

Jayam Patel

PH.D. CANDIDATE · ROBOTICS ENGINEERING · WORCESTER POLYTECHNIC INSTITUTE

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Research Interests

Swarm Robotics · Human-Swarm Interaction · Multi-Robot Systems · Human-Robot Interaction · Human-Computer Interaction · Augmented Reality · Interaction Devices and Methods · Collective Transport · Multi-Robot Localization

Education

Ph.D. in Robotics Engineering

WORCESTER POLYTECHNIC INSTITUTE (WPI)

- Focus: Human-Swarm Interaction

Worcester, MA, USA

Exp. Aug. 2020

Certificate in College Teaching

HIGHER EDUCATION CONSORTIUM OF CENTRAL MASSACHUSETTS (HECCMA)

- Professional training for becoming a certified college teacher by studying the trends of teaching methods and student psychology

Worcester, MA, USA

May 2019

M.S. in Robotics Engineering

WORCESTER POLYTECHNIC INSTITUTE (WPI)

- Thesis: Gesture-Based Navigation and Localization of a Smart Wheelchair using Fiducial Markers

Worcester, MA, USA

May 2016

B.Eng. in Electronics and Communication Engineering

GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

- Final Project: Advanced Reliable Intelligent and Efficient Security System (ARIESS) (Patent in scientific evaluation)

Ahmedabad, GJ, India

May 2012

Research

Ph.D. Candidate, NEST Lab, Worcester Polytechnic Institute

SUPERVISOR: PROF. CARLO PINCIROLI

- Worked on Human-Swarm Interaction and investigate interaction methods and devices for an effective interaction with robot swarms.
- Built an Augment Reality interface for a mixed-modality human-swarm interaction to convey the intent of the user
- Devised a collective transport behavior to test the interface

Worcester, MA, USA

Aug. 2016 - PRESENT

M.S. Thesis, River Lab, Worcester Polytechnic Institute

SUPERVISOR: PROF. TASKIN PADIR

- Worked on a gesture-based navigation technique to manipulate a smart wheelchair for the elderly and the specially-abled
- Implemented a indoor localization technique using April Tags as fiducial markers
- Implemented a simulator to test and verify results for all the test cases

Worcester, MA, USA

Aug. 2014 - Apr. 2016

Ahmedabad Robot Club

SUPERVISOR: DR. RONAK SHODHAN

- Worked on various robotics and automation projects
- Fabricated a security system to isolate the residents of the house to avoid any fatality (Patent Applied)
- Trained 50+ Students (9-35 year old) in "Basics of Robotics" (Line and Wall Following Robots)

Ahmedabad, GJ, India

Aug. 2008 - May 2013

Teaching

Co - Instructor, Swarm Intelligence, WPI

INSTRUCTOR: PROF. CARLO PINCIROLI, JAYAM PATEL

Worcester, MA, USA

Spring 2020

Teaching Assistant and Guest Lecturer, Swarm Intelligence, WPI

INSTRUCTOR: PROF. CARLO PINCIROLI

Worcester, MA, USA

Spring 2019, Spring 2018.

Teaching Assistant, Robot Dynamics, WPI

INSTRUCTOR: PROF. MAHDI AGHELI

Worcester, MA, USA

Fall 2018.

Teaching Assistant and Guest Lecturer , Robot Control, WPI INSTRUCTOR: PROF. MAHDI AGHELI,	Worcester, MA, USA Fall 2018, 2017.
Teaching Assistant , Frontiers Program, Physics, WPI INSTRUCTOR: PROF. P. K. ARAVIND	Worcester, MA, USA Summer 2017.
Teaching Assistant and Lab Lecturer , General Physics-Mechanics, WPI INSTRUCTOR: PROF. P. K. ARAVIND	Worcester, MA, USA Spring 2017, 2016. Fall 2016, 2015.
Teaching Assistant and Lab Lecturer , General Physics-Electricity And Magnetism, WPI INSTRUCTOR: PROF. P. K. ARAVIND	Worcester, MA, USA Spring 2017, 2016. Fall 2016, 2015.
Teaching Assistant and Lab Lecturer , Embedded Computing in Engineering Design, WPI INSTRUCTOR: PROF. SUSAN JARVIS	Worcester, MA, USA Spring 2015.
Teaching Assistant and Lab Lecturer , Introduction to Digital Circuit Design, WPI INSTRUCTOR: PROF. XINMING HUANG	Worcester, MA, USA Spring 2015.
Lecturer and Mentor , Basics of Robotics, Ahmedabad Robot Club SUPERVISOR: DR. RONAK SHODHAN	Ahmedabad, GJ, India 2008 - 2013.

