Yash Vardhan Pant

CONTACT INFORMATION	5114 Engineering 5,	E-mail: yash.pant@uwaterloo.ca	Phone: +1-267-563-0011
	Waterloo, ON, N2L 0J8, Canada	Homepage: yashpant.github.io	

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

Assistant Professor .... July 2021 – Present
Department of Electrical and Computer Engineering,
University of Waterloo, Waterloo, ON, Canada
Faculty Affiliate, Waterloo AI institute.

Postdoctoral Fellow: NSF VeHICaL Project .... October 2019 – July 2021
Department of Electrical Engineering and Computer Sciences,
University of California, Berkeley, CA
Mentors: Prof. Sanjit Seshia, Prof. Bjoern Hartmann, Prof. Richard Murray (Caltech)

Research Intern, Control Systems .... May 2014 – Aug 2014
Lit Motors, San Francisco, CA
Supervisor: Dr. Berenice Mettler

Doctoral Researcher .... September 2012 – Aug 2019
Electrical and Systems Engineering, University of Pennsylvania
Advisor: Prof. Rahul Mangharam

Graduate Research Assistant, Real-Time and Embedded Systems Lab .... Jun 2011 – Aug 2012
Electrical and Systems Engineering, University of Pennsylvania
Advisor: Prof. Rahul Mangharam

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

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] Mohammad Pirani, Yining She, Renzhi Tang, Zhihao Jiang, **Yash Vardhan Pant**. Stable Interaction of Autonomous Vehicle Platoons with Human-Driven Vehicles, American Control Conference (ACC), 2022.

[2] **Y. V. Pant** , M. Z. Li, R. A. Quaye, A. Rodionova, H. Abbas, M. Ryerson, R. Mangharam. FADS: Framework for Autonomous Drone Safety, Transportation Research Part C: Emerging Technologies, special issue on Embracing Urban Air Mobility, 2021.

[3] 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. ACM Transactions on Cyber-Physical Systems, 2021.

[4] **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, American Control Conference (ACC), 2021.

[5] K. Viswanadha, F. Indaheng, J. Wong, E. Kim, E. Kalvan, **Y.V. Pant**, D. J. Fremont, S. A. Seshia. Addressing the IEEE AV test challenge with Scenic and VerifAI, EEE International Conference on Artificial Intelligence Testing (AITest), 2021.

[6] S. Ghosh, **Y. V. Pant**, H. Ravanbakhsh, S. A. Seshia, Counterexample-Guided Synthesis of Perception Models and Control, American Control Conference (ACC), 2021.

[7] V. Tuck, **Y. V. Pant**, S. A. Seshia, S. S. Sastry. DEC-LOS-RRT: Decentralized path planning for multi-robot systems with Line-of-sight constrained communication, IEEE Conference on Control Technology and Applications (CCTA), 2021.

[8] **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`

[9] 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`

[10] 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**

[11] 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`

[12] **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/

[13] 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/

[14] 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/

[15] **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/

[16] 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

[17] **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/

[18] **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/

[19] **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/

[20] **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

[21] **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/

[22] 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

[23] Y. V. Pant et al., Distributed planning for multi-drone fleets with Signal Temporal Logic objectives. *In preparation*

[24] Y. V. Pant et al., Formalizing the Autonomy-to-Human hand-off process in autonomous and semi-autonomous driving *Under review*

<table>
<tr>
<td>Workshop
papers, Demo
Abstracts
and Works-
in-Progress</td>
<td>

[25] 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. *Automated Vehicles Symposium (AVS)*, 2020.

[26] **Y. V. Pant**, H. Abbas, R. Mangharam. Distributed planning of Multi-rotor drone fleets using the Smooth Robustness of Signal Temporal Logic. *Monitoring and Testing of CPS Workshop (MTCPS), CPS Week*, 2019.

[27] **Y. V. Pant**, H. Abbas, R. Mangharam. Control with Temporal Logic Requirements (poster). *SRC TECHCON*, 2017.

[28] **Y. V. Pant**, H. Abbas, R. Mangharam. Control using the Smooth Robustness of Temporal Logic. *Monitoring and Testing of CPS Workshop (MTCPS), CPS Week*, 2017.

