Andrew Beams

EDUCATION

University of Pennsylvania, Philadelphia, PA   August 2019 – May 2021
Master of Science in Computer Science • 4.0/4.0
- Certificate in College and University Teaching
- Led the Security Reading Group, Member of the Distributed Systems Lab
- *TA for graduate courses:* Computer and Network Security (x2), Theory of Computation
- *Coursework:* Cryptography, Topics in Privacy and Anonymity, Topics in Cryptography
- *Privately tutored:* Discrete Math, Data Structures, Algorithms, Cryptography (among others)

University of Alabama, Tuscaloosa, AL   August 2016 – May 2018
Bachelor of Science in Computer Science • 4.0/4.0
- Outstanding Senior Award in Computer Science
- *TA for undergraduate course:* Fundamentals of Computer Science II

EXPERIENCE

Chainalysis, Remote   *Blockchain Engineer II*   January 2025 – Current
- Onboarding various blockchains to an ETL data pipeline

Visa Engineering, Austin, TX   *Staff Blockchain Engineer*   March 2024 – January 2025
- Led design and development of a blockchain transaction management system to support gas price estimation, nonce management, transaction retries and recovery
- In charge of Ethereum smart contract development for Visa Tokenized Asset Platform
  - Transitioned stablecoin system to support ERC-3643 based smart contracts

Visa Research, Austin, TX   *Senior Blockchain Engineer*   December 2021 – March 2024
- Tech lead with two additional developers for the Central Bank of Brazil's CBDC pilot
  - Developed an API server to facilitate interactions with CBDC, tokenized bank deposits, and tokenized treasury bonds
  - Tested inter-bank transfers and trading of treasury bonds with multiple other Brazilian banks
  - Evaluated multiple blockchain privacy solutions
- Primary developer of multiple research projects in the blockchain and CBDC space:
  - Designed a protocol and developed a core cryptography library and the original PoC for the Visa Tokenized Asset Platform. Transitioned to a consultant role as the system was built up and used in a Hong Kong CBDC Pilot.
  - Participated in proposal and built a core deliverable for the Central Bank of Brazil's LIFT Challenge (https://liftchallenge.bcb.gov.br/site/liftchallenge/en)
  - Designed and implemented a blockchain-based dual-offline payments system using mobile phone TEEs and smart cards with support for funds recovery and government disbursements
  - Designed and built a trustless DeFi application for sealed-bid auctions which consumes 100x fewer network fees than existing work by using zero-knowledge proofs and programmable payment channels
  - Led a team of researchers to develop and show a new use case for account abstraction on Starknet
- Implemented a novel solution for federated machine learning in the context of payment networks

Southwest Research Institute, San Antonio, TX   *Software Engineer*   June 2018 – July 2019
- Developed core features for a greenfield traffic management system for traffic monitoring and signal optimization:
  - Created authentication service which interfaced with client's existing infrastructure
  - Created authorization service to be compatible with end-user traffic engineer requirements
  - Created system-wide notification service to immediately propagate relevant events to traffic engineers' dashboards
  - Designed monitoring service for detecting abnormal system events

Center for Advanced Public Safety, Tuscaloosa, AL   *Student Developer*   March 2017 – May 2018
- Developed an internal library for quickly adding authentication and authorization functionality to projects
  - Added support for Active Directory and Two-Factor Authentication.

PROJECTS
Universal Payment Channels, github.com/Visa-Research/upc
- Built a Java library that implements Universal Payment Channels, a programmable payment channel protocol for EVM-based chains

SealPIR, github.com/abeams/SealPIR
- Updated Microsoft Research's Private Information Retrieval library to work with SEAL 6.3

PasswordPIR
- Built an application to demonstrate a novel cryptographic protocol – PIR with access control

PUBLICATIONS
Packet Scheduling with Optional Client Privacy, CCS 2021 (Virtual)
Andrew Beams, Sampath Kannan, and Sebastian Angel

Pirmission: Single-server PIR with Access Control
Andrew Beams, Sebastian Angel
https://eprint.iacr.org/archive/2022/1089/1661221438.pdf

Privacy-Preserving Financial Anomaly Detection via Federated Learning & Multi-Party Computation,
ACSAC Workshops
Sunpreet Arora, Andrew Beams, Panagiotis Chatzigiannis, Sebastian Meiser, Karan Patel, Srinivasan Raghuraman, Peter Rindal, Harshal Shah, Yizhen Wang, Yuhang Wu, Hao Yang, and Mahdi Zamani
https://arxiv.org/pdf/2310.04546.pdf

Scalable Off-chain Auctions,
Mohsen Minaeim Duc V. Le, Ranjit Kumaresan, Andrew Beams, Pedro Moreno-Sanchez, Yibin Yang, Srinivasan Raghuraman, Panagiotis Chatzigiannis, and Mahdi Zamani
https://eprint.iacr.org/2023/1454.pdf

Auto Payments for Self-Custodial Wallets
Andrew Beams, Catherine Gu, Srini Raghuraman, Mohsen Minaei, and Ranjit Kumaresan
https://usa.visa.com/solutions/crypto/auto-payments-for-self-custodial-wallets.html

PATENTS
WO2023177902: Offline Interaction Blockchain System and Method

AWARDS & CERTIFICATIONS
U.S. PETs Prize Challenge Special Recognition   March 2023
FCC Amateur Extra Class License   July 2022
Japanese Language Proficiency Test N1 Level (Business fluent)   December 2019

SKILLS
Languages: Solidity, Python, Java (Spring Boot), Typescript, C++, C# (Dot net core), Javascript (Angular), SQL
Technologies: Ethereum/web3, Hardhat, Foundry, AWS CDK, Circom, SnarkJS, Javacard, Android TEE development, Starknet/Cairo, Blockchain, NodeJS, OpenAPI, Xunit, Redis, Docker, Kubernetes, MS SQL Server, Elastic Stack, Active Directory, Pandas, Spark, Wireshark, Microsoft SEAL, MCL