pant, S. Diaz, H. Jain, W. Price, A. Botelho. Protodrive: Simulation of Electric Vehicle Powertrains. <i>Final report: World Embedded Software Competition</i>, 2013. Third Place Award</p> <p>[30] W. Price, H. Jain, Y. V. Pant, R. Mangharam. Protodrive: An experimental platform for electric vehicle energy scheduling and control. <i>Work-in-progress, Real-Time Systems Symposium (RTSS)</i>, 2012.</p> <p>[31] S. Diaz, H. Jain, Y. V. Pant, W. Price, R. Mangharam. Protodrive: An experimental platform for electric vehicle energy scheduling and control. <i>Demo Abstract Real-Time Systems Symposium (RTSS)</i>, 2012.</p> <p>[32] Y. V. Pant. Demo: AutoPlug 2.0. <i>Real-Time and Embedded Technology and Applications Symposium (RTAS): Demo session</i>, 2012.</p> <p>[33] Y. V. Pant, R. Mangharam. Observer-based Sensor Fault Detection and Isolation. <i>Work-in-progress, ACM International Conference on High Confidence Networked Systems (HiCoNS)</i>, 2012. HiCoNS Student Travel Award</p>
PATENT (APPLIED FOR)	<p>United States Patent Application Serial No. 16/515,854 for CONTROL OF MULTI-DRONE FLEETS WITH TEMPORAL LOGIC OBJECTIVES</p> <p>Mar 2019</p>
SOFTWARE TOOLS	<p>“FLY-BY-LOGIC”: A Tool for multi-drone planning using Temporal Logic Objectives. Y. V. Pant, R. A. Quaye, H. Abbas, A. Varre, R. Mangharam https://github.com/yashpant/FlyByLogic</p> <p>“SMOOTH OPERATOR”: Control Using the Smooth Robustness of Temporal Logic. Y. V. Pant, H. Abbas, R. Mangharam https://github.com/yashpant/SmoothOperator0</p>
SELECTED TALKS	<p>“Fly-by-Logic: Control of Multi-rotor drone fleets using Temporal Logic Objectives” — Qualcomm Research - Autonomous Driving R&D, USA</p> <p>June 2020</p>

	— NSF VeHICaL Annual Meeting, UC Berkeley, USA	October 2019
	— Stanford Autonomous Systems Lab (ASL), USA	July 2019
	— Nokia-Bell Labs, Murray Hill, USA	Jun 2019
	— NASA Formal Methods Symposium, Houston, USA	May 2019
	— Monthly WAS Intel Science and Technology Center (ISTC) seminar, USA	Aug 2018
	— Amazon Robotics, Boston, USA	Jul 2018
	— Mathworks Research, Boston, USA	Jul 2018
	— ICCPS at CPS Week, Porto, Portugal	Apr 2018
	— UPenn GRASP/ PRECISE Industry Symposium (Poster and Demonstration), Philadelphia, USA	Feb 2018
	“Distributed planning for drone fleets with Temporal Logic Objectives”	
	— Intel-UPenn annual visit, Philadelphia, USA	May 2019
	“Smooth Operator: Control using the Smooth Robustness of Metric Temporal Logic”	
	— IEEE CCTA , Big Island, Hawaii, USA	Aug 2017
	— SRC Techcon (Poster), Austin, USA	Sep 2017
	“Robust Model Predictive Control for Non-Linear Systems with Input and State Constraints via Feedback Linearization”	
	— CDC, Las Vegas, USA	Dec 2016
	“Co-design of Anytime Computation and Robust Control”	
	— UPenn ESE PhD Colloquium, Philadelphia, USA	Mar 2016
	— UPenn PRECISE Industry Day (Poster), Philadelphia, USA	Feb 2016
	— RTSS, San Antonio, USA	Dec 2015
TEACHING	Teaching Assistant	
EXPERIENCE	— ESE 406/505: Control Theory, UPenn, Philadelphia, USA	Fall 2014
	— ESE 406: Control Theory, UPenn, Philadelphia, USA	Fall 2013
	Guest Lecturer	
	— ESE 350: Embedded Systems, UPenn, Philadelphia, USA	Apr 2019
	— ESE 519: Embedded Systems, UPenn, Philadelphia, USA	Nov 2018