Honors & Achievements

Patent Applied (#1584/MUM/2013) ADVANCED RELIABLE INTELLIGENT AND EFFICIENT SECURITY SYSTEM	Ahmedabad, GJ, India 2013
Academic Excellence (B.Eng. Batch Topper) GUJARAT TECHNOLOGICAL UNIVERSITY	Ahmedabad, GJ, India 2012
Recognition by Mr. Narendra Modi, Prime Minister of India FOR INTELLECTUAL CONTRIBUTION TO THE FIELD OF AUTOMATION AND ROBOTICS	Ahmedabad, GJ, India 2011

Publications

- [4] Jayam Patel, Tyagaraja Ramaswamy and Carlo Pinciroli. **Level of Transparency in Multi-Human Multi-Robot Interaction.** *Under Development for International Conference on Intelligent Robots and Systems (IROS).* 2020.
- [3] Jayam Patel and Carlo Pinciroli. **Indirect and Direct Communication in Multi-Human Multi-Robot Interaction.** *Under Development for International Conference on Intelligent Robots and Systems (IROS).* 2020.
- [2] Jayam Patel and Carlo Pinciroli. **Improving Human Performance Using Mixed Granularity of Control in Multi-Human Multi-Robot Interaction.** *Pre-print available. Under Development*
- [1] Jayam Patel, Yicong Xu and Carlo Pinciroli. **Mixed-Granularity Human-Swarm Interaction.** *In IEEE/RSJ International Conference on Robotics and Automation (ICRA).* 2019.

Awards

2019	ICRA Travel Award, \$500
2019	WPI Travel Award, \$500

Recent Projects

Multi-Human Multi-Robot Interaction NEST LAB, WPI <ul style="list-style-type: none"> Designed an augmented reality-based interface for multi-human multi-robot interaction Tested with 4 users and 9 robots simultaneously manipulating 2 objects in the field 	Worcester, MA, USA Jan. 2019 - Present
Human Swarm Interaction for Disaster Management NEST LAB, WPI <ul style="list-style-type: none"> Implement Human Interaction devices to interface with Swarm Robots Interfaces include: MYO (EMG Band), Leap Motion, Augment Reality, Hand-held tablets, Magic Leap One 	Worcester, MA, USA Jan. 2016 - Present

Author Age and Gender Prediction from Written Samples

ARTIFICIAL INTELLIGENCE COURSE PROJECT (TEAM OF 4)

- Predicting age and gender of an author using Machine Learning
- Implementing k-Nearest Neighbours, Decision Tree and Support Vector Machine

Worcester, MA, USA
Aug. 2016 - Dec. 2016

Gesture-Based Navigation & Localization of a Smart Wheelchair

M.S. THESIS, RIVER LAB, WPI

- Build EMG interface to control wheelchair navigation
- Indoor Localization of wheelchair using an of the shelf camera and APRIL Tags

Worcester, MA, USA
Aug. 2015 - May 2016

Gesture-Based sensor fusion SLAM

ADVANCED ROBOT NAVIGATION COURSE PROJECT (TEAM OF 2)

- Implement MATLAB-ROS Communication
- Process PID controller to generate smooth trajectory for turtle bot

Worcester, MA, USA
Jan. 2016 - May. 2016

ROS-GAZEBO Simulation of Neurosurgery Robot

ROBOT DYNAMICS COURSE PROJECT (TEAM OF 4)

- ROS-Gazebo bridge for simulating a no-go region for collision avoidance
- Planning a collision free trajectory of the MRI robot

Worcester, MA, USA
Jan. 2015 - May. 2015

Editorial Activities

CONFERENCE REVIEWER

- International Conference on Robotics and Automation (ICRA). 2019, 2020.
- International Conference on Autonomous Agents and Multiagent Systems (AAMAS). 2020.
- International Symposium on Multi-Robot and Multi-Agent Systems. 2019.
- International Conference on Intelligent Robots and Systems (IROS). 2019.
- Genetic and Evolutionary Computation Conference (GECCO). 2018.
- International Conference on Swarm Intelligence (ANTS). 2018.

