

# Jayam Patel

PH.D. · ROBOTICS SOFTWARE DEVELOPER · LEDDARTECH

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## Research Interests

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Autonomous Driving · Perception Systems · Computer Vision · Machine Learning · Swarm Robotics · Multi-Robot Systems · Human-Robot Interaction · Real-Time Systems · SLAM · Human Factors & Ergonomics · Cognitive Engineering · Augmented Reality · Mixed Reality · Collective Transport · Robot Navigation

## Education

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### Formal Education

#### Ph.D. in Robotics Engineering

WORCESTER POLYTECHNIC INSTITUTE (WPI)

- Thesis: Improving Human Performance in Multi-Human Multi-Robot Interaction

Worcester, MA, USA

Feb. 2021

#### Certificate in College Teaching

HIGHER EDUCATION CONSORTIUM OF CENTRAL MASSACHUSETTS (HECCMA)

- Professional training on 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) (Applied for Patent)

Ahmedabad, GJ, India

May 2012

### Further Education

#### Fundamentals of Reinforcement Learning

UNIVERSITY OF ALBERTA, COURSERA *Specialization*

- Online course covering basic concepts of reinforcement learning.

USA

Jul. 2020

#### Deep Learning Specialization

DEEPLARNING.AI, COURSERA *Specialization*

- Five course specialization covering different types of Neural Networks and parameter tuning.

USA

Jul. 2020

#### Introduction to Psychology

UNIVERSITY OF TORONTO, COURSERA *Certification*

- Online course covering concepts of psychology, social psychology and mental illness.

USA

Jul. 2020

#### Machine Learning

STANFORD UNIVERSITY, COURSERA *Certification*

- Online course covering concepts of machine learning and algorithms.

USA

Jun. 2020

## Industry Experience

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#### Perception Algorithm Developer

LEDDARTECH

- Enhancing ADAS and AD through AI-driven sensor fusion for improved vehicle safety
- Design path-planning algorithms, decision maker, and localization system for the autonomous vehicle

Montreal, QC, Canada

July. 2021 - Present

## Advisory Board

EDCALIBRE INC.

- Guiding innovative math ed-tech with gamified learning for better student engagement
- Assist in EdCalibre's mission to reduce math anxiety and improve academic performance in math education

*Canada & India  
Apr. 2021 - Present*

## Robotics Career Consultant & Speaker

BOARDING PASS FOR SUCCESS

- Guiding 10,000+ engineering students, fostering robotics careers at 35+ institutes
- Sharing industry insights from MIT, IIT, NASA JPL, and Amazon to inspire future engineers and robotics pros

*USA, Canada, & India  
May 2018 - Present*

## Research Experience

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### Ph.D. Researcher, NEST Lab, Worcester Polytechnic Institute

SUPERVISOR: PROF. CARLO PINCIROLI

- Worked on multi-human multi-robot framework to investigate methods and devices for an effective interaction
- Built a mixed reality-based and a cloud-based interface for testing human operators' usability and behaviour
- Investigated the impact of mixed-granularity of control, information transparency, human communication and loss of information on human operators' performance

*Worcester, MA, USA  
Aug. 2016 - May 2021*

### 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 an indoor localization technique using April Tags as fiducial markers
- Designed a simulator to test and verify results for all the test cases

*Worcester, MA, USA  
Aug. 2014 - Apr. 2016*

### Researcher, Ahmedabad Robot Club

SUPERVISOR: DR. RONAK SHODHAN

- Worked on various robotics and automation projects
- Designed a security system to isolate the residents of the house to avoid any fatality (Patent Applied)
- Trained 100+ Students (9-35 year old) in "Basics of Robotics" (Line and Wall Following Robots)

*Ahmedabad, GJ, India  
Aug. 2008 - May 2013*

## Teaching

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### Graduate Courses

#### Course Instructor, Swarm Intelligence, WPI

INSTRUCTORS: 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, PROF. WILLIAM R. MICHALSON

*Worcester, MA, USA  
Fall 2018.*

#### Teaching Assistant and Guest Lecturer, Robot Control, WPI

INSTRUCTOR: PROF. MAHDI AGHELI

*Worcester, MA, USA  
Fall 2018, 2017.*

#### Course Assistant, Foundations of Artificial Intelligence, University of Southern California

INSTRUCTOR: PROF. SHEILA TEJADA

*Los Angeles, CA, USA  
Spring 2014.*

### Undergraduate Courses

#### 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

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### 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

