

# Sammy Koujah

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## Education

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### University of California San Diego

June 2024

Bachelors of Science, Computer Engineering

Curriculum: Digital IC, Computer Microarchitecture, Operating Systems, RTL Design, Software Engineering, Object-Oriented Programming, Data Structures, Algorithms, Control System Theory

## Skills

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Languages: SystemVerilog, C/C++, assembly, Java

Tools: Quartus, Altium, Cadence, Git, Linux, Verilator, GTKWave

Personal: problem solving, communication (verbal and written), team oriented, self-led research

## Projects

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### Superscalar CPU Core

Verilator | SystemVerilog | GTKWave

- Implemented 2-way superscalar execution and branch prediction on MIPS processor to achieve 15% speed-up across 4 benchmarks
- Designed and simulated processor using Verilator and GTKWave in linux environment to create CPU core synthesizable on FPGA

### Avionics Bay PCB

PCB | Microcontrollers | Embedded Systems

- Designed microcontroller interface board, in Altium, to connect all sensor data to Arduino microcontroller
- Implemented and tested prototype circuits connecting sensors to microcontroller with I2C, SPI and UART before PCB fabrication
- Communicated between avionics subteams to design interfacing of flight system hardware

### Cooking Recipe Generator App

Java | MongoDB | HTTP

- Collaborated with team to design AI powered cooking app whilst executing Agile development methodology
- Utilized mongoDB and OpenAI APIs to implement database and generate recipes through generative-AI
- Utilized JavaFX library for frontend development, and programmed HTTP server to handle backend requests
- Implemented continuous integration testing on github to streamline development process and improve productivity

### Pinball Machine Microcontroller

Microcontrollers | Analog Circuits

- Designed full system schematic of pinball machine microcontroller and all peripherals, used to integrate hardware subsystems with microcontroller software
- Designed analog RC, transistor and op-amp circuits for each subsystem, tested using oscilloscopes and voltmeters
- Programmed microcontroller in C++, making use of finite state machines and interrupts, to control sensors and actuators

### Custom ISA Microprocessor

SystemVerilog | Quartus | QuestaSim

- Conducted research on pros and cons of various Instruction Set Architectures (ISAs)
- Designed an ISA specialized for encoding/decoding Hamming code, implementing 5-stage microprocessor design in SystemVerilog
- Programmed microprocessor in newly designed assembly language, assembled code using Python script

## Campus Involvement

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### Avionics Hardware - Rocket Propulsion Lab

Sept 2023 - Present

- Implemented analog and digital circuit for rocket's onboard avionics system, designing PCBs for embedded hardware using Altium
- Collaborated with team to design full system model of avionic system, communicating between subteams to troubleshoot problems
- Designed hardware schematics for microcontroller unit, implemented peripheral communications including I2C, SPI and UART

### Project Team - Biomedical Engineering Society

Nov 2022 - June 2023

- Researched robotic system design using microcontrollers and EMG sensors (muscle activation sensors)
- Designed and implemented analog circuit filters to read and amplify voltage signals from human muscle activation
- Programmed, in C, microcontroller to operate actuators, controlling robotic arm in response to muscle activation