

Erfan Abedi

MASTER STUDENT IN QUANTUM SCIENCE AND TECHNOLOGY

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Education

University of California, Los Angeles

MASTER OF QUANTUM SCIENCE AND TECHNOLOGY

Los Angeles, California, USA

Sept. 2022 - (Expected) Sept. 2023

Amirkabir University of Technology

BACHELOR OF SCIENCE IN COMPUTER ENGINEERING

Tehran, Iran

Sept. 2017 - Oct. 2021

Research Experience

Quantum Light-Matter Cooperative

RESEARCH ASSISTANT

- Working on numerical simulations of laser systems using Recurrent Neural Networks.

Under the Supervision of
Prof. Sergio Carbajo

Jun. 2023 - Current

QuOne Lab at Phanous Research and Innovation Centre (phanous.ir)

RESEARCH ASSISTANT

- Working on the theory and numerical simulations of a paper on Quantum Lazy Training.
- Assisting the senior researchers with their ongoing research on Quantum Machine Learning.
- Reading Papers and giving talks about various QML papers at the research group's weekly meetings.
- Designing assignments and educational material for the Center's 1000qubit workshop.

Under the Supervision of
Prof. Salman Beigi

Jun. 2021 - Sept. 2022

Publications

2022 **E. Abedi**, S. Beigi and L. Taghavi, *Quantum Lazy Training*, Quantum 7 (2023): 989, [Journal Access](#).

2021 **E. Abedi**, *Maqenta: Generating music with Quantum Machine Learning*, BSc Thesis (in Persian).

2021 B. Bisgin, N. Oruz, J. G. Jarkovský, **E. Abedi** and M. Mauser, *QSVT in Qiskit*,
[IBM's Qiskit Hackaton Europe 2021 Project Paper](#).

Notable Projects

Reimage-GPT ([On Github](#))

DEVELOPER

May. 2023 - Jun. 2023

- Reimage-GPT is an effort to make prompt-generation easier for using diffusion models.
- In this project, we fine-tuned a Large Language Model (LLM) to come up with a good prompt for a target image.
- First, an input image is separated into a text representation of its most important elements and their respective locations using Facebook's Detectron2 model.
- Then, a GPT-like model is instructed to come up with a good image-generation prompt using the text generated in the previous step.
- Then, GPT's output text is passed onto the Stable Diffusion model to get an output image.
- Finally, the distance between the output and input images is used as loss function to fine-tune the weights of the LLM.

QSVT in Qiskit ([On Github](#))

RESEARCHER & DEVELOPER

IBM's Qiskit Hackaton Europe 2021

Spring of 2021

- Quantum Singular Value Transformation (QSVT) is a framework that allows one to apply an arbitrary polynomial transformation to the singular values of a block-encoded unitary transformation.
- QSVT-implemented quantum search was implemented utilizing Fixed-point Amplitude Amplification.
- QSVT in Qiskit was selected as one of the top 3 winning teams of the Hackaton.

Maqenta ([On Github](#))

RESEARCHER & DEVELOPER

Summer of 2021

- Maqenta is a software for generating music using Quantum Machine Learning.
- Maqenta uses methods such as QLSTM and QGAN for generating music and is built upon PennyLane and PyTorch.
- Maqenta processes digital musical files as input and tries to compose a novel musical piece based on the said input.

AUT-ICPC Programming Contest's website (ICPC.aut.ac.ir)

BACK-END DEVELOPER

Summer of 2019

- AUT-ICPC's website is used by the contest's participants to register in and gather more information about the contest.
- AUT-ICPC's website is built using Django on the back-end and React.JS on the front-end.
- AUT-ICPC's website uses technologies such as Ngnix, PostgreSQL, REST framework and Redis.

Online Courses

- [Quantum Machine Learning - University of Toronto](#) (Audited)
- [Quantum Physics 1 - MIT](#) (Audited) — [Quantum Physics 2 - MIT](#) (Audited) — [Quantum Physics 3 - MIT](#) (Audited)
- [Differential Equations - MITx on edX](#) (Certificate available [on Github](#))
- [Statistics 110: Probability - HarvardX on edX](#) (Certificate available [on Github](#))
- [The Fourier Transform and its Applications - Stanford University](#) (Audited)

Honors & Awards

2021 **Top 3 Team**, IBM's Qiskit Hackaton Europe ([Certificate on GitHub](#))

2017 **Top 0.8% place**, The Iranian Nationwide University Entrance Exam for BSc. in Math & Engineering.

2015, 2016 **Acceptance in the 1st stage**, Iran's Chemistry Olympiad.

Extracurricular Activities

Students' Scientific Chapter of AUT's Department of Computer Engineering (CEIT-SSC.ir)

BOARD MEMBER & HEAD OF CONTESTS

Mar. 2019 - Sept. 2020

- Organized and provided technical means for the 6th Amirkabir Programming League.
- Organized the 1st Amirkabir Artificial Intelligence Summer Summit. (AAISS.ceit.aut.ac.ir)
- Organized and provided technical means for the 19th Amirkabir ICPC. (ICPC.aut.ac.ir)
- Organized the 11th Amirkabir Linux Festival. (LinuxFest.aut.ac.ir)

Programming Languages and Frameworks

Programming Languages

PYTHON · C/C++ · RUST · Q# · C# · GO · JAVA · JAVASCRIPT/TYPESCRIPT · MATHEMATICA

Frameworks and Technologies

PENNYLANE · QISKIT · CIRQ · QUTIP · PYTORCH · NUMPY · SCIPY · PANDAS · CUDA · OPENMP
DOCKER · DJANGO · MONGODB · POSTGRESQL · MYSQL · REDIS · KOA.JS · EXPRESS.JS · REST
GRAPHQL · ARDUINO

Languages

Persian

NATIVE

English

BILINGUAL PROFICIENCY

German

INTERMEDIATE