

XIAXIN SHEN

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🌐 <https://allisonshen.github.io/>

EDUCATION

• **B.S. Computer Information Technology, Purdue University**

GPA: 3.98 / 4.0

May 2022

West Lafayette, IN 47906

RESEARCH INTERESTS

My research interests include machine learning, deep learning, computer vision, malware detection, reinforcement learning, robotics and security.

SKILLS

- **Python:** Implemented data scraping, XML files parsing, data cleaning, data analytics and model building with TensorFlow and PyTorch
- **C/C++:** Implemented data structure and algorithms by finishing about 150 problems at online judge system
- **Java:** Maintained a Java-based system using the technique of Mybatis, Maven, Spring MVC for knowledge mapping. Implemented parallel programming for operating system. Currently learning Android mobile development
- **Dynamic website development:** Implemented an e-commerce site with HTML, CSS, JavaScript, JQuery, PHP, MySQL
- **Latex:** Edited paper with IEEE/ ACM/ Springer formats
- **Git:** Version control especially for group projects
- **Hadoop & Spark:** Set up a distributed, multi-node Apache Hadoop cluster backed by the Hadoop Distributed File System (HDFS), running on Ubuntu Linux. Ran MapReduce jobs with Hadoop. Deployed Spark and ran NLP tasks with Spark
- **Tableau:** Visualized and analyzed data for illicit drugs in US in Purdue's 7th Annual ASA DataFest Competition
- **AR:** Visualized the digital twin using augmented reality based on Web for showing network information and GPS location with mobile phones when scanning images

RESEARCH EXPERIENCE

UAV Ground Scanning System: Human Detection with Deep Learning

Advisor: Eric T Matson

Team Leader in the IITP Technology Entrepreneurship Program

Jan 2021 - present

- Set up the IoT devices, including the Raspberry pi, the GPS sensor and the infrared camera sensor (more intro of the problem)
- Presented a novel human detection methodology based on deep convolutional neural network with UAV imagery
- Built and preprocessed the dataset including daytime and night infrared imaging taken from a high-altitude downward angle with Python and TensorFlow Object Detection API
- Implemented transfer learning with weights of YOLO v5 and SSD mobile net on the dataset
- Working on deploying and pushing warning messages with GPS information when human are detected when searching or rescuing events are operated

RoboMal: Malware Detection for Robot Network Systems

Advisor: Richard M. Voyles

Undergraduate Research Assistant

Mar 2021 - Aug 2021

- (problem, intro, goal) Developed the RoboMal dataset using the controller files of the publicly available autonomous car with Gazebo-based simulation for both robotic systems and simpler embedded actuator-based Cyber Physical Systems (CPS)
- Created a total of 450 binary executable and linkable format (ELF) files with 232 malware files and 218 good software files by modifying gains and scalars and manipulating the proportional-derivative (PD) control structure
- Built a bidirectional Long Short-Term Memory (LSTM) based model with embedding for identifying the maliciousness of the code with an accuracy of 85% and precision of 87% which outperforms than other methods like CNN, GRU, and ANN

Flow Simulation with CNN and Feature Extraction with Autoencoder for Airfoil Images

Advisor: Tae-Hoon Kim

Undergraduate Research Assistant

Aug 2020 - Dec 2020

- Cleaned data with Python for geometry images, data of pressure, velocity, coordinates of X and Y and constructed CSV files with those data
- Built multiple autoencoder models with geometry images and extracted features with different settings of neurons
- Implemented multiple CNN structures and trained models for getting a competitive prediction accuracy for Airfoil pressure and velocity with Python, TensorFlow, Google Colab, and Purdue's Scholar and Gilbreth computing resources

A Reinforcement Learning based Stabilization Module for Airplane Flight with Q-Learning **Advisor: Ricardo A. Calix**
Undergraduate Research Assistant *Jan 2020 - Nov 2020*

- Collaborated with 2 students to analyze and evaluate how a simulated Cessna 172 can learn to stabilize itself while in flight
- Developed and tested a reinforcement learning based methodology for airplane stabilization using Python
- Performed the analysis on X-plane 11 which is a realistic flight simulator
- Collected data and wrote results in the paper with IEEE format

COURSE PROJECTS

Twitter Scraper

Jan 2021 - May 2021

- Built a web scraping tool to obtain Twitter information by accessing and recording data from the Twitter website with Python library selenium
- Scraped information including user, handle, post dates, tweet texts as well as counts of reply, retweet and like.
- Cleaned the data and saved the data to CSV files
- Analyzed and visualized the data with Python libraires: pandas and matplotlib

Visualising the Digital Twin Using Augmented Reality Based on Web

Jan 2020 - May 2020

- Presented an application where an Augmented Reality system access the Twin Model data and display real-time information to the user
- Utilized WebAR technology for showing network status, device information and GPS location with the browser of the mobile phone when scanning images through the phone's camera
- Applied three.js, jsartokit, and ar.js to the application and utilized jQuery for the ease use of JavaScript

E-Commerce Website

Team Leader

Aug 2019 - Dec 2019

- Collaborated with 6 students to design and implemented front-end and back-end of the e-commerce website using HTML, JavaScript, CSS, PHP, MySQL
- Utilized distributed application architecture and deployed the database at the Oracle server
- Identified user requirements, drew ER, EER diagram, and created relational schema to build the database

AWARDS

- University-wide: Award for Best Visualization in Purdue's 7th Annual ASA DataFest Competition *2021*
- Undergraduate Research Grant: Reinforcement Learning Implementation in X-plane Automatic Flying *2020*
- National-wide: Top 40 and Finalist in the ITA Tech Challenge Programming Competition *2019*
- National-wide: Chinese Scholarship Council (CSC) Scholarship *2018*

PUBLICATIONS

Accepted

- Upinder Kaur, Haozhe Zhou, **Xiaxin Shen**, Byung-Cheol Min, and Richard M. Voyles. Robomal: Malware detection for robot network systems. In *2021 IEEE International Conference on Robotic Computing*. IEEE, 2021

Under Review

- David Richter, Lance J. Natonski, **Xiaxin Shen**, and Ricardo A. Calix. Attitude control for fixed-wing aircraft using q-learning

In Preparation (Draft available)

- **Xiaxin Shen**, Haeun Ko, Yeji Gong, Taeuk Gwak, Jihyeon Noh, Minji Lee, and Eric T. Matson. Uav ground scanning system: Human detection with deep learning

REFERENCES

- Eric T Matson, Professor *ematson@purdue.edu*
- Richard Voyles, Daniel C. Lewis Professor *rvoyles@purdue.edu*
- Tahir M. Khan, Clinical Assistant Professor *tmkhan@purdue.edu*