Invited Talks

- [12] “**Research and Development in the field of Robotics**”, KJ Somaiya College Of Engineering, Mumbai, MH, India. Jan. 8, 2020.
- [11] “**Research and Development in the field of Robotics**”, Sankalchand Patel University, Visnagar, GJ, India. Jan. 2, 2020.
- [10] “**Today in Robotics.**”, Government Polytechnic, Ahmedabad, GJ, India. Dec. 30, 2019.
- [9] “**Today in Robotics.**”, Government Polytechnic, Ahmedabad, GJ, India. Dec. 20, 2019.
- [8] “**Research and Development in the field of Robotics**”, Silver Oak College of Engineering and Technology, Ahmedabad, GJ, India. Dec. 19, 2019.
- [7] “**How to make simple Robots!**”, Government Polytechnic For Girls, Surat, GJ, India. Dec. 18, 2019.
- [6] “**Today in Robotics.**”, Government Polytechnic For Girls, Surat, GJ, India. Dec. 13, 2019.
- [5] “**Advancements in the Field of Robotics.**”, St. Kabir School, Drive-In New Branch, Ahmedabad, GJ, India. Jan. 16, 2019.
- [4] “**Advancements in the Field of Robotics.**”, St. Kabir School, Drive-In Old Branch, Ahmedabad, GJ, India. Jan. 16, 2019.
- [3] “**Robotics Research Tools and Technologies**”, National Institute of Technology (NIT), Surat, GJ, India. Jan. 9, 2019.
- [2] “**Advancements in the Field of Robotics.**”, St. Kabir School, Naranpura Branch, Ahmedabad, GJ, India. Jan. 5, 2019.
- [1] “**Advancements in the Field of Robotics.**”, St. Kabir School, Navrangpura Branch, Ahmedabad, GJ, India. Jan. 4, 2019.

Supervising

Prajankya Sonar, Human Swarm Interaction Interface Development

GRADUATE DIRECTED RESEARCH, CO-SUPERVISOR

Worcester, MA, USA
Jan. 2020 - May. 2020

Eula Zhong, Kent Libby, Noah Van Stralen, Diagnostic Tools for Swarm Robots

UNDERGRADUATE MAJOR QUALIFYING PROJECT, CO-SUPERVISOR

Worcester, MA, USA
Aug. 2019 - Present

Danny Sullivan, Eric Arthur, Przemek Gardias, Gestures for Human Swarm Interaction

UNDERGRADUATE MAJOR QUALIFYING PROJECT, CO-SUPERVISOR

Worcester, MA, USA

Aug. 2019 - Present

Tyagaraja Ramaswamy, Localization for Swarm Robots

M.S. THESIS, CO-SUPERVISOR

Worcester, MA, USA

Jan. 2019 - Present

Christopher Dalessio, Motion Planning for Swarm Robots

GRADUATE DIRECTED RESEARCH, CO-SUPERVISOR

Worcester, MA, USA

Jan. 2019 - May. 2019

Alexandra Wheeler, Erika Snow, Jerish Brown, Josiah Boucher, Diagnostic Tools for

Swarm Robots

UNDERGRADUATE MAJOR QUALIFYING PROJECT, CO-SUPERVISOR

Worcester, MA, USA

Aug. 2018 - May. 2019

Yicong Xu, Goal Based Human-Swarm Interaction for Collaborative Transport

M.S. THESIS, CO-SUPERVISOR

Worcester, MA, USA

Aug. 2017 - May. 2018

Press Coverage

- [4] **Education Times, The Times of India Newspaper.** (Sep. 3, 2012). “The likeness in learning.”
- [3] **Daily News and Analysis (DNA) Newspaper.** (Aug. 30, 2011). “Robotics enthusiasts of Ahmedabad test their mean machines”
- [2] **The Indian Express Newspaper.** (Aug. 28, 2011). “Robot slugfest attracts hundreds to city.”
- [1] **City Bhaskar Gujarati Newspaper** (Aug. 20, 2011). “Robots made by students ran with pride”. (Original article in Gujarati)

Skills

- Programming** Python, C, C++, C#, Buzz, JAVA, HTML, LaTeX
- Robotic Tools** ARGoS, ROS, Gazebo, RVIZ, MoveIt
- Hardware** Atmel, Arduino, MSP430, ARM, 89cXX-80xx Series, PIC, Basic Stamp, Lego Mindstorm
- Software Tools** Unity, Vuforia, SVN, Git, QtCreator, Eclipse, MATLAB & Simulink, AVR Studios, Keil µvision

Organization Memberships

- **Student Member**, IEEE
- **Student Member**, IEEE Robotics and Automation Society
- **Student Member**, IEEE Systems, Man, and Cybernetics Society
- **Student Member**, ACM

Language Proficiency

- Hindi** Native
- Gujarati** Native
- English** Fluent

Extracurricular Activity

Rho Beta Epsilon, Robotics Honor Society, WPI

MEMBER

Worcester, MA, USA

2019 - PRESENT

Boarding Pass for Success

TECHNICAL ADVISOR AND MENTOR FOR SCHOOL AND COLLEGE STUDENTS

USA, Canada and India

2018 - PRESENT

Reiki and Tarot Cart Practitioner

USUI AND KARUNA REIKI MASTER, THE INTERNATIONAL CENTER OF REIKI TEACHING (ICRT) LICENSED

USA, Canada and India

2006 - PRESENT

South Asian Student Association(SASA), WPI

PRESIDENT

Worcester, MA, USA

2015 - 2016

YUVA Unstoppable (NGO)

VOLUNTEER, COLLEGE AMBASADOR

Ahmedabad, GJ, India

2006 - 2013