

# 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

## 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.

## **PUBLICATIONS**

### **LIGHT COMMANDS: LASER-BASED AUDIO INJECTION ATTACKS ON VOICE-CONTROLLABLE SYSTEMS**

USENIX SECURITY 2020

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 ACM CONFERENCE ON COMPUTER AND COMMUNICATIONS SECURITY (CCS) 2019

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

Benjamin Cyr, Jubayer Mahmud, 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

Yin Sun and Benjamin Cyr.

<https://ieeexplore.ieee.org/document/8764465>

### **INFORMATION AGING THROUGH QUEUES: A MUTUAL INFORMATION PERSPECTIVE**

IEEE SPAWC 2018 – SPECIAL SESSION ON THE AGE OF INFORMATION

Yin Sun and Benjamin Cyr.

<https://ieeexplore.ieee.org/document/8764465>

## **PRESENTATIONS AND VIDEOS**

**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 COLLABORATION | SMARTER EVERY DAY | DECEMBER 2019

<https://youtu.be/ozIKwGt38LQ>