Benjamin Andrew Cyr

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RESEARCH VISION

To build and inspire life-enhancing technologies that will remain secure and trustworthy even under threats that most would never consider.

EDUCATION

UNIVERSITY OF MICHIGAN | Ph.D. in Computer Science
Expected May 2023 | Ann Arbor, MI • Advisor: Dr. Kevin Fu

UNIVERSITY OF MICHIGAN | MSE in Computer Science
May 2020 | Ann Arbor, MI • GPA: 4.0 / 4.0

AUBURN UNIVERSITY | BS in Electrical Engineering (Computer Engineering Option)
Dec 2017 | Auburn, AL • GPA: 3.98 / 4.0

PUBLICATIONS

LIGHT COMMANDS: LASER-BASED AUDIO INJECTION ATTACKS ON VOICE-CONTROLLABLE SYSTEMS
Usenix Security 2020 | Acceptance Rate: 16.1%
T. Sugawara, B. Cyr, S. Rampazzi, D. Genkin, and K. Fu.
https://www.usenix.org/conference/usenixsecurity20/presentation/sugawara

ADVERSARIAL SENSOR ATTACK ON LIDAR-BASED PERCEPTION IN AUTONOMOUS DRIVING
ACM Conference on Computer and Communications Security (CCS) 2019 | Acceptance Rate: 16%
Yulong Cao, Chaowei Xiao, Benjamin Cyr, Yimeng Zhou, Won Park, Sara Rampazzi, Qi Alfred Chen, Kevin Fu, Z. Morley Mao.
https://dl.acm.org/doi/10.1145/3319535.3339815

LOW-COST AND SECURE FIRMWARE OBFUSCATION METHOD FOR PROTECTING ELECTRONIC SYSTEMS FROM CLONING
IEEE Internet of Things Journal 2019 Vol. 6 Issue 2
Benjamin Cyr, Jubayer Mahmod, Ujjwal Guin.
https://ieeexplore.ieee.org/abstract/document/8598922

SAMPLING FOR DATA FRESHNESS OPTIMIZATION: NON-LINEAR AGE FUNCTIONS
IEEE Journal of Communications and Networks 2019 Vol. 21 Issue 3
Yin Sun and Benjamin Cyr.
https://ieeexplore.ieee.org/document/8764465

INFORMATION AGING THROUGH QUEUES: A MUTUAL INFORMATION PERSPECTIVE
IEEE SPAWC 2018 | Acceptance Rate 54%
Yin Sun and Benjamin Cyr.
https://ieeexplore.ieee.org/document/8764465

RESEARCH EXPERIENCE

SPQR LAB – UNIVERSITY OF MICHIGAN | Cyber-Physical Security Research
June 2018 – Now | Ann Arbor, MI | Advisor: Dr. Kevin Fu
- Investigated light-based signal injection on microphones in voice-controllable systems.
- Defined adversarial capabilities of laser spoofing attacks on LiDAR sensors used in autonomous vehicles.

AUBURN UNIVERSITY | Hardware Security Research
January 2018 – May 2018 | Auburn, AL | Advisor: Dr. Ujjwal Guin
- Proposed a new theoretical defense through software obfuscation to prevent cloning in low-cost embedded systems.
- Reproduced a firmware extraction attack on an STM32 Microcontroller

AUBURN UNIVERSITY | Networking Optimization Research
August 2017 – May 2018 | Auburn, AL | Advisor: Dr. Yin Sun
- Developed MATLAB simulations for optimizing the age of information in real-time networks.
- Researched the effects of information age on control system networks.

HOCHSCHULE MANNHEIM | Embedded Systems Research
May 2017 – July 2017 | Mannheim, Germany | Advisor: Prof. Dr. Walter Götzmann
- Developed a system to measure and display data from an electronic bike using an AVR microcontroller.
- Worked on experimental hardware and interfacing with a mobile application.

