Troy, MI (Willing to relocate)
(734)-450-0241
cuiqy@umich.edu

Qiyuan Cui

Software Developer & Cybersecurity Engineer

LinkedIn:@charly-cuiqy
github.com/CharCoding
umich.edu/~cuiqy

Education

B.S. in Computer Science and B.S. in Mathematics | University of Michigan, Ann Arbor **December 2023**
Course Highlights: Cryptography, Computer Security, Randomized Algorithms, Information Theory, Conversational Artificial Intelligence, User Interface Development, Algebraic Combinatorics, Abstract Algebra

Technical Skills

Programming Languages	C/C++, Python, JS/JSX/Node, WebAssembly, Rust, HTML5/CSS3, Go, Lisp, Mathematica, Java
Natural Languages	Chinese (native), English (fluent), Russian (intermediate)
Other Skills	Linux, Git, GPG, LaTeX, Figma, MySQL, Docker

Experience

Full Stack Developer | Block Harbor Cybersecurity **Jan 2024 — Present**
- Co-developed a full-stack application using React and SailsJS for the Vehicle Security Engineering Cloud
- Refactored the frontend and backend based on customer feedback and profiling for a more intuitive and responsive user experience
- Built a python test suite for automated vehicle pentesting through BlueTooth, CAN, Ethernet, USB, and Wifi interfaces
- Programmed Raspberry Pi's to communicate between VSEC and vehicle hardware to perform tests and generate reports

Research Assistant | Refraction Networking **Jun 2023 — Sep 2023**
- Collaborated with researchers across multiple universities to set up refraction networking stations for censorship circumvention
- Streamlined the update and backup processes for critical server stations using a python script
- Co-developed a format-transforming encryption (FTE) algorithm using Go and C++
- Implemented FTE in communication protocols to better disguise client traffic

CTF Challenge Author/Reviewer | WolvCTF 2023 **March 2023**
- Collaborated with 11 other team members to organize the capture-the-flag event at the University of Michigan, Ann Arbor
- Co-developed the CTF infrastructure using CTFd
- Authored a medium-difficulty cryptography challenge based on weaknesses of Diffie-Hellman on certain multiplicative groups
- Reviewed and verified many other challenges in the CTF event

Research Lead | Randomness and Statistical Properties of Quadratic Congruential Generators **Jan 2022 — Jun 2022**
- Led a team of 4 researchers to devise an improved algorithm for congruential random number generators
- Eliminated many weaknesses of the original generator at a relatively low performance cost
- The algorithm showed significant improvement in both Dieharder and TestU01 randomness test suites
- Increased difficulty of reverse engineering the internal state and parameters of the recurrence function

Projects

Lead Developer | Tetris Bot | C++ **Aug 2024 — Present**
- Led a team of 4 developers and tetris players to create a multi-strategy modern tetris bot for a tournament
- Invented an optimized tetris game state representation by exploiting bitfields and rotation invariants
- Currently developing an advanced perfect clear search algorithm using precomputed setup data and parity invariants

Developer | LFSR | C++ **April 2024 — Aug 2024**
- An extremely performant primitive polynomial finder and LFSR generator using 128-bit Galois field arithmetic
- Implemented a novel addition-chain exponentiation algorithm to efficiently raise polynomials to prime powers
- Optimized the LFSR algorithm to use only 3 CPU instructions to generate 64 pseudorandom bits at once

Co-developer | Schematica | HTML5/CSS/JS/Lisp **Dec 2019 — Mar 2020**
- A WebApp for drawing diagrams using a dialect of Lisp without boilerplate code
- Responsible for the syntax checker, parser, interpreter and optimization of the program overall
- Added functionality of URL-saving and exporting to .png, .svg and LaTeX TikZ formats

Developer | Substitution Box Analyzer | HTML5/JS **Jul 2020 — Aug 2020**
- A graphical statistical analyzer for linear and differential probability biases in substitution boxes of block ciphers
- Analyzes a Nyberg S-Box - affine transforms on a Galois Field inversion
- Useful for quickly generating dynamic, maximal nonlinear S-Boxes

Developer | Chomp | C/C++/HTML5/JS **Mar 2021 — Jul 2021**
- An optimal AI for the poset game, Chomp, using memoization
- Provides a new perspective to finding patterns of critical positions in Chomp
- Invented a space-efficient data structure for storing critical positions