# Yoav **Rabinovich**, BSc

Research, Artificial Intelligence, Quantum Computing

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I am a researcher and prospective PhD student in the field of artificial intelligence, passionate about deep learning theory. I believe that my background, experience, and passion make me a uniquely suited to this exciting area of study. As a research fellow at Harvard University, I worked on several papers developing a metric for implicit social biases in text using word embeddings. My experience working at Quantum Machines, Satellogic and AI Collective demonstrates my expertise in machine learning, natural language processing, computer vision and quantum computing. I believe my background in Physics gives me a unique perspective and a novel set of methods to apply machine learning theory. I am eager to continue learning and conducting research in this field.

## Experience

**Research Fellow**, Department of Psychology, Harvard University, Remote 2020–2022

As a machine learning specialist, led research in Mahzarin Banaji's lab to develop a quantifiable metric for word associations and implied social biases derived from corpora of text. Using word embedding techniques to encode words in a space of meanings, the resultant distance metric is applied to characterize collective representation biases in language use, such as gender or racial biases, and to examine the change in such biases over time and in different contexts.

**Publications**

T. Charlesworth, M. Navon, **Y. Rabinovich**, N. Lofaro, B. Kurdi. The Project Implicit International Dataset: Measuring Implicit and Explicit Social Group Attitudes and Stereotypes Across 34 Countries (2009–2019). *Behavior Research Methods 2022*.

**Y. Rabinovich**, T. Charlesworth. Valence-Regularized Training of Diachronic Word Embeddings for Tracking Social Attitudes. *In progress*.

**Y. Rabinovich**, T. Charlesworth. Measuring Trends in Social Attitudes using Reddit Word Embeddings. *In progress*.

**Quantum Computing Researcher**, Wolfram Research, Remote 2020

Participated in the Wolfram Physics summer research program, researching Quantum Computing in Stephen Wolfram's young model of Physics. Implemented Shor's Algorithm in Wolfram Language and researched its features as a Wolfram multiway system, determining the plausibility of the existence of Quantum Speedups in the context of the Wolfram Model lens on quantum measurement. This work was featured on Stephen Wolfram's blog.

**Quantum Deep Learning Scientist**, Quantum Machines, Tel Aviv, Israel 2019–2020

I devised a compiler optimization scheme for Quantum Machine's domain-specific quantum programming language, designed for a custom processor used in their qubit control hardware. Wrote a Bachelor's thesis on using conditional recurrent neural networks for code generation for gate-model quantum computers in Python using Qiskit, TensorFlow and Keras.

**Computer Vision Intern**, Satellogic, Buenos Aires, Argentina 2019

Participated in a term-time project with Satellogic, building deep learning models for segmentation of satellite imagery based on state-of-the-art U-Net architectures in Python using PyTorch.

**Machine Learning Intern**, AI Collective, San Francisco, CA 2018

Built a chatbot and a natural language processing model for classification of medical emergencies for an NGO dedicated to providing healthcare information to women in Malawi, which was deployed using Google's DialogFlow interface and incorporating Twilio's SMS API.

**Machine Learning Specialist / Teacher's Assistant**, Minerva University and Department of Psychology, Harvard University, San Francisco, CA 2017–2020

Used machine learning algorithms and OpenCV for computer vision, analyzing videos of subjects' eyes in a neurological study with Professor Christine Looser at Harvard University and provided statistical analysis of the data to estimate the causal treatment effect.

Also served as a teacher's assistant in both the Quantum Mechanics and Statistical Mechanics courses at Minerva Schools.

**Intelligence Analyst / Researcher**, Research Division, Israel Defense Forces Intelligence Corps, Tel Aviv, Israel 2012-2016

Following admittance to a prestigious course of service in the IDF Intelligence Corps, provided research and analysis of data from a variety of sources to assess clandestine strategic R&D projects abroad. Presented research to high ranking officers and government decision-makers and to large crowds regularly. Awarded a personal Award of Excellence by the Chief Intelligence Officer.

## Education

**Bachelor of Science (B.Sc.)**, School of Computational Sciences, Minerva University GPA 3.74, 2020
Admitted to Minerva University in 2016 and graduated majoring in Computer Science in 2020 with concentrations in Machine Learning and Quantum Information. Bachelor's thesis on Quantum Code Generation with Conditional Recurrent Neural Networks.
Prestigious international program with semesters spent living in San Francisco, California; Seoul, South Korea; Hyderabad, India; Berlin, Germany; Buenos Aires, Argentina; London, UK; and Taipei, Taiwan.

**Course Repositories and Significant Projects**

Bachelor's Thesis CP194
Quantum Information Theory IL199
Deep Learning Theory & Application IL199
Bachelor's Thesis: **Quantum Code Generation with Conditional RNNs**
A Conditional Stacked Recurrent Neural Network with GRU cells used to generate quantum circuits based on desired target quantum states. The conditional network was trained on randomly sampled circuits and their simulated output states as conditions that are introduced into the internal memory state of the initial GRU cell.

Statistical Mechanics NS162
Modeling, Simulation & Decision-making CS166
Joint Final Project: **Deep Renormalization**
A Replication of a paper by C. Alexandru et al. using Deep Autoencoders to learn the critical temperature of the 2D Ising Model. The technique is then expanded to test larger latent dimension size and to include an examination of layer activations. This was done to test a hypothesis that like Mehta and Schwab showed for Restricted Boltzmann Machines, the autoencoder will converge on a standard block renormalization scheme.

Artificial Intelligence Algorithms CS152
Machine Learning for Science & Profit CS156
Joint Final Project: **Wumpus World 3D**
A Wumpus World game coded in C# using Unity 3D and implementing a PID-controlled robot, featuring a convolutional neural network trained on screenshots for visual recognition of objects in the virtual environment.

Optimization Methods CS164
Final Project: **Constrained Optimization of Latent Distributions to Support Neural Network Training**
An implementation and discussion of a paper by Pathak et al. improving the training of neural networks by incorporating domain-knowledge through a constrained convex optimization of a latent distribution derived from the model during training. The technique was demonstrated in the context of convolutional neural networks for object-segmentation.

Algorithms & Data Structures CS110
Final Project: **Quantum Computing and the Deutsch-Jozsa Algorithm**
An introduction to Quantum Computing, its defining features and its relation to algorithmic complexity achieved through a simple walk-through of Deutsch-Jozsa Algorithm and quantum speedups.

**Continuing Education**, Harvard University 2021

Electrodynamics PHYS 153
Quantum Mechanics II PHYS 143B

## Awards and Achievements

Won a personal Award of Excellence by the Chief Intelligence Officer of the Israeli Defense Forces for his work as an Intelligence Analyst and his contribution to global peacekeeping in the monitoring of proliferation of unconventional weapons.

## Personal interests

Science, Technology, Guitar, Cooking, Baking, Films, and Comedy.