Jayanth Bhargav

✉ jbhargav@purdue.edu
jayanthbhargav.github.io
Github | Linkedin

Research Interests

Machine Learning, Control Systems, Robotics, Optimization, Path Planning, Data-driven Modelling & Control and System Identification

Education

Aug 2021 – Present **Purdue University**, *West Lafayette USA*
Doctor of Philosophy in Electrical and Computer Engineering
Research Advisor: Dr. Shreyas Sundaram

Aug 2019 – May 2021 **University of Pennsylvania**, *Philadelphia USA*
Master of Science in Electrical and Systems Engineering *GPA: 3.70/4*
Research Advisor: Dr. Rahul Mangharam

Aug 2015 – July 2019 **Rasthreeya Vidyalaya College of Engineering**, *Bangalore IN*
Bachelor of Engineering in Electrical and Electronics Engineering *GPA: 9.45/10*
University ***Gold Medal***

Experience

May 2020 – July 2021 **University of Pennsylvania**, *Philadelphia USA*
Graduate Research Assistant, Real-Time & Embedded Systems Laboratory (mLab)

Research: Overtaking strategies of 1/10th scale autonomous vehicles
- Studying various driving & overtaking strategies and analysing F1 tracks
- Enhancing MPCC for overtaking maneuvers in two-player racing games on real F1 tracks
- Creating sophisticated overtaking strategies to perform safe yet aggressive overtakes
- Developing benchmarks to quantify the advantage required to execute successful overtakes

https://www.overleaf.com/project/5f9d91d90cf5330001f5d70b

May 2018 – May 2019 **ABB Renewable Energy Laboratory**,
Undergraduate Research Assistant

Major Thesis: Data-driven diagnostics and control for smart-grids
- Test-bench for Failure Modes & Effect Analysis (FMEA) of Standalone PV in smart grids
- Data driven expert systems for safe operation & control of renewable energy units
- Signature analysis of faults and optimal sensor network design Publication: C1
- IoT based automation for efficient operation of solar panels Publication: C2
- An end-to-end solution for solar energy system design and monitoring Presentation

Minor Thesis: Predictive models for power management of hybrid micro-grids
- Scheduling techniques for optimal power management in renewable integrated micro-grids
- Application of numerical techniques for iterative discrete short time scheduling
- Building predictive models for forecasting output of erratic renewable sources
- Novel training strategy for time-series regression of solar power Publication: J1

Aug 2016 **Team Chimera - Student Formula SAE** , *RVCE Bangalore IN*

to Dec 2018 ***Engine Control Unit Design***

- Design of control units for safety and emergency vehicle shutdown
- Design & integration of speed control for induction motor based electric car
- Integration of driver assist systems with infotainment for driver safety
- Website: Team Chimera

Publications

Conferences

C1 S. Sarkar, K. U. Rao, **J. Bhargav** , S. Sheshaprasad and A. S. C A, "Signature Analysis of Electrical Faults in Standalone PV Systems with Storage," 2019 IEEE 3rd International Conference on Recent Developments in Control, Automation & Power Engineering (RDCAPE 2019) [PDF]

C2 S. Sarkar, K. U. Rao, **J. Bhargav** , S. Sheshaprasad and A. Sharma C.A., "IoT Based Wireless Sensor Network (WSN) for Condition Monitoring of Low Power Rooftop PV Panels," 2019 IEEE 4th International Conference on Condition Assessment Techniques in Electrical Systems (CATCON 2019) [PDF]

C3 **J. Bhargav**, T. R. Shourya, A. Anantharaman, C. Chinmay, K. U. Rao and G. R. Salanke, "Parametrics for the choice of Embedded Systems and Control Algorithms for Application Specific Robot Designs.," 2018 IEEE 2nd International Conference on Inventive Systems and Control (ICISC 2018) [PDF]

Journals

J1 Sarkara, S., Rao, U., Prema, V., **Bhargav, J.**, & Shourya, T. R. (2019). Novel Modular LS-SVM Based Regression Model for Prediction of Solar Power. International Journal of Science, Technology, Engineering and Management-A VTU Publication [PDF]

Technical Reports

T1 **Jayanth Bhargav**, Nagarakshith MS, Vikas Shankarathota and Vishrutha K Reddy, "PennCloud-CIS 505 Software Systems Final Project Report Fall 2020" [PDF]

T2 Zhang Jiahao, Yeshas Thadimari, Venkat Varun Velpula and **Jayanth Bhargav**. "Learning Interactions and Dynamics of Swarms." [PDF]

T3 **Jayanth Bhargav** and Mariliza Tzes. "Distributed Sampling-Based Target Tracking." [PDF]

T4 **Jayanth Bhargav**, Venkata Jahnavi and Ranjani Narayanan. "Path optimization for autonomous robots in grid world" [PDF]

