Isabella M. Laybourn

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Education

2019–2023 **B.S. Computer Science**, *Carnegie Mellon University*, Pittsburgh, PA
Concentration in Algorithms & Complexity · Minor in Game Design · 3-time Dean's List Honoree

Industry Experience

May 2022– **Software Engineer Intern: Apps Test Engineering**, *Apple*, Cupertino, CA
Aug 2022
- Automated QA processes by creating proof-of-concept coverage-guided fuzzing tools in Swift
- Delivered property-based testing framework to extend existing tests and improve resilience/coverage
- Contributed analytic event processing to internal tool, enabling migration from aging test framework
- Collaborated with senior engineers to inject bugs into iOS apps to reproduce test failures
- Presented project to internal and cross-functional partners to increase adoption of property-based testing

May 2021– **Infrastructure Security Intern: Reference Design, Security Controls, and Architecture**, *Salesforce*, Remote
Aug 2021
- Found 30 new high-priority bugs in production code
- Prevented XXE and deserialization attacks by researching and improving static analysis tooling
- Improved automated code review by adding 13 Semgrep rules for Java, Python, and Ruby
- Presented project to Security Assurance SVP to promote unified security tooling strategy

Jun 2020– **Infrastructure Security Intern: Reference Design, Security Controls, and Architecture**, *Salesforce*, Remote
Aug 2020
- Categorized over 600 bugs filed by InfraSec Advisory team for analysis of current security posture
- Automated password rotation by collaborating with Secrets team to develop Go program integrating secrets management program Vault and internal APIs.

Jan 2020– **Software Engineer Intern**, *Cyber Crucible*, Pittsburgh, PA
May 2020
- Developed security authentication based on voice recognition in Java for Android app

Academic Experience

Jan 2021– **Research Assistant**, *Carnegie Mellon University Institute for Software Research, PASTA Lab*
Present
- Placed 2nd in ICSE'22 Student Research Competition as sole author of μ^2: Using Mutation Analysis to Guide Mutation-Based Fuzzing
- First author of 2022 paper *Guiding Greybox Fuzzing with Mutation Testing*
- Created mutation-analysis-based guidance plugin μ^2 for fuzzing framework JQF
- Programmed mutation testing functionality using JVM bytecode instrumentation

Jan 2022– **Teaching Assistant**, *17-355/17-665/17-819 Program Analysis*
May 2022
- Developed new recitation guiding students through interfacing with JVM bytecode for Java code analysis and repair
- Helped students understand and apply class concepts including dataflow analysis, Hoare logic, and fuzzing

Aug 2020– **Teaching Assistant**, *15-151/21-128 Mathematical Foundations of Computer Science*
Dec 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

Jun 2021– **Student Volunteer**, *SIGGRAPH*
Aug 2021
- Performed QA testing for AR/VR pieces submitted to VR Theater
- Reviewed and edited closed captioning for conference presentations

Sep 2015– **Leader**, *Girls Can Code Club*
May 2019
- Taught Python and Unity as leader, Technovation semifinalist 2018

Projects

Sporshmallow, *Game Creation Society*
- Programmed sports-themed fighting minigame in Unity with team

Biometric Shirt for Dravet Patient
- Programmed biometric shirt using LEDs to monitor temperature and activity for a Dravet Syndrome patient
- Created two working prototypes using Arduino, Adafruit, and Particle IoT boards