Yash Vardhan Pant

Contact Information

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Research Interests

Control Theory, Formal Methods and Optimization with applications in Control and Planning for Autonomous Systems

Education

Doctor of Philosophy (Ph.D.) in Electrical Engineering — Sep 2012 - May 2019 (expected)
University of Pennsylvania (UPenn) (GPA 3.7/4.0)
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 (GPA 3.7/4.0)
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 (GPA 72/100)

Experience

Research Intern, Control Systems — May 2014 – Aug 2014
Lit Motors, San Francisco, CA

Graduate Research Assistant — Jun 2011 – Aug 2012
Real-Time and Embedded Systems Lab,
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

Student Travel Grant: IEEE CCTA — Big Island, Hawaii, USA 2017
Student Travel Grant: ACC — Portland, USA 2014
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 — Beijing, China 2012
Richard K. Dentel Memorial Prize for outstanding research in Urban Transportation — UPenn 2012
Second place, the Embedded System Competition — Indian Institute of Technology Roorkee, India 2009

Publications

[1] **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.

[2] 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.

[3] 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.

[4] 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.

[5] **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.

[6] **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**

[7] **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.

[8] **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.

[9] **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.

[10]**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**

[11] 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.

Under Preparation:

[12] **Y. V. Pant**, H. Abbas, K. Mohta, R. A. Quaye, T. X. Nghiem, J. Devietti, R. Mangharam. Co-design of Anytime Computation and Robust Control with Deterministic and Stochastic estimation performance. 2019

[13] **Y. V. Pant**, H. Abbas, R. A. Quaye, R. Mangharam. Distributed planning for multi-drone fleets with Signal Temporal Logic objectives. 2019

[14] **Y. V. Pant** , M. Z. Li, R. A. Quaye, H. Abbas, M. Ryerson, Rahul Mangharam. FADS: Framework for Autonomous Drone Safety. 2019

Demo Abstracts, Workshop papers and Works-in-Progress

[15] **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.

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

[17] **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.

[18] 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.

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

[20] **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.

[21] **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**

[22] **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**

[23] 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.

[24] 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.

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

[26] **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**

Software Tools

"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

Selected Talks

"Fly-by-Logic: Control of Multi-drone fleets using Temporal Logic Objectives"
— Monthly WAS Intel Science and Technology Center (ISTC) seminar — 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

"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

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

Senior Design Technical Advisor: Team EagleEye, ESE UPenn, 2018

— Winners of the 2018 Frederick Ketterer Memorial Award

— Winners of the 2018 FAA RAISE Award

Senior Design Technical Advisor: Team UrbanDrone, ESE UPenn. 2019

Reviewing Activities

ACM Transactions on Embedded Computing Systems

IEEE Embedded Systems Letters

Design Automation Conference (DAC)	2018
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
Indian Control Conference (ICC)	2015 – 2017
EMSOFT: International Conference on Embedded Software	2013, 2015, 2018
Symposium on Reliable Distributed Systems (SRDS)	2015
ACM SIGPLAN/SIGBED Conference on Languages, Compilers, Tools and 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

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

Skills

Scientific Computing:	MATLAB/Simulink and R.
Programming Languages:	C and C++.
Tools:	Robot Operating System (ROS), CasADI, CVX, CVXgen, MPT, YALMIP, STaliro, qpOASES
Embedded Platforms:	Arduino, Odroid, Raspberry PI, Teensy, dsPIC, ATMEGA32, NVIDIA Jetson
Other skills:	Proficient with Linux/Unix Shell; Version control.

Relevant Courses

Non-linear Control Theory, Optimal Control, Convex Optimization, Machine Learning, Applied Regression and Analysis of Variance, Linear Systems, Robotics and Automation, Elements of Probability Theory, Computer Vision, Networked Control Systems, Convex Optimization in Control Systems.