	— CSCI 699: Formal methods for Cyber-Physical Systems, University of Southern California (via teleconferencing), Los Angeles, USA	Oct 2018
MENTORING	Technical Expert: Girls in Engineering (GiE), University of California, Berkeley	2020
	Senior Design Technical Advisor: Team UrbanDrone, ESE UPenn	2019
	Senior Design Technical Advisor: Team EagleEye, ESE UPenn	2018
	— Winners of the 2018 Frederick Ketterer Memorial Award	
	— Winners of the 2018 Federal Aviation Administration (FAA) RAISE Award	
REVIEWING	Proceedings of the IEEE	
ACTIVITIES	IEEE Transactions on Automatic Control Systems (TAC)	
	Journal of Artificial Intelligence Research (JAIR)	
	ACM Transactions on Embedded Computing Systems	
	Chemical Product and Process Modeling (CPPM)	
	IEEE Embedded Systems Letters	
	IEEE Control Systems Letters	
	IEEE International Conference on Robotics and Automation (ICRA)	2021
	Learning for Decisions & Control (L4DC)	2020, 2021
	ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS)	2013 – 2018
	IEEE Conference on Decision and Control (CDC)	2016, 2019

	American Control Conference (ACC)	2014, 2018, 2020, 2021
	International Conference on Communications, Computation, Networks and Technologies (INNOV)	2019
	Design Automation Conference (DAC)	2018
	Indian Control Conference (ICC)	2015 – 2017
	EMSOFT: International Conference on Embedded Software	2013, 2015, 2018
	Symposium on Reliable Distributed Systems (SRDS)	2015
	ACM Conference on Languages, Compilers, Tools & Theory for Embedded Systems (LCTES)	2015
	ACM International Conference on Future Energy Systems (ACM e-Energy)	2015
	International Conference on Information Processing in Sensor Networks (IPSN)	2015
	European Conference on Wireless Sensor Networks (EWSN)	2015
	ACM International Conference on High Confidence Networked Systems (HiCoNS)	2014
	IEEE Real-Time Systems Symposium (RTSS)	2012
	IEEE International Conference on Sensing, Communication and Networking (SECON)	2012
CONFERENCE SERVICES	<i>Program Committee Member:</i> 9 th International Conference on Communications, Computation, Networks and Technologies (INNOV)	2020
	<i>Program Committee Member:</i> 4 th Workshop on the Design and Analysis of Robust Systems (DARS), as a part of the International Conference on Computer-Aided Verification (CAV).	2019
	<i>Technical Committee Member:</i> 8 th International Conference on Communications, Computation, Networks and Technologies (INNOV)	2019
SKILLS	Scientific Computing: MATLAB/Simulink and R.	
	Programming Languages: Proficient: C and C++; Intermediate: Python; Beginner: Javascript	
	Tools: Robot Operating System (ROS), CasADI, CVX, CVXgen, MPT, YALMIP, STalro, qpOASES	
	Embedded Platforms: Pixhawk flight controller, Arduino, Odroid, Raspberry PI, Teensy, Jetson	
	Other skills: Proficient with Linux/Unix Shell; Version control, CITI Certification: Social and Behavioral Research Investigators	
RELEVANT COURSEWORK	Non-linear Control Theory, Optimal Control, Convex Optimization, Machine Learning, Applied Regression and Analysis of Variance, Linear Systems Theory, Robotics and Automation, Elements of Probability Theory, Computer Vision, Networked Control Systems, Convex Optimization in Control Systems, Control Theory, Linear Optimization.	