

EDUCATION

University of Houston

Ph.D student, Computer Science

08/2020 - Present

- Instructional Assistant
- Cumulative G.P.A - 4.0/4.0
- Anticipated Graduation Date - 05/2025

University of Illinois at Springfield

Master of Science, Computer Science

01/2019 - 05/2020

- Graduate Assistant
- Graduated with honor
- Cumulative G.P.A - 4.0/4.0

North China University of Technology

Bachelor of Science, Cyber Security

09/2013 - 07/2018

- Undergraduate Research Assistant
- Cumulative G.P.A - 3.5/4.0

COURSE WORK

- **Graphic Related** - Computer Graphics, Visualization
- **Others** - Data Structures & Algorithms, Parallel Computations, Machine Learning

TECHNICAL SKILL

- **Programming Language** - C/C++, Python, R, SQL
- **Simulation Software** - SOFA, MFEM, FEniCS, Deepxde, OpenFOAM
- **Software & Toolkit** - MATLAB, VTK, Qt5, OpenGL, Blender, Libigl, L^AT_EX

EXPERIENCE

ABB Corporate Research Center

Ladenburg, Germany

Research Intern

06/2023 - 09/2023

- Created of a benchmark simulation of a lid-driven cavity problem based on the finite element method for the coupled system of Navier-Stokes equations and heat equation.
- Developed and validated improvement of sensor performance based on physical-informed neural networks.

State Key Laboratory of Information Security, Chinese Academy of Sciences

Beijing, China

Research Intern

07/2016 - 07/2018

- Attended Chinese Academy of Sciences Innovation Practice Training Program for digital watermark.
- Designed a library to manage, distribute, and store 4 TB GIF images and their property to multiple physical nodes using the Hadoop distributed file system and SQL.
- Designed an algorithm using Apache Spark to calculate the encoding rules for the 4 TB GIF image data set on 6 physical nodes and 250 GB DRAM.

RESEARCH PROJECT

Graph Neural Networks for Meshing

University of Houston, TX, USA

Geometry Modeling, Machine Learning

01/2024 - Present

- Conduct research on embedding geometric information into Graph Neural Networks (GNNs) for mesh processing tasks, such as mesh generation, smoothing, and simplification.

Hex-dominant Mesh Structure Extraction, Analysis, Simplification

University of Houston, TX, USA

Geometry Modeling, Open Source

01/2022 - Present

- Organized the individual elements into larger components, provides a coarse representation for mesh element.

- Extracted an optimized valence-based singularity graph wireframe to analyze the mesh structure, the structure provides a better internal visualization of hex-dominant meshes.
- Simplify hex-dominant mesh based on the extracted structure information.
- Write NSF funding proposal.

Hex/Quad Visualization Toolkit for Reveal Poor-quality Element

University of Houston, TX, USA

Geometry Modeling, Visualization, Open Source

11/2020 - 12/2021

- Proposed a glyph design for highlighting the small elements that have bad mesh quality. This design can effectively allow people to focus on the bad quality elements without being disturbed by the element size.
- Developed a boundary error visualization system using the UV mapping method. This system transferred 3D surface error to the plane height difference.

Wild Life Detection

University of Illinois at Springfield, IL, USA

Deep Learning

10/2019 - 05/2020

- Employed the animal images and their background images in the region proposal component to extract region candidates for the animal's location.
- The proposed method can detect wildlife animals in night images with an average accuracy of 68%. For deer, the method is 95% accurate.

Network Intrusion Detection

University of Illinois at Springfield, IL, USA

Cyber Security, Deep Learning

08/2018 - 09/2019

- Collected 246 unique exploit-payload pairs from two common operating systems.
- Converted 12597 attack network traffic data in image format, and label the region of malware.
- Trained a real-time object detection system with 99% accuracy on the dataset.

National Undergraduate Electronics Design Contest

Beijing, China

Team Leader

07/2015 - 07/2016

- Designed a real-time control algorithm for a quadcopter to control height, speed, attitude and moving based on sensor data in real time on STM32 microcontroller.
- Developed a object detection algorithm using first derivative operator on KL25 microcontroller.

National University Students Intelligent Car Race

Beijing, China

Team Leader, Director

07/2014 - 07/2015

- Designed a real-time autopilot algorithm by using proportional-integral-derivative method on KL25 microcontroller with 16 KB RAM.
- Adopted Kalman filtering algorithm to correct the path direction.

AWARD

- 2023 - DAAD (German Academic Exchange Service) 2023 RISE Professional Scholarship
- 2019 - University of Illinois Springfield Graduate with Honors
- 2017 - Chinese Academy of Sciences Undergraduate Innovation Practice Training Program
- 2016 - National Undergraduate Freescale Smart Car Contest Beijing Regional Second Prize
- 2015 - National Undergraduate Robotics Contest National Second Prize
- 2015 - National Undergraduate Electronic Design Contest Beijing Regional Third Prize
- 2015 - National Undergraduate Game Design Contest Third Prize

TEACHING ASSISTANT

- **Introduction to Immersive Technology and Spatial Computing** - Introduce students to Extended Reality (XR)(includes Augmented, Mixed, and Virtual Reality) application development.

RESEARCH ACTIVITY

- **Reviewer** - Frontiers of Information Technology & Electronic Engineering
- **Reviewer** - Computer Graphics International 2024

PUBLICATION

1. **Si, Lei** and Guoning Chen. Structure-guided hex-dominant mesh improvement. *Symposium on Geometry Processing*, On Going, 2024
2. **Si, Lei**, Haowei Cao, and Guoning Chen. Hybrid base complex: Extract and visualize structure of hex-dominant meshes. *IEEE Transactions on Visualization and Computer Graphics*, pages 1–12, 2024
3. Giulia Toti, **Si, Lei**, David Daniels, Matin Amoozadeh, Mohammad Alipour, and Guoning Chen. Students and instructors reflections on the impact of covid-19 on computer science education after one year of remote teaching. 12 2023
4. **Si, Lei** and Guoning Chen. A visualization system for hexahedral mesh quality study. In *2023 IEEE Visualization and Visual Analytics (VIS)*, pages 86–90, 2023
5. Muhammad Naeem Akram, **Si, Lei**, and Guoning Chen. An embedded polygon strategy for quality improvement of 2d quadrilateral meshes with boundaries. In *VISIGRAPP (1: GRAPP)*, pages 177–184, 2021
6. Yanhui Guo, Thomas A Rothfus, Amira S Ashour, **Si, Lei**, Chunlai Du, and Tih-Fen Ting. Varied channels region proposal and classification network for wildlife image classification under complex environment. *IET Image Process.*, 14(4):585–591, 2020
7. Chunlai Du, Shenghui Liu, **Si, Lei**, Yanhui Guo, and Tong Jin. Using object detection network for malware detection and identification in network traffic packets. *CMC-COMPUTERS MATERIALS & CONTINUA*, 64(3):1785–1796, 2020
8. Chunlai Du, Shenghui Liu, Yanhui Guo, **Si, Lei**, and Tong Jin. Detection and information extraction of similar basic blocks used for directed greybox fuzzing. In *International Conference on Artificial Intelligence and Security*, pages 353–364. Springer, 2020
9. Yanhui Guo, Amira S Ashour, **Si, Lei**, and Deep P Mandalaywala. Multiple convolutional neural network for skin dermoscopic image classification. In *2018 IEEE International Symposium on Signal Processing and Information Technology (ISSPIT)*, pages 365–369. IEEE, 2018