Alejandro Montanez

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EDUCATION

PHD. MECHANICAL ENGINEERING
University of Guanajuato
May 2018- Apr 2022 | Salamanca, GTO
GPA: 10.0/10.0 | Summa Cum Laude

MSC. MECHANICAL ENGINEERING
University of Guanajuato
Jan 2019- Dec 2020 | Salamanca, GTO
GPA: 9.0/10.0

B.E. ELECTORMECHANICAL ENGINEERING
Universidad Pedagógica y Tecnológica de Colombia
Jan 2019- Dec 2020 | Duitama, BOY
GPA: 4.0/5.0 | First Class Honors

LINKS

LinkedIn:// **alejandromontanez**
GitHub:// **alejomonbar**
Google Scholar:// **J.A. Montanez-Barrera**

SKILLS

QUANTUM PROGRAMMING
Qiskit • Cirq • Pennylane • Amazon Braket • Qutip • QAOA • VQE • Ocean

MACHINE LEARNING
TensorFlow • PyTorch • KLearn

PROGRAMMING
Python • Jupyter • Git, Github • Numpy • Matplotlib • Scipy • Pandas

ADDITIONAL INFO

AWARDS AND RECOGNITION

- **Winner QHack 2023** - Quantum Computing Today, Amazon Braket challenges
- **Qiskit Advocate**
- **Winner QHack 2022** - Financial, QAOA, and Entrepreneur challenges
- Winner iQCHack 2022 - Social for good
- IBM Quantum Excellence 2020
- **Best GPA PhD** , University of Guanajuato.
- **Scholarship - Best GPA** at the Universidad Pedagógica y Tecnológica de Colombia.

INTERESTS

Quantum Computing • Non-equilibrium Quantum Thermodynamics • Deeplearning • Machine Learning • Quantum Error Mitigation • Optimization

EXPERIENCE

POSTDOCTORAL RESEARCHER | JÜLICH SUPERCOMPUTER CENTER
June 2022-Ongoing| Optimization in quantum computing | Benchmarking and characterization of quantum computing hardware | Simulation of large quantum systems

MICROGRANT | UNITARY FUND
January 2023-Ongoing| Develop the optimization problems structure of openQAOA a python-based library from Entropica Labs |

QUANTUM COMPUTING MENTORSHIP | IBM
Jan-May 2022| Adding functionalities to the BasicAer backend | Mentor: Kevin Sung.
Sept-Dec 2021| Adding applications to the Qiskit Optimization library and benchmarking codes of these applications | Mentor: Takashi Imamichi.

LATEST RESEARCH PAPERS

• (2024) Transfer learning of optimal QAOA parameters in combinatorial optimization. **In preparation**

•(2023) Improving Performance in Combinatorial Optimization Problems with Inequality Constraints: An Evaluation of the Unbalanced Penalization Method on D-Wave Advantage. **IEEE International Conference on Quantum Computing and Engineering (QCE)** https://doi.org/10.1109/QCE57702.2023.00067

•(2022) Unbalanced penalization: A new approach to encode inequality constraints of combinatorial problems for quantum optimization algorithms 23–25. http://arxiv.org/abs/2211.13914

•(2022) Decoherence predictions in a superconductive quantum device using the steepest-entropy-ascent quantum thermodynamics framework. **Physical Review A** https://doi.org/10.1103/PhysRevA.106.032426

•(2022) Method for generating randomly perturbed density operators subject to different sets of constraints. **Quantum Information Processing** https://doi.org/10.1007/s11128-022-03651-1

LATEST PROJECTS

QUANTUM-POWERED PLANNER FOR EV CHARGING NETWORKS
2022| https://github.com/alejomonbar/Quantum-Supply-Chain-Manager | Optimizing the electric vehicle charging networks using neutral atoms quantum computers
Language: **Python** Libraries: **Pulser•Numpy**

QUANTUM SUPPLY CHAIN MANAGER
2022| https://github.com/alejomonbar/Quantum-Supply-Chain-Manager | The quantum supply chain manager is a quantum solution for logistics problems.
Language: **Python** Libraries: **Qiskit•Numpy**

QUANTUM COUNSELOR FOR PORTFOLIO INVESTMENT
2022| https://github.com/alejomonbar/Quantum-Counselor-for-Portfolio-Investment | Stock Forecasting using QNN and Portfolio optimization with a novel heuristic equation using QAOA and VQE
Language: **Python** Libraries: **Qiskit•Numpy • Cirq • Pennylane**

COURSES & CERTIFICATIONS

- Quantum Programming 101 - **DWave**
- IBM Certified Associate Developer - **Quantum Computation using Qiskit v0.2X**