Eraraya Ricardo Muten

(+49) 1777-4844-61 | ericardo.muten@tum.de | ericardomuten.com | ericardomuten | ericardomuten

Education

Technical University of Munich (TUM)
Munich, Germany

Master of Science in Quantum Science & Technology — *Oct 2022 - Present*

- Focus area: theoretical quantum science & technology, quantum computing.

Bandung Institute of Technology (ITB)
Bandung, Indonesia

Bachelor of Science in Engineering Physics (Cum Laude), **3.94**/4.00 | Prof. Andriyan B. Suksmono & Dr. Nugraha. — *Aug 2016 - Mar 2021*

- Thesis: Developed a variational quantum algorithm to classify the MNIST dataset. Used PCA and quantum convolution to reduce the image dimension. Designed VQCs that work similarly to convolution filters in CNN for quantum convolution. The proposed architectures achieved up to 99.7% of accuracy, an improvement compared to related works.

Research, Teaching and Work Experience

Widya Institute of Technology
Remote

Course Developer — *Mar 2021 - Present*

- Creating an online course with hands-on coding modules using Qiskit on Intro to Quantum Computing.

Indonesian National Research and Innovation Agency
Remote

Research Assistant (Intern) | Dr. Agung Budiyono & Dr. Ahmad R. T. Nugraha — *Oct 2021 - Jul 2022*

- Developed a novel Monte Carlo simulation within epistemically-restricted phase-space formulation, inspired by CV quantum neural networks, for quantum many-body systems. Led the code development, coded the algorithm with TensorFlow. Benchmarked the algorithm on bosonic systems vs the regular VMC.

CERN
Remote

openlab Summer Student | Dr. Sofia Vallecorsa — *Jun 2021 - Sep 2021*

- Investigated the Quantum GANs to simulate the $t\bar{t}H(b\bar{b})$ production process in the LHC experiment. Benchmarked the results with the classical models, studied how the quantum model affects the performance. Used TensorFlow Quantum to build and train the model. Presented the work at the 2021 CERN Summer Student Session.

Google Summer of Code, Machine Learning for Science (ML4Sci)
Remote

Student Developer | Prof. Sergei V. Gleyzer — *May 2021 - Aug 2021*

- Conducted research on the potential of Quantum Convolutional Neural Networks in classifying images of particles in HEP. Benchmarked the results with the classical models, studied how the quantum model affects the performance. Presented the work at the 2021 MCQST Student Conference. Published the code as an open-source project.

IBM Quantum
Remote

Qiskit Advocate Mentorship Program Mentee | Dr. Anna Phan — *Mar 2021 - Jun 2021*

- Studied the Quantum Graph Neural Networks (Verdon, et al.) and translated the algorithm to Qiskit code. With the code, presented a demo of simulations for finding the unknown Hamiltonian parameters of transverse-field Ising models using Quantum Graph Recurrent Neural Networks at the Qiskit Advocate Monthly Meetup.

Bandung Institute of Technology
Bandung, Indonesia

Teaching Assistant — *Aug 2017 - Dec 2020*

- Delivered academic and hands-on tutorials (software, programming languages, practicum kits). Provided students with assistance on exam preparations, laboratory activities, assessed quizzes, and homework. Subjects covered: Wave Phenomena, Electric Circuits and Electronics, Fluid Mechanics, Introduction to Information Technology, Engineering Drawing.

Nodeflux Inc.
Jakarta, Indonesia

AI Engineer Intern — *Dec 2019 - Jan 2020*

- Designed a real-time blemish removal face-filter application. HSV color threshold and elliptical kernel dilations were used for skin detection. Blemishes were detected by utilizing CLAHE and blob detection, coded the algorithms using OpenCV. Trained a YOLO model for face detection using PyTorch. Achieved 85-90% of blemishes removal.

Instrumentation, Control, and Decision Systems Lab, Bandung Institute of Tech.
Bandung, Indonesia

Student Researcher | Prof. Yul Yunazwin Nazaruddin — *Sep 2019 - Nov 2019*

- Conducted research in utilizing Diagonal RNN & LSTM to make the localization of an autonomous car more reliable in the absence of GPS signal, reducing 70% of localization errors. Built and trained the models with TensorFlow and Keras. The works resulted in two conference publications.

