Sasha Lopoukhine

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EDUCATION

University of Cambridge   Cambridge, UK
PhD in Computer Science supervised by Tobias Grosser   *Jan 2023 — Present*

Researching the use of MLIR and multi-level compilation to effectively target AI accelerators.

- Led the development of a novel MLIR-based linear algebra micro-kernel backend that targets ETH's Snitch Core, yielding 95% FPU utilization and 94% of theoretical maximum throughput for our chosen kernels. Whole neural networks compiled via this micro-kernel outperform the state of the art by >22x.
- Developed a novel MLIR-based extensible interpreter, which I presented at the 2023 MLIR developer meeting.
- Mentored a number of undergraduate students for their dissertation work and internships, one of whom won silver at the CGO 2024 student research competition.

Publications:
- Sidekick compilation with xDSL

University of Cambridge   Cambridge, UK
BA in Computer Science - II.i   *2012 — 2015*

Received Bob Diamond prize for Computer Science.

EMPLOYMENT HISTORY

Co-Founder & Chief Engineering Officer   September 2021 — January 2022
Cub3   *Los Angeles, CA*

Led development of a platform that enabled third parties to employ Web3 tools, NFTs, and other blockchain technology to encourage positive behavior in online fan communities.
- Spearheaded the engineering team, developing a minimal viable product, identifying key features and coordinating efforts.

Software Engineer   March 2018 — September 2021
Apple   *Cupertino, CA*

Curated Library – a novel iOS 13 feature providing user photos in a curated perspective free of memes, screenshots, and duplicate images, deployed to **over a billion devices**.
- Responsible for efficient calculation of the unique Years/Months/Days display on the Curated Library page, leveraging date, time, and other metadata to provide a beautiful, clutter-free, display of the user's photo library.
- Carried out extensive performance and unit testing, building new profiling infrastructure in the process.

Patent: US20200356227A1 – **Curated Media Library**

On-disk graph – a novel infrastructure component of Photos Memories. Enabled numerous features, such as on-demand availability of all Memories, automatic song selection, and next memory suggestion.
- Implemented a graph database to represent Memories data, accommodating roughly 1,000 times more data than the previous representation.
- Led the migration of existing features to the new database, with minimal regressions, leading to a 9x reduction in testing time— from 1 hour and 30 minutes to 10 minutes.
- Added many new unit tests to ensure the continued high quality of this component of the infrastructure.

Next memory suggestion – a recommendation engine for the Memories interface that suggests new memories to watch
- Developed a novel recommendation engine for Memories, leveraging features of the current Memory, and the user's library.

Integration of Apple Music into Memories – a feature that lets users select any song from the Apple Music library to play in Memories.
- Required handling enormous data sets including over a billion users' photo libraries and Apple Music's 90 million song library.
- Led the feature extraction efforts to provide the recommendation engine with information from the Memories database to suggest appropriate music.
- Provided Swift mentoring to the team and offered guidance on the project's software architecture and design patterns.

iOS Engineer   January 2016 — September 2017

[Snips](#)   *Paris, France*

[Keyboard extension](#) – a cutting-edge tool leveraging the Snips Personal Knowledge Graph to suggest phrases from their personal database as they entered text throughout iOS.
- Created a software keyboard that interacted with supporting services (email, calendar, and contact

information) to extract the necessary information as the user was typing.
- Enhanced the functionality of the auto-completion and next-word recommendation.
- Developed a bespoke binary-encoded language model that loaded in milliseconds and outperformed the built-in keyboard in terms of word recommendations, auto-complete, and auto-correction.

Snips Platform – Labs - prototyped natural language parsers and applications built on top of them.
- Built an interactive voice assistant on iOS, that could handle queries such as "Show me photos from the restaurants I went to last week" using CKY parsing.
- Built an interactive voice assistant engine that would fill in the gaps in user's queries.
- Developed prototypes for voice-activated gadgets such as speakers and coffee machines.

Cofounder & CEO   2014 — 2016

Blue Tatami   *Cambridge, UK*

Blue Tatami was a startup developing personal productivity applications on iOS. We developed Dodeka, an iOS program for displaying calendar events on a 12-hour watch face. This program required a unique visualization designed from the ground up to show the current day's calendar events in the clearest way possible.
- Developed the project's concept and wrote app from scratch
- Introduced a unique personal productivity tool
- Created innovative graphics and design features
- Grew to **more than 6,000 users** with no advertising
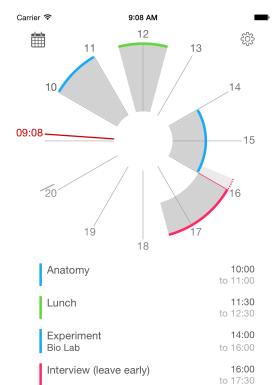
PROJECTS

Maintainer, [xDSL](#)   Jan 2023 — Present

xDSL is a pythonic counterpart to MLIR, that makes modern compiler abstractions and tools more accessible to researchers and students.

Author, [Simple Datagram Protocol](#) | [Article](#)   2017

Worked around Apple's requirement for devices to have Made for iPhone certification to access Bluetooth, by using BTLE to transfer configuration data to Raspberry Pis instead.

Author, [BioSwift](#)   2015

First open-source framework in Swift to handle gene data.

PRESENTATIONS

[2023 EuroLLVM - Prototyping MLIR in Python](#)

[2023 LLVM Dev Mtg - Compiler backend design with MLIR](#)

[2024 EuroLLVM - Teaching MLIR concepts to undergraduate students](#)

SKILLS AND AWARDS

- **Programming Languages**: Python, Swift, Objective-C, C/C++, JavaScript/TypeScript, Assembly
- **Languages**: Fluent in English, Russian, French