Joshua Antu Kannappilly

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EDUCATION

University of Notre Dame — Notre Dame, IN
Bachelor of Science — May 2028
Major: Electrical Engineering | Concentration: Semiconductors & Nanotechnology — *GPA: 3.95/4.00*

EXPERIENCE

Midi Synthesizer - *Individual Project* — Jul 2025 – Aug 2025

- Engineered a Midi Synthesizer, interfacing an ESP32 microcontroller with a USB Host Shield, PCM5102A DAC, and PAM8403D amplifier to drive dual 40mm speakers, enabling digital piano connectivity.
- Designed and routed a custom PCB in KiCad to integrate all components, optimizing for signal integrity and component layout for the compact synthesizer.
- Developed C++ firmware for the ESP32, implementing software-defined waveform generation for sine, square, triangle, and sawtooth waves, alongside real-time MIDI processing and polyphonic voice management.

IrishSat - *Power Electronics Team and Shamrock Electrical Project Member* — Jan 2025 – Present

- Designed and tested a custom Battery Management System (BMS) PCB in KiCad using the BQ28Z chip to manage a 2S2P lithium-ion pack, with an I²C fuel gauge interface to the Power Control Board for state-of-health monitoring.
- Identified design flaws during board bring-up, including mismatched I²C logic levels (1.8V vs 3.3V) and the need for a secondary protection IC; currently leading a complete redesign for next-generation flight readiness.
- Implemented a custom magnetorquer wrapping system utilizing an Arduino microcontroller and stepper motor control, enabling precise attitude control for the satellite.

Bernstein Lab, University of Notre Dame - *Undergraduate Research Assistant* — Sep 2025 – Dec 2025

- Modernized a legacy Python library for the Newport SMC100 controller, implementing ESP-error handling and translating raw encoder counts into high-precision angular units (0.001° resolution).
- Integrated customized motion control drivers into the QCoDeS measurement framework, utilizing hardware abstraction to automate data logging into a centralized SQL database.
- Engineered a 2D "snaking" raster scan algorithm for Thorlabs Kinesis motors, optimizing spatial mapping efficiency and reducing mechanical wear for future LWIR thermal imaging.

CookieChimp - *Software Engineering Intern* — May 2024 – Aug 2024

- Developed an automated test suite for GDPR and CCPA consent banners, ensuring proper functionality and accurate consent data handling using Capybara with Selenium.
- Implemented a user onboarding survey to gather insights on user demographics and behavior, integrating Slack API to send survey results to the onboarding channel.
- Created a timeframe filter to display user consent data with dynamic date grouping (by day, month, or year) based on the selected period, utilizing Tailwind UI for responsive styling.

LEADERSHIP & ACTIVITIES

University of Notre Dame — Notre Dame, IN
Small Event Coordinator | *South Asian Student Association* — *August 2025 - Present*

- Organize over 20 cultural events annually, collaborating with 9 other board members to build a stronger sense of community and belonging among club members and introduce South Asian culture to different ethnicities.

TECHNICAL SKILLS

Hardware: PCB Design, Schematics, Embedded Systems (Arduino, ESP32, Raspberry Pi)
Programming: Python, C, C++, SQL, MATLAB, Ruby, JavaScript, RTOS, Serial (I²C, I²S, SPI), Automated Testing
Other: KiCad, Pandas, Matplotlib, Git, GitHub, Linux, SolidWorks, Rails, Automation Tools, Troubleshooting, Excel