**Stefan Zorcic**

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**EDUCATION**

**University of Waterloo**  Waterloo, ON

* Bachelor of Computer Science **(GPA: 3.98)** *Expected Graduation: May 2028*

**EXPERIENCE**

**Theoretical Computer Science Research Assistant** August 2023 - Present

University of Waterloo, Department of Computer Science  *Waterloo, ON*

* Created and tested various discrete finite automata with output for verification of properties in various series.
* Coded a simulation in Python3 to test various proposed morphism techniques for values under 10000.
* Developed proof techniques using automata theory and the Walnut software.

**Software Developer** August 2023 - Present

WATonomous Autonomous Software Division*Waterloo, ON*

* Containerized all code with Docker and integrated it into the main codebase on Github using Git.
* Designed and trained a convolutional neural network in Python3 with TensorFlow to detect traffic lights in an input image and determine signal value with an out of sample accuracy of 95%.
* Subscribed to ROS2 nodes to collect data from sensors (LIDAR, Camera, Radar) and verified data with foxglove.

**PUBLICATIONS**

* Coauthored “**Power-free Complementary Binary Morphisms**” submitted for publication in the *Journal of Combinatorial Theory Series A,* December 11, 2023*.*
* Special Acknowledgement for “**Proof of Irvine’s Conjecture via Mechanized Guessing**” posted on the *Cornell Archives,* November 27, 2023*.*

**RELEVANT SOFTWARE PROJECTS**

**Hurricane Formation Detection**

* *Honorable Mention at NASA Toronto Youth Space Apps Hackathon*
* Scrapped data from website databases using NASA and JSTAR web APIs and stored normalized data using Git.
* Created a AI model to determine hurricane formations in an opensource NASA database with 87% accuracy.
* Preformed image preprocessing on training data using the cv2 library in a custom Python3 script.

**AI Paraplegic Mouse Interface**

* *Winner of Best Education Hack at the Ignition Hacks Hackathon*
* Developed a Python3 script to allow paraplegics to interface with their computer through their web camera.
* Integrated the cv2 and pyautogui library with an AI face detection model under the MIT creative commons license to perform the logic workload of a custom developed python script.

**Twitter NLP Sentiment Detection**

* Developed a Python3 script to determine the sentiment of tweets in a public database with 94% accuracy.
* Integrated Scikit-learn’s MLP classifier model to preform natural language processing on tokenized data.
* Preformed data preprocessing using the NLTK and string module in python to tokenize the training data.

**Live Emotion Deep Learning Detection**

* Developed several models to predict the emotion probability vector (anger, contempt, disgust, fear, happiness, neutrality, sadness, surprise) of a face in an image with a 92% data accuracy in classification testing.
* Designed and trained several custom convolutional neural networks using the TensorFlow library.
* Utilized the cv2 library to preprocess training data from an opensource Kaggle dataset.

**SKILLS**

Git, API, Data Manipulation/Management, Python, NumPy, Pandas, TensorFlow, Scikit-learn, C++, Java, Docker, Bash