AUBURN UNIVERSITY | Image Processing Research
August 2016 – May 2017 | Auburn, AL | Advisor: Dr. Stanley Reeves
- Development of system for real-time image-processing using Xilinx Zynq-7000 SoC.
- Designed user interface to test the image-processing system.

INDUSTRY EXPERIENCE

ADTRAN INC. | Network Driver Development
May 2016 – August 2016 | Huntsville, AL
- Software development of custom network driver on proprietary ADTRAN equipment.
- Interfaced with the Linux Kernel and a custom FPGA networking accelerator.

ADTRAN INC. | Design Verification Testing
August 2015 – December 2015 | Huntsville, AL
- Wrote automated tests to check functionality of software releases on ADTRAN Management and Switch Modules.
- Member of an Agile Team.

ADTRAN INC. | System Design and Verification Testing
January 2015 – May 2015 | Huntsville, AL
- Performed routine tests of ADTRAN and Cisco devices using custom CLI and proprietary GUIs.
- Gained detailed knowledge of custom networking management and hardware.

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION (SAIC) | Network Administration
May 2014 – August 2014 | Huntsville, AL
- Maintained devices and accounts on a private network of computers used to simulate and test vehicle software.
- Provided technical support to engineers developing the vehicle software.

OTHER ENGINEERING EXPERIENCE

AUBURN UNIVERSITY SMALL SATELLITE PROGRAM (AUSSP) | Electrical Power System Member
January 2014 – May 2018 | Auburn, AL
- Member of Electrical Power System Team in student-managed CubeSat program.
- Managed and taught a team of younger students to build and test embedded systems.

TEACHING EXPERIENCE

INTRODUCTION TO EMBEDDED SYSTEM DESIGN | Lab Design
May 2020 – August 2020 | Ann Arbor, MI
- Designed and wrote lab documents for a undergraduate embedded systems course.
- Course had to be converted and improved so that the labs could be completed remotely.

PRESENTATIONS

BREAKOUT SESSION: AI AND AUTONOMOUS SYSTEMS SECURITY
Lightning Talk | SPQR DEI Embedded Security Workshop | August 2020
https://spqrlab1.github.io/securityworkshop.html

LIGHT COMMANDS: LASER-BASED AUDIO INJECTION ATTACKS ON VOICE-CONTROLLABLE SYSTEMS
Paper Presentation | Usenix Security | August 2020
https://www.usenix.org/conference/usenixsecurity20/presentation/sugawara

LIGHT COMMANDS: LASER-BASED AUDIO INJECTION ATTACKS ON VOICE-CONTROLLABLE SYSTEMS
Invited Talk | Institute of Defense Analysis (IDA) | August 2020

BREAKING INTO A SMART HOME WITH A LASER - SMARTER EVERY DAY 229
Invited Video Collaboration | Smarter Every Day | December 2019
https://youtu.be/ozIKwGt38LQ

LOW-COST AND SECURE FIRMWARE OBFUSCATION METHOD FOR PROTECTING ELECTRONIC SYSTEMS FROM CLONING
Poster Presentation | SEC Academic Conference | April 2018
http://ocm.auburn.edu/sec/index.html

UNDERGRADUATE RESEARCH ADVISEES

TANVI DESHMUKH
May 2020 – Now
Investigating the physics of light signal injection into MEMs devices.
https://tddeshm.github.io/research/

COMMUNITY INVOLVEMENTS

SPQR DEI EMBEDDED SECURITY WORKSHOP | Volunteer Organizer
August 2020
An organizer for the the virtual Embedded Security Workshop. Responsible for managing breakout sessions and handling workshop emails and questions.
https://spqrlab1.github.io/securityworkshop.html

UNIVERSITY OF MICHIGAN CSEG STUDENT ORGANIZATION | SPQR Lab Liaison
January 2019 – Now
Representative from the SPQR Lab in CSEG-hosted events in welcoming incoming students and ensuring strong student connections in the Computer Science and Engineering Department.
https://cseg-michigan.github.io/