Yizhi Wang

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Education

Columbia University New York, NY
MS in Computer Engineering, GPA: 3.6/4.0 Aug 2023 – Dec 2024

- **Coursework:** Algorithms, Cloud Computing, Formal Verifications, Blockchain, Database, Computer Networks, Embedded Systems, Hardware Security, Modeling and Performance, Reinforcement Learning, Content Delivery Networks

Ohio State University Columbus, OH
BS in Electrical and Computer Engineering, GPA: 3.5/4.0 Aug 2018 – Dec 2022

- **Honors:** Cum Laude, Dean's List for SP 2020, AU 2020, SP 2021, AU 2021, SP 2022, and AU 2022
- **Teaching Assistant** of Digital Logic Jan 2022 – May 2022
- **Coursework:** Operating System, Computer Architecture, Advanced Digital Design, Software Development and Design

Research Projects

Ohio State University Columbus, OH
GAN - Adding Noise to Discriminator Jan 2022 - Dec 2022

- Developed an automated fuzzing system to enhance image quality by dynamically adding noise to the discriminator and implementing a feedback mechanism to adjust noise based on model performance, optimizing the training process.
- Created training and testing datasets in Python with defined epochs and learning rates for both the generator and discriminator.
- Monitored and analyzed loss trends to evaluate the impact of noise on the discriminator's ability to improve generated image quality.

Cornell University Ithaca, NY
Smart Cane (Assistive Technology) June 2022 - July 2022

- Developed and integrated a Robot Operating System (ROS) embedded system using Raspberry Pi to control ultrasonic sensors, vibration motors, and cameras for real-time navigation and obstacle detection for blind users.
- Implemented A* path planning and PID control algorithms using Python to optimize movement and ensure precise navigation.
- Programmed in Python to process sensor data, control actuators, and manage haptic feedback for user guidance.

Academic Projects

Columbia University New York, NY
Reinforcement Learning - Emotion Propagation Aug 2024 - Dec 2024

- Developed EmotionWorld 2D environment and optimized emotion propagation using Python and Deep Q-Network (DQN) reinforcement learning, simulating emotion diffusion in social networks.
- Leveraged DQN and graph theory to model emotion propagation dynamics, incorporating personalized emotion parameters (e.g., spread rate, duration, and radius) and utilizing experience replay and target Q-networks to train agents for optimal emotion spreading.
- Visualized the emotion propagation process in real-time with Pygame, fine-tuned the model through hyperparameter adjustments, and enhanced performance and stability through Epsilon exploration-exploitation strategies.

Columbia University New York, NY
Blockchain-based Content Distribution Verification Mechanism Aug 2024 - Dec 2024

- Designed and implemented a blockchain-based content distribution verification mechanism with Python, which integrates blockchain and Merkle Tree technologies to ensure data integrity and security in a content delivery network (CDN).
- Developed a decentralized solution utilizing Proof of Work (PoW) and Merkle Trees for real-time data validation and tamper detection, ensuring the reliability of content delivered across distributed nodes.
- Simulated a CDN network that successfully verified and distributed content, incorporating blockchain for trust and Merkle Trees for efficient data integrity checks, demonstrating robust handling of data tampering and repair.

Columbia University New York, NY
ARM TrustZone Streaming Client Project (Hardware Security) Jan 2024 - Aug 2024

- Designed and implemented a secure streaming media client using C++ based on ARM TrustZone (TZ) technology to ensure the confidentiality of video content
- Developed a Rich Application (RA) to receive encrypted video streams from the server and pass them to the Trusted Application (TA) for decryption
- Created the TA application to securely store the private key and provide video decryption functionality, leveraging the OP-TEE framework to simulate the communication between TEE and Rich Execution Environment

Columbia University New York, NY
Formal Verification (CDN Proxy System) Aug 2023 - Dec 2023

- Utilized Promela language and SPIN model checker to perform formal verification of a CDN proxy system, ensuring the security and stability of multithreaded concurrent communication.
- Validated the system's safety properties (e.g., preventing deadlocks, ensuring mutual exclusion, avoiding message corruption) and liveness properties (e.g. message retransmission), enhancing system reliability and fault tolerance.
- Designed and verified a proxy system handling multiple concurrent client requests, addressing DNS load balancing and thread synchronization issues, and used SPIN for state-space exploration to detect and resolve potential deadlocks and resource conflicts, improving system efficiency and error detection.

Columbia University New York, NY
Build An Online Job Search Platform Aug 2023 - Dec 2023

- Crafted an intuitive user interface with customizable features through the AWS Management Console with a group
- Leveraged Amazon's Simple Storage Service (S3) as the primary storage mechanism for all application data and Python as the implementation language, ensuring high security, real-time updates, and efficient data management
- Adopted a modular approach by designing and deploying different modular using AWS microservices

Ohio State University Columbus, OH
Anti-Racist: Air Quality Analysis and Awareness Project Aug 2022 - Dec 2022

- Collected particulate matter data across 14 zip code regions in Columbus, OH using GP2Y1010AU0F and KEYESTUDIO PM2.5 sensors.
- Analyzed air quality disparities between affluent, predominantly white neighborhoods and underserved, racially diverse communities.
- Built an interactive website to visualize collected data, explain project findings, and provide resources for community-led studies.

Skills and Technologies

Languages: Python, C++, C, Java, C#, SQL, Assembly, Promela, SystemVerilog, VHDL, HTML

Technologies: ARM Cortex-M, STM32, Raspberry Pi, FPGA, Robot Operating System (ROS), Oscilloscope, ARM TrustZone, OP-TEE, Secure Boot, AES, RSA, DH, Merkle Trees, Blockchain, Secure Key Storage, Git, Ethernet, TCP/IP, Pandas, NumPy, Matplotlib, AWS, GCP, Azure, MySQL, ArduinoIDE, Xilinx, MATLAB, Git, Docker, Google Colab, Jupyter Notebook, PyTorch, TenserFlow