Jase Branch

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EDUCATION

University of Texas at Arlington Arlington, TX
*Bachelor of Science in Computer Science **GPA: 3.41/4.0*** *May 2024*

AI/Vision: Computer Vision, Neural Networks & Deep Learning, Artificial Intelligence

Systems: Computer Architecture, Operating Systems, Information Security

TECHNICAL SKILLS

Languages: C++, C, Rust, Python, Bash, Java
Robotics & Middleware: ROS2, Nav2, SLAM, Gazebo
Embedded Systems: STM32, ESP32, FreeRTOS, CAN, UART, SPI, I2C, MQTT
Graphics & Compute: OpenGL, GLSL, CUDA, Bullet Physics
Networking & Systems: Boost.Asio, UDP/TCP, real-time systems, sensor fusion
Tools & CI/CD: Git, CMake, Clang, Docker, Docker Compose, GitHub Actions

PROJECTS

Autonomous Drone Simulator (C++, OpenGL, Ada, Boost.Asio) Spring – Summer 2025
- Built a real-time autonomous drone simulator using Bullet Physics, custom rendering, and networked flight control.
- Emulated five onboard sensors (IMU, GPS, etc.) with **10–100 Hz asynchronous** updates.
- Measured system throughput exceeding **260 messages/sec** across the sensor and networking pipeline.
- Developed a virtual flight controller in both Ada & Python communicating over UDP with the simulation

Embedded Sensor Fusion Network (C++, Rust, FreeRTOS, STM32, ESP32) Summer – Fall 2025
- Architected a multi-node embedded system streaming real-time IMU data over CAN and Wi-Fi.
- Tuned sensor pipeline sustaining **80–90 messages/sec** with low jitter.
- Reduced packet loss from **12% to under 3%** using multi-chunk CAN packetization and queue restructuring.
- Delivered reusable CAN serialization libraries and a Rust Embassy receiver sustaining **150–170 messages/sec**.

ROS2 Autonomous Navigation Benchmark (ROS2, Nav2, Gazebo, SLAM) Fall – Winter 2025
- Built a reproducible benchmarking framework for autonomous navigation using ROS2 and Nav2.
- Automated **4 parallel** navigation trials using Docker Compose for consistent and repeatable testing.
- Collected and analyzed metrics including completion time, path length, and trajectory efficiency.

GPU Boid Simulation (C++, CUDA, OpenGL) Spring – Summer 2025
- Implemented a GPU-accelerated Boid simulation using CUDA with OpenGL instanced rendering.
- Scaled performance from **600 to 20,000 agents** at **60 FPS**, achieving a **35–40×** speedup over CPU execution.
- Optimized GPU memory layout and kernel execution for large-population flocking behavior.

OpenGL 3D Renderer (C++, OpenGL, GLSL) Summer 2024 – Winter 2024/25
- Developed a real-time 3D renderer achieving **90+ FPS** with **40+ objects** and **327k+ triangles**.
- Implemented Blinn-Phong lighting and shadow mapping using custom GLSL shaders.
- Built a scalable entity-component system (ECS) for efficient scene management.

EXPERIENCE

Team Member — UT Arlington & Bell (Textron) Flight Aug. 2023 – Dec. 2023
GPS-Denied Autonomous Drone Competition *Fort Worth, TX*
- Collaborated with a 6-person multidisciplinary team and Bell engineers on a GPS-denied autonomous UAV system.
- Reproduced, diagnosed, and debugged intermittent MQTT communication failures observed during flight testing.
- Validated subsystem interfaces to ensure reliable end-to-end data flow across onboard and ground systems.

General Labor & Odd Jobs June 2024 – Present
Various Jobs *Fort Worth, TX*
- Provided general labor support for various tasks and family needs while working on technical projects