Michael Gillan

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EXPERIENCE

IMPROBABLE DEFENCE
Software Engineer, Simulation Execution | Sep 2019 - Present

- Part of the team responsible for designing and developing a simulation engine to enable high-fidelity synthetic environments at large scale. Primarily working in a large **C++** codebase. The simulation engine supports real-time and faster-than-real-time simulations, made of composable agent-based models, to recreate complex systems within the real world.
- Took ownership of large parts of the system design, including the implementation of **Query-Based Interest** , a complex system for managing the dependencies between components in an ECS environment, allowing for high-density simulations without excessive compute or network usage.
- Part of small number of engineers chosen to support our top priority project, adapting our platform and runtime to support real-time, interactive simulations with network-connected game clients
- Seconded into the project as part of a small tiger team to enable increased scaling of agent-based models. Optimised **Python** and **Cython** code for performance improvements at a much higher entity count.
- Created and extended services in **Kotlin** and **Go,** and orchestrated them with **Kubernetes**
- Ran interviews independently, including our system design interview, for a large number of both campus and senior hires

IMPROBABLE
Software Engineering Intern | Apr 2018 - Sep 2018

- Created and extended services in **Go** to manage deployments on the SpatialOS platform. Implemented **gRPC** APIs and generated client libraries to interact with them.
- Inaugural member of a team creating backend services, such as matchmaking and lobbying, for games developed on SpatialOS. Responsible for creating and managing infrastructure for Mavericks, a battle royale game.

ORPIVA
Research Fellow | Oct 2017 - Feb 2018
Deep Learning Research Intern | Jul 2017 - Oct 2017

- Internship researching and creating machine learning models to solve a number of classification problems. One model **improved classification recall by 48 percentage points** over the previous heuristic model.
- Gained experience using various tools and techniques for deep learning, such as **Caffe** and **PCA**
- Independently managed two large projects with open-ended specifications, and incorporated these projects into a microservices architecture.

EDUCATION

IMPERIAL COLLEGE
MEng in Computing | First Class Honours | Grad. June 2019

Final Year Project: Designed a polymorphic type system for the language Pony using constraint-based generics combined with deny capabilities and actor-based execution

Notable Courses: Deep Learning, Distributed Algorithms, Machine Learning, Networks and Communications, Operating Systems, Probabilistic Inference, Scalable Systems for the Cloud, Simulation and Modeling

PROJECTS

METAMATCH
Jun - Jul 2017 | Java, Typescript, SQL

A real-time, match-making application for multiplayer games. Backend written in **Java** with REST API and socket server for real-time interactions between users. Interactive frontend written in **Angular2** and **Typescript**

PINTOS
Dec 2016 - Mar 2017 | C

Extended a basic operating system framework written in **C** for the x86 architecture, implementing **threading, user programs, system calls, and virtual memory** . Developed and applied knowledge related to **concurrency, scheduling, and paging** .

WACC COMPILER
Oct - Dec 2016 | Java

Compiler for WACC into ARM11 instructions, written in **Java** using the ANTLR toolchain. Extended specification to add **function overloading,** and added several compile-time optimisations, including **control flow analysis** and **constant propagation** .

GENTLY DOWN THE STREAM
Jun 2016 | C

Created a 3D boat racing game in C to run on the Raspberry PI. Implemented the **GJK algorithm** for 2D collision detection, a large part of our **custom, rigid-body physics engine** . Created a controller using the Pi's GPIO pins.