

# Timothy Rupprecht

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## SYNOPSIS

Tim Rupprecht is a Ph.D. candidate in the electrical and computer engineering department at Northeastern University concentrating in the field of deep learning, machine learning, and algorithms. He focuses on developing lightweight algorithms for edge devices. He has a BS and MS in computer engineering also from Northeastern. He has done scientific programming for a number of companies and universities.

## EXPERIENCE

**CoCoPIE Inc.** Boston, MA January 2022 - Present  
*Intern, Software Developer*

*Works alongside Professor Yanzhi Wang where we work with investors and customers to use our state-of-the-art compression and acceleration techniques on a variety of deep learning tasks. CoCoPIE was created by Professor Wang to offer his compression techniques in a “software-as-a-service” model.*

- Explores the algorithms of other researchers to look for good candidates for model compression.
- Develops demos for prospective customers when good candidates for compression are found.
- Works to bring specific lightweight neural networks to customers with application specific problems.
- Writes scientific papers for technical journals in the event of successful novel research applications.
- Relies on networking to bring in new customers eager to implement lightweight neural networks.

**Northeastern University** Boston, MA August 2020 - Present  
*Research Assistant, Teaching Assistant, Student*

*Works alongside Professor Yanzhi Wang in the development of deep learning algorithms for a variety of applications. Presently Professor Wang has achieved the best model compression techniques for the implementation of deep learning algorithms on targeted hardware devices.*

- Writing a dissertation on deep learning super resolution for targeted hardware devices.
- Working with state-of-the-art model compression and acceleration techniques for deep learning.
- Writing a survey of deep reinforcement techniques for applications in motor control and resource allocation tasks hopefully to be published soon.
- Teaching Assistantship lead to the best professorial reviews ever attained by Professor Wang in his undergraduate computer architecture course.
- I developed my MS thesis under Professor Wang which showed the regularization technique known as Dropout still has relevance in a world eager to abandon dropout.

**Northeastern University** Boston, MA September 2018 – August 2020  
*Research Assistant, Student*

*Worked in the Robust Systems Lab run by Professor Octavia Camps Ph.D. contributing to projects funded by ALERT. The projects are funded by the department of homeland security and involve applying computer vision and machine learning solutions to airport security problems.*

- Implemented state of the art neural networks for the purpose of activity recognition in problem spaces.
- Designed systems as part of a team to overcome computer vision problems in airport security camera video experiments meant to correlate human travelers and their associated luggage.
- Worked with Professor Camps to identify new problems that existing intellectual property can solve.
- Parsed data and visualized results for computer vision demos given to customers, university partners, and general audiences.

**Northeastern University** Boston, MA

January 2018 – September 2018

*Software Engineer, Contractor*

*At ALERT, a Department of Homeland Security Center of Excellence, supported a project to develop successfully automated tracking of passengers and divested items at an airport checkpoint using video cameras.*

- Created accurate ground truth data for computer vision experiments by designing and implementing a system that allows the logging of bounding boxes drawn over objects of importance in a set of video frames.
- Managed a team of students using the aforementioned tool to develop ground truth for machine learning projects.
- Worked with researchers to score their tracking algorithm's performance by developing code that compares algorithm data to the prepared ground truth data.
- Directed, and planned data gathering events to generated video data to be used by the ground truth tool and algorithm research teams.
- Developed manuals, and specifications for the tools created during the project.

**L3 Technologies** Woburn, MA

January 2015 – July 2017

*Software Engineer*

*Optimized updates of the ClearScan Checkpoint System by automating production code releases to client airports and expanded the scope of the product's internal logging system.*

- Added utilities to expand the scope of the log files to ease the effort to debug the system by tracking data on various system components and their device states. Created a daemon to track system metrics by parsing the logs for these device states.
- Improved client relationships by using the metadata from the system metrics daemon to prove to customers that errors present in their system were being caused by various industrial partners, as opposed to being caused by the L3 ClearScan.
- Cut system install time by 90%, updating installation from requiring a series of install CDs, to downloading directly from a portable local network server that acted as a repository for production software being distributed to the field.

**Northeastern University Network Labs** Boston, MA

September 2015 – May 2016

*Research Assistant*

*Software developer for two different projects working with graduate level students on research and development in the Northeastern University Networks Lab. After achieving the desired results for the first project, I was brought on to a second.*

- Utilized the Google Maps API to calculate the optimal route to a destination that would keep one within range of a Wi-Fi source.
- Gathered raw data to act as values at nodes within a graph that could be used for decision making in a breadth-first search algorithm that would traverse the graph.
- Incorporated outputs of the algorithm into progress reports by utilizing report generating software (R Markdown & Latex)
- Implemented a networked software-defined radio framework using python servers and clients with lead graduate students.
- Created and expanded existing features to the software-defined radio servers and clients, improving performance and scalability.
- Created a bash script making use of new features of the project for testing before implementation.

