

## Education

### University of Massachusetts, Amherst

B.S. in Computer Science and Math  
Anticipated Graduation: May 2021

September 2017 - Present

Amherst, MA

### Graduate Courses

Cryptography  
Advanced Cryptography  
Operating Systems Implementation

### Undergrad Courses

Cryptography  
Operating Systems  
Algorithms  
Functional Programming  
Software Engineering  
Abstract Algebra  
Data Structures

## Awards

- Binance DEXathon Winner (\$50,000)
- MIT Bitcoin Hackathon: City of Zion Prize (\$5,000)
- HackUMass V: Grand Prize
- YHack: JP Morgan Finance of the Future Prize

## Talks

### ClockWork: An Exchange Protocol for Proofs of Non Front-Running

Stanford Blockchain Conference  
February 2020

## Skills

• Go • Rust • C++ • TypeScript • OCaml  
• Solidity • Scala •  $\text{\LaTeX}$  • C • Python  
• Git • C# • Linux • .NET

## Experience

### VMware | Software Engineer Intern, VMware Tanzu

Remote

June 2020 - August 2020

- Implemented internal support for the Cluster API Docker provider (CAPD) in Tanzu Kubernetes Grid (TKG).
- Automated testing of certain features and operations of TKG using the docker provider.

### UMass Cryptography Lab | Undergraduate Researcher

Amherst, MA

January 2020 - Present

- Working with professor Adam O'Neill on a cryptanalysis of the Bitcoin Pseudorandom Number Generator.

### MIT Digital Currency Initiative | Undergraduate Researcher

Cambridge, MA

January 2019 - September 2019

- **Wrote an academic paper** (in submission) which introduces new cryptographic protocols to decrease trust needed in cryptocurrency and securities exchanges.
- Worked with layer 2 technologies such as the Bitcoin Lightning Network and hash time lock contracts (HTLCs) to implement non-custodial exchange technology.
- Designed algorithms to mitigate the front-running problem in cryptocurrency and securities exchanges, and increase overall public audit-ability of exchanges.
- Implemented research while building OpenCX, an open source cryptocurrency exchange framework.

### Charles River Analytics | Software Engineer Intern

Cambridge, MA

June 2018 - August 2018

- Created framework to score causal analysis algorithms for time series analysis in Python.
- Implemented various statistical analysis methods to detect causality in time series data with Granger, Pearson, and Convergent Cross Mapping tests.
- Demonstrated an increase in precision and recall for detecting causal effects in sets of arbitrary time series data.

## Projects

### OpenCX | Open-source project - Author

- Author of OpenCX, an open-source toolkit for building asset exchanges.
- Implemented a batching system for revealing and decrypting exchange orders that are locked in cryptographic puzzles for a certain amount of time.
- Developed state of the art features for non-custodial trading, timelock puzzles, and public verifiability of exchange behavior.
- Designed and implemented a novel front-running resistant and non-custodial exchange protocol using tools from OpenCX.

### Binance DEX | Open-source project - Co-author

- Modified the Bitcoin codebase to implement asset creation, limit GTC order creation, and delegate voting on the blockchain.
- Designed and implemented a Delegated Proof of Stake consensus algorithm that works with the UTXO Model.
- Won **\$50,000** for DEX implementation. Design rationale that was submitted for the contest can be read at [dancline.net/binance](http://dancline.net/binance).