Aditya Milind Deshpande

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Education

University of Cincinnati — *Cincinnati, Ohio, USA*

PH.D. IN MECHANICAL ENGINEERING — *Aug. 2017 - Present*

- Research Focus: Embodied Intelligence in robots

University of Cincinnati — *Cincinnati, Ohio, USA*

M.S. IN MECHANICAL ENGINEERING — *Aug. 2015 - Jul. 2017*

- Thesis: Robot Swarm Based On Ant Foraging Hypothesis With Adaptive Lévy Flights. (Electronic Thesis).

Maharashtra Institute of Technology — *Pune, India*

B.E. IN MECHANICAL ENGINEERING — *Aug. 2010 - Jul. 2014*

- Senior Design Project: Design Optimization of Heat Exchanger

Experience

Cooperative Distributed Systems Lab, University of Cincinnati (Prof. Manish Kumar) — *Cincinnati, Ohio, USA*

GRADUATE RESEARCHER — *May. 2017 - Present*

- Developed quadrotor robot for indoor and outdoor autonomous flights – NSF Grant.
- Researched embodied robot learning methods based on evolutionary approaches for hexapod robot.
- Architected and developed a non-invasive Computer Vision Toolkit (CVT) for Legacy Machines – DMDII Grant.
- Developed Computer Vision Software to assist in road traffic monitoring using quadrotor robots – Ohio Dept. of Transportation Grant

CEAS, University of Cincinnati — *Cincinnati, Ohio, USA*

INSTRUCTOR — *Jan. 2019 - Apr. 2019*

- Primary instructor for the large enrollment (60 students) course of Robot Control and Design.
- Designed the course material to including robot projects with opensource tools.
- Presented tutorials on software interfacing of Arduino micro-controllers with Raspberry Pi using ROS.

Viaanix, Inc. — *Wichita, Kansas, USA*

ENGINNEERING INTERN — *Jun. 2016 - Jul. 2016*

- Developed sensor fusion algorithms for wearable IMU sensors used in human motion tracking.
- Presented wearable device design solution as per the customer/chiropractor requirements and budgets.
- Collaborated with design and firmware teams for hardware-software interface testing.

Dassault Systèmes (SIMULIA) — *Pune, Maharashtra, India*

SOFTWARE ENGINEER — *Jul. 2014 - Jul. 2015*

- Developed the graphical front-end of the next generation SIMULIA product using Polymerjs and JavaScript
- Development of web automation tools for data extraction and transfer between various applications developed in SIMULIA brand.
- Focused on website rendering time minimization and usability to improve the user experience.

Skills

Software	Python, C++, Julia, MATLAB, LaTeX, Robot Operating System (ROS), OpenCV, Gazebo Sim, PyBullet, AirSim
Deep Learning	Pytorch, Keras, TensorFlow
Hardware	PixHawk Autopilot, NVIDIA Jetson, Arduino Uno, Raspberry Pi

Publications and Presentations

JOURNAL PUBLICATIONS

- **Deshpande, A. M.**, Ramakrishnan, S., Kumar, M. (2019) “Adaptive Switching between Brownian and Lévy Foraging Strategies for Improved Area Coverage by a Biologically Inspired Robot Swarm.” Submitted to Swarm Intelligence (Under review).

BOOK CHAPTER

- Kumar R., **Deshpande, A. M.**, Scott D., Wells J. Z., Kumar, M. ”Special Transportation Modes.” in ”Disruptive Emerging Transportation Primer”. American Society of Civil Engineers (ASCE) (Under review).

CONFERENCE PUBLICATIONS

- Scott, D., Radmanesh, M., Sarim, M., **Deshpande, A.**, Kumar, M., Pragada, R. (2019, June). Distributed Bidding-Based Detect-and-Avoid for Multiple Unmanned Aerial Vehicles in National Airspace. In 2019 International Conference on Unmanned Aircraft Systems (ICUAS) (pp. 930-936). IEEE.

