

Matthew Danish

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Experience

Utrecht University

Utrecht, NL

Researcher (Human Geography & Spatial Planning)

2023–2024

- Designed and developed the *Percept* mobile web app for the street view perception survey project.
- Co-authored several papers on computer vision and street view perception surveys.

Cambridge University

Cambridge, UK

Research Associate (Digital Technology Group & Systems Research Group)

2015–2022

- Collaborated on the West Cambridge Digital Twin project with the Centre for Digital Built Britain.
- Developed **DeepDish**, intelligent sensor software for object tracking in real-time video feeds, flexible enough to run on high-performance GPU workstations or edge systems installed alongside on-street cameras.
- Co-authored 6 papers with the **AdaptiveCity** team about intelligent sensors, data management and more.
- Designed, implemented and tested the **CamFort** automated lightweight verification, modernisation and analysis tools for scientific Fortran, as part of a 4-person team.
- Delivered **Fortran-Src**, an industrial-strength open-source parser and analyser for Fortran versions 66 through 2003, now used internally by commercial partners such as Bloomberg, LP.
- Negotiated for a £99,000 donation to my research, and used the funds to hire a research assistant.
- Consulted with the Met Office weather forecasting service and developed automated tools to analyse their very large Fortran code base to find hidden bugs and improve code quality.
- Lectured in an international series of Fortran Modernisation workshops for scientists in the UK, Spain and Germany, which were hosted by representatives from the Numerical Algorithms Group, Ltd.
- Chaired the departmental Research Staff Forum and organised regular social events (pre/post-COVID).

Cambridge Cycling Campaign

Cambridge, UK

Charity Trustee (volunteer role)

2016–2022

- Advised and managed a 1,600+ member charity that works for more, better and safer cycling. Led numerous campaigns for substantial cycling safety and accessibility changes to roads and planned developments.

Boston University

Boston, Massachusetts, USA

PhD, Computer Science

2008–2015

Skills

Linux: Power-user and programmer for 25+ years. Debian package maintainer since 2001.

Functional Programming: Practical engineering experience in Haskell, ML & Lisp as well as with advanced language topics such as core compiler design & data-flow analysis, for nearly 20 years.

Systems Programming: Experience ranging from setting up distributed sensor networks to writing Linux kernel modules to bootstrapping new operating systems from scratch in C/assembly.

Machine Learning: Extensive use of PyTorch-based machine-learning applications for computer vision, languages and beyond, including fine-tuning LLMs and developing CLIP-based algorithms.

Other: Comfortable with languages & tools such as HTML, JS, CSS, SQL, PostGIS & scripting in Python or R. Experienced with common dev tools such as git, docker and the GNU toolchain.

Leadership and Management: Lead team of authors on several papers. Secured £99,000 donation from industrial partner for my research, and used it to hire a research assistant. Chaired the Computer Laboratory Research Staff Forum. Volunteered as a charity trustee, leading campaigns for safer streets and cycling-friendly developments, and hiring 2 charity employees.

Communication: Presented at numerous workshops, conferences and meetings. Experienced at policy discussions with elected officials from the level of city councillor up to MP. Authored several op-ed columns in local newspapers and frequent articles for the charity's regular magazine.

Networking: Planned and managed social events on an almost weekly basis (pre/post-COVID) for research staff, students and the wider university community, including some events supported by industrial partners. Facilitated workshops such as Testing & Verification for Computational Science.

Languages: English (native), Español (C1), Nederlands (A2–B1), Polski (< A1)

Work eligibility: All EU countries, plus UK and USA

Additional Roles & Awards

EdgeSys workshop (co-hosted with EuroSys): Publicity Chair (2021), Presenter (2020, 2022)

New Wiseman Award 2019: Received for outstanding contributions to the Computer Laboratory.

Campaigner of the year 2018: Received for volunteer work with Cambridge Cycling Campaign.

Debian: Software package maintainer for the ATS language and several small Lisp packages.

Projects

Percept: Toolkit for preparing and deploying street view perception survey (mobile) web apps.

DeepDish: Intelligent sensor software for object detection and tracking with edge computing.

Adaptive City: Real-time urban and in-building sensor data processing platform.

CamFort: Automated software evolution and verification of computational science models.

Fortran-Src: Haskell library for parsing and analysis of historical & modern Fortran programs.

Terrier: Embedded ARM OS incorporating the ATS language for advanced type safety features.

ATS: Functional programming language with linear and dependent types (former group member).

Quest: Real-time OS with virtualisation-based sandbox features (former group member).