Viduranga Shenal Landers

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Education

University of Colombo School of Computing – *BSc (Hons) in Computer Science* *2023 – 2027*
- GPA: 3.95/4.00 (Highest) • Director's List (Semesters 1,2,3,4) • Faculty Award (Year 1)
- Leadership: Chairperson (ACM), Executive Committee (ISACA), Divisional Manager (SEDS)

QWorld and University of Latvia – *QClass 23/24 (6 ECTS, Graduate Level)* *2023 – 2024*
- Courses: Elements of Quantum Computing and Programming (100%), Elementary Quantum Algorithms (81.4%)

D.S. Senanayake College – *Secondary Education* *2013 – 2022*
- G.C.E. Advanced Level: 2A 1B 1C (National Rank: 2256) • SAT: 1490 (790 M, 700 EBRW)

Publications & Patents

10 Publications: 6 Conference Papers (IAC, ICGS3), 3 Book Chapters (Springer), 1 Policy Brief
- Quantum Revolution in Space: Enhancing Space Technology (2024, Springer Space Law and Policy Series)
- Quantum E-voting System Using QKD and Enhanced Quantum Oracles (2024, ICGS3)
- Symmetrically Entangled Quantum Oracles for Quantum Key Distribution (2023, Pre-Print)

2 Patents: Autonomous Adjustable Grousers (LK21653), Extendable Drill System (LK21652)

Key Achievements

Quantum: QHack Top 40 • Quantum Internet Application Challenge Top 3 • IBM Quantum Challenge Top Scorer
Space: Asia Pacific Space Leader Award • NASA GLEE Winner • NASA SpaceApps Global Nominee
Technical: IEEE Xtreme 2nd/4th in Sri Lanka • European Rover Challenge Finalist • ICGS3 Keynote Speaker

Technical Skills

Programming: C/C++, Python, Java, Scala, Octave, MERN Stack, VHDL, Verilog, Arduino
Quantum: Qiskit, QNE-ADK, SquidASM, Pennylane
Engineering: CAD/FEM (SolidWorks, Inventor), DEM (Altair EDEM), MBSE (Capella), FPGA, IoT

Selected Projects

Quantegrity: Quantum-Secure E-Voting System - *Research Project*
- Architected a novel e-voting system leveraging symmetrically entangled oracle based QKD for secure key distribution and authentication, and a mixnet based ballot system similar to Scantegrity for ensuring voter privacy.
- This research was published at the ICGS3-24 conference [C.1].

HA-FPGA: Hybrid Analog-FPGA Architecture - *Team Aerolite*
- Developing a novel hybrid computing architecture, designed to significantly enhance processing efficiency, reconfigurability, and crypto-agility in small satellites.
- Recognized as a semi-finalist in the ACHIEVED competition under sustainable satellite technologies theme.

Quantum Circuit & Network Simulator - *Personal Project*
- Developed a quantum computing simulator from the ground up using JavaScript, featuring an intuitive drag-and-drop interface for circuit design and a network simulation module to model basic network protocols.

Professional Development

Electronics: FPGA Embedded Systems (ACCIMT) • ASIC/FPGA Design (UoM) • IoT Product Design (UoM)
Quantum: QBronze, QZinc, QMercury, QNickel (QWorld) • IBM Qiskit Global Summer School (x4)

See appendix for detailed project descriptions, complete publications list, and additional achievements

APPENDIX - DETAILED INFORMATION

Publications

C=Conference, P=Pre-print, B=Book Chapter, PB=Policy Brief

Google Scholar Profile, ResearchGate Profile

[C.1] Landers V.* (2024). **Quantum E-voting System Using QKD and Enhanced Quantum Oracles**. *16th Annual International Conference on Global Security, Safety and Sustainability, ICGS3*, Nov 25-27, 2024.

[C.2] Landers V*, Pathirana O, et al. (2024). **Economical Lunar Sample Return Mission with Soil Penetration Darts**. *75th International Astronautical Congress*, Milan, Italy, Oct 14-18, 2024. IAC-24,A3,IP,118,x89101.

