# ERIC ZACHARIA

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**CURRENT POSITION**

**Data Analytics Master's Student** — September, 2020 – present
Department of Computer Science, University of Chicago

**EDUCATION**

**M.S. in Computer Science**, University of Chicago — December, 2021
**B.S. in Aerospace Engineering**, Syracuse University — 2016

**PUBLICATION**

Eric Zacharia, Melissa Green, *Hydrodynamics of Dolphin Caudal Fins*, 2016 (available here)

**SKILLS**

Python, NumPy, Pandas, Scikit-learn, matplotlib, Jupyter, PyTorch, TensorFlow, Keras, SciPy, SQL, Golang, HTML5, CSS3, MATLAB, $L^AT_EX$, Excel, Git, Windows, MacOS

**PROJECT EXPERIENCE**

**Machine Learning Methods** — present

Implemented the following models from scratch, with little to no toolkits, e.g., sklearn

- AdaBoost Decision Tree Classifier ensemble model
- Pegasos algorithm for solving the soft margin Support Vector Machine primal problem, skipping the dual problem, with regularization & hinge loss
- Soft margin SVM dual problem using a quadratic programming solver
- Neural Network classifier with computation graph, Xavier weight initialization, and forward and backward propagation of matrix multiplication and addition, cross product, sigmoid, ReLU, and SoftMax
- Convolutional Neural Network built upon NN classifier with forward and backward propagations for convolution, max pooling, and flattening filters
- k-Nearest Neighbors with cross validation to optimize k
- Linear Regression using gradient descent and cross-validated learning rates
- Logistic Regression with regularization, normalized inputs, & gradient descent
- Quadratic Weighted Kappa scoring function for ordinal logistic regression
- Decision Tree Classifier with splitting on class and continuous attributes, information entropy, generalization error, and pruning

**Algorithms** — 2021

Wrote classes for the following algorithms with problem specific methods from scratch

- **Graph Algorithms –** BST, AVL Tree, Binary Min Heap, BFS, DFS, Dijkstra, Bellman-Ford, DAG shortest path, MST Prim, MST Kruskal, Max Flow Edmond Karp & Ford-Fulkerson
- **Sorting Algorithms –** Heapsort, Quicksort, Mergesort, Insertion Sort
- **Data Structures –** Coarse grained locking **c**oncurrent **l**inked list, concurrent stack, concurrent queue, open addressing hash table, LRU cache
- **Dynamic Programming –** LCS, LIS, Edit Distance, Knapsack, Coin Change, Word Break, Rod Cutting, Optimal Tree Placement, etc.

**Slack Clone** — 2021

- A single-page web application written with asynchronous JavaScript and Flask

- Create account using an email and a password that is encrypted and hashed
- Includes features like "forgot password", change username, change password, create new messaging channel, and reply to messages thread
- User info, channels, and messages are stored in database using SQL

**Twitter Feed Clone** 2021

- Handles adding and removing "tweets" to a coarse grained concurrent linked-list feed using a bounded concurrent queue lock implementation
- Talks to a server by decoding and encoding JSON files from strings

**Other Projects**

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|---|---|---|
| Pinterest Clone | Content Management System | Speaker Recognition System |
| Jack Programming Compiler | Blob Video Game | VM to Assembly Translator |
| Text Completion Software | Stock API Graph Generator | Authorship Text Verification |
| Roman Numeral Converter | Caesar Cypher File Encryptor | 1st Place Model Aircraft Flight |

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## WORK EXPERIENCE

**Aerospace Stress Engineer**, Spirit AeroSystems Inc. 2016-2020

- Worked on teams that designed, built, analyzed, and tested aerospace structures for The Department of Defense, Boeing's 787 Dreamliner, and Boeing's 777X; gained promotion to Level II Stress Engineer within 18 months
- Applied knowledge of MATLAB, Excel, linear algebra, ABD matrices, statics, dynamics, fatigue, damage tolerance, crack growth, Finite Element Analysis, Computer-Aided-Design, and properties of aluminum and composite materials

**Host of Glacier's Bed and Breakfast** 2018-2020

- Hosted guests in my 3-bedroom home with over 80 bookings
- Classified as a "Super Host" by Airbnb for sustaining a 5-star rating over two years

**Fluid Dynamics Researcher**, Syracuse University 2015-2016

- Studied the propulsive aspects of dolphin tails and experimented with 3D-printed dolphin caudal fins that mimicked swimming motion inside a water tunnel
- Synthesized knowledge of MATLAB, Excel, SolidWorks (CAD), 3D printing, Arduino, laser-induced fluorescence, HD videography, fluid dynamics, and circuits
- Used fluorescent dye and planar-shaped lasers to highlight trailing-edge vortices
- Constructed 3D vortex visualizations in MATLAB using pixel data from the HD recordings of the 2D vortex sheets by stacking and interpolating between points

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## CERTIFICATIONS

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| Secret Government Security Clearance | 2020 |
| Private Pilot | 2019 |
| Open Water Scuba Diver | 2016 |

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*Last updated : 05/27/2021*