

Sagar Suhas Joshi

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RESEARCH INTERESTS

Intelligent decision-making for robots, Search-based motion planning, Deep learning for planning, Reinforcement learning, Planning for robotic manipulators, autonomous vehicles.

EDUCATION

Georgia Institute of Technology

PhD in Robotics, GPA: 3.8/4.0

Advisor: Panagiotis Tsiotras

Atlanta, GA

August 2017-May 2022

Indian Institute of Technology (IIT)-Madras

B.Tech and M.Tech, Engineering Design (Automotive), CGPA:9.25/10

(Top rank in Department)

Chennai, India

July 2017

AWARDS

- Two IIT-Madras institute merit awards for exemplary academic performance (2017,2016 India)
- Institute convocation award for highest CGPA in all five years (2017 India)
- DAAD (German Academic Exchange Service) scholarship winner (2015 India)

PUBLICATIONS

- **Sagar Joshi**, Seth Hutchinson and Tsiotras, P., "Time-Informed Exploration for Robot Motion Planning", Fourth Machine Learning in Planning and Control (MLPC) Workshop, ICRA 2020
- **Sagar Joshi** and Tsiotras, P., "Relevant Region Exploration On General Cost-Maps for Sampling-Based Motion Planning," Accepted for publication at IROS 2020, Las Vegas, USA
- **Sagar Joshi** and Tsiotras, P., "Non-Parametric Informed Exploration for Sampling-Based Motion Planning," ICRA, Montreal, Canada, May. 20-24, 2019.
- **Sagar Joshi**, Niko Maas, and Dieter Schramm, "A Vehicle Dynamics Based Algorithm for Driver Evaluation", IEEE ISCO, Coimbatore, India, 5-6 January, 2017

RESEARCH EXPERIENCE

Planning for Robots

Graduate Research Assistant

Georgia Tech, USA

August 2017 -

- Deep learning and heuristics based methods for intelligent exploration in motion planning
- Implementing the algorithms using popular frameworks such as ROS, Pytorch, Gym, OMPL and MoveIt!

Pipe Routing and Optimization Algorithm

A.I Research Intern

Caterpillar Inc, India

January - May 2016

- Designed a A* based algorithm for routing considering piping constraints
- Formulated and solved an integer programming problem for segmenting the route

Motion Planning and Control of Autonomous Ground Vehicles

IIT-Madras, India

Research Assistant, Masters Thesis Project

May 2016 - May 2017

- Used Hybrid A* algorithm to generate feasible, obstacle free path for non-holonomic vehicles
- Designed a LQR optimal path tracking algorithm considering steering wheel (motor) dynamics
- Simulated the developed controller on a detailed nonlinear plant using IPG CarMaker

Vehicle Dynamics Based Algorithm for Driver Evaluation

University of Duisburg, Germany

Research Intern

May - July 2015

- Formulated a novel algorithm for generating a real time driver performance metric using vehicle data
- Evaluated driver's steering input for lane keeping, pedal activity for tire slip and acceleration for passenger comfort

ROBOTS

RACECAR

August 2017-

- Developing a ROS based autonomous navigation software for the RACECAR robot
- Please find a small [video here](#)

Robotic Manipulators

August 2018-May 2019

- Applied the developed motion planning algorithms on 7 DOF Panda Arm in ROS simulator
- Used OMPL and MoveIt! frameworks for implementation and benchmarking against the state-of-art

DESIGN PROJECTS

P.A.L Game

Jan-April 2014

- Designed a computer game using PyGame-Python intended to help ADD/ADHD children
- Used the principle of paired associate learning (P.A.L) for designing a flash card memory game
- The application was presented at EuroPython conference, Berlin, 2014

Novel Computer Interface for physically disabled

2015

- Designed a computer interface for one arm and visually challenged users consisting of a glove keyboard
- Low cost input device with 26 copper patches as keys on the palm of the glove. Thin copper wires carrying information to an Arduino micro-controller.

PROGRAMMING SKILLS

- | | | |
|----------|----------------|-------------------|
| ○ Python | ○ PyTorch | ○ Matlab/Simulink |
| ○ C++ | ○ Gym | |
| ○ ROS | ○ OMPL/MoveIt! | |

LEADERSHIP AND MENTORING

- **Head teaching assistant** for the course Mathematical Principles of Planning and Decision-making.
Designed the course project relating to autonomous navigation for racecar robot
- Mentored a team of undergraduate students at Georgia Tech for a Racecar robotics project
- **Institute basketball captain** of the undergraduate team at IIT-Madras
- Robotics workshop coordinator at Technical festival organized by IIT-Madras