- **Deshpande, A. M.**, Kumar, R., Radmanesh, M., Veerabhadrappa, N., Kumar, M., Minai, A. A. (2018, June). Self-Organized Circle Formation around an Unknown Target by a Multi-Robot Swarm using a Local Communication Strategy. In 2018 Annual American Control Conference (ACC) (pp. 4409-4413). IEEE.
- **Deshpande, A.**, Kumar, M., Ramakrishnan, S. (2017, October). Robot swarm for efficient area coverage inspired by ant foraging: The case of adaptive switching between Brownian motion and Lévy flight. In ASME 2017 Dynamic Systems and Control Conference (pp. V002T14A009-V002T14A009). American Society of Mechanical Engineers.
- **Deshpande, A. M.**, Phatnani, G. M., Kulkarni, A. J. (2013, June). Constraint handling in firefly algorithm. In 2013 IEEE international conference on cybernetics (CYBCO) (pp. 186-190). IEEE.

Posters

- Kumat, A., Omotuyi, O., **Deshpande, A. M.**, Calabrese, N., Kumar, M., Autonomous Mobile Robot Localization and Navigation system using Camera and Inertial Measurement Unit (IMU) in indoor environment. 2019 AIAA Intelligent Systems Workshop, July 2019.
- Anand, S., Kumar, M., **Deshpande, A.**, Jakkali, V., Telikicherla, A. K., Non-Invasive Computer Vision Toolkit (CVT) using MT Connect®. Future Factory Technology Showcase, UI Labs, Chicago, Illinois, Nov. 13, 2018.

Presentations

- **Aditya M. Deshpande**, Manish Kumar, Ali A. Minai. "Teaching Quadruped Robot to Walk using Reinforcement Learning and Central Pattern Generators." 2019 AIAA Intelligent Systems Workshop. July 2019.
- James Wells, **Aditya M. Deshpande**, Rumit Kumar, Anujj Ssaxena, Bryan Brown, Dieter Vanderelst, and Manish Kumar. "Autonomous Indoor Flight in GPS Denied, Degraded Environments." 44th Dayton-Cincinnati Aerospace Sciences Symposium. March 2019.
- Rumit Kumar, **Aditya M. Deshpande**, Siddharth Sridhar, Kelly Cohen, Manish Kumar. "Quaternion Feedback Based Full Pose Control of a Quadcopter UAV with Thrust Vectoring Capabilities." 44th Dayton-Cincinnati Aerospace Sciences Symposium. March 2019.
- Oyindamola Omotuyi, James Wells, **Aditya M. Deshpande**, Rumit Kumar, Manish Kumar. "Laser Based EKF Localization on TurtleBot3 Robot." 44th Dayton-Cincinnati Aerospace Sciences Symposium. March 2019.
- **Aditya M. Deshpande**, Manish Kumar, Subramanian Ramakrishnan. "Robot Swarm inspired by Ant Colony for Augmented Search and Retrieval." 43rd Dayton-Cincinnati Aerospace Sciences Symposium. February 2018
- **Aditya M. Deshpande**, Manish Kumar, Ali A. Minai. "Self-Organized Circle Formation around an Unknown Target by a Multi-Robot Swarm using a Local Communication Strategy." 43rd Dayton-Cincinnati Aerospace Sciences Symposium. February 2018.
- **Aditya M. Deshpande**, Manish Kumar, Subramanian Ramakrishnan. "Area Coverage Based On Lévy Foraging Hypothesis Applied to Robot Swarm Emulating Ant Foraging Behavior." 42nd Dayton-Cincinnati Aerospace Sciences Symposium. March 2017.

Affiliations and Professional Activities

Affiliations

2017-Present	**American Society of Mechanical Engineers (ASME)**, **Student Member**
2019-Present	**American Association for the Advancement of Science (AAAS)**, **Student Member**

Professional Activities

2017-19	**Dynamic Systems and Control Conference**, **Reviewer**
2017-18	**American Control Conference**, **Reviewer**

Honors & Awards

2019	**Pilot Research Project Award, $7000**, IoT based AI Application for Posture Recognition to reduce Workplace Injuries. University of Cincinnati's Education and Research Center	*Ohio*
2019	**Video in Science Award**, 44th Dayton-Cincinnati Aerospace Sciences Symposium, presented the implementation of Style transfer on the scenic video from quadcopter.	*Dayton, Ohio*
2018	**Media Coverage: "UC researchers team up with ODOT to study traffic with drones"**, WCPO-TV, Channel 9 Cincinnati, July 10, 2018	*Cincinnati, Ohio*
2018	**University Reseach Council (URC) Award, $5000**, Principal Investigator (PI) for the research on "Deep Intelligence for Complex Learning in Robots"	*Cincinnati, Ohio*
2015-19	**University Graduate Scholarship**, University of Cincinnati	*Cincinnati, Ohio*