

MYTHRA V. BALAKUNTALA

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EDUCATION

Purdue University, West Lafayette Ph.D. in Technology (Robotics), Collaborative Robotics Lab	Aug 2017 - Mar 2023[Expected] GPA: 3.8/4
Indian Institute of Technology, Madras Bachelors of Technology (Honours) in Mechanical Engineering (Minor in Microelectronics)	July 2011 - May 2015 GPA: 8.8/10

RESEARCH EXPERIENCE

Coaching by demonstration for learning contact-rich skills <i>Thesis, CRL Lab, Purdue University, Supervisor: Dr. Richard Voyles</i>	Jan 2018 - <i>Ph.D. Thesis</i>
- Devised and formalized a framework of robot coaching by demonstration based on partially observable Markov decision process. - Designed an end-to-end approach to learn contact-rich tasks with few human demonstrations and sparse interactions using deep reinforcement learning, 3D vision and a multi-modal state representation.	
Fundamental Theory for Dexterous Surgical Skills Transfer to Medical Robots <i>Purdue University, Supervisor: Dr. Richard M. Voyles and Dr. Juan Wachs</i>	Aug 2019 - <i>Research Assistant</i>
- Devised and implemented a framework for remote teleoperated robotic surgery resilient to delays for different surgical tasks – peg transfer, debridement, and cricothyroidotomy. - Developed a 3D computer vision based object detector to enable manipulation. - Led a team of 4 to develop to execute surgical actions autonomously using reinforcement learning.	
Indy Autonomous Challenge <i>Purdue University</i>	Aug 2021 - Jan 2022
- Developed the control architecture and software stack for an full scale autonomous IndyCar. - Created hierarchical fault-tolerant safety system and a dynamic motion planning for passing other cars.	
Robots for infectious diseases: Enhancing Safety of Students with Mobile Air Filtration from COVID-19 <i>Purdue University, Supervisor: Dr. Richard Voyles</i>	Aug 2020 - Jan 2021 <i>Research Assistant</i>
- Designed and built the Purdue Campus Patrol Robot – a prototype for indoor robotic air filtration, which provides effective and continuous protection in a classroom setting. - Proposed a class of parameterized trajectories in a classroom arrangement and optimized these to minimize the infection risk for people near the source.	

PROFESSIONAL EXPERIENCE

Mercedes Benz Research and Development India, Bangalore <i>Internship</i>	Jun 2014 - July 2014
Designed a Full Truck plant model with variable stiffness suspension system for multi-axle trucks to predict roll, pitch and bounce based on data from trucks.	
Airwood Aerostructures, Chennai <i>Internship</i>	Dec 2013 - Jan 2014
Designed a model for quick assembly of the wing to decrease the overall product assembly time. Implemented features like additional flaps for easy flying and tip airfoil add-ons for preventing tip stall, and a wing damage prevention system to minimize damage in case of any crash.	

Internship

- Developed a quadrotor with both manual control and autonomous GPS way-point navigation capabilities.
- Implemented features such as multi - layered PID for position and velocity control, camera motion control, camera stabilization, lift and endurance optimization.

PUBLICATIONS

1. **Balakuntala, M. V.**, Kaur, U., Ma, X., Wachs, J., & Voyles, R. M. (2021). Learning Multimodal Contact-Rich Skills from Demonstrations Without Reward Engineering. In 2021 IEEE International Conference on Robotics and Automation (ICRA). IEEE.
2. Gonzalez, G., **Balakuntala, M. V.**, Agarwal, M., ... , Wachs, J. (2022). ASAP: A Semi-Autonomous Precise System for Telesurgery during Communication Delays. IEEE Transactions on Medical Robotics and Bionics (T-MRB). IEEE.
3. Yang, H., **Balakuntala, M. V.** et al (2021). Enhancing Safety of Students with Mobile Air Filtration during School Reopening from COVID-19. In 2021 IEEE International Conference on Robotics and Automation (ICRA). IEEE.
4. **Balakuntala, M. V.** et al (2020). SARTRES: a semi-autonomous robot teleoperation environment for surgery. Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization, 1-8.
5. Chakravarthy, S., **Balakuntala, M. V.**, Rao, A. M., Thakur, R. K., & Ananthasuresh, G. K. (2018). Development of an integrated haptic system for simulating upper gastrointestinal endoscopy. Mechatronics, 56, 115-131.

TECHNICAL PROFICIENCY

Programming	Python, MATLAB, C++
Software Tools	PyTorch, OpenCV, ROS and SLAM.
Simulation/Design:	Gazebo, CoppeliaSim (VREP), Solidworks, Abaqus
Robots	Rethink Sawyer, Rethink Baxter, ABB Yumi, SRI Taurus, Omniveyor, IndyCar

ACHIEVEMENTS & EXTRACURRICULAR

- Received the **Amazon Research Award 2020** a research grant of \$100,000 in cash and data services. Conceived the primary idea and organized a team to write the proposal with the topic - coaching by demonstration for learning contact-rich tasks.
- Recipient of **2021 ICON Outstanding Student Research Award**.
- **Invited talk** on learning through sparse interactions at **Hitachi America R&D**.
- **Instructor** for Robot Programming with ROS (MFET 442, Spring 2023) at Purdue University.
- **Founder** and **President** of League of Robotic Engineers at Purdue, provided mentoring and hands-on robotics workshops for 30 undergraduate students from Purdue University, Berea College, and PSGIT-India.
- Assisted in teaching the ECET 581 - Robot programming with ROS(Fall 2017, Fall 2018, Fall 2019) and MFET 490 - COVID Robot Design (Fall 2020).
- **Best Oral Presentation Paper Award**, IFToMM Asian Mechanism and Machine Science (Asian MMS 2018)
- Managed and mentored 25 undergraduate projects as core member of Centre For Innovation (CFI), IIT Madras.