RAJAT RASAL

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EDUCATION

Imperial College London
MEng Computing
Sept 2017 - July 2021
Achieved 2:1 at the end of the 1st year

Ilford County High School
Secondary School, one of the top boys grammars schools in the UK.
Sept 2010 - July 2017

- A level - 3 A*, 2 A : Mathematics, Physics and Computing, EPQ (research project) and Further Mathematics.
- GCSE - 12 A*, 1 A, 1 A* with Distinction in Further Mathematics

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WORK EXPERIENCE

Devito Project Research Group @ Imperial College London
Software Research Intern (July-Sept 2018)

- Implemented **mini-batch gradient descent with TF and Sklearn** to solve inversion problems in which gradient calculations are performed by the Devito engine.
- Optimised performance by using different gradient descent optimisers and fine-tuning hyper-parameters using **Bayesian optimisation techniques**, using the Oscar, Tune and HyperOpt libraries.
- Used Dask to distribute each shot calculation within Docker containers over a Kubernetes cluster hosted on Minikube and the Google Kubernetes engine on Google Cloud Platform.
- My findings are being used as tutorials for Devito users and extensions of it are being presented by the Devito Project group at conferences. **My work has contributed to various academic papers, in which I will be a co-author**.

PythonAnywhere (Python web-based startup)
Intern (Aug 2016)

- Took part in a number of pair programming projects: 1) redesigning the layout for the quickstart guide using JS and Bootstrap, 2) linking pages hosted on the help server to a live PythonAnywhere IDE 3) replying to support emails from users regarding all parts of the PythonAnywhere development stack
- Used **agile development methodologies for development** : pair programming, extreme programming, TDD, CI, IID.

Bank Of Tokyo Mitsubishi
Intern (Aug 2015)

- Improved their internal web portal design using HTML, CSS and Javascript.
- I was commended for my ability to quickly understand the workings of the ServiceNow tool, with my work being approved for deployment by management.

TECHNICAL SKILLS

	Proficient in	Comfortable with	Exposed to
Languages and Technologies	**Python 3.4-3.7**; HTML5 + CSS; **Java 8-10;**	**C**; **Bash**; Django; **SQLite; Tensorflow + Scikit-Learn;** C++11-14; **Docker;** Git; Javascript; JQuery w/ AJAX; Bootstrap; Haskell; **TDD** with JUnit4+, Mocking and pytest; Multithreading in Java;	**Keras;** NodeJS; **Kubernetes -** minikube, dask/ dask_kubernetes; **Google Cloud Platform and Google Kubernetes Engine;** Scratch; Prolog;
Software and Tools	**Jupyter Notebooks;** VIM; Slack; Github; GitLab;	Intellij IDE; Latex; Markdown; TMUX	Android Studio; Wireshark; ServiceNow; Github Pages; Gradle

NOTABLE PROJECTS

PintOS (Sept 2018 - Dec 2018)

- **Optimised/developed key features of a simple OS framework for the 80x86 architecture in a small team using C**.
- The main features we implemented include: 1) system timer for sleeping threads, 2) priority scheduling with donations, 3) MLFQS scheduling, 4) system calls, 5) user programs in C and Bash using the implemented system calls, 6) virtual memory.

ARM11 Assembler and Emulator (May 2016 - Jun 2016)

- Created an assembler and emulator for the ARM11 assembly language using C to run on a Raspberry Pi.
- Set up registers in the emulated Pi memory to control GPIO pins in order to control circuits using ARM11.
- **Used conductive paint with the Pi to create a handsfree music control box** which allowed you to pause, play, change volume and shuffle between songs using hand gestures without having to touch the surfaces of the box.

Web Based Cricket Scorecard (Jan 2016 - Apr 2016)

- Used Django to create a web based cricket scorecard app to record cricket match data.
- Used Bootstrap and AJAX to build responsive web pages which were suitable for mobile devices.
- Used Node.js server to post live score updates to Twitter and used aggregate SQL queries to produce live in game statistics.