IHI Corporation *Yokohama, Japan*

Summer Research Intern *Jul 2019 - Aug 2019*

- Developed reinforcement learning agents to solve control problems in OpenAI Gym as the first testbed for the company's AI platform, which would later become the cornerstone for the company's machine learning software. Designed microservices for that platform to make it easier in building and training a reinforcement learning agent.

GV Lab, Tokyo University of Agriculture and Technology *Tokyo, Japan*

Student Researcher | Prof. Gentiane Venture *Oct 2018 - Jan 2019*

- Did research in using CNN to classify types of touch interaction from humans by learning the data pattern from a force sensor. Trained the model using Keras and TensorFlow. The model reached 88% real-time accuracy. Presented the work at the TUAT AIMS Program Student Conference.

Publications, Presentations & Panel Discussions

Oct 2021	**Modified Layerwise Learning for Data Re-uploading Classifier in HEP Event Classification**, (published, presented at the IEEE Intl. Conf. on Quantum Computing & Engineering and the Quantum Computing for High-Energy Physics Workshop)
Sep 2021	**An Approach for the Localization Method of Autonomous Vehicles in the Event of Missing GNSS Information**, (published, presented at the 2021 Society of Instrument and Control Engineers Annual Conference)
Aug 2021	**Quantum Generative Adversarial Networks on $t\bar{t}H(b\bar{b})$ Process Data Generation**, (presented at the 2021 CERN Summer Student Session)
Jul 2021	**Quantum Convolutional Neural Networks for High-Energy Physics Analysis at the LHC**, (presented at the 2021 Munich Center for Quantum Science and Technology Student Conference)
Apr 2021	**Panelist**, Panel Discussion: Innovation and Future Scope in Quantum Computing, IEEE SIES GST EPSILON 2021 Symposium
Nov 2019	**Localization Method for Autonomous Car Using Virtual Sensing System**, (published, presented at the 6th International Conference on Electric Vehicular Technology)
Dec 2018	**Learning Human Touch Interaction with Convolutional Neural Networks**, (presented in student conference at Tokyo University of Agriculture and Technology)

Achievements & Fellowships

2022	**Xanadu's QHack Quantum Machine Learning Open Hackathon**, awarded in three categories: 1st in Open Hackathon Experiment on Amazon Braket Simulators, 1st in Hybrid Algorithms Challenge, 3rd in Quantum Finance Challenge
2022	**First Place in Xanadu's QHack Quantum Machine Learning Coding Challenges**, out of 800+ teams from 100+ countries
2021	**Runner-up in Xanadu's QHack Quantum Machine Learning Open Hackathon**, out of 400+ teams from 85+ countries
2019	**Most Outstanding Student of Engineering Physics Department**, top 1 of holistic achievements out of 270 students
2019	**First Place in Paragon Inc. Interdisciplinary Engineering Idea Challenge Competition**, out of 60+ teams, 400+ students
2018	**First Place in National Scientific Research Paper Competition for University Students**, vs 10+ universities in the final
2016-21	**Dean's List: Bandung Institute of Technology**, top 5% of GPAs

2021	**MCQST Summer Student Program 2021**, 19 awardees from 200+ global applicants
2020	**IBM Quantum Qiskit Advocate 2020**, the first from South-East Asia
2020	**UCLQ Quantum Tech Summer School 2020**, 20 awardees from global pool of applicants
2018	**AIMS Exchange Programme to Tokyo Univ. of Agriculture and Tech.**, 4 awardees selected from the whole university

Volunteering Activity

Indonesian Qiskit Documentation Localization Project *Remote*

Founder & Team Leader *Aug 2020 - Present*

- Managed an Indonesian localization team for Qiskit Documentation. We translate the documentation hoping that more people from Indonesia can engage and get interested in quantum computation. The team has grown to nineteen members from only three at the beginning. Have personally translated more than 15000 words.

Qiskit Global Summer School 2021: Quantum Machine Learning *Remote*

Mentor *July 2021*

- Answered questions in quantum computing and machine learning from students. Discussed career opportunities and shared my personal experience with the students. Provided extra Qiskit tutorials to students who still got confused after the main classes.

Skills

Quantum Programming Frameworks	Qiskit, Cirq, TensorFlow Quantum, PennyLane, QuTiP
Programming Frameworks	TensorFlow, Keras, PyTorch, OpenCV, Scikit-learn, Scikit-image, PySCF
Programming Languages	Python, MATLAB, C++, C, LaTeX