

Anna Buchele

EDUCATION

- **Northeastern University: Electrical and Computer Engineering** Boston, MA
Ph.D. Candidate (Qualifying exam passed Nov. 2025) Sept. 2024 – present
- **Franklin W. Olin College of Engineering** Needham, MA
Engineering: Robotics Aug. 2015 – May 2019

PUBLICATIONS

- **Adversarial Light Projection With Moving Observer** Submitted: ICPR 2026
Training projected light patch in simulation, applied in physical world March – Dec. 2025
 - **Projection Simulation:** Created custom components to simulate a projection system in Pytorch3D, a differentiable rendering library. Created custom shader to accurately simulate a light projector projecting a detailed image onto a 3D object and seen by a camera from a different angle. Modified Pytorch3D to make required components fully differentiable.
 - **Adversarial Attack:** Created a novel VAE-style adversarial patch attack.
 - **Simulation Training, Physical World Attack:** Trained adversarial attack in simulation and directly applied it in the physical world with random camera and projector locations (projector and camera always in different locations). Goal was to train a patch which is successful regardless of projection distortion or projection angle. Simulation attack success rate (ASR) against YoloV11-m: 81%. Physical world attack success rate: 87%.
 - **Projection Enclosure:** Built projection enclosure in area with constrained space requirements and around non-moveable objects. Machined metal frame, made custom blackout curtains, machined oddly-shaped base to fit around non-moveable components.
- **Amazon Robotics: End effector for autonomous object retrieval** Patent no. US10751882B1
Software development, sensor integration for reactive end effector Accepted Aug. 2020
 - **Pick-and-Place System:** Developed novel pick-and-place solution for autonomous retrieval of variety of objects. Designed sensor system and complementary software architecture for self-guided end-effector and self-notification upon successful retrieval.
 - **Computer Vision and Sensor Integration:** Used an Xbox Kinect and RGB cameras to detect locations of objects. Used Bluetooth to activate guidance system.

SKILLS

- **AI:** Pytorch, Pytorch3D, TensorFlow, TFLite
- **Programming:** Python, C#, C++, Bash/shell scripting, Linux development
- **Robotics/Perception:** ROS, OpenCV, LIDAR, sensor interfacing
- **Prototyping:** Electronics system design, CAD, 3D printing, laser cutting, soldering, machining,
- **Embedded Programming:** Jetson Orin, Raspberry Pi, Arduino

EXPERIENCE

- **Teaching Assistant: Intro to Electrical Engineering Lab** Northeastern University
Basic electronics: circuits, waveform generators, oscilloscopes, etc. Jan. 2026 – Present
- **Army Educational Outreach Program (AEOP) Fellow** USMA West Point, NY
Research: light-based adversarial attacks targeting object detectors Jan. 2025 – Sept. 2025
- **Graduate Research Assistant** Northeastern University
Physical-world adversarial attacks Sept. 2024 – Dec. 2025

• Cognex

Natick, MA

Software Engineer, AI research team

June 2019 – Dec. 2023

- **Research & development:** Implemented novel deep-learning tool for computer vision application (PyTorch, Python). Experimented with novel deep learning architectures for more robust localization outcomes. Benchmarked performance on variety of embedded systems.
- **Management:** Managed team of three junior engineers on a project prototyping novel pretrained AI tool.

Software Engineer, UX Development

- **Project Owner:** Led development of frontend and firmware for new deep learning computer vision tool.
- **Software Architecture Guild:** Served on Software Architecture Guild, a small team which oversees architecture decisions and ensures proper development practices for clean and extensible code.
- **UX Design Guild:** Served on UX Design Guild, a small team which oversees UX decisions and ensures user-friendly design choices are made when developing new products. Ran user experience testing and presented results. Pushed for better design practices: reduced number of clicks required to perform an operation, visual indicators rather than text for non-precision tasks, removal of visual clutter.
- **Development:** Created frontend and firmware components for Cognex's user-friendly application for vision system setup and configuration (C#, WPF/XAML, MVVM architecture).
- **Prototyped novel deep learning tool:** Prototyped GUI and user workflow within existing product structure, created firmware for tool, and created server/client to run inference and send results back to tool firmware. Experimented with variety of model optimization techniques to run as quickly as possible. Prototype was successful - tool was productized and released.

• Amazon Robotics

North Reading, MA

Software Engineering Intern

Summer 2018

- **Data visualization:** Built plugins for a visualization system (Unity, C#) to represent large amounts of data in real-time.

• Raptor Maps

Somerville, MA

Engineering Intern

Summer 2017

- **Sensor system:** Developed the software suite and selected and integrated hardware, electrical, and sensor components for an agricultural sensor system, including multiple RGB cameras and a thermal camera. Designed and built electrical system.
- **Computer vision:** Created continuous service to perform high-speed stereoscopic feature matching in real-time and upload results and images to cloud over 2G (Python, C++, OpenCV).

• Teaching Assistant: Intro to Engineering Lab, Machine Shop Instructor

Ashesi University

Taught Arduino programming, CAD tutorials, machining tutorials, machine shop safety training

Summer 2016