ISABELLA LAYBOURN

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EDUCATION

Carnegie Mellon University — **Pittsburgh, PA**
B.S. Computer Science, Concentration in Algorithms & Complexity, Minor in Game Design — *May 2023*
Dean's List in Fall 2019, Spring 2021, Fall 2021
Coursework: Program Analysis, Probability and Computing, Algorithm Design and Analysis, Discrete Mathematics, Imperative Computation, Functional Programming, Parallel Data Structures and Algorithms, Theoretical Computer Science, Computer Systems, AI Representation and Problem Solving, Computer Graphics, Software Engineering

INDUSTRY EXPERIENCE

Apple — **Cupertino, CA**
Software Engineer Intern, Apps Test Engineering — *May 2022 – August 2022*
- **Automated test generation** in **Swift** for **iOS** apps

Salesforce — **(Remote)**
Infrastructure Security Intern, REDSCAR Team — *May 2021 – August 2021*
- Researched and improved Salesforce's **static analysis** tooling for **XXE** and **deserialization** attacks
- Presented work to SVP, Security Assurance
- Wrote 13 **Semgrep** rules (2 open-source) for **Java**, **Python**, and **Ruby** to run on all code reviews
- Tested and extended **Checkmarx** rule for Java code injection
- Caught 30 new, high-priority bugs in production code

Infrastructure Security Intern, REDSCAR Team — *June 2020 – August 2020*
- Worked with Reference Design, Security Controls, and Architecture (REDSCAR) team
- Categorized over 600 security bugs filed by Infrastructure Security Advisory team
- Collaborated with Secrets team to integrate secrets management program Vault and internal APIs to develop automated support for secret rotation (Python for **AWS Lambda** and **Go** in **Docker** container)
- Performed design reviews for security assessment

Cyber Crucible — **Pittsburgh, PA**
Software Engineering Intern — *January 2020 – May 2020*
- Developed voice rec for security authentication in Java and integrated **REST APIs** for an **Android** app

ACADEMIC EXPERIENCE

Research Assistant, Institute for Software Research, PASTA Lab — *January 2021 – Present*
- Created mutation analysis-based guidance plugin μ^2 for **fuzz testing** framework JQF
- Programmed **mutation testing** functionality using **JVM bytecode** instrumentation
- Presented *μ^2: Using Mutation Analysis to Guide Mutation-Based Fuzzing* at ICSE '22, placed second in SRC
- Presented at CMU's Meeting of the Minds in 2021
- Currently working toward testing mutation-guided fuzzing on larger benchmarks

Teaching Assistant
17-355/17-665/17-819 Program Analysis — *Spring 2022*
- Designed recitation on working with JVM bytecode to instrument Java code for analysis and repair
- Helped students with class concepts including dataflow analysis, Hoare logic, and fuzz testing

15-151/21-128 Mathematical Foundations of Computer Science — *Fall 2020, Fall 2021*
- Taught weekly recitations, held office hours, and graded homework and exams
- Helped students understand and apply class concepts including logic, functions, probability, and counting

SIGGRAPH Student Volunteer — *2021*
- Performed quality assurance tests for **AR/VR** pieces submitted to the SIGGRAPH VR Theater

Girls Can Code Club — *2015 – 2019*
- Taught Python and **Unity** as leader and participated in Technovation (semifinalist 2018)

PROJECTS

Game Creation Society — *September 2019 – December 2019*
- Programmed sports-themed fighting minigame Sporshmallow in Unity with team

Biometric Shirt for Dravet Patient — *2018 – 2019*
- Programmed biometric shirt using LEDs to monitor temperature and activity for a Dravet patient
- Created two working prototypes using Arduino, Adafruit, and Particle IoT boards
- Tested a feature that writes the gathered temperature/activity information to a ThingSpeak channel

SKILLS: program analysis, Java, Python, C, C++, OCaml, C#, HTML, JavaScript, LaTeX, shell script, git, vim, Unity, Arduino