Daniel Nakhimovich

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Education

Rutgers University — New Brunswick, NJ
Doctor of Philosophy in Robotics; GPA: 3.94 — *Sept 2019 – May 2025*

The Cooper Union — New York, NY
Bachelor of Engineering in Electrical Engineering; GPA: 3.55 — *Sept 2015 – May 2019*

Machon Shlomo: The Heiden Institute — Jerusalem, Israel
Jewish Law, Ethics, Philosophy, and Leadership — *Sept 2021 – June 2023*

Peer-Reviewed Publications

Development of a Socially Cognizant Robotic Campus Guide, by Benjamin Greenberg, Daniel Nakhimovich, Richard Magnotti, Hriday Purohit, Sanskar Shah, Aniket Satish Kulkarni, Uriel Gonzalez-Bravo, and Noah R. Carver, in *Companion of the 2024 ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, 2024.

Resolution Complete In-Place Object Retrieval given Known Object Models, by Daniel Nakhimovich, Yinglong Miao, and Kostas E. Bekris, in *IEEE International Conference on Robotics and Automation (ICRA)*, 2023.

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.

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.

Giga Graph Cities: Their Buckets, Buildings, Waves, and Fragments, by James Abello, Haoyang Zhang, Daniel Nakhimovich, Chengguizi Han, and Mridul Aanjaneya, in *IEEE Computer Graphics and Applications*, IEEE, 2022.

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.

Additional Research Projects

PRACSYS — New Brunswick, NJ
PI: Kostas Bekris — *Sept 2019 – ...*

- **Robot Nudging**: A robot nudge is a robot behavious or ineherent design which alters a person's behaviour without significantly changing the incentive structure. I performed an extensive literature review of the subject in order to discover which ethical parameters are most urgent to consider for robot designers and policy makers.
- **Object Rotation Task Descriptions for Robots in English**: I performed an informal survey, collecting human descriptions in English of household objects being rotated in a simulated environment. The goal is to study how people naturally describe tasks to a robot without assumptions of "key words" and "wake phrases".

- **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 expreriments to test human ability to interpret instructions given by a real robot.

DIMACS Piscataway, NJ
PI: James Abello *Summer 2018 – 2020*

- **k-connectivity**: k-connectivity is a connectivity measure for graphs. I designed two algorithms for finding approximations of minimum seperating 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 developement intern

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

Industry Experience

PulsePoint New York, NY
TechOps Intern *Summer 2017*

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

Conceptheca Fair Lawn, NJ
Mobile Application Developer *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/Certifications

2023; Certificate in Socially Cognizant Robotics: Upon completing 2 years in an NSF-funded National Research Traineeship focused on Socially Cognizant Robotics for a Technology Enhanced Society

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

2018; HackCooper; 1^{st} **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 achievment and community service

Miscellaneous

Peer Reviewes: 2019 - ...

- **IROS**: Conference on Intelligent Robots and Systems
- **ICRA**: International Conference on Robotics and Automation
- **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