Charlie Du

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Education

University of Illinois at Urbana-Champaign May 2025
Bachelor of Science in Computer Science *GPA: 3.82/4.0*
Relevant Coursework: Data Structures, Algorithms, Game Development, Computer Graphics, Computer Vision, Distributed Systems, Real-time Systems, Computer Architecture, Embedded Systems, Database Systems, IoT

University of Illinois at Urbana-Champaign May 2026
Master's in Computer Science *GPA: 3.95/4.0*
Relevant Coursework: Digital Agriculture, Machine Learning, Parallel Programming, Web Programming

Experience

Software Engineering Intern | *Most Outstanding Undergraduate Intern* May 2022 - Present
Brunswick Corporation *Champaign, IL*

- **Led development and deployment** of interactive boating simulators for **four consecutive Consumer Electronics Show(CES) exhibitions**, earning featured coverage in **BBC, Yahoo Finance, and AutoWeek**
- Engineered a Python sync server to manage simulation state across multiple nodes for large scale displays
- **Optimized rendering and GPU utilization** achieving a **2x performance increase** for our simlators
- Developed a **custom C++ buoyancy and physics solution** to improve simulation stability and realism
- **Created a C++ API wrapper** as an Unreal Plugin for **Kvaser's CanLIB**, enabling **hardware-in-the-loop** (HIL) communication between real boat control systems and the simulation projects
- Evaluated and implemented large-scale display technologies including nDisplay, Unreal, and VIOSO

Student Researcher August 2025 – Present
University of Illinois at Urbana-Champaign *Urbana, IL*

- Developed a parallelized **reinforcement learning** simulation for robotics using **NVIDIA IsaacGym**
- Designed virtual testing scenarios to evaluate and improve **contextual awareness** in autonomous home robots

Game Development Course Assistant August 2024 – May 2025
University of Illinois at Urbana-Champaign *Urbana, IL*

- Mentored classes of over 150 students on game programming and debugging during weekly office hours
- Managed project milestones for student teams, providing feedback on code quality and game design

Projects

Agricultural Robotics Localization | *Python, mmWave Radar, SLAM, TerraSentia+* *August - December 2025*

- Developed a **radar-first SLAM pipeline** for the TerraSentia+ platform using **Python** to enable robust autonomous navigation through dense, GPS-denied crop canopies and under-canopy environments
- Proposed a novel **Doppler-constrained** odometry approach that fuses raw mmWave radar imagery with IMU data and wheel odometry, achieving **sub-percent drift** in high-uncertainty field conditions

Blackjack Reinforcement Learning Agent | *Python* *August - December 2025*

- Trained **DQN and PPO agents** using **PyTorch** to determine optimal play and betting strategies across millions of simulated hands while accounting for variable deck penetration and house rules
- Developed adaptive reward functions to account for a larger action space, allowing the agent to consistently **outperform** traditional card-counting methods and basic strategy by identifying shifts in dealer probabilities

Flight Simulation Game | *Unreal Engine, C++, Diversion* *January - May 2024*

- Built a high-fidelity flight simulator in **Unreal Engine** to explore realistic physical simulation methods
- Implemented an **asynchronous physics calculation thread** using realistic aerodynamics equation to decouple the simulation from the render thread, ensuring stability and consistency across a wide range of framerates

Technical Skills

Languages: C++, Python, C#, Rust, JavaScript, Java
Frameworks/Libraries: PyTorch, TensorFlow, Svelte, React, Node.js, NumPy, OpenCV
Tools/Engines: Unreal Engine, Unity, IsaacGym, Docker, Git, Perforce, VIOSO, nDisplay, Blender