alex bellon

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EDUCATION

2021–Present **Ph.D., Computer Science**, *The University of California San Diego*
Advised by Deian Stefan and Pat Pannuto, with a focus on the security of embedded and IoT devices and firmware. Part of SysNet and CryptoSec groups.

2017–2021 **B.S., Computer Science**, *The University of Texas at Austin*

2017–2021 **B.S., Mathematics**, *The University of Texas at Austin*

PUBLICATIONS

[3] **Alex Bellon**, Miro Haller*, Andrey Labunets, Enze Liu, Stefan Savage (* = first author). "An Empirical Analysis on the Use and Reporting of National Security Letters". 4th ACM Symposium on Computer Science and Law (CSLAW 2025). March 2025.

[2] Enze Liu, Lu Sun, **Alex Bellon**, Grant Ho, Stefan Savage, Geoffrey M. Voelker, Imani N. S. Munyaka. "Understanding the viability of e-mail origin indicators for identifying the sender". 19th USENIX Symposium on Usable Privacy and Security (SOUPS 2023). August 2023.

[1] **Alex Bellon**, Alex Yen, and Pat Pannuto. "TagAlong: A Free, Wide-Area Data-Muling Service Built on the AirTag Protocol". 24th International Workshop on Mobile Computing Systems and Applications (HotMobile 2023). February 2023.

[0] **Alex Bellon**, Alex Snoeren, and Deian Stefan. "Hacking for Fun and Glucose: Reverse Engineering an Insulin Pump". SRC TECHCON 2022. September 2022.

RESEARCH EXPERIENCE

Fall 2023 **Research Intern**, *Max Planck Institute for Security and Privacy*, Bochum, Germany
- Extracted control flow from insulin pump firmware
- Instrumented insulin pump firmware in order to be emulated and fuzzed
- Extracted and rehosted insulin pump simulation libraries from demo Android application

2021–Present **Graduate Student Researcher**, *University of California San Diego*, San Diego, CA
- **Reverse engineering and securing insulin pump firmware**
  - Disassembled and reverse-engineered hardware of an insulin pump, developed custom PCBs to connect to board and allow firmware to be extracted
  - Reverse-engineered extracted firmware using Ghidra
  - Rehosted firmware to boot and run without hardware
  - Worked with manufacturer to responsibly report security issues
  - Currently running simulations against model of pancreas to look for incorrect behavior
- **Finding security vulnerabilities in commercial airplane firmware**
  - Added support for Motorola 68000 architecture to emulation tool
  - Rehosted extracted firmware from in-flight entertainment (IFE)/WiFi box
  - Reverse-engineered IFE firmware and associated software to find security issues
  - Currently constructing exploits for IFE box firmware, with entry from passenger WiFi
- **Crowd-sourced and private downlink communication for BLE-only devices**
  - Secured $100,000 Qualcomm Innovation Fellowship to fund project
  - Designed protocol to allow for downlink communication to BLE embedded devices using nearby phones, while preserving the privacy of participants in the system
  - Implemented proof-of-concept version of system to test viability
  - Currently implementing fully featured system

INDUSTRY EXPERIENCE

Summer 2023 **Software Engineering Intern**, *Micron*, San Jose, CA
- Created optimization passes for LLVM/Clang to improve workload performance with CXL memory

Summer 2020 **Security Engineering Intern**, *Mozilla*, Mountain View, CA (remote)
- Researched security issues in language-based package managers like Cargo, NPM and PyPI
- Used prior work to fix security scoring algorithm on Mozilla's Dependency Observatory (*github.com/mozilla-services/dependency-observatory*) project, used to "rate" the security of NPM packages

Summer 2019 **Security Analyst Intern**, *Electronic Arts*, Seattle, WA
- Used Python to automate checking for open ports and other attack vectors on EA's cloud instances. Scanned 800+ instances, found 1400+ security incidents
- Automated sending summary of vulnerabilities to affected parties, with descriptions of the vulnerabilities and instructions to resolve them

TEACHING EXPERIENCE

Spring 2021 **Undergraduate TA - CS349 Contemporary Issues in Computer Science**, *UT Austin*
- Graded assignments and held office hours for a class of 40+ students
- Shared resources and information regarding ethical and social issues in computer science

Spring 2019, Fall 2019 **Undergraduate TA - CS361 Introduction to Computer Security**, *UT Austin*
- Created and graded security-focused assignments for 80+ students
- Lectured on various topics in security including cryptography and data forensics
- Wrote, hosted and ran a CTF competition for the students' final exam

FELLOWSHIPS, SCHOLARSHIPS & HONORS

2024 **Doctoral Excellence in Service & Leadership Award**, *UCSD Computer Science & Engineering*

