Curriculum Vitae

Maximilian Du

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`phone number redacted`

Education

September 2020— Present	**Degree:**	Bachelor of Computer Science, AI Track
	Where:	Stanford University, Stanford, CA
	GPA:	4.141 of 4.0
	Prospective CS Coterminal, Electrical Engineering minor	
September 2016— June 2020	**Degree:**	High School Diploma
	Where:	Fayetteville-Manlius High School, Manlius, NY
	GPA:	4.0 of 4.0

Relevant Courses

- ⋆ CS109 Introduction to Probability for Computer Scientists (Spring 2021)
- ⋆ CS107E Computer Organization and Systems (Winter 2021)
- ⋆ Math 113 Linear Algebra and Matrix Theory (Winter 2021)
- ⋆ Physics 14N Quantum Information (Winter 2021)
- ⋆ CS106B Programming Abstractions (Fall 2020)
- ⋆ Math 51 Linear Algebra and Multivariable Calculus (Fall 2020)
- ⋆ Integral Multivariable Calculus (2019-20, JHU Online)
- ⋆ CSE488 Internet Security (2018-19, Syracuse University)
- ⋆ CSE484 Computer Security (2017-18, Syracuse University)

Skills and Experiences

Artificial Intelligence
Experienced: TensorFlow, Long Short-Term Memory Neural Networks (LSTMs)
Knowledgeable: Convolutional Neural Networks (CNNs), Reinforcement Learning, Factor Graphs
Cursory Knowledge: Transformers, Game Theory, Computer Hardware for ML

Computer Programming
Experienced: Python, Java, C++.
Knowledgeable: C, HTML, CSS, Linux Bash, VIM.
Cursory Knowledge: Javascript, Docker, SQL

Computer/Internet Security
Buffer Overflow, SQL Injection, Race Conditions, Encryption, One-Way Hash, TCP/IP, DNS, Firewall, VPN, Public Key Encryption

Electronics
Experienced: THT Soldering, PCB Design, Breadboard Prototyping, Arduino
Knowledgeable: Analog Circuit Theory, Electricity & Magnetism, SMD Soldering, Raspberry Pi

Software and Content Creation
Experienced: Autodesk Inventor, LaTeX, DSLR Cameras, Adobe Premiere Pro, Photoshop
Knowledgeable: Autodesk Eagle, VSCode IDE, Web Graphic Design, Adobe InDesign, Illustrator

Public Speaking and Writing
Research & Educational Presentations, On-Camera Experience, Academic & Non-Fiction Writing

Work, Teaching, and Volunteer Experience

January 2021—
Present

Position: CS 106A/B Section Leader
Where: Stanford University

Led weekly instructive "sections" for the popular CS106A/B Stanford course series. During these sections, I answered conceptual questions and guided students through coding problems. I also helped grade assignments and exams.

October 2020—
Present

Position: Student Advisory Board
Where: Stanford University

Helped give feedback on the institutionally-required courses given to first-year students

May 2020—
August 2020

Position: Guest Lecturer and Teaching Assistant
Where: Association for Young Scientists and Innovators

Gave virtual lectures on the theory of machine learning. I also held office hours, where I helped debug code and give suggestions on capstone machine learning projects.

September 2018—
June 2020

Position: Co-CEO, Public Relations Manager
Where: Youth Engineering Initiative

Organized events that introduced young children to the principles of engineering. Also helped develop the organization's website.

May 2018—
June 2020

Position: Event Designer and Site Volunteer
Where: Museum of Science and Technology (MOST)

Helped design science programs at the museum, score manager for New York State Science Congress, helped run booths, introduced artificial intelligence in a guest lecture program.

June 2018—

Position: Guest Lecturer and Lab Assistant

June 2019   **Where:**   Syracuse University SEcurity EDucation (SEED) Labs

Gave lectures on computer security (SQL Injection, Meltdown, Spectre) to high school teachers and professors looking to adopt SEED Labs for their curriculum. I also helped them work through the lab examples.

