Shashank Rao Marpally

Student

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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 proof of concept for Industrial 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

Publications

Preprints

- **Asking the Right Questions: Interpretable Action Model Learning using Query-Answering**,Pulkit Verma, **Shashank Rao Marpally**, Siddharth Srivastava
- **Order Matters: Generating Progressive Explanations for Planning Tasks in Human-Robot Teaming**,Mehrdad Zakershahrak, **Shashank Rao Marpally**, Akshay Sharma, Ze Gong, Yu Zhang

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, Indianapolis (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 modelling 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 — *Powai, 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

Systemantics Pvt. Ltd., India — *Bangalore, India*

Software Intern — *December 2017*

- *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 a video 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: Continouous 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

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