

TOLGA AKTAS

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EDUCATION

University of Rochester

ROCHESTER, NY

Bachelor of Science Electrical & Computer Engineering, Minor in Computer Science

Anticipated May 2020

- **GPA:** 3.6 out of 4.0, Dean's List 7 out of 8 semesters
- **Selected Coursework:** Autonomous Mobile Robotics, Computer Vision, Artificial Intelligence, Stochastic Processes, Digital Signal Processing, Digital Image Processing, Machine Hearing, Data Mining, Human Computer Interaction
- **Research Interests:** Machine Learning, Signal Processing, Robotics, Computer Vision, Artificial Intelligence, Machine Hearing
- **Skills:** C, C++, CUDA C, Java, Keras, MATLAB, Numpy, Pandas, Python, PyTorch, ROS, Scikit-Learn, skimage, Tensorflow
- **Honors:** e5 Fifth-year Technical Entrepreneurship Fellowship, Kearns Fellowship, Xerox Fellowship for Engineering Research
- **Online Learning:**
 - Udacity: PyTorch Deep Learning Fellowship, Private & Secure AI
 - Deep Learning: Convolutional Neural Networks, Sequence Models, Structuring Machine Learning Projects, Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization, Neural Networks and Deep Learning

PROJECTS

Autonomous Mobile Robot Challenge:

- Built a fully autonomous system on TurtleBot-II for CSC 232: Autonomous Mobile Robots final challenge. Extensively used **ROS**, **C++** and **Git** control throughout the semester-long project.
- Built modules on ROS runtime for EKF SLAM localization & mapping, perception, path-finding controller, *A* search* planner for shortest distance path to the goal point.

DotLip: Lip Reading with Deep Neural Nets

- Implemented and optimized LipNet architecture in **Tensorflow** and **Keras** for lip-reading task as a final project for a computer vision class.
- Used GRID Corpus dataset for training LSTM

Wavelet-based Statistical Speckle Reduction in Ultrasound Images

- Implemented the statistical filtering method proposed by Gupta et. al (2004) for reducing speckles in medical ultrasound images.
- Implemented 12 filtering methods and evaluated their comparative performance on edge preservation and noise suppression.

Speech Source Separation using Deep Neural Networks

- Implemented fully connected and LSTM-based neural networks to separate singing voice from the audio waveforms in **PyTorch**.
- Trained and tested on DSD100 dataset.

English Accent Classification from Speech

- Implemented clustering algorithms to apply an unsupervised learning scheme to map different voice datapoints into different clusters.
- Implemented a Bidirectional LSTM with Attention mechanism to classify different English accents from speech in **PyTorch**

Senior Capstone: Real-time Library Monitoring and Data Analytics

- Developed an end-to-end solution with my team to have Raspberry PI devices locally perform human detection in order to localize and count people, report to a MySQL server for data storage and processing.
- Implemented Haar-based body detectors in **Python**, using **OpenCV** and **TensorFlow**. Implemented the server backend using **NodeJS** and **MySQL** on the server-side, and Python on the client-side to collect real-time data. Used REST API for designing the data flow.

ELECTRICAL ENGINEERING AND COMPUTER SCIENCE EXPERIENCE

Incoming Software Engineering Intern, Google

May 2020 – August 2020

- Will join Geo team to examine the use of large satellite image datasets for 3D object reconstruction tasks.
- Investigate the use of image segmentation, reconstruction methods, and deep learning-based generative modelling methods

Research Assistant, VISTA Lab at University of Rochester

October 2019 - Present

- Studying Visual Grounding and Video Localization problems using natural language queries.
- Exploring different visual and text embedding models for improving the accuracy on Visual Question Answering (VQA) tasks.

E5 Entrepreneurial Fifth-Year Fellowship

September 2019 - Present

- E5 is a fellowship granted to U of Rochester students who propose an entrepreneurship project and get accepted to the program.
- Leading a project that aims to design a wearables-based solution to provide real-time workout activity recognition and tracking.
- Exploring the methods of exploiting ECG, EMG and accelerometer data for real-time exercising analytics.
- Designing different experiment settings for building an annotated dataset of ECG, EMG and accelerometer data to be collected during workout sessions.

Software Engineering Intern, Qualcomm Technologies Inc.

Extended Reality (XR) Systems

May 2019 – September 2019

- Built OpenGL ES application for avatar rendering using OBJ files developed in Autodesk Maya.
- Implemented eye-tracking algorithm to integrate eye tracking capabilities

- Implemented facial landmark detection and tracking algorithm to add real-time gesture tracking capabilities
- Worked on variational/conditional VAE to generate avatar facial texture images using **TensorFlow**.
- Investigating deep learning-based methods for alternative generation of occluded facial landmarks from speech and/or occluded image.

Research Assistant, Computer Vision Systems Lab, University of Rochester

February 2018 – November 2018

- Exploring different architecture models to design and optimize a mobile ISP (Image Signal Processor) pipeline using semantic information from CNN engine. Implementing ISP pipeline simulator in **Halide** for performance monitoring
- Developing and testing AR applications on **ARCore** to analyze the performance metrics and explore different architectural models for efficient execution of AR applications on mobile platforms.

Xerox Undergraduate Research Fellow, Robotics & AI Lab, University of Rochester

June 2018 – August 2018

- Explored hardware architecture models on different platforms to perform prediction and perception tasks more efficiently and faster for real-time robotic operations
- Built a dataset of moving robots & objects collected from TurtleBot 2.
- Gained practical and theoretical experience in parallel programming and optimization on **CUDA C**.

Teaching Assistant, Department of Computer Science, University of Rochester

September 2016 – May 2019

- Ran workshops and taught lab sessions for Introduction to Java, Data Structures & Algorithms, and Introduction to C & C++ Programming courses in different semesters
- Created teaching & grading material for 198 students, and writing script files in **Python** for automated grading