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Summary

I'm interested in work that has a positive impact on the world. For the past five years I've been working on analytics and industrial vision systems to reduce waste and CO_2e output from factories, and am ready for a new challenge.

I have been heavily involved in a number of open source projects, including the Ubuntu phone project, the Libre.fm (and GNU FM) music sharing site, the Jokosher audio editor and the GStreamer multimedia framework.

I have a PhD in developmental robotics, and the open source learning framework I developed as part of my research has gone on to be used in multiple further research projects, and featured in the book *"How to Grow a Robot: Developing Human-Friendly, Social AI"* published by the MIT Press.

I love working with small teams/start-ups where I can get my hands dirty in a number of different areas. I'm a strong generalist, and if I'm not already familiar with a tech stack, I'm able to get up to speed and become productive with it very quickly. Across my career I've developed software for a wide range of platforms including mobile phones, desktops, servers, vision systems, embedded sensors and humanoid robots.

Career Overview

- **Lead full-stack developer at Metis Labs**
  2018 to present
  Metis Labs is a start-up applying AI and computer vision to industrial manufacturing processes, resulting in greatly reduced waste and energy usage.

  I'm the lead developer on our cloud and edge based industrial analytics platform, which uses an Angular front-end and Python back-end. This collects data from a variety of industrial sources (historians, PLCs, MQTT brokers, etc.) and provides tools for process engineers and factory managers to analyse long terms trends, generate regular automatic reports and set up alarms. The system also generates user-configurable dashboards for use on the factory floor, providing workers with real time data, visualisations and alerts.

  I created two of our industrial vision products: a 3D laser scanning system which detects defects in extruded clay bricks prior to them entering the kiln (thus resulting in large CO_2e savings) and a camera system for ensuring consistency of colour in roofing tile mix. These have been deployed in factories with two major manufacturers, both in the UK and mainland Europe. In one case, a factory which had previously been receiving around 80 customer complaints a year were able to reduce this to 0 complaints in the two years that our system has been monitoring their production.

- **Software engineer at Bloomsbury AI**
  2017 to 2018
  Bloomsbury was an AI start-up focusing on machine reading and natural language processing, the company had a successful exit after being acquired by Facebook. Our primary product, Cape, provides an API which allows developers to add rich question answering functionality to their applications. You can provide Cape with a set of documents and a natural language question and Cape will search those documents to find an answer to your question.

Cape is now available as free/open source software:
https://github.com/bloomsburyai/cape-webservices

I worked on development of the back-end services, ensuring our research models become performant, scaleable production models, designing and implementing our API and Python client library, maintaining our continuous deployment and testing infrastructure, and rapid development of prototypes for new uses of our core technology and their subsequent development into mature parts of our platform.

- **Software developer at Canonical**
  2014 to 2017
  Canonical are the company behind the Ubuntu Linux distribution. I worked within the System Apps team, developing key applications and infrastructure for the Ubuntu Touch mobile platform. I was the lead developer for the on-screen keyboard, I also became the primary maintainer of the Ubuntu Download Manager project. In addition to this I contributed to the Ubuntu Web Browser and the Content Hub infrastructure, which was used for securely sharing content between applications.

- **Freelance programming**
  2012 to 2014
  After finishing my Ph.D. I worked on a range of different projects including:
  - A research project with the Department of Psychology at Sheffield University, integrating the open source framework I developed as part of my Ph.D. with their neural models of the basal ganglia.
  - Mathematics Playground - A suite of interactive HTML5/JavaScript examples designed to help students gain a more intuitive understanding of a range of mathematical concepts.
  - eOceanic.com - A website which provides dynamic and detailed information about harbours and routes around the coast in an effort to keep sailors safe, utilising current marine weather conditions to provide warnings and advice. Recently this has also involved some Android development work, creating a mobile client that sailors can use when offshore.
  - ZorinOS - I was hired to fix a number of bugs in the GnoMenu and Avant Window Manager components used by the Zorin Linux distribution (an Ubuntu derivative).
  - Mobile apps - I've released two commercial mobile apps for the MeeGo platform, Erudite which makes it possible to use the Amazon Cloud Reader on MeeGo phones and Rockwatch which allows MeeGo devices to communicate with Pebble smart watches.
  - DZone - I was commissioned to write a tutorial about native development on the Tizen mobile platform.
  - Tutoring - I provide VoIP based tutoring services, most recently helping a computational biologist get to grips with Linux in preparation for running simulations on a high performance computing cluster.
  - Red Giant - I was hired to help out with a number of GStreamer related issues in Red Giant's video editing tools.

- **Research assistant at Aberystwyth University**
  2012
  During the final six months of my Ph.D. I was also employed as a research assistant on the IM-CLeVeR project, a pan-European robotics project focusing on the open source iCub robot platform.

- **Part-time demonstrator and tutor at Aberystwyth University**
  2008 to 2012
  I ran a number of practical lab sessions for undergraduate students, gave a few lectures and acted as a personal tutor for roughly 12 students each year, helping students to learn Java, Haskell and systems administration.

- **Software developer at Credativ GmbH**
  2006 to 2007
  I worked on customising the open source Horde and Kolab groupware systems and helped in developing mail server monitoring tools as part of the Open Security Filter project. I also performed various systems administration tasks, primarily on systems within the German government.

