

Shashank Rao Marpally

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Education

Arizona State University

Tempe, AZ

MASTERS IN ROBOTICS AND AUTONOMOUS SYSTEMS (AI CONCENTRATION), GPA: 4.0/4.0

August 2019 - May 2021

- **Research Assistant (Supervisor: Dr. Siddharth Srivastava)**
 - Pursuing Research on Action Model Learning
 - Experiment design of an NSF Funded project on human-robot teaming 🦾
- **Graduate Researcher (Supervisor: Dr. Yu Zhang)**
 - Research on Generating Progressive Explanations in Human-Robot Teaming using an Inverse Reinforcement Learning Approach 🦾

National Institute of Technology, Karnataka

Mangalore, India

BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING, GPA: 3.77/4.0

August 2015 - May 2019

- **Undergraduate Researcher (Supervisor: Dr. K.R.Guruprasad)**
 - Teaching Assistant for Automatic Control Engineering (ME322)
 - Thesis: Geometry-Based Mapping for Robot Exploration

Research Interests

AI Safety

Robotics

Human Robot/AI Collaboration, Interaction

Action Model Learning

Publications

Preprints

- **Asking the Right Questions: Interpretable Action Model Learning using Query-Answering**, Pulkit Verma, Shashank Rao Marpally, Siddharth Srivastava (IN REVIEW: AAAI-2021) 🦾
- **Order Matters: Generating Progressive Explanations for Planning Tasks in Human-Robot Teaming**, Mehrdad Zakershahra, Shashank Rao Marpally, Akshay Sharma, Ze Gong, Yu Zhang (IN REVIEW: RA-L (ICRA) 2021) 🦾

Conferences

- **Geometrical Mapping of an Initially Unknown Region by a Mobile Robot**, Shashank Rao Marpally, MS Nagarakshith, Arjun Sadananda, KR Guruprasad 🦾

Experience

Toyota Material Handling

Columbus, Indiana (Remote)

ROBOTICS INTERN

June 2020 - July 2020

- *Developed* Laser Merging Functionality using ROS2 and Gazebo to be used in Forklift Simulation being developed by R&D Department
- Technologies: ROS2, Gazebo, Docker, Azure Devops, C++

IIT Kanpur, India

Kanpur, India

RESEARCH INTERN

June 2018 - August 2018

- *Synthesized* training data from a simulated 6DOF UR5 industrial robot arm which consisted of generating feasible end-effector positions and recording joint space and cartesian space data of the generated motion plan
- *Achieved* 98% accuracy in modeling inverse kinematics of the robot by supplying joint space coordinates to a deep feedforward network trained on generated data and testing against cartesian space data 🦾
- Technologies: Python, ROS, Gazebo, MoveIt!, TensorFlow

IIT Bombay, India

Mumbai, India

RESEARCH INTERN

June 2017 - August 2017

- *Implemented* an algorithm that employs a decentralized approach for multiple robots to completely explore a region without direct communication with one another
- *Achieved* 100% exploration of any maze environment using the implemented algorithm 🦾
- Technologies: Python, ROS, Gazebo

- *Re-designed* Android App UI for Control of a Robot to be more intuitive and practical by using Material Design concepts
- Technologies: Android App Development (Java, XML)

Projects

Robot Snakes Mimic snakes from video using genetic algorithms

- *Developed* a framework that uses Genetic Algorithms to mimic Snake motion from videos onto a simulated Robot Snake 🔗

Deep Reinforcement Learning Nanodegree

- Project 1: Navigation using DQN: Trained an AI Agent using DQN, DDQN, DDDQN to solve RL environment 🔗
- Project 2: Continuous Control with DDPG: Trained an AI Agent using DDPG to solve RL environment 🔗
- Project 3: Multi-Agent Control using MADDPG: Trained multi-agent AI using MA-DDPG to solve RL environment 🔗

Follow-Me Robot

- *Developed* a simulation of a robot which tries to follow a simulated human using a vision based controller for tracking (using ROS, Gazebo and OpenCV) 🔗

ABU-ROBOCON 2018

- *Participated* in National Round of one of Asia's largest Robotics Competitions with a Team size of 8 (Most teams have 20+ students)
- First team from NIT Karnataka to successfully complete building required robots and reach national phase
- *Designed, developed, prototyped, fabricated and assembled* (as a team) two industry-level robots that were to play a cooperative game of shuttlecock throwing 🔗

Stable Control of an Inverted Pendulum

- *Adapted* Particle Swarm Optimization method to achieve 100% stabilization of a simulated inverted pendulum system

Smart City Model

- *Interfaced* multiple sensors and actuators to model a smart building and established communication between Arduino and central Raspberry Pi Server with I2C protocol. The resulting model was able to send statistics of the smart building to the central server to performing necessary actions by analyzing sensor readings and accordingly operating actuators
- *Collaborated* with a team of 25+ students to achieve project goals

Technical Skills

Python, C++

ROS, ROS2, Gazebo, CoppeliaSim

Fetch Robot, ABB's Yumi Robot

PDDL

Object Oriented Programming

PyTorch, Tensorflow

Experiment Design

AutoCAD, Fusion 360