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- [5] Jayam Patel, Prajankya Sonar and Carlo Pinciroli. **On Multi-Human Multi-Robot Remote Interaction: A Study of Transparency, Inter-Human Communication and Information Loss in Remote Interaction.** *In the Springer Journal of Swarm Intelligence.* 2022.
- [4] Jayam Patel, Tyagaraja Ramaswamy, Zhi Li and Carlo Pinciroli. **Level of Transparency in Multi-Human Multi-Robot Interaction.** *Under Review. Available on arXiv.*
- [3] Jayam Patel, Tyagaraja Ramaswamy, Zhi Li and Carlo Pinciroli. **Inter-Human Communication in Multi-Human Multi-Robot Interaction.** *Under Review. Available on arXiv.*
- [2] Jayam Patel and Carlo Pinciroli. **Improving Human Performance Using Mixed Granularity of Control in Multi-Human Multi-Robot Interaction.** *In IEEE International Conference on Robot and Human Interactive Communication (RO-MAN).* 2020.
- [1] Jayam Patel, Yicong Xu and Carlo Pinciroli. **Mixed-Granularity Human-Swarm Interaction.** *In IEEE/RSJ International Conference on Robotics and Automation (ICRA).* 2019.

## Presentations

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- [7] **Improving Human Performance Using Mixed Granularity of Control in Multi-Human Multi-Robot Interaction.** Paper Presentation, *IEEE International Conference on Robot and Human Interactive Communication (RO-MAN).* 2020.
- [6] **Improving Human Performance Using Mixed Granularity of Control in Multi-Human Multi-Robot Interaction.** Poster Presentation, *Northeast Robotics Colloquium (NERC).* 2019.
- [5] **Improving Human Performance Using Mixed Granularity of Control in Multi-Human Multi-Robot Interaction.** Poster Presentation, *WPI Robotics Engineering 10-Year Anniversary Research Symposium.* 2019.
- [4] **Mixed-Granularity Human-Swarm Interaction.** Paper Presentation, *IEEE/RSJ International Conference on Robotics and Automation (ICRA).* 2019.
- [3] **Mixed-Granularity Human-Swarm Interaction.** Poster Presentation (Finalist), *Graduate Research Innovation Exchange (GRIE), WPI.* 2019.
- [2] **Mixed-Granularity Human-Swarm Interaction.** Presentation, *Robotics Engineering Department Colloquium, WPI.* 2019.
- [1] **Human-Swarm Interaction for Disaster Management.** Poster Presentation, *Graduate Research Innovation Exchange (GRIE), WPI.* 2018.

## Awards

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

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

## Key Projects

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### Multi-Human Multi-Robot Interaction

NEST LAB, WPI

- Designed an augmented reality-based and a cloud-based interface for multi-human multi-robot interaction
- Evaluated various research aspects with 8 user studies involving 122 participants

Worcester, MA, USA

Jan. 2019 - May 2021

### Human Swarm Interaction for Disaster Management

NEST LAB, WPI

- 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 - May 2021

### Author Age and Gender Prediction from Written Samples

ARTIFICIAL INTELLIGENCE COURSE PROJECT (TEAM OF 4)

- Predicted age and gender of an author using Machine Learning
- Implemented algorithms - 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

- Built EMG interface to control wheelchair navigation
- Designed 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)

- Implemented MATLAB-ROS Communication
- Designed PID controller to generate smooth trajectory for turtle bot

Worcester, MA, USA

Jan. 2016 - May. 2016

### ROS-GAZEBO Modeling of Neurosurgery Robot

ROBOT DYNAMICS COURSE PROJECT (TEAM OF 4)

- Created ROS-Gazebo bridge for simulating a no-go region for collision avoidance
- Designed an algorithm to plan a collision free trajectory of the MRI robot

Worcester, MA, USA

Jan. 2015 - May. 2015

## Editorial Activities

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### Journal Reviewer

- Springer Journal on Swarm Intelligence.
- IEEE Robotics and Automation Letters (RA-L).
- Springer Journal on Virtual Reality (VIRE)
- Science Direct Journal of Virtual Reality & Intelligent Hardware (VRIH).

### Conference Reviewer

- International Conference on Intelligent Robots and Systems (IROS). 2019, 2021.
- International Conference on Robotics and Automation (ICRA). 2019, 2020, 2021. 2023.
- The Association for the Advancement of Artificial Intelligence Conference (AAAI). 2020.
- International Conference on Autonomous Agents and Multiagent Systems (AAMAS). 2020.
- International Conference on Ubiquitous Robots (UR). 2020.
- International Symposium on Multi-Robot and Multi-Agent Systems (MRS). 2019.
- Genetic and Evolutionary Computation Conference (GECCO). 2018.
- International Conference on Swarm Intelligence (ANTS). 2018.

