# JOSE RAYOS

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Available Spring/Summer 2027 | Continuing M.S. EE through May 2028

Project Portfolio: www.joserayos.com

## EDUCATION

**Texas Tech University** — Lubbock, Texas
B.S. Electrical Engineering | **GPA: 3.69** — December 2026
M.S. Electrical Engineering — Est. May 2028
**Areas of Interest:** RF Systems, Avionics, Analog Circuit Design, Communications Systems
**Relevant Coursework:** Analog IC Design (Grad Level), RF Project Lab, Advanced Electronics, Communication Systems

## EXPERIENCE & RESEARCH

**Texas Tech Pulsed Power and Power Electronics Lab** — August 2026 – Present
*Undergraduate Research Assistant | Advisor: Dr. Bayne*

- Investigating parallel combination of **Class E switching amplifiers** to scale RF output power beyond what a single device delivers while preserving **drain efficiency**
- Evaluated load-network and RF power-combining topologies to narrow viable architectures, analyzing **combiner loss, port isolation, and device mismatch** across candidates
- Modeled Class E amplifier behavior in **AWR Microwave Office** to build design intuition ahead of parallel-combining implementation, characterizing switching waveforms and load-network response

**Diamondback Energy** — Midland, Texas
*Automation Engineering Intern* — May 2026 – August 2026

- Assessed shutdown and **ESD system architectures (PLC-based Remote I/O)** to surface hardware reliability risks, evaluating failure modes and standardization considerations across communication architectures
- Identified a **22% cost reduction** by benchmarking **IJB against RIO architectures** in a comparative cost analysis
- Integrated and bench-validated a **DLR ring network** for Allen-Bradley devices, **verifying** redundancy and failover ahead of Sept. 2026 test battery deployment

*Facilities Electrical Engineering Intern* — May 2025 – August 2025

- Uncovered **$60,000 in potential generator cost savings** by building a power monitoring system on **Ignition SCADA and Modbus TCP**
- Authored **SOW, AFE packages, and installation plans** to scope and fund electrical panel deployments
- Partnered with field operations teams to confirm accurate data acquisition across **generator assets**, validating monitoring system deployment in the field

## PROJECTS

**137 MHz Weather Satellite Receiver (RF Front End)** - In Progress | RF Project Lab — August 2026 - Present

- Developed a **6 MHz, 4th-order Chebyshev preselector bandpass filter** for the front end of a 3-person 137 MHz weather satellite superheterodyne receiver
- Retuned the filter's air-core inductors to correct a 700 kHz center-frequency offset, **cutting vector network analyzer measured insertion loss from 8.5 dB to 4.35 dB**
- Designed and built a **double-balanced diode ring mixer** using BAT81S Schottky diodes and hand-wound ferrite baluns for **10.7 MHz IF**
- Measured **6.85 dB conversion loss** in mixer (7 dB predicted) and **30 dB port isolation** via signal generator and spectrum analyzer, beating the 20 dB target
- Next: LNA IC integration and KiCad PCB Design

**Hartley Oscillator – 40 MHz Discrete Design** | Personal Project — June 2026

- Constructed a **40 MHz Hartley oscillator** using a **2N3904** biased at about **1.8 mA** with **2.6 V** across the device from a 12 V supply
- Traced the **32 MHz** initial build to the tapped-coil **L1:L2 ratio**, then relocated the tap to correct the feedback fraction and bring the oscillator to **40 MHz**
- Measured **40.1 MHz (0.25% error)** at **1.79 Vpp** on an oscilloscope, cross-checking measured behavior against **LTspice** simulation

**Python FM Broadcast SDR Receiver** | Digital Communications Lab (ECE 3334) — January – May 2026

- Demodulated real-time FM broadcast from raw RF by implementing a **Python SDR pipeline** that captured and processed **IQ samples**
- Applied **FIR filtering and decimation**, recovering audio through an **instantaneous phase discriminator**
- Traced distorted output to **signal clipping and antenna tuning** by visualizing IQ data, validating fixes against real-time audio
- Developed end-to-end understanding of the **RF receiver chain** from antenna to audio output through software-defined implementation

## LEADERSHIP & AFFILIATIONS

**Treasurer**, Tau Beta Pi, Texas Tech Chapter — August 2025 – Present
**General Officer**, Eta Kappa Nu (HKN), Texas Tech Chapter — January 2026 – Present
**Member**, IEEE Microwave Theory and Technology Society (MTT-S) — August 2026 – Present

## TECHNICAL SKILLS

**RF & Measurement Equipment:** Oscilloscopes, Signal Generators, Spectrum Analyzers, Vector Network Analyzers, Multimeters
**Programming & Tools:** Python, MATLAB, LTspice, AWR Microwave Office
**Circuit Design & Signal Processing:** Analog/RF discrete-component design, Oscillator design, Filter synthesis, Schematic capture, FM demodulation, FIR filtering, SDR