

EDUCATION

**Rutgers University***Doctor of Philosophy in Robotics; GPA: 3.94*

New Brunswick, NJ

Sept 2019 – May 2024**The Cooper Union***Bachelor of Engineering in Electrical Engineering; GPA: 3.55*

New York, NY

Sept 2015 – May 2019**Machon Shlomo; The Heiden Institute***Talmudic Study and Leadership*

Jerusalem, IS

Sept 2021 – June 2023

PEER-REVIEWED PUBLICATIONS

Persistent Homology for Effective Non-Prehensile Manipulation, by Ewerton R. Vieira, Daniel Nakhimovich, Kai Gao, Rui Wang, Jingjin Yu, and Kostas E. Bekris, in *IEEE International Conference on Robotics and Automation (ICRA)*, 2022.

Uniform Object Rearrangement: From Complete Monotone Primitives to Efficient Non-Monotone Informed Search, by Rui Wang, Kai Gao, Daniel Nakhimovich, Jingjin Yu, and Kostas E. Bekris, in *IEEE International Conference on Robotics and Automation (ICRA)*, 2021.

Robotics as an Enabler of Resiliency to Disasters: Promises and Pitfalls, by Rui Wang, Daniel Nakhimovich, Fred S. Roberts, and Kostas E. Bekris, in *Resilience in the Digital Age - Lecture Notes in Computer Science (LNCS)*, Springer Nature, 2021, 75–101.

Pushing the Boundaries of Asymptotic Optimality in Integrated Task and Motion Planning, by Rahul Shome, Daniel Nakhimovich, and Kostas E. Bekris, in *Algorithmic Foundations of Robotics XIV*, Springer International Publishing, 2021, 467–484.

Graph Cities: Their Buildings, Waves, and Fragments, by James Abello, Daniel Nakhimovich, Chengguizi Han, and Mridul Aanjaneya, in *The 4th International Workshop on Big Data Visual Exploration and Analytics with EDBT/ICDT (BigVis)*, 2021.

Graph Waves, by James Abello and Daniel Nakhimovich, in *The 3rd International Workshop on Big Data Visual Exploration and Analytics with EDBT/ICDT (BigVis)*, 2020.

RESEARCH PROJECTS

**PRACSYS***PI: Kostas Bekris*

New Brunswick, NJ

Sept 2019 – ...

- **Multi-object Rearrangement:** Manipulating most objects is simple for humans but hard for robots; taking a combinatorial perspective, the challenge is to minimize the number of grasps a robot makes to rearrange a set of objects in a confined environment. I developed a region graph structure to discretize the search of object dependencies. I also proposed and tested a number of heuristics to generate intermediate object configurations.
- **Integrated Task and Motion Planning (iTAMP):** iTAMP algorithms seeks to simultaneously reason about high level decisions (e.g. which object to hold in what order or which shelf to look for an item in) and the actual robot trajectories to perform the respective actions. I worked on describing an algorithmic framework that can perform iTAMP while retaining probabilistic completeness (high probability of eventually finding a solution) and asymptotic optimality (ensuring solutions found will converge to the best one).
- **Put That There:** Human-Robot Interaction studies typically focus on robots understanding humans whereas this project studies how robots can be better understood by humans. I designed and performed experiments to test human ability to interpret instructions given by a real robot.

**DIMACS***PI: James Abello*

Piscataway, NJ

Summer 2018 – 2020

- **k-connectivity:** k-connectivity is a connectivity measure for graphs. I designed two algorithms for finding approximations of minimum separating sets of a graph in order to perform efficient graph decomposition for data visualization.

- **Graph Peeling:** Graph Peeling is the iterative process of removing vertices from a graph. I explored properties of various graph peeling techniques and designed a new peeling algorithm (wave decomposition) in order to decompose very large graphs efficiently.

ONE-OFF PROJECTS

2019; OpenSesame: Open source cryptographic co-processor implemented on an FPGA
2018; pass2act: Passive to active sentence transformer built using spaCy's dependency tree parser
2017; biboch: Bitboard checkers implementation with an AI that performs a fast alpha/beta search on the game tree
2016; 8-bit processor: Custom 8-bit instruction set architecture written in verilog
2015; 2048 Circuit: A recreation of the popular mobile game 2048 using various CMOS ICs, buttons, and LEDs

TEACHING/MENTOR EXPERIENCE

Teaching Assistant; Rutgers University:

- **2019:** 512: Introduction to Data Structures and Algorithms

2015 — 2016; Conceptheca: Mentored Android development intern

2014 — 2015; Fair Lawn High School: Marching Band Woodwind Section Leader; Clarinet Tutor

INDUSTRY EXPERIENCE

 **PulsePoint**
TechOps Intern

New York, NY

Summer 2017

- **QPS Monitoring:** QPS stands for queries per second. Optimized application metric collection/alerting to reduce the false positive rate of QPS drops.
- **System Integrity:** Automated the backup and data verification of large (~100GB) databases.

 **Conceptheca**
Mobile Application Developer

Fair Lawn, NJ

2015 – 2016

- **Blood-loss:** A mobile application on Android/iOS for doctors that calculates the maximum allowable blood-loss that a patient can undergo before reaching critical condition
- **JAM Fractals:** A mobile game on Android OS that allows a player to mix ingredients to form seemingly random and chaotic fractal images
- **Sepsis Clock:** An iOS application to help doctors keep track of the time and completion progress of the procedures to treat patients with septic shock

SKILLS

Languages: C/C++/Objective-C, Python, Rust, Java, C#, MATLAB, Verilog, Bash, HTML/CSS, Russian

Robotics and Sensing Software: OpenCV, CGAL, ROS, Gazebo

Robots and Hardware: Baxter, Xilinx FPGAs, 3D Printing

Physics Engines: Bullet, Godot, Unity

Miscellaneous: Docker

AWARDS

2021; Best Paper Award at BigVis: Graph Cities: Their Buildings, Waves, and Fragments

2018; HackCooper; 1st prize: skEye Net - Wireless eye tracking / gaze estimation headset that works in realtime

2015 — 2019; Half-tuition scholarship: Merit scholarship from Cooper Union

2015 — 2019; Innovators Merit Scholarship: Merit scholarship from Cooper Union

2015; David Lee Memorial Scholarship: For academic achievement and community service

MISCELLANEOUS

Peer Reviews: 2019 - ...

- **IROS:** Conference on Intelligent Robots and Systems
- **CoRL:** Conference on Robot Learning
- **RSS:** Robotics: Science and Systems Conference
- **RA-L:** IEEE Robotics and Automation Letters
- **BigVis:** Big Data Visual Exploration and Analytics Conference