Lei Si

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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

TECHNICAL SKILL

- **Research Topics** - Mesh Generation and Optimization, Visualization, Computer Graphics, Computer Vision, Machine Learning, Digital Twin, UI/UX design
- **Programming Language** - C/C++, Python, R, SQL
- **Simulation Software** - SOFA, MFEM, FEniCS, Deepxde, OpenFOAM
- **Software & Toolkit** - MATLAB, VTK, Qt5, OpenGL, Blender, Libigl, LaTeX

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 a physics-informed neural network for the prediction of physical fields in the benchmark problem.
- Numerically 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.
- Developed a system for mapping any data into a set of GIF images with precomputed encoding rules.
- 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

Hex-dominant Mesh Structure Extraction And Analysis University of Houston, TX, USA
Geometry Modeling, ***Open Source*** *01/2022 - Present*
- Organizes the individual elements (i.e., hexahedra, tetrahedra) into larger components (or blocks), provides a coarse representation for mesh element.
- Extract an optimized valence-based singularity graph wireframe to analyze the mesh structure, the structure provides a better internal visualization of hex-dominant meshes.
- Writing 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 cross-platform multi-view mesh quality visualization system to analyze mesh quality globally, regionally, adjacently, and locally.
- Developed a boundary error visualization system using the UV mapping method. This system transferred 3D surface error to the plane height difference.
- Implementing a web application based on three.js for the proposed system for cross-platform access.

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.
- Covert 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.

TEACHING

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

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

PUBLICATION

1. **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
2. 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
3. **Si, Lei** and Guoning Chen. A visualization system for hexahedral mesh quality study. *IEEE VIS*, 2023
4. 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
5. 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
6. 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
7. 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

8. 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