

Zach Norvell

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U.S. Citizen | Eligible for U.S. security clearance

Professional Summary

Pursuing an M.S. in Electrical Engineering. Engineer in Charge at Texas A&M Athletics' 12th Man Productions, leading live-broadcast engineering for Texas A&M athletics. Hands-on experience in digital design, VLSI design, FPGA development, Verilog, C++, embedded systems, network infrastructure, fiber optics, hardware security, reverse engineering, and software systems development.

Technical Skills

Programming: C / C++, Python, Verilog, Java, JavaScript / TypeScript, ARMv8 Assembly

Hardware & Electronics: VLSI layout (Cadence Virtuoso), Digital logic / RTL design, Analog circuits (BJT, MOSFET, op-amps), ESP32, Raspberry Pi, FPGA, Oscilloscope, DMM, function generator, Soldering, SolidWorks

EDA, Simulation & Design: Cadence Virtuoso, LTspice, Multisim, Git / GitHub, Linux, Docker / Docker Compose

Networking: OSI model, TCP/IP, UDP, HTTP(S), DNS, Routing, Switching, VPNs, Firewalls

Broadcast: Fiber optics, SMPTE, SDI, RJ45, XLR, AWS Elemental Live, EVS Cerebrum, Grass Valley camera systems

Security: Binary exploitation, Applied cryptography, Web security

Professional Experience

Texas A&M Athletics - 12th Man Productions — College Station, TX

Engineer in Charge (EIC) | Broadcast & Solutions Engineering | 2024 - Present

- Promoted to Engineer in Charge, the highest student engineering position, leading live-broadcast engineering operations for Texas A&M athletic events.
- Route and manage video/audio sources across control room multiviews, camera returns, and recording pipelines during live productions.
- Support broadcast systems, camera and fiber optic infrastructure, and live production operations through setup, maintenance, troubleshooting, and system integration.
- Design and develop technical solutions and custom production hardware, including 20+ 3D-printed components designed in SolidWorks.

Projects

Professional / Work Projects

Broadcast Recording Automation Platform (In progress) — Next.js, Python, PostgreSQL, AWS Elemental Live, EVS Cerebrum

- Orchestrates automated game recording across AWS Elemental Live and EVS Cerebrum from a centralized request and configuration interface.
- Integrates the ESPN API to automatically detect scheduled games, create and name recording events, and generate configuration files from game metadata.
- Designed strict network isolation between internet-facing services and broadcast equipment to prevent direct external access.

Control Room Scheduling Automation — Next.js, TypeScript, Turso, Vercel, Raspberry Pi 5

- Ingests When-I-Work ICS feed and ESPN game data; drives 4 Raspberry Pi DAKboard displays with live per-panel crews.
- Replaced manual schedule populating and panel routing across 60+ games per season.
- Admin dashboard allows for live schedule overrides and crew assignment changes; all changes reflected in real-time across all displays.

NCAA Archive Automation — Google Apps Script, ESPN/NCAA APIs

- Automated update of Texas A&M game broadcast archive documentation in Google Sheets, filling box scores, game locations, and opponents.
- Reduced manual entries from 10,000+ to under 500 by integrating multiple public sports APIs.

Academic Projects

Smart Garage Parking System (Senior Capstone sponsored by FLUOR) — C++, Python, LiDAR, OpenCV, FastAPI, React

- Led development of an assisted parking system using LiDAR-based space detection, vehicle tracking, and Bezier-curve path planning to provide real-time parking guidance.
- Designed and 3D-modeled a LiDAR/Raspberry Pi housing and tripod-mounted sensing unit; implemented high-frequency LiDAR data collection with UART connectivity.
- Developed computer vision algorithms to detect and model garage walls from LiDAR point clouds and created real-time vehicle tracking using bumper point clusters.
- Integrated the system with FastAPI and React to provide a live interface for guidance feedback as the user is parking.

8-Bit Pipelined Adder — Cadence Virtuoso

- Designed Inverter, NAND2, and XOR2 standard cells from logic schematics through transistor-level physical layouts using metal and polysilicon; verified with DRC and LVS.
- Applied a hierarchical design flow to integrate standard cells into full adders, 4-bit adders, and an 8-bit pipelined adder.
- Validated functionality and timing through hierarchical testbench simulations.

ARMv8 Single-Cycle Processor — Verilog, Linux

- Designed and implemented a single-cycle ARMv8 processor in Verilog, integrating the control unit, ALU, register file, memory, and sign extender.
- Implemented support for the ARMv8 instructions LDUR, STUR, ADD, SUB, AND, and OR.
- Developed and debugged the processor in a Linux environment using the command line and Emacs.

Personal Projects

Salvaged Stadium LED Panel — ESP32, Wireshark

- Reverse engineered a proprietary NovaStar Ethernet control protocol using Wireshark and analyzed communication between the controller and LED receiving hardware.
- Developed an ESP32-based interface to investigate direct control of the panel's HUB interface and characterize its communication protocol.

Gym Timer IR Controller — ESP32, C++, NEC IR protocol

- Reverse-engineered a salvaged gym timer's proprietary IR command set through systematic NEC protocol analysis and command-space testing.
- Designed and built a discrete transistor IR driver circuit and ESP32-based Wi-Fi controller for remote timer operation.

Education

M.S., Electrical Engineering — Texas A&M University, College Station, TX | Expected 2027

B.S., Computer Engineering, Minor in Mathematics — Texas A&M University, College Station, TX | May 2026

- GPA: 3.96/4.00 — Summa Cum Laude with Honors
- Electrical Engineering Honors, Dean's List, Kroll and Chevron Scholarships

Leadership

TAMU Sports For Kids — *President / Chairman* | Current

- Coordinate organization members, event logistics, and organizational partnerships to deliver youth sports opportunities.

Academic Papers

- **Review of ICSREF: Automated Reverse Engineering of Industrial Control Systems Binaries** — Embedded Security coursework (2025)