> Sophia Kolak

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> education

school : Carnegie Mellon University — location : Pittsburgh, PA
degree : PhD candidate, Software Engineering — when : Fall 2021 - Spring 2023

school : Columbia University — location : New York, New York
degree : BA, Computer Science — when : Fall 2017 - Spring 2021

> work & research experience

IBM Quantum — New York, NY
Quantum Partners & Commercial Ecosystems (intern) — May 2022 - December 2022
- Demonstrated a relevant quantum computing use-case and integration strategy for an ISV partner.

ARiSe Lab — Columbia University
Research Assistant — 2020 - 2021
- Developed a static, probabilsitic embedding technique to provide information about potential performance bugs at the statement level

Squares Lab — Carnegie Mellon University
Research Intern — Summer 2020
- Proposed, implemented and evaluated *neuro-reuse*, a novel transfer-learning method for allowing self-adaptive systems to autonomously evolve their planning network after an unexpected change.

Squares Lab — Carnegie Mellon University
Research Intern — Summer 2019
- Conducted the first empirical study of the ROS ecosystem.
- Mined over 200,000 ROS packages on Github and their dependencies over time.
- Analyzed growth in the ROS ecosystem, identified a small set of working groups at the core of its collaboration structure.

Axel Lab — Columbia University
Research Assistant — 2018-2019
- Analyzed fMRI activity from a navigation task on how mice represent, recognize, and employ sparse olfactory landmarks.
- Used machine learning to identify place and time cells in high-dimensionality fMRI data
- Found different patterns of place cell activity depending on the type of odor administered to the mouse.

> publications

[1] Revisiting Unnaturalness for Automated Program Repair in the Era of Large Language Models
Yang, ***Kolak***, *et al.* ICSE 2025 *UNDER REVIEW*

[2] Evaluating Quantum Algorithms For Linear Solver Workflows
Sophia Kolak, *et al.* International Supercomputing Conference 2023

[3] Patch Generation with Language Models: Feasibility and Scaling Behavior,
Sophia Kolak, *Ruben Martins, Claire Le Goues, Vincent Hellendoorn*, ICLR DL4C workshop 2022

[4] It Takes a Village to Build a Robot: An Empirical Study of the ROS Ecosystem,
Sophia Kolak, *Afsoon Afzal, Claire Le Goues, Michael Hilton, Chris Timperley*, ICSME 2020

[5] Detecting Performance Patterns with Deep Learning,
Sophia Kolak, SPLASH Companion 2020

[6] SHIRLEE: A Sharp-edge Handheld Identifier and Remover in Low-gravity Extravehicular Environments, Dada, Ganeshan, Groll, ***Kolak***, *Ravi, Stein, Wang*, AIAA SciTech Forum 2021

> awards & achievements

SPLASH Student Research Competition 2020, 3rd Place

CRA Outstanding Undergraduate Researcher Award 2021, Finalist

AIAA Student Research Competition 2020, Best Paper

Micro-G NASA Challenge 2019, Winning Tool

AWM Student Chapter 2020, Award for Scientific Excellence

CRA Grad Cohort for Women 2021, Conference Acceptance

> presentations & posters

Patch Generation with Large Language Models | *Poster*
ICLR DL4C Workshop, virtual 2022

It Takes a Village to Build a Robot | *Video* | *Slides*
ROScon, Macau 2019

Robotics Software Quality Panelist | *Video*
ROS World, virtual 2020

ROS Developers Podcast | *Video*
Featured Interview, 2020

Quantum Computing and Independence-Friendly Logic | *Program*
Deconstrucking Hintikka, Dubrovnik 2020

> teaching, leadership & service

Association for Women in Mathematics | *President* | 2020-2021
* Organized weekly community-building events within math department, oversaw mentorship, outreach, events, and publicity.

Art & Machine Learning | *Teaching Assistant* | 2023
* Assisted with lectures, demoed new generative AI tools, and held weekly office hours.

Computer Science Theory | *Teaching Assistant* | 2019-2020
* Ran office hours, graded assignments, managed piazza and held recitation.

Columbia Space Initiative | *Mission Co-Lead* | 2019-2020
* Led Columbia's team of undergraduate researchers in the NASA-SUITS design competition.

AWM Machine Learning Reading Group | *Lead* | 2020
* Ran weekly discussion on introductory topics in machine learning.

FIRST Robotics | *Volunteer* | 2022
* Volunteer judge for regional high-school robotics competition.

ROS World Program Committee | *Volunteer* | 2021
* Volunteer PC member for ROS World.

> skills

Programming: Python, Java, C, C++, MATLAB, R, MySQL, GraphQL, Neo4j

Frameworks/Libraries: ROS, PyTorch, TensorFlow, Scikit-Learn, Qiskit

Languages: English (Native), Croatian (Elementary)

> relevant coursework

Advanced Natural Language Processing, Program Analysis, Ethics & Robotics, Machine Learning, Programming Languages & Translators, Art & Machine Learning, Software Engineering for Startups, Advanced Software Engineering, Artificial Intelligence, Computation and the Brain, Senior thesis in Computer Science, Analysis of Algorithms, Modern Analysis, Quantum Computing, Computer Science Theory, Fundamentals of Computer Systems, Advanced Programming, Data Structures, Linear Algebra, Research in Computer Science I & II, Discrete Math, Multivariable Calculus