[29] K. N. Nischal, P. Kelkar, D. Kumar, **Y. V. Pant**, H. Abbas, J. Devietti, R. Mangharam. Hardware Optimizations for Anytime Perception and Control. *Work-in-progress, Real-Time Systems Symposium (RTSS)*, 2015.

[30] P. Gurniak, **Y. V. Pant**. Demo: Low-cost Autonomous Navigation with Anytime Control and Computation. *University Transportation Center (UPenn-CMU) Annual Meeting*, 2014.

[31] **Y. V. Pant**, T. X. Nghiem, R. Mangharam. Knock NOx: Model-based Remote Diagnostics of a Diesel Exhaust Control System. *Work-in-progress, IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)*, 2013.

[32] **Y. V. Pant**, H. Jain, A. Mulay, R. Dutta. Protodrive: Rapid Prototyping and Simulation of Electric Vehicle Powertrains. *Final report: Intel Cornell Cup*, 2013. **Award for Top-10 Finish**

[33] **Y. V. Pant**, S. Diaz, H. Jain, W. Price, A. Botelho. Protodrive: Simulation of Electric Vehicle Powertrains. *Final report: World Embedded Software Competition*, 2013. **Third Place Award**

[34] W. Price, H. Jain, **Y. V. Pant**, R. Mangharam. Protodrive: An experimental platform for electric vehicle energy scheduling and control. *Work-in-progress, Real-Time Systems Symposium (RTSS)*, 2012.

[35] S. Diaz, H. Jain, **Y. V. Pant**, W. Price, R. Mangharam. Protodrive: An experimental platform for electric vehicle energy scheduling and control. *Demo Abstract Real-Time Systems Symposium (RTSS)*, 2012.

[36] **Y. V. Pant**. Demo: AutoPlug 2.0. *Real-Time and Embedded Technology and Applications Symposium (RTAS): Demo session*, 2012.

[37] **Y. V. Pant**, R. Mangharam. Observer-based Sensor Fault Detection and Isolation. *Work-in-progress, ACM International Conference on High Confidence Networked Systems (HiCoNS)*, 2012. **HiCoNS Student Travel Award**

</td>
</tr>
<tr>
<td>Patent
(applied for)</td>
<td>United States Patent Application Serial No. 16/515,854 for CONTROL OF MULTI-DRONE FLEETS WITH TEMPORAL LOGIC OBJECTIVES   Mar 2019</td>
</tr>
<tr>
<td>Software
Tools</td>
<td>

"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
"SMOOTH OPERATOR": Control Using the Smooth Robustness of Temporal Logic.
     Y. V. Pant, H. Abbas, R. Mangharam
     https://github.com/yashpant/SmoothOperator0

</td>
</tr>
<tr>
<td>Selected
Talks</td>
<td>

"Fly-by-Logic: Control of Multi-rotor drone fleets using Temporal Logic Objectives" (and related topics)
     — Indian Institute of Technology Roorkee, India   August 2021

</td>
</tr>
</table>

— Aalto University, Finland	November 2021
— Qualcomm Research - Autonomous Driving R&D, USA	June 2020
— 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 EXPERIENCE	Instructor	
	— ECE 780: Model Predictive Control, U. Waterloo, Waterloo, Canada	Winter 2022
	Teaching Assistant	
	— 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 ACTIVITIES	Proceedings of the IEEE
	IEEE Transactions on Automatic Control Systems (TAC)
	IEEE Transactions on Intelligent Transportation Systems
	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

Workshop co-chair: 8th workshop on Intelligent Transportation Systems (ITS), as a part of the International Conference on COMmunication Systems & NETworkS (COMSNETS)	2022
Program Committee Member: 9th International Conference on Communications, Computation, Networks and Technologies (INNOV)	2021
Program Committee Member: 4th Workshop on the Design and Analysis of Robust Systems (DARS), as a part of the International Conference on Computer-Aided Verification (CAV).	2019
Technical Committee Member: 8th International Conference on Communications, Computation, Networks and Technologies (INNOV)	2019