

# Robert McLaughlin

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**Citizenship:** USA

## Summary

My research focuses on program analysis of VM-based software, in particular the Ethereum Virtual Machine (EVM). I have used both static and dynamic analysis techniques to assess issues including financial manipulation, theft of digital assets, and to conduct generalized vulnerability discovery. I have work experience at 3 large technology companies, and have mentored students on several occasions.

## Education

**University of California, Santa Barbara** Santa Barbara, California  
PhD in Computer Science September 2019 – Present  
Advisors: Professors Christopher Kruegel & Giovanni Vigna

**Rochester Institute of Technology** Rochester, NY  
BS in Software Engineering September 2013 – May 2019  
Minors: Philosophy, Mathematics, Computer Science

## Publications

### **Approve Once, Regret Forever: On the Exploitation of Ethereum's ERC20 Approve-TransferFrom Ecosystem**

Nicola Ruaro, Robert McLaughlin, Dongyu Meng, Fabio Gritti, Ilya Grishchenko, Christopher Kruegel, Giovanni Vigna.

*Under Submission*

### **HOUSTON: Real-Time Anomaly Detection of Attacks Against Ethereum DeFi Protocols**

Fabio Gritti, Nicola Ruaro, Robert McLaughlin, Ilya Grishchenko, Christopher Kruegel, Giovanni Vigna.

*Under Submission*

### **The Power of Default: Measuring the Effect of Slippage Tolerance in Decentralized Exchanges**

Nir Chemaya, Dingyie Liu, Robert McLaughlin, Nicola Ruaro, Christopher Kruegel, Giovanni Vigna.

*Financial Cryptography, 2024.*

### **Not your Type! Detecting Storage Collision Vulnerabilities in Ethereum Smart Contracts**

Nicola Ruaro, Fabio Gritti, Robert McLaughlin, Ilya Grishchenko, Christopher Kruegel, Giovanni Vigna.

*Network and Distributed System Security, 2024.*

### **A Large Scale Study of the Ethereum Arbitrage Ecosystem**

Robert McLaughlin, Christopher Kruegel, Giovanni Vigna.

*USENIX Security, 2023.*

### **Confusum Contractum: Confused Deputy Vulnerabilities in Ethereum Smart Contracts**

Fabio Gritti, Nicola Ruaro, Robert McLaughlin, Priyanka Bose, Dipanjan Das, Ilya Grishchenko, Christopher Kruegel, Giovanni Vigna.

*USENIX Security, 2023.*

### **Regulator: Dynamic Analysis to Detect ReDoS**

Robert McLaughlin, Fabio Pagani, Noah Spahn, Christopher Kruegel, Giovanni Vigna.

*USENIX Security, 2022.*

#### Honors and scholarships

Outstanding Publication (UCSB Dept. of Computer Science)	2023
Kearse Undergraduate Writing Award in Philosophy (RIT Dept. of Philosophy)	2018

#### Teaching experience

**PIPELINES mentor, US Navy** Summer 2021  
Oversaw a small team of undergraduate student interns at Port Hueneme as they developed an embedded software system for the US Navy.

**Teaching assistant, Computer Science (UCSB)** Fall 2019 - Winter 2020  
CS 32: Object Oriented Design (C++)

**Tutor, Software Engineering (RIT)** January 2015 - May 2018  
Volunteer tutor (4hr / week) for introductory computer science and software engineering topics. Created and proctored practice exams.

#### Industry experience

**Microsoft, Azure** Redmond, WA  
Software Engineer II July 2018 - September 2019  
Productivity and engineering systems team. Maintained internal legacy software delivery (build & release) tools, and integrated them with modern systems. Participated in on-call rotation for emergency maintenance of Azure.

**Microsoft, Universal Store** Redmond, WA  
Software Engineering Intern Summer 2017  
Developed an internal system which monitors publication progress of millions of Store catalog items including apps, music, books, and movies. Includes business-specific logic such as international availability restrictions, sales, etc. Technologies include C#/.NET, Azure, message queues, and internal tooling.

**Twitter, Fabric** Boston, MA  
Software Engineering Intern Summer 2016

Worked on Fabric team, a business-facing mobile app analytics platform. Developed an internal business growth metrics and analytics system capable of handling over 1 billion data points daily, sourced from nearly every mobile device around the globe. Used Hadoop, HP Vertica, Go, and AWS.

**Constant Contact** Waltham, MA  
Software Engineering Intern Summer 2015

Developed a suite of microservice-based SaaS applications for small businesses to manage events, coupons, and donations using technologies such as Rails, Node.js, MongoDB and Java Spring.

**SnipSnap Coupon App** Philadelphia, PA  
Software Engineering Intern Summer 2014

Developed an online business-facing coupon management system for authoring, scheduling, publishing, and monitoring coupons. Also maintained a user-facing coupon redemption system. All developed using Ruby on Rails and cloud hosting.

## Skills

### Programming

Python, SQL, Java, C++, C#, Bash, Ruby, JavaScript, Go, Datalog

### Technologies and Techniques

Debuggers, decompilers, bytecode analysis, dynamic tracing, SMT solvers, function optimization.

Experience with frameworks Flask, Django, SQLAlchemy, Ruby on Rails, Express.js, React, and others.

### Languages

English (fluent, native), Chinese (intermediate)

## Organizations

**Shellphish** 2020 – Present

Member of Shellphish capture-the-flag (CTF) hacking team, participated in several DEFCON CTF international finals. Participated in writing hacking challenges for several CTFs with participants ranging from experienced cybersecurity experts to high school students.

## Other interests

- Language learning: Chinese, Japanese
- Hiking and camping
- Automotive maintenance