2024-2025 **Qualcomm Innovation Fellowship**, *Qualcomm*

2021-2025 **San Diego Fellowship**, *UCSD Graduate Division*

2020–2021 **Louis E. Rosier Memorial Scholarship**, *UT Austin Computer Science*

2017–2018 **Jack S. Blanton Family Scholarship**, *Texas Exes Houston Chapter*

CONFERENCE GRANTS

2023 **GREPSEC Student Grant**, *USENIX*

2023 **ACM HotMobile Student Travel Grant**, *ACM HotMobile*

2022 **Linux Open Source Summit Diversity Scholarship**, *Linux Foundation*

2020 **Tapia Conference Scholarship**, *UT Austin Computer Science*

2020 **USENIX Security Student Diversity Grant**, *USENIX Security*

2019 **Grace Hopper Conference Scholarship**, *UT Austin Computer Science*

2019 **BlackHat USA Student Scholarship**, *BlackHat*

2019 **DEFCON 27 Scholarship**, *Women in Security & Privacy*

AWARDS

CAPTURE THE FLAG

2020 **AtlassianCTF (1st)**, *with team "hhh_"*

2019 **SunshineCTF (1st), SwampCTF (3rd), AngstromCTF (3rd)**, *with team "UTC"*

Texas Network Massacre (1st), AtlassianCTF (3rd), *with team "hhh_"*

2018 **AtlassianCTF (3rd)**, *with team "hhh_"*

HACKATHONS

2019 **TAMUHack (1st), Hacklahoma (3rd)**, *with team "Waitlisters"*

2018 **Hacklahoma (Top 10)**, *with team "Waitlisters"*

LEADERSHIP

2023-Present **(Re-)Founder, Graduate Student Lounge Rep.**, *UCSD CSE Graduate Student Council*
- Led initiative to revive CSE Graduate Student Council, which had dissolved 10+ years prior

2022-Present **Administrator**, *UCSD "Chez Bob"*
- Oversee operation of student-run snack and food co-op that handles hundreds of transactions per day
- Order and restock food and drinks, maintain cold brew kegerator
- Maintain infrastructure that runs POS system, fixing bugs and adding features

2018–2021 **President (previously Engineering Officer)**, *UT Information & Systems Security Society*
- Led the UTCTF project in 2021 and 2020, a CTF with over 2500+ participants. Coordinated planning, communication, prizes, and wrote challenges (*isss.io/github/UTCTF-21*, *isss.io/github/UTCTF-20*)
- Created ForeverCTF, an always-up entry level CTF to allow people to practice security skills (*forever.isss.io*)
- Led "Beginner Series" initiative, a series of introductory security talks (*isss.io/talks/beginner-series*)
- Wrote security challenges for biweekly Capture the Flag (CTF) competitions (*isss.io/github/ctf*)
- Gave talks about security-related topics such as cryptography, data forensics, privacy, etc. (*isss.io/talks*)

2019–2021 **Captain**, *UT Collegiate Cyber Defense Comp. and Collegiate Penetration Testing Comp.*
- CCDC: Led a team of 8 in a blue team simulation, where students must defend 8-10 machines from red team attackers while also completing business 'injects' (setting up new services, managing users, etc.). Competed at Nationals in 2021, placed 1st (2021), 2nd (2019), 3rd (2020) at Southwest Regionals
- CPTC: Led a team of 6 students in a red team simulation, where students perform a comprehensive penetration test of a company network with , then write a detailed report of the vulnerabilities and security flaws they found. Placed 2nd (2019) at New England Regionals

2018–2020 **Web/Tech Senior Officer (previously Web/Tech Junior Officer)**, *UT ACM Chapter*
- Implemented new features and fixed bugs on UT's ACM chapter website
- Wrote curriculum for and hosted 'CS101', a series of 8-10 introductory workshops for freshmen with topics like Linux basics, Git/VCS, debugging, etc (*github.com/UTACM/CS101*)
- Created and implemented 'A to Zs of UTCS', a glossary of terms related to computer science, UTCS and UT Austin to help new students get up to speed (*texasacm.org/AtoZ*)

ADDITIONAL SERVICE

2022-Present **Volunteer Host (GeoGuessr, Tetris, Cookie Decorating, Pumpkin Carving)**, *CSE Social Hour*

2023-Present **Volunteer (Student Panel, Campus Guide, Game Night, Bus Chaperone)**, *CSE PhD Visit Day*

2022-2024 **GPSA Representative**, *UCSD Student Transit Advisory Council*

2022-2024 **CSE Dept. Representative**, *UCSD Graduate & Professional Student Association (GPSA)*

SELECTED PROJECTS

See my GitHub page for all personal projects.

Elitzur-Vaidman attack on quantum money, *github.com/alex-bellon/quantum-money-attack*
- Implementation of an attack in which a user can recover the state of a piece of quantum money using only basic quantum logic gates

Anshel-Anshel-Goldfeld key exchange, *github.com/alex-bellon/anshel-anshel-goldfeld-rubiks-cube*
- Implementation of a key exchange protocol that uses non-commutative cryptography with the Rubik's Cube Group

Scrambled: Rubik's Cube based steganography, *github.com/alex-bellon/rubikstega*
- Implemented steganographic algorithm to encode text in Rubik's Cube move notation
- Wrote paper for "PagedOut" security zine about project (*pagedout.institute*)

TECHNICAL SKILLS

Most comfortable in Python, C and C++; familiar with Java, assembly (M68K, x86), SQL, JavaScript, HTML/CSS. Experience with Lean4 and Haskell.

Comfortable with Linux (Debian/Ubuntu, Arch/Manjaro) and UNIX, shell (`bash`, `zsh`), `git`, `vim`, `emacs` (including `org-mode`), LaTeX, Ghidra (including scripting), and command line tools. Familiar with Wireshark, `gdb`, LLVM (writing passes), GNURadio, Kubernetes and Docker.