Matthew Danish

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Experience

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 though 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 TensorFlow-based machine-learning applications for computer vision, languages and beyond, including techniques such as transfer learning / training fresh models.

Other: Comfortable with languages & tools such as HTML, JS, CSS, SQL, PostGIS & scripting in Python or Ruby. 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 (CEFR C1), Nederlands (beginner)

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.
MAPC & MassDOT '37 Billion Miles Data Challenge Award' 2014: 'Most Policy Relevance': *Exploring Transit and Driving Behavior in MA, with Google Fusion Tables.*
Hacker League 2014: 'Best Historical Data Tool': *The Late Night T Data Explorer*
Debian: Software package maintainer for the ATS language and several small Lisp packages.

Projects

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).