# BENTON H. WEIZENEGGER

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## SUMMARY

Computer Engineering B.S. (Montana State University, Winter 2025) focused on embedded Linux, FPGA/RTL, and real-time video pipelines. Built multi-camera dashcam prototype on Raspberry Pi 5 using OpenCV motion detection, FFmpeg H.264 encoding, and RTSP streaming.

## EDUCATION

**Montana State University** **Bozeman, MT**
B.S. Computer Engineering, Graduated Winter 2025
Relevant coursework: Digital Design, Computer Architecture, Embedded Systems, DSP, Feedback Controls, Computer Networks

## TECHNICAL SKILLS

Languages: C, Python, VHDL (familiar: Verilog), MATLAB, Java
FPGA/RTL: Quartus Prime, ModelSim, Avalon-MM, Linux device tree + platform drivers
Embedded/Linux: Raspberry Pi (Picamera2/libcamera), MSP430 (I2C/UART/ADC), GPIO, systemd
Video/Signal Processing: OpenCV, FFmpeg, H.264, RTSP/MediaMTX, frame differencing, thresholding
Tools: Git, Linux shell, debugging with logs/metrics, basic test automation

## SELECTED PROJECTS

**Security Dashcam (Raspberry Pi 5) - Processor Subsystem** | *Python, OpenCV, Picamera2, FFmpeg, RTSP*

- Implemented round-robin motion detection across CSI + USB cameras using grayscale downsampling and morphological cleanup to reduce false triggers.
- Built full-processing pipelines for 1080p segmented recording and 720p low-latency streaming using FFmpeg (x264 ultrafast, TCP RTSP via MediaMTX).
- Designed a race-hardened capture/stream handoff (device reservation + orderly start/stop) to avoid libcamera "device busy" failures during stream bring-up.
- Integrated IR illumination control and camera-dark metering to gate night-mode behavior and reduce power draw during idle periods.

**DE10-Nano SoC FPGA - Custom Peripherals + Linux Driver** | *VHDL, Linux, C*

- Created Avalon-MM peripherals for RGB PWM and LED patterns; defined register maps and validated behavior in ModelSim/Quartus.
- Wrote Linux platform drivers bound via device tree overlays; exposed control via sysfs attributes and a misc char device for register access.
- Integrated ADC-based duty-cycle mapping for real-time brightness control and documented memory maps and bring-up steps.

**Black-Scholes Option Pricing Deviation Visualizer (MSP430)** | *C, PWM, keypad input*

- Computed theoretical option prices and mapped deviations to an LCD/LED bar; drove RGB output via PWM for intuitive "hot/cold" visualization.
- Interfaced keypad/rotary/pot inputs and implemented confirm/reset workflows with debouncing and state management.

## EXPERIENCE

**Lead Laboratory Assistant, Montana State University** **Aug 2025 – Present**

- Support microprocessor hardware/software labs; debug MSP430 I/O, serial protocols, and timing issues with students.
- Develop short reference guides and example code to improve lab throughput and reduce recurring errors.

**Self-Employed Carpenter, Weizenegger Construction** **Dec 2023 – Present**

- Manage client jobs end-to-end: estimating, scheduling, procurement, and quality control under tight timelines.

**Operator, Apex Asphalt** **Aug 2020 – Nov 2024**

- Led an 8-person crew and improved paving workflows; trained new hires and coordinated with customers on site constraints.

## LEADERSHIP & ACTIVITIES

IEEE Member; Competitive Jiu Jitsu; Eagle Scout