[C.3] Landers V.*, Campioli S., et al. (2023). **High-technology Operation for Planetary Exploration - uRanian mOons impActoR (HOPE-ROAR) mission: an innovative in-depth study of the Uranian satellites**. *74th International Astronautical Congress*, Baku, Azerbaijan, Oct 2-6, 2023. IAC-23,B4,8,12,x76984.

[C.4] Landers V.*, Pathirana O., et al. (2022). **Soil Penetration Darts (SPDs) for Deep Soil Sampling**. *73rd International Astronautical Congress*, Paris, France, Sep 18-22, 2022. IAC-22,A3,IPB,30,x72590.

[C.5] Rao S.*, Landers V., et al. (2022). **Mercury Sample Return Mission Design Utilizing Innovative Systems & Technologies**. *73rd International Astronautical Congress*, Paris, France, Sep 18-22, 2022. IAC-22,A3,5,1,x69552.

[C.6] Landers V.*, Pathirana O., et al. (2021). **A Self Adapting Wheel System for Space Exploration Rovers**. *72nd International Astronautical Congress*, Dubai, UAE, Oct 25-29, 2021. IAC-21,E2,3-GTS.4,2,x65366.

[B.1] Landers V.* (2024). **Quantum Revolution in Space: Enhancing Space Technology**. Jahankhani H., Kendzierskyj S., et al. (Eds.), *Space Law Principles and Sustainable Measures*, Space Law and Policy Series, Springer.

[B.2] Landers V.* (2024). **Quantum Technologies for Space and Aerial Vehicles**. Jahankhani H., Kendzierskyj S., et al. (Eds.), *Space Governance: Challenges, Threats and Countermeasures*, Space Law and Policy Series, Springer.

[P.1] Landers V.* (2023). **Symmetrically Entangled Quantum Oracles for Quantum Key Distribution**. Pre-print. Submitted to 25th International Conference on Advances in ICT for Emerging Regions (ICTer), Colombo, Sri Lanka, Nov 19-20, 2025.

[P.2] Landers V.* (2025). **Planetary Penetrators for Space Mining**. Accepted for Jahankhani H., Kilpin D., et al. (Eds.), *Space Mining: Humanities Quest for Equity*, Space Law and Policy Series, Springer.

[PB.1] Fonseka A.*, Landers V (2025). **Opportunities for Digitization of Sri Lanka's Public Sector**. *Policy Tribune Vol 1 - Issue 2*, Bandaranaike Academy for Leadership and Public Policy.

Patents

A Wheel that includes Autonomous Adjustable Grousers (Sri Lankan Patent No: LK21653 – Oct 2023)

A Fully Autonomous Extendable Drill and Method Thereof (Sri Lankan Patent No: LK21652 – July 2024)

Research & Project Experience

Quantegrity: Quantum E-Voting System – *Research Project* *2024 - Present*

- Developed a novel quantum-secure e-voting system featuring a symmetrically entangled oracle-based QKD protocol and a mixnet-based ballot system for ensuring voter privacy.
- Selected as a notable application (Top 3) at the Quantum Internet Application Challenge.
- **Work & Tools:** Implemented the novel QKD protocol and mixnet based voting system using Python, Qiskit, and the SquidASM quantum network simulation framework.
- *Related Publications: [C.1], [P.1]*

Quantum Circuit & Network Simulator – *Personal Project* *2025 - Present*

- Built a client-side computational quantum computing simulator from scratch and a quantum network simulator with multiple node entanglement capabilities. Hoping to contribute as a library to Ballerina Language ecosystem.
- **Work & Tools:** Developed entirely in JavaScript, featuring a visual circuit builder, quantum network builder, state-vector simulation, and support JSON based import & export.

Hybrid Analog-FPGA Computing Architecture – *Lead, Team Aerolite* *2024 - Present*

- Developing a novel Hybrid Analog-FPGA computing architecture, designed to significantly enhance processing efficiency, reconfigurability, and crypto-agility in small satellites for increased sustainability.
- Recognized as a semi-finalist in the ACHIEVED competition.
- **Work & Tools:** Designing the architecture and developing a compiler wrapper for proof of concept demos.