Other Projects

- (Apr 2018) - Led 1st year group research project on **cloud computing with Tensorflow**, Spark and MapReduce; **we won the 2nd place prize overall.**
- (Dec 2018) - **Predicted Stocks Movements based on Sentiment Analysis (NLP)** of Trump's Tweets in King College London Annual Hackathon using Word2Vec and Deep Stacked RNNs, **won runner up in Capital One Financial Challenge.**
- (Oct 2018) - Performed a detailed analysis and made predictions on the **UK Road Accident's dataset for Imperial AI Hack 2018,** using Random Forests Classifiers and Regressors, PCA, and simple Neural Networks.
- (Aug 2018) - **Multivariate RNN to make Bitcoin time series predictions** using Keras, ARIMA and Facebook's Prophet.
- (2016) - Browser security research project - used Kali Linux tools to explore developments in web security, focusing on SQL injection, XXS, HTTPS and SSL and click-jacking. Basic understanding of TCP/IP networking.
- (2015 - onwards) - Using Bootstrap, JQuery, JS to make mobile-friendly, responsive webpages for friends and family.

ACTIVITIES AND INTERESTS

Extra-Curricular Interests

- (2018 - onwards) - **Data Science & ML** - attended **Cambridge Spark Data Science courses at JP Morgan and HSBC**, ML course at Bloomberg, **Imperial AI Hack**, AI academy in Imperial Data Science society, **Kaggle Competitions,** King College London MedTech Society, **Kings College London Annual Hackathon,** Google DevFest 2018.
- (Mar 2017) - Imperial Robotics Society - Raspberry pi programming and robotics course.
- (Sept - Nov 2017) - **Department of Computing Society education scheme -** teaching weekly coding lectures to non-computing students.
- (2015) - **Taught programming at local primary schools** - ran after-school computer science course at a local primary schools, teaching year 5/6 students programming techniques in Python and Scratch. Won the **Jack Petchey Award**.
- (2018 - onwards) - Blockchain - Solidity introduction course hosted by Bloomberg, entered Future of Blockchain competition

Awards

- (Dec 2018) - **Runner up in Capital One Financial programming challenge** in Kings College London Annual Hackathon
- (Apr 2018) - **Imperial College corporate partnership programming prize for projects** in topics in Computing (1st Year)
- (Apr 2018) - **Imperial College partnership programming prize for presentations** in topics in Computing (1st Year)
- (Dec 2015) - Bebreas Higher Computational Thinking Challenge - Distinction Award
- (2015) - Royal Society's Bronze Crest Award for Physics

Hobbies

🏏 Played semi professional county cricket for Essex and the Essex academy; 🎻 Played the violin - attained ABRSM Grade 5 exam.

REFERENCES

Dr Paul Kelly - p.kelly@imperial.ac.uk (reference below); **Dr Gerard Gorman** - g.gorman@imperial.ac.uk (available on request)

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02 December 2018

Paul H J Kelly, PhD
Professor of Software Technology

Re: Mr Rajat Rasal

I lead Imperial's Software Performance Optimisation research group, and I teach on our second-year Compilers course, and our graduate-level Advanced Computer Architecture course. I have known Rajat since he started his studies here, in October 2017.

My research work is in domain-specific performance optimisations, to achieve more effective automated performance optimisations than compilers for general-purpose languages can achieve, while maintaining a high level of expressiveness and abstraction for the application developer. A key aspect of our work is performance portability – enabling a single body of source code to run efficiently on diverse computing platforms, including clusters of vector multicore CPUs as well as GPUs. Major projects include Firedrake and Devito, which target solution of partial differential equations, and SLAMBench, which targets realtime 3d scene understanding.

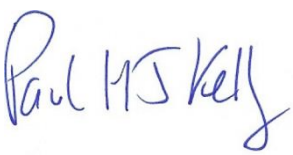
Rajat did really well in his first year, and on the basis of his exam performance and his contributions in our weekly small-group programming tutorials, I recommended him for a summer internship, through our Undergraduate Research Opportunities Programme, with my colleague Dr Gerard Gorman.

Rajat contributed to Dr Gorman's Devito project, and quickly became an active and valued participant in the project's online Slack discussion forum. He had an amazing summer – making exceptional progress in reproducing the results in a research paper on using Tensorflow to formulate the seismic inversion problem. Along the way, he integrated Devito into Tensorflow and extracted the resulting dataflow graphs so that he could then schedule their execution in a cloud facility. His work is now being followed up by a Masters student, and the fruits of his pathfinding work have proven invaluable in talking about Devito with industrial collaborators.

Rajat is evidently an extremely talented software engineer, with growing experience and discipline that already exceeds that of many more senior students. I have been advising him on internship opportunities for summer 2019 – he is clearly driven by a desire to learn. I am happy to be able to recommend him to you without reservation.

I confirm that Rajat's English is entirely satisfactory, and that he has always proven straightforward and reliable.

Yours faithfully,



Paul H J Kelly