Skills Summary

- *Technical Skills*
  - **Python** - Metis Lab's API service is developed in Python using Flask, with a suite of PyUnit tests. We also have a number of micro-services for alarm processing, report generation and data ingestion also all written in Python, with common functionality shared between them in various library modules. The API is also able to trigger the execution of both tensorflow and XGBoost based machine learning models. As part of my work I also created PyAndon, an open source module for controlling industrial warning lights, which implements a user-space USB driver for Patlite devices.
    In the past I was a core contributor to the Python-based Jokosher audio editor, working on the recording/playback system and the GTK based user interface; I also created the initial Python bindings for the libchamplain map rendering project. I developed a large number of functional tests for Ubuntu Touch in Python, using the autopilot framework.
  - **TypeScript** - The front-end for the Metis Labs industrial analytics platform was implemented in TypeScript using the Angular framework. This provided an interface for configuring and viewing industrial dashboards, setting alarms, creating scheduled reports, configuring data connections, managing users and providing a range of analytics features including multiple graphing options (via the e-charts library).
  - **JavaScript** - The front-end for Cape, Bloomsbury AI's document reading product, was written using the VueJS framework; I also developed a JavaScript based Chrome extension for answering questions about the current webpage (demo video).
    As part of my work on GNU FM, I developed a jQuery based HTML5 audio player, capable of streaming songs, reporting listening statistics and allowing users to tag songs as they hear them.
  - **Docker** - Our cloud infrastructure at Metis Labs was based around ECS orchestrated Docker images, fully integrated with our continuous integration, testing and deployment pipeline. Our local installations also used Docker containers managed by docker-compose, for installation on industrial PCs on factory floors.
  - **Flutter** - As part of a research collaboration between Metis Labs and Entolab I developed a cross-platform mobile app for collecting data from mealworm farms, including on-device execution of computer vision models for automatically detecting properties of worm trays.
    I'm the main author of Baby Elephant, an open source smartwatch client for the Mastodon federated social network.
  - **Qt** and **QML** - I was the lead developer on the Ubuntu on-screen keyboard and contributed to the Ubuntu Web Browser, both core components of the Ubuntu Touch platform, which had their user interfaces developed in QML with Qt based C++ back-ends.
    In the past I also developed a number of other Qt applications for Nokia's MeeGo platform including a client for the StatusNet/GNU Social micro-blogging platform; Rockwatch, an application for interacting with a Pebble smart watch and Erudite, which made it possible to use the Amazon Cloud Reader to access Kindle books on mobile platforms not otherwise officially supported by Amazon. I also developed TizMee, a Cordova based compatibility layer allowing Tizen applications to run on MeeGo (and potentially other Qt based mobile platforms).
  - **C++** - At Metis Labs I created a laser profiling solution for brick factories using Gocator lasers. This was able to automatically determine the properties of new products, take measurements, provide visualisations and detect defects prior to the bricks entering the kiln (detecting issues at this early stage of the process results in significant CO_2 savings, as the bricks are typically in the kiln for between 2 and 5 days at temperatures around 600°C).
    Many of the applications mentioned in the Qt section were developed in C++ (with the exception of the StatusNet client and Rockwatch which were both developed in Python). I also developed an omnidirectional camera system for the Gazebo 3D robotics simulator, duplicating the distortion of a physical hemispherical mirror based camera.
  - **C** - I wrote a collection of drivers for the Player robotics framework to handle image processing tasks and to control Adept robot arms and I've also written a number of elements for GStreamer in C (described below).

  - **GIS/Mapping** - I developed a sea based navigation and collision warning system for eOceanic's mobile app, including a custom map processing pipeline allowing them to display Admiralty charts anywhere that supports OpenStreetMap tiles (Qt's map widget, LeafletJS, etc.)
  - **GStreamer** - I developed plugins for computer vision tasks within the GStreamer multimedia framework, based around OpenCV, these are now included as part of the upstream project. I also created elements for performing speech recognition using Mozilla's DeepSpeech model and created an element for rendering MusicXML documents to MIDI (which can then be synthesised by GStreamer's existing MIDI elements).
  - **PHP** - I implemented a range of customisations and helped to optimize the Horde and Kolab groupware systems for use by a number of departments within the German government. I was also a core developer on the GNU FM music community system, which powers Libre.fm and is written using PHP and the Smarty template engine.
  - **SQL** - I've worked with both ORM systems (such as SQLAlchemy and Django's ORM) and direct SQL. Using MySQL, PostgreSQL and SQLite, and in the case of my work with Metis Labs dealing with large data sets.
  - **NoSQL** - I designed and implemented DynamoDB tables for customer configurations, machine learning model metadata and dashboard layouts for Metis Labs' analytics platform.

- *Personal Skills*
  - **Team working** - I've worked in a number of both remote and globally distributed teams; commercially at Metis Labs and Canonical and as part of free/open source software projects. I've also worked on two large European research projects, ROSSI and IM-CLeVeR. The research projects and my work at Metis Labs and Canonical both involved international travel for on-site work with clients, meetings and conferences.
  - **Presentational skills** - At Metis Labs I've created a number of video tutorials for customers, explaining advanced features of our products. I've given short talks about my research at various academic conferences and I've also spoken about the GNU FM project at the FOSDEM free/open source software conference.
  - **Mentoring experience** - I've mentored students as part of the Google Summer of Code program, working on both the Jokosher audio editor and the GNU FM music sharing platform, and worked as a personal tutor for undergraduate students at Aberystwyth University. I also created public video tutorials for application developers, explaining various aspects of Ubuntu Touch development.

Education

- **Ph.D., Developmental Robotics**
  2008 - 2012
  Aberystwyth University

- **BEng, Software Engineering**
  2004 - 2008
  Aberystwyth University
  First class

References

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