Soil Penetration Darts – *Project Lead, Nexus Aurora Corporation* *Aug 2022 – Present*

- Leading an international team to develop planetary penetrators for deep soil sampling missions.
- **Work & Tools:** Performed hyper-velocity impact simulation using Discrete Element Method (Altair EDEM), Mission analysis (Python), Model-Based Systems Engineering (Capella), and CAD/FEA (SolidEdge).
- *Related Publications: [C.2], [C.4], [P.2]*

Great Lunar Expedition for Everyone (GLEE) – *Team Lead, Team Aerolite* *May 2022 – Present*

- Leading a team in a NASA Artemis Student Challenge, winning Best Overall Proposal for the L-SPyDer, a deployment module designed to disperse 100 ChipSats on the lunar surface.
- **Work & Tools:** Led the end-to-end mission design, from system architecture and innovation to technical implementation, including power budget analysis (Python) and payload programming (Arduino).

ACHIEVED Research Initiative – *Project Co-Lead / Subsystem Lead. SGAC* *Jan 2022 – Dec 2023*

- Co-led an international team designing a CubeSat mission to a Uranian moon (HOPE) and led the structures/thermal design for a Mercury sample-return mission concept (RAISE).
- **Work & Tools:** Utilized MBSE (Capella) for system architecture, CAD (SolidEdge), and Python for thermal analysis and mission budgeting.
- *Related Publications: [C.3], [C.5]*

Lunarbot – *Founder & Team Leader* *2020 – 2024*

- Founded and led a team to engineer innovative rover instrumentation, resulting in two patents and a publication for a novel Self-Adapting Wheel System. The system was prototyped and is arranged for field-testing in Arctic.
- **Work & Tools:** Led from concept to prototyping and testing, including performing terramechanic simulations (EDEM), Finite Element Analysis, self-locking gear system design, and control algorithm development.
- *Related Publication: [C.6]*

Taprobane Rover – *Technical Lead, Robotics and Rover Division, SEDS Sri Lanka* *Jan 2022 - Apr 2025*

- Led a 50+ member team in developing Taprobane, Sri Lanka's first analog Mars rover, achieving a 17th place ranking at the European Rover Challenge 2022 qualifications and 5th in the ERC 2023 remote Qualification A.
- **Work & Tools:** Oversaw the end-to-end system design, integration of all subsystems (mechanical, electrical, software), and preparation and review of comprehensive technical documentation (MDR/PDR/CDR).

Selected Coursework Projects – *University of Colombo School of Computing* *2023 – Present*

- **Quantum Educational Platform:** Developed a full-stack (MERN) educational tool featuring the client-side quantum circuit simulator (QCNS) built from scratch in JavaScript.
- **Low-Level Systems Programming:** Built a custom memory allocator ('malloc' emulator) in Python and developed a simple parser using Flex & Bison.
- **Software Architecture from Scratch:** Engineered a comprehensive ERP system using a Java-based microservices architecture and a custom front-end framework (mini-React), without external libraries.

FPGA/ASIC Design & Low-Level Systems - *Coursework & Personal Projects*

- Implemented various digital systems on FPGAs (Cyclone I/II, Max 10) using VHDL/Verilog and completed certified training in ASIC/FPGA design, embedded systems, and IoT product development.

Work Experience

Technical Partner – *iRentTech* *Sep 2023 – Present*

- Overseeing delivery and repairs (software & hardware) of Laptops

Honors and Awards

Faculty Award for Best Performing Student (Year 1) – University of Colombo School of Computing (2024)

Asia Pacific Space Leader Award – Space Generation Advisory Council (2023)

Keynote Speaker – 15th International Conference on Global Security, Safety & Sustainability (2023)

Achievements

2025
- **Top 3 Notable Applications** – Quantum Internet Application Challenge, Quantum Internet Alliance

