Carol Hanna

Computer Scientist

CV - February 2026

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I'm a final-year Computer Science PhD candidate at UCL researching automation for hot fixing time-critical software bugs. Alongside my PhD, I work as a Principal Research Scientist at Code SA, a software testing startup. I also co-supervise multiple Undergraduate and Master's student dissertations and have experience as a guest lecturer and teaching assistant. I bring experience in software engineering, venture capital, and advising deep tech ventures, and I'm actively engaged in the software engineering research community.

Research Interests: Automated Software Repair, Hot Fixing in Production Systems, Genetic Improvement, AI-driven Software Engineering, Software Reliability.

Research Vision: I aim to create the first coordinated research effort around hot fixing and symptom mitigation of time-critical bugs, including dedicated workshops, conference tracks, and special journal issues. My vision is to position the UK at the forefront of emergency automated repair research by uniting academia and industry to develop methods that detect, contain, and repair faults in live, mission-critical systems.

EDUCATION

PhD - ***Computer Science*** **-** University College London, UK ***Jan. 2023 - PRESENT (near submission)***

Supported by departmental doctoral scholarship.

Doctoral Dissertation: Automating the detection, generation, and propagation of hot fixes for critical issues in production software.

MSc - ***Software Systems Engineering*** **-** University College London, UK ***Sep. 2021 - Sep. 2022***

Distinction

Master's Dissertation: Optimising mutation operator selection for search-based automated program repair with reinforcement learning.

BSc - ***Computer Science*** **-** Technion, Israel ***Oct. 2016 - Oct. 2020***

Undergraduate Dissertation: Binary2Name- Automatic detection of the functionality of a binary code snippet using a deep neural network. Achieved excellent results (above 60% F1 value).

EMPLOYMENT EXPERIENCE

Teaching Assistant and Guest Lecturer, **University College London**, United Kingdom ***Sep. 2023 - PRESENT***

Guest lectures, leading tutorials and grading coursework. Modules include: Research Methods, Algorithms I, and Automated Software Engineering.

Principal Research Scientist, **Code SA** United Kingdom ***Sep. 2025 - PRESENT***

I lead research on improving the automated code analysis and test generation services by identifying inefficiencies and reliability gaps and developing solutions that drive impact.

Venture Fellow, **Creator Fund**, United Kingdom ***Oct. 2024 - Oct. 2025***

Sourced and evaluated AI-focused deals for a pre-seed fund investing in university-founded startups; advised portfolio companies on product strategy and growth post-investment.

Research Assistant, **University College London**, United Kingdom ***Oct. 2022 - Jan. 2023***

RA at the Software Systems Engineering group at UCL, with research placement resulting in a journal publication.

Verification Engineer, **Intel Corporation**, Israel ***Aug. 2019 - Jul. 2021***

Created functional verification environments for several components of the Mobileye sixth-generation autonomous driving chip architecture, including the direct memory access unit, the scalar processor, and an accelerator on the chip. Promoted after 8 months at the company, while still a full-time student.

Student Mentor, **Technion**, Israel ***Sep. 2018 - Jul. 2019***

Adviser for incoming freshmen and students who are struggling academically.

Research Assistant, **Technion**, Israel ***Jun. 2018 - Oct. 2018***

Worked closely with the Dean of the Education, Science, and Technology faculty on research that focused on migrating

the portfolios and work of students to the digital world.

PUBLICATIONS

Citations: 650< ; h-index: 7 (Google Scholar, February 2026)

Under review at top-tier venues:

1. When Done is Better than Perfect: Rethinking Automated Program Repair for Hot Fixing Time-Critical Bugs
2. HotBugs.jar: A Benchmark of Hot Fixes for Time-Critical Bugs
3. Hot Fixing in the Wild: An Empirical Study of Hot Fixes in Large-Scale GitHub Data
4. A Mixed-Method Study of Hot Fixing in Industry: Practices, Bottlenecks, and Opportunities

Conferences:

5. Behind the Hot Fix: Demystifying Hot Fixing Industrial Practices at Zühlke and Beyond - 2025 - FSE.
6. LLM-Guided Genetic Improvement: Envisioning Semantic Aware Automated Software Evolution - **2025** - ASE
7. Optimised fitness functions for automated improvement of software's runtime - **2025** - SSBSE.
8. Toward Systematizing Hot Fixing for Production Software - **2024 -** FSE.
9. Exploring LLM-driven explanations for quantum algorithms - **2024 -** ESEM.
10. Hot Patching Hot Fixes: Reflection and Perspectives - **2023** - ASE.
11. Evaluating Explanations for Software Patches Generated by Large Language Models - **2023** - SSBSE.
12. Enhancing Genetic Improvement Mutations Using Large Language Models - **2023** - SSBSE.