**Harvard Bioscience** Framingham, MA

January 2014 – July 2014

*Co-op for Northeastern University degree**Worked with professional engineers, to perform back-end development. This included creating device drivers and application code for medical syringe pumps. Led all the other coop students in the testing of these medical syringe pumps at each product release. Eventually automated the tests so no man power was needed to perform.*

- Met the performance and operational needs of new customers by improving existing products by implementing design features and upgrading motor drivers.
- Maintained customer relationships by tracking down the causes of bugs and applying bug fixes to existing software for future software releases.
- Worked with the production floor to develop software tools for packaging software onto products.
- Automated a series of motor tests that are done for quality assurance and led others in QA testing.

**Bose Corporation** Framingham, MA

January 2013 – July 2013

*Co-op for Northeastern University degree**Worked with professional engineers, to perform back-end development. This included creating gadgets used to interface with the car amplifier during testing, making operating the test vehicles safer to operate, as well as enhancing their analysis toolset used for studying different theoretical cabin configurations.*

- Composed MATLAB scripts for transfer function analysis of microphone and speaker combinations inside car cabins for different scenarios.
- Made testing cars safer for the engineering team by designing a device that sends commands to a car amplifier using an Arduino and a printed circuit board.
- Verified simulated test outcomes for noise cancellation performance on actual cars using software that would simulate driving conditions.

**Northeastern University Project Karman** Boston, MA

January 2015 – May 2016

*Lead Firmware Designer**Led peers in the development of Northeastern University's attempt to be the first academic institution to breach the Karman line using rocket propulsion. Karman began as a senior design project to create a proof of concept which then became a project to implement the proof of concept by the local chapter of AIAA.*

- Appointed lead firmware developer for the effort to implement the proof of concept once the project was assumed by the university chapter of the American Institute of Aeronautics and Astronautics.
- Developed with team members an asynchronous Twin Wire Interface driver for taking measurements external to the rocket.
- Managed the work of twenty students, designing and implementing a mission plan, further device drivers, and operating system tasks.
- Created manuals and specifications for the device drivers, operating system tasks, and mission plan created during the project.

**EDUCATION****Northeastern University, College of Engineering** Boston, MA

May 2023 (expected)

Ph.D. in Computer Engineering

Research Assistant to Professor Yanzhi Wang, Ph.D.

GPA: 3.33 / 4.0

**Northeastern University, College of Engineering** Boston, MA

Dec 2020

MS in Computer Engineering concentrating in Machine Learning

Research Assistant to Professor Michael Silevitch, Ph.D.

GPA: 3.67 / 4.0

**Northeastern University, College of Engineering** Boston, MA  
BS in Computer Engineering  
College of Engineering Dean's Scholarship (All Semesters)  
In Major GPA: 3.56 / 4.0  
Cumulative GPA: 3.29 / 4.0

May 2016

## **PUBLICATIONS**

Rupprecht, T. A, Wang, Yanzhi (2022). *A Survey for Deep Reinforcement Learning in Markovian Cyber-Physical Systems: Common Problems and Solutions*. Elsevier Neural Networks.  
<https://www.sciencedirect.com/science/article/abs/pii/S0893608022001873>

Rupprecht, T. A. (2020). *In Defense of Dropout* [Unpublished master's thesis]. Northeastern U.

## **PROFESSIONAL SKILLS**

- *Programming languages: C, C++, Python, Matlab*
- *Machine Learning APIs: Pytorch, Tensorflow, MATLAB Topic Modeling Toolbox, mlpack*
- *Computer Vision APIs: OpenCV, SimpleCV*
- *Scientific Programming: numpy, scipy, PyOpenCL, rpclib*
- *Data Visualization: Qt, Tkinter, plotly, LaTeX, R Markdown*
- *Professional Services: Google, Amazon Web Services*
- *Office tools: Word, Excel, PowerPoint, Visio, Visual Studios*
- *Operating Systems: Linux, freeRTOS, safeRTOS, Ubuntu/Debian, Redhat, ROS, Windows*
- *Other skills: Object Oriented Design, Scripting, Scientific Programming*