2024
- **Winner (Overall Category)** – Lunar Deployment Challenge (Team), NASA's GLEE Mission
- **1st Runner Up** – Predicta (Team), Data Science Hackathon
- **2nd - Sri Lanka (75th - Global)** – IEEE Xtreme 18.0 (Team), Competitive Programming Hackathon
- **40th Global (AWS $500 Powerup)** – QHack 2024 (Team), Quantum Machine Learning Hackathon

2023
- **4th - Sri Lanka (152nd - Global)** – IEEE Xtreme 17.0 (Team), Competitive Programming Hackathon
- **Best 3 Applications** – Quantum Network Explorer Application Challenge

2022
- **Finalist Team (17th)** – European Rover Challenge - On-site edition (Team)

2021
- **Distinction Award** – Singapore Space Challenge 2021 (Team)
- **Top Scorer** – IBM Quantum Challenge, Quantum Computing Hackathon

2020
- **Global Nominee** – NASA Space Apps Challenge 2020 (Team)
- **Silver Award** – Hong Kong International Math Olympiad

2019
- **Gold Medalist** – Sri Lankan Astronomy & Astrophysics Olympiad

Professional Training

SC=Short Course (≤ 3M), LC=Long Course (≤ 1Y), CC=Certificate Course, WS=Workshop, SS=Summer School, V=Virtual, P=Physical, H=Hybrid

[SC/V] CMOS Analog IC Design and Simulation '25. *ENTC, University of Moratuwa* — *Jun - Aug 2025*

[SC/V] {System}Verilog for ASIC/FPGA Design & Simulation '25. *ENTC, University of Moratuwa* — *Jan - May 2025*

[SC/V] Embedded Product Design for IoT '25. *ENTC, University of Moratuwa* — *Jan - May 2025*

[CC/P] FPGA Embedded System Design. *Arthur C Clarke Institute for Modern Technologies* — *July 2024*

[CC/V] QBronze, QZinc, QMercury, QNickel Diplomas in Quantum Computing Technologies. *QWorld* — *2020 - 2024*

[LC/V] Quantum Hardware Certificate, Quantum Software Certificate. *Womanium Quantum* — *2023*

[SC/V] Introduction to Programming with Neutral Atoms. *QuEra* — *Aug 2023*

[LC/V] Introduction to Quantum Computing & Programming. *Coding School, Qubit x Qubit, IBM* — *2020 - 2021*

[SS/V] Qiskit Global Summer School - x4 times. *IBM* — *2021, 2022, 2023, 2025*

[LC/V] Systems Engineering, Launch & Operations, Space Mission Design & Analysis, Payload Design. *ACHIEVED Academy, SGAC* — *Mar - August 2024*

[SC/H] CubeSat Development and Ground Station Control. *SEDS Pera, IEEE MTT-S, Orion Space* — *May - Jun 2021*

[WS/P] CubeSat Workshop and Lecture Series. *SEDS Pera, Orion Space, University of Peradeniya* — *7-10 Mar 2020*

Volunteering

National Point of Contact, Sri Lanka – *Space Generation Advisory Council* — *Oct 2023 – Present*

- Representing Sri Lanka in SGAC in support of the United Nations program on Space Applications, coordinating national space-related activities, and fostering international collaboration.

STEM Outreach & Mentorship — *2020 – Present*

- Led and contributed to multiple initiatives promoting STEM in Sri Lanka, including coordinating the SEDS Juniors chapter (∼1000 members), co-authoring a national policy brief on digitalization, and organizing educational donation projects benefiting over 1500 rural students.

Citizen Scientist – *International Astronomical Search Collaboration* — *2020 – 2021*

- Discovered 4 provisional asteroids through analysis of astronomical data sets from the Pan-STARRS telescope.

Additional Information

Mathematical Art Publications:

- **SpiraL & Collatz Feather 2.0** Exhibition of Mathematical Art, Joint Mathematics Meetings 2023.
- **Collatz Fractals** Anomalous Mathematical Patterns Sci-Art Contest 2025, Isaac Newton Institute, UK.

Interests: Quantum Computing, Space Technology, Computer Architectures, Hardware Security, Planetary Robotics