

SHASHANK RAO MARPALLY

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EDUCATION

Master of Science - Robotics and Autonomous Systems (AI Concentration)

(Expected) May 2021

Arizona State University, Tempe, AZ

Bachelor of Technology in Mechanical Engineering

May 2019

National Institute of Technology, Karnataka, India

GPA: 3.77/4.0

- **Teaching Assistant:** Automatic Control Engineering (ME322)
- **Publication:** Author (In Press): **Marpally Shashank Rao**, M.S. Nagarakshith, Sadananda Arjun, Guruprasad K.R., Geometrical Mapping of an Initially Unknown Region by a Mobile Robot, *2019 IEEE Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER)*
- **Thesis:** Geometry-based Mapping for Robot Exploration

TECHNICAL SKILLS

- **Languages:** Python, C++, MATLAB, Java (Android)
- **Frameworks and Toolkits:** ROS, Gazebo, PyTorch, Tensorflow

CERTIFICATIONS

Deep Reinforcement Learning Nanodegree (Udacity)

- Analyzed the relative performance of DQN, Double DQN and Duelling DQN in solving an RL task.
- Solved continuous domain control RL tasks using DDPG (Training a robot arm to reach a randomly generated position) and MADDPG (Multi-Agent Tennis) (using Actor-Critic Networks) algorithms and Analyzed the effect of perturbing various model hyperparameters on the model performance (No. of episodes to solve the task).

Artificial Intelligence Nanodegree (Udacity)

- Built a Sudoku solver using constraint propagation and analyzed the performance of multiple heuristics.
- Analyzed search algorithms: A*, GBFS, BFS, DFS, UCS with various heuristics based on the time taken to find the goal and depth of search for an air-cargo based problem.
- Developed an agent that used Minimax, Greedy search, Monte-Carlo Tree Search, Iterative Deepening and Alpha-Beta Pruning strategies to solve an adversarial search problem, Analyzed the performance of each strategy.

Aerial Robotics (Coursera)

- Achieved Hover Control and Trajectory control with an 8%-15% error threshold for 1D, 2D and 3D simulated quadrotors using PID controllers.

INTERNSHIP EXPERIENCE

Research Intern: IIT Kanpur, India | Python, ROS, Gazebo, google-protobuf, MoveIt!

Summer 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

Research Intern: IIT Bombay, India | Python, ROS, Gazebo

Summer 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.

UX Design Intern: Systemantics Pvt. Ltd., India | Android Development: Java, XML

Winter 2017

- Re-designed Android App UI for Control of a Robot to be more intuitive and practical by using Material Design concepts.

ACADEMIC PROJECTS

ABU-ROBOCON 2018 Team representing National Institute of Technology, Karnataka

- 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 (Course Project)

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

Smart City Model (Course Project) Feb 2018 - Apr 2018

- 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