Research & Academic Projects

Aug 2020 to Dec 2020 **PennCloud - Fully Distributed Cloud with Webmail and Storage Services**

Software Systems, Distributed Servers, Webmail and Data Storage Technical Report: T1

- A fault-tolerant & client-consistent cloud with Key-Value Stores, HTTP & SMTP servers
- Developed multi-threaded SMTP & POP3 servers in C++ to serve concurrent mail clients
- Developed a scalable HTTP 1.1 compliant server to support GET, PUT, POST & DELETE
- Distributed Replication & Fault Tolerance by implementing 2-Phase Commit Protocol
- Google Protobuf based API's for back-end to front-end server communication and data exchange

Jan 2020 **Learning Interactions and Dynamics of Swarm Robots**

to May 2020 *Deep Learning, System Identification, Multi-agent systems* Technical Report: T2

- Developed CNN,RNN,LSTM & MLP for learning the interactions & dynamics of swarms.
- Sparse Identification of Non-Linear Dynamics (SINDy) for learning candidate non-linear functions.
- A novel neural-ODE based deep learning model to accurately predict non-linear transient states

Jan 2020 **Distributed Algorithm for Multi Robot Multi Target Tracking**

to May 2020 *Path Planning, Active Information Acquisition, Sensing* Technical Report: T3

- Developed a novel distributed sampling-based tree-building algorithm for target tracking tasks
- Implemented a Extended Kalman Filter for target localization/sensing
- Performed extensive simulations to prove scalability for larger targets & lesser robots.

Aug 2019 **Path optimization for constrained grid world robots**

to Dec 2019 *Integer Optimization, TSP, Graph traversal* Technical Report: T4

- A hybrid optimization problem using Travelling Salesman Problem (TSP) and Linear Programming
- Solved an obstacle avoidance and node constrained path planning for robots in a grid-world using LINDO Optimization software.

Aug 2017 **Robotic Exoskeleton for Rehabilitation**

to May 2018 *Robotic System Design, Precision control* Publication: C3

- Arm Exoskeleton design for rehabilitation of patients suffering from muscular dystrophy
- Designed smooth and precision speed and position control system immune to backlash and varying pay loads.
- Designed and Tuned a PID controller for backlash error correction
- Published a review paper on various SOTA control algorithms and embedded systems used in robot designs.

Teaching

Fall 2019 **Nonlinear Systems and Control** ESE 619 UPenn

Teaching Assistant under Dr. Erfan Nozari

Summer 2020 **Programming and Math** Summer Academy, UPenn

Course Instructor - Python programming for Math

Fall 2020 **Linear Systems Theory** ESE 500 UPenn

Teaching Assistant under Dr. George J. Pappas

Spring 2021 **Certificate in College and University Teaching**

Centre for Teaching and Learning, University of Pennsylvania

Honors and Awards

- **Gold Medal** (Summa Cum Laude/Rank 1) in Electrical and Electronics Engineering
- The Sorroco Award for the Best Outgoing Student, RV College of Engineering®
- Best Bachelor Project/Thesis in Electrical Engineering
- Award of Excellence in Engineering Mathematics, RV College of Engineering®
- **Hindustan Aeronautics Limited (HAL) Scholarship for Merit & Excellence**

Coursework

Machine Learning	Applied Machine Learning, Deep Learning, Big Data Analytics, Reinforcement Learning, Learning in Robotics
Optimization & Control	Classical Control Theory, Modern Control Theory, Discrete Control Systems, Linear Systems Theory, Model Predictive Control, Modelling and Control of Power Systems, Linear,Non-linear and Convex Optimization
Electrical Sciences	Signals and Systems, Digital Signal Processing, Microcontrollers, Graph Theory
Computer Science	Algorithms and Data Structures, Distributed/Software Systems

Skills

Programming	C, C++, Python, MATLAB, R
Machine Learning	TensorFlow, PyTorch, Keras, SageMaker, GPflow, Scikit-learn
Optimization	LINDO, GAMS, Forcespro, MPT
Modelling	MATLAB- Simulink, Simscape
Robotics	ROS, Open AI Gym

Professional Services

President — Electrical & Systems Engineering Graduate Association, Univeristy of Pennsylvania

Coordinator — IEEE R10 Student Branch Chapter, Bengaluru

- Chaired a Seminar on Future of e-mobility at IEEE PES Chapter in association with Mahindra Reva
- Student Volunteer for IEEE Asia Pacific Power and Energy Engineering Conference
- Organized and Chaired the Student Transition and Elevation Program at IEEE Young Professionals Bangalore Chapter

Coordinator — Formula Racing Team RVCE Bangalore, 2017-18

Speaker — Robotics, AI and Automation Workshop, IEEE RVCE Chapter Bangalore