Ethan Dsouza

MEng in Electronics and Information Engineering Candidate
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Penultimate-year Electronics and Information Engineering student with strong programming foundations and hands-on experience building software systems from embedded controllers to cloud infrastructure. Passionate about defence technology and collaborative problem-solving. Seeking a summer software internship to contribute to real-world defence challenges while learning from experienced engineers.

Core Technical Competencies

Category	Skills & Tools	Relevance
Programming Languages	Python, C++, C90, SystemVerilog	Strong multi-language foundation
Databases & Data Systems	PostgreSQL, AWS RDS MySQL, Real-time data streaming	SQL experience with distributed systems
Embedded Software	FPGA (Nios II), Motor control, Sensor interfacing, Real-time constraints	Low-level systems programming
System Architecture	Distributed systems, Cloud (AWS EC2), Backend APIs (Flask), IoT pipelines	Full-stack system design
ML Systems	TensorFlow, Supervised Learning, Model optimization, Data processing	ML fundamentals and workflows
Development Practices	Git, Testing (testbenches), Agile collaboration, Code reviews	Team-based software development

Project Spotlight:

1. Custom RISC-V Processor Implementation:

- **Focus**: Digital Logic Design, Processor Architecture, Verification**.** Implemented a fully pipelined RISC-V processor in System Verilog, achieving a top 5 ranking in a competitive cohort.
- **Technical Design (Pipeline Architecture)** The design utilizes a classic 5-stage pipeline to maximize instruction throughput and minimize clock cycles per instruction (CPI). The architecture handles data and control hazards through integrated Forwarding Units and Hazard Detection Unit.
- **Responsibilities:** Led pipelining implementation, designed the Program Counter path for branching/jumps, Forwarding Units and Hazard Detection Unit, and testbenches for functional verification.

2. C90-to-RISC-V Compiler Development

- **Focus:** Low-Level Software, Language Translation, Processor Interfacing. Built a C90 compiler targeting RISC-V assembly using C++, Flex, and YACC, implementing key language constructs.
- **System Design (Compiler Toolchain Pipeline)** This pipeline illustrates the critical stages of language translation, highlighting experience with lexical analysis (Flex) and parsing (YACC) to generate optimized, platform-specific (RISC-V) assembly code.
- **Responsibilities:** Responsible for integrating Flex/YACC for front-end processing and developing the C++ back-end logic for functions, parameters, types, and pointer management.

3. FPGA Online Multi-player Game

- **Focus**: Hardware-Software Integration, Networking, FPGA I/O. Built a two-player online Space Invaders game utilizing FPGA-based controllers with real-time gameplay hosted on EC2 web server.
- **System Design**: We engineered a three-layer distributed control loop to handle the real-time demands. the FPGA (Nios II) handles I/O and filtering, while the Unity client processes actions into WebSocket packets, and the hub acts as a real-time traffic cop to sync players and enforce logic.
- **Responsibility**: Actively involved in developing both the game logic on Unity and the underlying hardware implementation for the FPGA controllers using the buttons and accelerometer

4. Multi-Sensor Data Fusion and Remote Control (Rover Project)

- **Focus:** Signal Processing, Data Fusion, Low-Bandwidth Telemetry
- Designed and built a rover that performs multi-domain signal detection (Infrared, Ultrasound, Radio Frequency) and streams fused data to a remote application.
- **System Design (Signal Processing Pipeline)** This architecture demonstrates handling raw signal inputs and utilizing a low-overhead protocol to stream only critical, processed telemetry (commands and processed data) to the front-end application for visualization and control.
- **Responsibilities:** Implemented rover motor control, managed multi-domain sensor acquisition, and developed the data streaming interface to the remote application front-end.

5. Data-Driven Energy Optimization for Smart Grids

- **Focus:** Cloud Backend, Predictive Optimization, Resource Management. Developed the backend AWS server and implemented an energy trading algorithm that optimized energy costs by forecasting demand, leveraging deferrable loads, and dynamic response to prices and supercapacitor reserves.
- **Algorithm:** The core algorithm implements Price-Aware Resource Management. It uses Dynamic Price Thresholds (based on historical data) to conduct Supercapacitor Arbitrage. It also applies Deadline-Aware Scheduling to fulfil deferrable loads only when the price is low or the deadline is imminent, effectively minimizing operational cost and ensuring supply.
- **Responsibilities:** Responsible for developing the low-level C++ back-end logic (functions, parameters, types, pointer management) and operating the Python/Flask backend to fetch real-time data, perform the calculations, and log all historical energy metrics to the AWS RDS MySQL database.

Education and Other Experience

Imperial College London 2023 - 2027

- MEng in Electronics and Information Engineering
- Achieved a 2:1 in both Year 1 and Year 2 of studies
- Societies & Activities – Robotics Society, University Badminton 1st Team

Sir William Borlase's Grammar School 2016 - 2023

- A*A*AA in Mathematics, Chemistry, Physics, Further Mathematics respectively
- 9s in Maths, Additional Maths, Physics, Chemistry, Biology, Comp. Science, Design & Technology

Online Learning:

- Algorithms Part 1 by Princeton University Coursera - learnt fundamental data structures and algorithms like union-find, sorting, searching and exploring efficient implementations of key data types (e.g. stacks, queues, symbol tables, and hash tables) and apply them to practical problems
- Machine Learning Specialization Coursera - Coursework included supervised learning (linear/logistic regression, neural networks), model evaluation and tuning, and tree ensemble methods (decision trees, random forests, boosted trees).

Other Experience

- Optiver Trading Academy (2025) – Attended a 3-week in-person trading course focused on market making and options trading
- McDermott International, Ltd (2022): Shadowed engineering disciplines; gained exposure to LNG process plant operations and the use of Electrical Drawings and P&ID diagrams.
- Tata Consultancy Services (2025): Spring insight program focused on consultancy and future of AI.
- Code Ninjas (2022): Tutored young kids in programming.