Research

Project: ITAckling Fine-Grained Robot Manipulation Tasks Using Multi-Modal Reinforcement Learning
When: January 2021—Present
Where: Stanford University
Advisors: Suraj Nair / Chelsea Finn **Contributions/Accomplishments:**

- Used Mujoco, Robosuite, and Pytorch to run reinforcement learning algorithms on simulated robot environments
- Will incorporate various sensory inputs, including proprioception, RGB camera, pressure, and sound
- Will integrate with real robots in Stanford's IRIS lab

Project: Monitoring Human Activity with Wi-Fi Metadata
When: June 2019—March 2020
Where: Manlius, NY
Contributions/Accomplishments:

- Used Channel State Information from normal Wi-Fi transmissions to infer the status of a person inside a room (working, sleeping, walking, and fall accident)
- Collected signal-level metadata from a common ESP32 IoT board
- Trained convolutional neural networks (CNNs) to use the phases and magnitudes of the signal subcarriers to make reasonable inferences
- Gained experience with the ESP32 API and TensorFlow 2

Project: Improving LSTM Neural Networks for Better Short-Term Wind Power Predictions
When: June 2018—November 2019
Where: Stony Brook University, Stony Brook, NY
Advisors: `advisors redacted`
Contributions/Accomplishments:

- Proposed and tested various LSTM modifications to improve wind power prediction accuracy
- Proposed a metric to measure the amount of "Naiveity" of the trained models
- Collected, processed, and combined databases of wind power and weather forecast data (totaling to around 3 terabytes of raw information)
- Proposed using auxiliary weather forecast data to provide context for wind power data, resulting in better model performance

- Trained Long Short-Term Memory Neural Networks (LSTMs) to predict wind power output
- Gained experience with TensorFlow and database management

Project: Interpreting Sign Language Using CNN-based Models
When: June 2019—August 2019
Where: Stony Brook University, Stony Brook, NY
Advisors: `advisors redacted`
Contributions/Accomplishments:

- Trained Convolutional Neural Networks (CNNs) to classify individual sign language gestures
- Collected, cleaned, and processed a database of sign language videos
- Developed various video–to–image pipelines, including center sampling, frame overlap, motion energy, and motion history, to reduce processing overhead while minimizing information losses
- Gained experience with standard, residual, and inception CNNs

Project: Breath Detection and Monitoring System Through Recurrent Neural Networks
When: June 2017—May 2018
Where: Manlius, NY
Contributions/Accomplishments:

- Designed and trained a machine learning model to monitor breathing through audio data only.
- Trained Recurrent Neural Networks (RNNs) to distinguish the sounds of breathing from background noise
- Implemented Autoencoders to extract key features from input audio
- Implemented statistical algorithms to find breath pattern abnormalities
- Designed and fabricated a low-cost parabolic microphone assembly and denoising amplifier circuit
- Gained experience with graph-based TensorFlow

Project: Intellistove: An Intelligent Stove that Prevents Cooking Fires
When: June 2016—May 2017
Where: Manlius, NY
Contributions/Accomplishments:

- Designed and created an intelligent stove that turns off when a pot boils dry
- Designed various prototypes of PCBs for use with programmable ATMEGA 328 chips
- Designed a password protected cellular remote control protocol
- Designed a temperature-based algorithm for boil-dry detection

Publications

* Maximilian Du. "Improving LSTM Neural Networks for Better Short-Term Wind Power Predictions". In: *2019 IEEE 2nd International Conference on Renewable Energy and Power Engineering (REPE).* 2019, pp. 105–109
* Maximilian Du. "Application of Autoencoder-Assisted Recurrent Neural Networks to Prevent Cases of Sudden Infant Death Syndrome". In: (2019). DOI: `10.13140/RG.2.2.28868.48002`. eprint: `arXiv:1904.12386`

Relevant Honors and Awards

* National Regeneron Science Talent Search Scholar (2020)
* Discovery Education "Making for Good Challenge" National Second Place (2020)
* American Invitational Mathematics Examination (AIME) Qualifier (2020)
* Finalist of Intel International Science & Engineering Fair (2018 and 2019)
* International American Statistical Association Award (2019)
* International IEEE President Scholarship Award (2018)
* International Council on Systems Engineering Award (2018)
* Broadcom MASTERS National Finalist (2015), 1st place in Science category
* Minor planet named in recognition of my research: `31660 Maximiliandu`

Extracurriculars

Stanford Amateur Radio Club
Member, working towards Technician radio license

Photography
Experimentative and classical photographic techniques. Specialized in nature and night photography

Creative Non-Fiction Writing
Author of book-in-progress: "The Spectacle" (tentative title)

"Making"
Various forms of casual electrical engineering projects, including a sewage backup detection system and an arc welder.