

Sayantan Datta

PhD Candidate in Robotics

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I'm in the fifth year of my Ph.D. in Computer Science. My research is currently about robot exploration in unknown environments. My work is interdisciplinary and stems from different backgrounds such as Engineering, Operations Research, Mathematics, and Computer Science.

Willing to relocate: Anywhere

Work Experience

Graduate Teaching Assistant

University of North Carolina at Charlotte - Charlotte, NC

August 2017 to Present

- Courses: Data Structures, Mobile Robotics, and Intelligent Topics
- Topics: Java, Robot Operating System (ROS), robot manipulator kinematics, inverse kinematics, localization, mapping

Graduate Research Assistant

University of North Carolina at Charlotte - Charlotte, NC

August 2018 to July 2020

- Multi-agent robot navigation in outdoor environments using Robot Operating System (ROS) as part of DARPA OFFSET Challenge
- Optimize artificially illuminated low-light collision scene reconstruction with drone-captured images.
- Mentored three undergraduate students: (1) to build a simulation environment for indoor robots using AirSIM, (2) SLAM using RGBD cameras.

Google Summer of Code Intern

Google

June 2013 to September 2013

- Open source contribution in KDE software Digikam
- Created a local editing tool to modify portions of an image using a brush tool.

Summer Intern

Belzabar Software Design - Delhi, Delhi

May 2013 to August 2013

Differential backup of Amazon AWS S3 instances at specific time intervals and reinstated backups during server failures

Education

Ph.D. in Computer Science

University of North Carolina at Charlotte - Charlotte, NC

August 2017 to Present

Skills

- C++
- Python
- Git
- Robotics
- MATLAB
- Robot programming
- Java
- AWS
- Data Structures
- Linux
- Scripting
- C/C++
- GitHub
- Gazebo Simulation (3 years)
- TensorFlow (2 years)
- Keras (2 years)
- Data visualization (3 years)
- Shell Scripting
- User Interface (UI)
- Linux (10+ years)
- OpenCV (7 years)
- Computer graphics (1 year)
- 3D animation (2 years)
- Blender (Less than 1 year)

Languages

- English - Expert
- Hindi - Intermediate
- Bengali - Fluent

Links

<https://github.com/kenzo450D>

<https://webpages.charlotte.edu/sdatta3/>

Awards

Graduate Life Ambassador

July 2021

Graduate Life Ambassadors (GLA) are volunteers who help run Center for Graduate Life and Learning (CGLL) events, promote events/programs to fellow students, and suggest new initiatives for the CGLL.

Publications

Prioritized Indoor Exploration with a Dynamic Deadline

<https://ieeexplore.ieee.org/document/9636199>

2021

This paper introduces a priority-based exploration algorithm for situations with an initially unknown and dynamically assigned deadline. The goal of our exploration strategy is to determine the geometric structure of an unknown environment as rapidly as possible and return to the home location. This is necessary for dangerous environments where an initial rapid robot exploration provides critical information about the layout for subsequent operations.

Low-light collision scene reconstruction using unmanned aerial systems

<https://www.rti.org/publication/low-light-collision-scene-reconstruction-using-unmanned-aerial-systems>

2019

The goal of this project is to evaluate the suitability of using unmanned aerial systems (UAS) to perform low-light collision scene reconstructions. Prior work by the NCDOT and NCSHP has shown that UAS are suitable for replacing 3-D scans by the FARO Focus3D X330 laser scanner for daytime collision scenes. The RTI and UNC Charlotte teams were tasked by NCDOT (sponsor) and NCSHP (client) with understanding whether, and if so, under what conditions UASs are suitable for producing low-light collision reconstructions.

Multi-trajectory Pose Correspondences using Scale-dependent Topological Analysis of Pose-graphs

<https://ieeexplore.ieee.org/document/8202270>

2017

This paper considers the problem of finding pose matches between trajectories of multiple robots in their respective coordinate frames or equivalent matches between trajectories obtained during different sessions. Pose correspondences between trajectories are mediated by common landmarks represented in a topological map lacking distinct metric coordinates. Despite such lack of explicit metric level associations, we mine preliminary pose level correspondences between trajectories through a novel multi-scale heat-kernel descriptor and correspondence graph framework.

Pose-graph Robustification via Heat-Kernel Analysis

2016

This paper presents a robustification technique for robot localization and mapping. The technique is based on heat-kernel embedding to prune outlier loop closures. Our algorithm has higher precision and recall when compared and is able to handle a large number of outlier measurements.