# NATHAN ELIAS

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## EDUCATION

**STANFORD UNIVERSITY - B.S. Computer Science** **Expected 2026**

- Previous Coursework: Data Structures, Programming Abstractions, AI Principles, Linear Algebra, Differential Equations, Statistics, Multivariable Calculus, Digital Electronics

## EXPERIENCE

**InvasiveAI LLC (Internship under Texas Parks & Wildlife Dept.)** **Austin, TX**

Founder & Software Engineer (SWE) January 2020 – Present

- Founded & designed cross-platform AI mobile for offline invasive species detection via Android Studio and React Native & deployed quantized (.tflite) TensorFlow species classification models via optimized mobile CPU/GPU & camera acceleration
- Implemented authenticated Firebase backend storage for users' reportings of 5K+ unique invasive species and created dynamic in-app species distribution maps via Leaflet
- Created mutable AWS S3 containers, AWS Lambda Python programs, and Unix Cron Job schedulers to automatically update and re-train ML forecast maps of invasive species spread
- Maintained app (InvasiveAI) under active chapter of Texas Parks & Wildlife Dept. & prevented/projected **10,000+** real-world instances of invasive species growth. Featured in **Forbes** Magazine, **Entrepreneur** Magazine, **CBS** News, **FOX** Broadcasting

**UT ODEN INSTITUTE**[1] **Austin, TX**

Undergraduate Machine Learning Research Intern[1] November 2020 – August 2022

- Worked with **Dr. Chandrajit Bajaj** to create transfer-learning-based InceptionV3 Convolutional Neural Networks (CNNs), image augmentation pipelines & semi-supervised GANs for classifying 200+ invasive species with 97% accuracy
- Developed Long Short-Term Memory Neural Networks (LSTMs) for generative, seasonal forecasting of invasive species spread & engineered 1.9+ million novel occurrences & trainable features (i.e. location, temperature, competition, etc.)
- Designed 3D PointNet CNN models to identify 75+ invasive species via 3-D voxel & point-cloud representations of invasive species. Currently working on deploying models to aerial, drone, or vehicular LIDAR systems with SLAM-based mapping

**Thinkery Children's Museum**[2] **Austin, TX**

Software Engineering Intern[2] August 2021 – May 2022

- Built second iteration of tactile learning app (Codex) to teach AI/CS basics via hand-held paper blocks & augmented reality
- Utilized OpenCV contour detection, Tensorflow (.tflite) CNNs, transfer learning & image augmentation pipeline for 3x improvements in app's ML models' speed & accuracy in classifying students' organization of symbolic paper coding blocks
- Developed dynamic in-app augmented reality & 2D character game animations via Google ARCore, SceneForm & Java

## PATENTS & PUBLICATIONS

- [1] *Deep Learning Methodology for Early Detection and Outbreak Prediction of Invasive Species Growth*. 2023 IEEE/CVF Winter Conference on Applications of Computer Vision (**WACV**) (pp. 6335-6343)
- [1] *A Novel Method for Automated Identification and Prediction of Invasive Species Using Deep Learning*. 2021 **IEEE IEMCON** (pp. 1-5)
- [2] *A Computer-Vision-Based Mobile Algorithm For Tactile Education*. European Conference on Computer Vision (**ECCV** 2023). IEEE International Conference on Image Processing (**ICIP** 2022), Asian Conference on Computer Vision (**ACCV** 2022
- [1] Elias, Nathan. 2022. Distributed Invasive Species Tracking Network. U.S. Patent filed Oct. 1, 2022. **Provisional patent**.

## PROJECTS

**Arithmetic Logic Unit (ALU)** - *Used: Logism, Python*

- Constructed 16-bit ALU with assembler, decoder, CLA adders, overflow/memory control & conditional logic (findMax, sort)

**COVID-19 Classroom Contact Tracing Platform** - *Used: C++, Data Structures, Python Queries & CSV Libraries*

- Designed district-wide system to calculate individual student contact risk of COVID-19 using linked lists, graphs & BFS neighbor searching. Customized infection risk level by class type, proximity to infected neighbors, & classroom layout

**Kaggle** - *Used: TensorFlow, Sci-Kit Learn, Numpy, SQL, PyTorch, Python*

- Competed in global computer vision/ML challenges on large datasets (top .1% in housing prices & titanic survival prediction)

## ADDITIONAL

**Certifications & Training:** Deep Learning Sequence, Machine Learning, TensorFlow Spec., MATLAB for Quant. Analysis
**Frameworks**: TensorFlow, React Native, Android Studio, OpenCV, Firebase, AWS, GCP, GitHub, Chaquopy, MeshLab/Spin3D
**Languages:** Python, Java, C++, JavaScript, MATLAB, HTML/CSS, SQL, Verilog

## SELECTED HONORS

- **International Science and Engineering Fair (ISEF)** - Finalist + 4x Special Awards (AAAI Honors, USAID)
- **Regeneron Science Talent Search (STS) Scholar/Semifinalist** - Top 300 Science Fair Project/Researcher Internationally
- **ACM Cutler-Bell Prize in High School Computing** - $10,000 research prize awarded to 4 students in the United States