## Invited Talks

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- [16] “**Robotics: Today and Tomorrow! (Webinar)**”, Government Engineering College, Bharuch, GJ, India. Sep. 29, 2020.
- [15] “**Robotics in Industry 4.0 (Webinar)**”, KJ Somaiya College Of Engineering, Mumbai, MH, India. Jun. 29, 2020.
- [14] “**ECE Opportunities in India, USA and Canada (Webinar)**”, Indus University, Ahmedabad, GJ, India. May. 30, 2020.
- [13] “**Robotic applications around the world (Webinar)**”, Knowledge Studio, Surat, GJ, India. May. 12, 2020.
- [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.”**, Mechanical Engineering Department, Government Polytechnic, Ahmedabad, GJ, India. Dec. 30, 2019.
- [9] **“Today in Robotics.”**, Electrical and Computer Engineering Department, 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

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### Graduate Students

**Prajankya Sonar**, Human Swarm Interaction Interface Development

GRADUATE DIRECTED RESEARCH, CO-SUPERVISOR

*Worcester, MA, USA*

*Nov. 2019 - May 2021*

**Tyagaraja Ramaswamy**, Localization for Swarm Robots

GRADUATE DIRECTED RESEARCH, CO-SUPERVISOR

*Worcester, MA, USA*

*Jan. 2019 - May. 2020*

**Christopher Dalessio**, Motion Planning for Swarm Robots

GRADUATE DIRECTED RESEARCH, CO-SUPERVISOR

*Worcester, MA, USA*

*Jan. 2019 - May. 2019*

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

M.S. THESIS, CO-SUPERVISOR

*Worcester, MA, USA*

*Aug. 2017 - May. 2018*

### Undergraduate Students

**Harrison James, Paul Mara, Vlad Stelea**, swARm Project

UNDERGRADUATE MAJOR QUALIFYING PROJECT, CO-SUPERVISOR

*Worcester, MA, USA*

*Aug. 2020 - May 2021*

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

UNDERGRADUATE MAJOR QUALIFYING PROJECT, CO-SUPERVISOR

*Worcester, MA, USA*

*Aug. 2019 - May. 2020*

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

UNDERGRADUATE MAJOR QUALIFYING PROJECT, CO-SUPERVISOR

*Worcester, MA, USA*

*Aug. 2019 - May. 2020*

**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*

**Members of Ahmedabad Robot Club**, 100+ Students, Maze Solving Robot

ROBOTICS PROJECT, SUPERVISOR

*Ahmedabad, GJ, India*

*Aug. 2008 - May. 2013*

## Press Coverage

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- [5] **Tej Gujarati**. (Aug. 29, 2020). “Guiding young minds in the field of Robotics.” (Original article in Gujarati)
- [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

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**Programming** C++, C#, Buzz, Python, C, MATLAB, HTML, LaTeX  
**Robotic Tools** ARGoS, ROS, Gazebo, RVIZ, MoveIt  
**Hardware** Magic Leap, Leap Motion, MYO/EMG Sensor, Atmel, Arduino, MSP430, ARM, 89cXX-80xx Series  
**Software Tools** Unity, Vuforia, SPSS, VS Code, SVN, Git, Qt Creator, Eclipse, MATLAB & Simulink

## Organization Memberships

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

## Language Proficiency

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**English** Fluent  
**French** Intermediate  
**Hindi** Native  
**Gujarati** Native

## Extracurricular Activity

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### Leadership

#### IEEE Robotics and Automation Society, WPI Chapter

HEAD OF TECHNICAL EVENTS

Worcester, MA, USA

2020 - 2021

#### Rho Beta Epsilon, Robotics Honor Society, WPI

MEMBER AND VOLUNTEER

Worcester, MA, USA

2019 - 2021

#### South Asian Student Association(SASA), WPI

PRESIDENT

Worcester, MA, USA

2015 - 2016

### Student Outreach

#### Boarding Pass for Success

TECHNICAL ADVISOR AND MENTOR FOR SCHOOL AND COLLEGE STUDENTS

USA, Canada and India

2018 - PRESENT

#### Independent Activities for Awareness in the Field of Robotics

MENTOR AND GUIDE STUDENTS OF ALL AGES TO HELP THEM FIND A CAREER IN THE FIELD OF ROBOTICS

USA, Canada and India

2009 - PRESENT

### Community Service

#### YUVA Unstoppable at LJ Engineering (NGO)

COLLEGE AMBASSADOR

Ahmedabad, GJ, India

2009 - 2012

#### PRAYAS at LJ Engineering (NGO)

VOLUNTEER

Ahmedabad, GJ, India

2008 - 2012

#### YUVA Unstoppable (NGO)

COLLEGE AMBASSADOR

Ahmedabad, GJ, India

2006 - 2009

#### Independent Activities with My Mother

THANK YOU, MOM (PRAGNA PATEL)

Ahmedabad, GJ, India

2000 - 2013

### Life Guidance and Counselling

#### Reiki and Tarot Cart Practitioner

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

USA, Canada and India

2006 - PRESENT