Qirui Fu

(+86) 13182971969 | Email: FU_Qirui@foxmail.com

Education

Nanjing University Nanjing, China
B.Sc. in Computer Science and Technology *September 2020 - Present*

- **GPA: 4.42/5.0**
- Major Courses: Digital Logic and Computer Organization(92.5), Data Structures(91), Algorithm Design & Analysis, Introduction to Computer Systems(91), Operating Systems, Formal Languages and Automata(90), Numerical Method(92), Pattern Recognition(91)

Research Experience

Meta Graphics & 3D Vision Lab, Nanjing University
Research Assistant *August 2023 – Present*

- Participated in implementing a range of fluid simulation methods, including Eulerian fluid simulation, Weakly Compressible Smoothed Particle Hydrodynamics (WCSPH), Position Based Fluids (PBF), and Affine Particle-In-Cell (APIC). The work involved applying comprehensive computational graphics and algorithmic skills.
- Conducted research on the field of multi-fluid simulation. Developing a multi-fluid simulator based on SPH and volume fraction method.

Project Experience

UAV Swarm Flight Strategy Validation Platform
Team Leader, Institute of Computer Software, NJU | Video Link *October 2022 – December 2023*

- Led the development and implementation of a Virtual-Reality platform for UAV swarm flight strategy validation, including rendering module, abstract drone module, and intermediate data server module.
- Oversaw team coordination and project management, including technical discussions, strategy formulation, and administrative tasks, culminating in the project's recognition as a national-level college student innovation project.
- Integrated a custom renderer with the motion capture system to achieve real-time rendering of real drone; developed platform structure, leaving interfaces for the virtual drone's power module.
- Obtained a platform capable of real-time flight and rendering for multiple real and virtual drones.

C - - Language Compiler Project
Individual Project | Github Link *February – June 2023*

- Developed a comprehensive compiler for C - - language, capable of converting source code into MIPS assembly code for execution on the SPIM Simulator.
- Executed the project in five distinct stages: lexical and syntax analysis using Flex and Bison, semantic analysis and type checking, intermediate code generation and optimization, and final assembly code translation.
- Implemented advanced compiler techniques, including syntax tree analysis and flow graph-based intra-block optimization, enhancing the compiler's efficiency and optimization capabilities.
- Successfully produced a functional compiler that can translates C - - code accurately and optimize execution processes.

Recognition & Training for Emergent Swarm Intelligence Behaviors
3D Renderer Developer, Institute of Computer Software, NJU *August - December 2022*

- Participated in the development of a UE5-based renderer, designed to visualize the flight effects of swarm intelligence behavior in UAVs.
- Designed C++ classes UAVs, trees, and cubes to implement rendering for corresponding objects; implemented C++ class CmdCenter to receive socket messages and manage instances of other classes.
- Developed camera management functionality; attached three virtual following cameras on each drone and allowed users to switch camera views through commands.
- Achieved the creation of a comprehensive renderer capable of dynamically visualizing flight scenes and enabling user-centric camera switching, significantly aiding in the analysis and understanding of emergent swarm intelligence behaviors.

Digital Logic and Computer Organization Experiments
Team leader, Hardware Developer | Video Link *February – June 2022*

- Led and managed the development of an interactive computer system on an FPGA development board, focusing on creating a basic computer architecture capable of executing machine instructions.
- Utilized Verilog for the development of critical hardware components including CPU, memory manager, VGA display, and keyboard input, integrating these elements to build a functional computer hardware system.
- Successfully delivered an FPGA-based interactive computer system, enabling command line control for simple computational tasks such as managing time, controlling digital tube and LED displays, and calculating expressions and Fibonacci sequences.

Honors & Awards

2^{nd} Prize, Award on Renmin Scholarship (Top 30%) *October 2021, 2022*
Honorable Mention, Mathematical Contest In Modeling (Top 21%) *January 2022*