Ryan Lehmkuhl

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EDUCATION

UC BERKELEY
B.S. Electrical Engineering and Computer Science
Class of 2021
Dean's List
Regent's Scholar
GPA: 3.9 / 4.0

COURSEWORK

GRADUATE
Systems Security
Decentralized Secure Systems
Lattices and Post-Quantum Cryptography *(Audit)*

UNDERGRADUATE
Computer Security *(Student Instructor)*
Cryptography
Abstract Algebra I & II
Artificial Intelligence
Operating Systems
Optimization Models
Probability and Random Processes
Efficient Algorithms & Intractable Problems
Machine Structures
Discrete Mathematics & Probability Theory
Data Structures
Linear Algebra
Information Devices & Systems I & II *(Lab Assistant)*

SKILLS

PROGRAMMING
Python • Rust • C/C++
Java • LaTeX • Assembly
HTML • CSS • XML

FRAMEWORKS
TensorFlow • Keras
RayTune

PROGRAMS
Wireshark • GNURadio

EXPERIENCE

CIRCADENCE | Research and Development Intern
Summers 2017, 2018 | San Diego, CA

- Built a **software-defined radio** TCP/IP modem using **QPSK modulation** in GNURadio
- Researched **cellular network** attacks utilizing software-defined radios
- Implemented an **exploit execution management engine** capable of launching Metasploit modules and custom scripts on remote agents
- Configured an **ELK stack** for data throughput to a machine learning algorithm

SPAWAR | Research and Development Intern
Summers 2015, 2016 | San Diego, CA

- Performed **vulnerability analysis** that helped earn over **$200,000** in lab funding

RESEARCH

RISELAB | Undergraduate Research Assistant
September 2018 - Present | Berkeley, CA

- Working under **Raluca Popa** and **Pratyush Mishra** on techniques for **secure prediction** on **deep neural networks**.

PROJECTS

DELPHI | Efficient deep neural network cryptographic inference
2019 | Rust, C++, and Python

- Developed new approaches for training DNN architectures that are performant with cryptographic techniques using **Keras** and **RayTune** in Python
- Built a secure two-party protocol for convolution and matrix multiplication using **fully homomorphic encryption** with Microsoft's SEAL library in C++
- Integrated Python and C++ backends into a complete inference protocol utilizing **state-of-the-art MPC techniques** written in Rust

GENETIC SCHEDULE | Finds optimal schedule w/ complex constraints
Winter 2019 | Python

PINTOS (CS162) | Operating System Kernel
Spring 2019 | C

- Designed and implemented **file system**, **user space programs** + **syscalls**, **scheduling algorithms**, **user space allocator**, and **synchronization primitives** in a team of four

SCRYPTO | Secure file encryptor/decryptor
Summer 2018 | Python & Rust

- Password-protected authenticated file encryption using **AES-GCM** and **PBKDF2**

SECURE FILE STORE (CS161) | Shared file store in a malicious setting
Spring 2018 | Python

- Provides secure upload/download functionality, **hierarchical sharing/revocation**, and efficient updates to large files using a **Merkle Tree**

SCADA NETWORK TCP SESSION HIJACKER | MITM exploit
Summer 2016 | Python

- Concurrently executes **ARP cache poisoning**, **TCP session hijacking**, and **packet sniffing/injection** to hijack a SCADA controller used by the Navy (now patched)

PUBLICATIONS

[1] P. Mishra, R. Lehmkuhl, A. Srinivasan, W. Zheng, and R. Ada Popa, *Delphi: A cryptographic inference service for neural networks*, Accepted USENIX Security '20.