Journals:

13. Hot Fixing Software: A Comprehensive Review of Terminology, Techniques, and Applications - 2025 - TOSEM.
14. Reinforcement Learning for Mutation Operator Selection in Automated Program Repair - 2025 - ASE Journal.
15. Large Language Model-Based Mutations in Genetic Improvement - **2024** - ASE Journal.

Workshops:

16. Improving a Parallel C++ Intel SSE SIMD Linear Genetic Programming Interpreter - **2026** - GI Workshop @ ICSE.
17. Applying Genetic Improvement Techniques for Automated Program Repair of Transpiled Code - **2026** - GI Workshop @ ICSE.
18. From Kotlin to Swift and Back: Toward Fully Automated Cross-Language Code Transpilation - **2025** - A-Mobile.
19. Large Language Model-based Code Completion is an Effective Genetic Improvement Mutation - **2025** - GI Workshop @ ICSE.
20. Enhancing Software Runtime with Reinforcement Learning-Driven Mutation Operator Selection in Genetic Improvement - **2025** - GI Workshop @ ICSE.
21. An Analysis of the Automatic Bug Fixing Performance of ChatGPT - **2023** - APR Workshop.

PROFESSIONAL SERVICE

Leadership Roles:

- SSBSE conference steering committee member.
- Track Co-Chair of SSBSE Challenge Track 2025 and 2026
- Organizer of the bi-weekly Software Systems Engineering Group Invited Speakers Seminar
- Co-organizer of the 67th and 68th CREST open workshop

Supervisory Roles:

- Co-supervisor for Master's student dissertations:
    - Devu Raju Kurup 2025
    - Jingyuan Wang 2024
    - Dimitris Bouras 2024

    - Hancheng Zuo 2024
- Co-supervisor for undergraduate student dissertations:
    - Levon Davtyan 2026
    - Prasham Jadhwani 2024
    - Sachi Lad 2024
    - Damien Bose 2024

Programme Committees & Reviewing:

- Peer reviewer for ACM Transactions on Software Engineering and Methodology (TOSEM) journal
- Peer reviewer for IEEE Transactions on Software Engineering (TSE) journal
- ASE research track 2026 program committee member
- Peer reviewer for Journal of Software: Evolution and Process
- MSR Main Track 2025 program committee member
- SSBSE Main Track 2025 and 2026 program committee member
- ASE tool demonstration 2025 program committee member
- Interware tool demonstration 2025 program committee member
- LLM4Sec 2025 program committee member
- Genetic Improvement workshop 2024 and 2025 program committee member
- ICTSS challenge 2024 program committee member
- SSBSE RENE/NIER 2024 program committee member

Volunteering & Outreach

- Student Volunteer at ICSE 2025; FSE 2025; ASE 2025
- Session chair: ASE 2023; ASE 2025; COW 65 and 67; bi-weekly SSE seminar
- Photography and social media for the 66th UCL CREST Open Workshop
- Participation in ASE 2023, FSE 2024, ICSE 2025, FSE 2025, ASE 2025
- Volunteered to develop the official Android application for the Society for the Prevention of Cruelty to Animals in my local community. Published in the Google Play Store.

TALKS AND LECTURES

- Invited talk- King's College London SSY Group Seminar
- ASE 2025 paper presentations
- SSBSE 2025 paper presentation
- A-mobile 2025 paper presentation
- 67th CREST Open Workshop "AI-powered advances in genetic improvement"
- FSE 2025 paper presentation
- GI workshop@ICSE 2025 paper presentation
- Guest Lecture in ASE module at UCL, Autumn 2024 and Autumn 2025
- FSE 2024 paper presentation
- ASE 2023 paper presentation
- SSE seminar 2022 on applying reinforcement learning for automated program repair

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PROGRAMMING: C, C++, Java, Python, Verilog I **LANGUAGES**: English, Arabic, Hebrew (all fluent)