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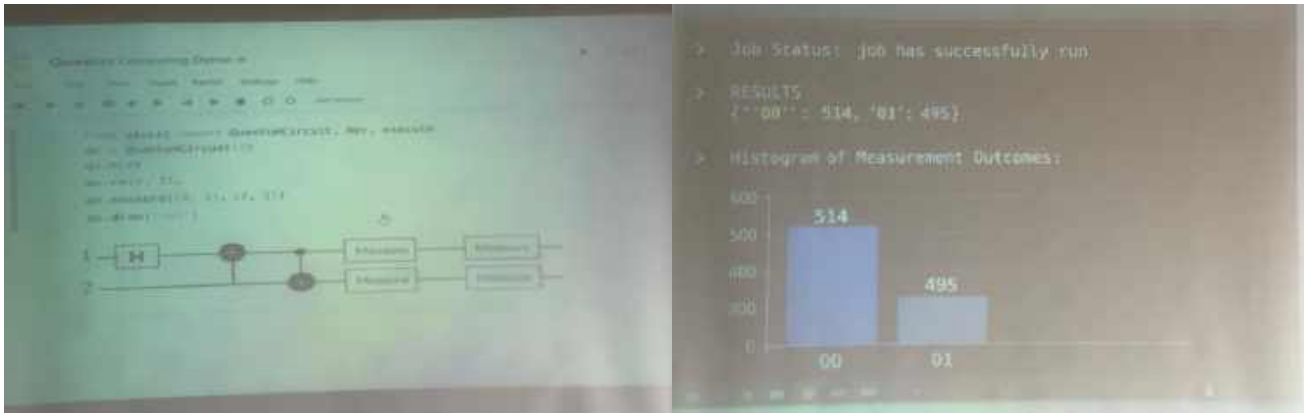
A Report on One Week Domain-Specific Hands-On Workshop on "Quantum Computing and Its Open Source Frameworks" Organized by Department of Computer Science & Engineering In Association with MITS IEI Student Chapter from 02.02.2026 to 07.02.2026

Report Submitted by: Dr. Aleemullakhan Pathan, Assistant Professor, Department of Computer Science & Engineering.
Resource Person: Mr. Premkumar Murugan, Product Engineer, Multicoreware, Coimbatore.
Mode of Conduct: Offline
Venue: SRB308
Total Participants: 72 (Internal)
Report Received on 24.02.2026.

Event Overview

Title: One Week Domain-Specific Hands-On Workshop on "Quantum Computing and Its Open Source Frameworks"
The program commenced at 9:30 AM with a warm welcome address delivered by Mr. Aleemullakhan Pathan, Assistant Professor, Department of CSE. He greeted the dignitaries, resource person, faculty members, and students, and briefly outlined the purpose of organizing the workshop.
Following the welcome address, **Dr. M. Sreedevi**, Professor and Head, Department of CSE, emphasized the growing significance of Quantum Computing in today's technology-driven world. She highlighted the importance of conducting the workshop on "Quantum Computing and Its Open Source Frameworks" to equip students with industry-relevant skills. She encouraged the participants to actively engage in the sessions, clarify their doubts, and make the best use of the hands-on learning opportunities provided during the workshop.



The session was then handed over to the resource person, Mr. Premkumar Murugan. He began by expressing his sincere gratitude to the organizing committee, the Head of the Department, the Principal, and the Management of MITS Madanapalle for providing him with the opportunity to share his knowledge and expertise. He also appreciated the enthusiastic participation of the students. The resource person then introduced the core concepts of Quantum Computing and its open source frameworks and shared his insights on practical implementation, real-world applications, and emerging trends in the field.

Program Objectives:

The primary objectives of the program were:

- To introduce the fundamental concepts of quantum computing.
- To provide practical exposure to open-source quantum computing frameworks through guided hands-on sessions.
- To enable students to design, simulate, and execute basic quantum circuits.
- To develop problem-solving skills using quantum algorithms.
- To familiarize students with real-world applications of quantum computing.
- To motivate students toward advanced learning, research, and career pathways in quantum technologies.

Day 1: Introduction to Quantum Computing

Session Topics:

- Limitations of classical computing
- Fundamentals of quantum mechanics for computing
- Qubits, superposition, and measurement

Hands-On Activities:

- Installing Python and required quantum libraries
- Exploring quantum concepts using simple simulations
- Running first basic quantum examples on simulators

Day 2: Quantum Gates and Quantum Circuits

Session Topics:

- Single-qubit and multi-qubit quantum gates
- Bloch sphere representation
- Quantum circuit model

Hands-On Activities:

- Creating simple quantum circuits using Qiskit
- Applying basic gates (X, H, CNOT)
- Visualizing circuit outputs and measurements

Day 3: Quantum Algorithms – Basics

Session Topics:

- Quantum parallelism
- Deutsch–Jozsa and Grover's algorithm (conceptual overview)
- Circuit depth and noise basics

Hands-On Activities:

- Implementing Grover's algorithm on small datasets
- Simulating algorithms and analyzing results
- Comparing classical vs quantum performance (conceptual)

Day 4: Open-Source Quantum Frameworks

Session Topics:

- Overview of open-source quantum ecosystems
- Comparison of different frameworks
- Introduction to Cirq

Hands-On Activities:

- Building quantum circuits using Cirq
- Running simulations and interpreting outputs
- Framework comparison through mini tasks

Day 5: Real-World Applications of Quantum Computing

Session Topics:

- Quantum computing in optimization and cryptography
- Introduction to quantum machine learning
- Near-term quantum devices (NISQ era)

Hands-On Activities:

- Solving a simple optimization problem using a quantum approach
- Implementing a basic variational circuit
- Case-study discussion on industry use cases

Day 6: Capstone & Future Directions in Quantum Computing

Session Topics:

- Design principles for end-to-end quantum solutions
- Performance analysis of quantum circuits and results interpretation
- Research trends and career pathways in quantum computing

Hands-on Activities:

- Debugging and optimizing quantum circuits
- Running circuits on simulators and available quantum backends
- Interpreting outputs and documenting results

Mini Project

Students developed a **Quantum Computing–based application**, such as:

- Quantum Search Application
- Quantum Optimization Model
- Quantum Random Number Generator
- Simple Quantum Circuit–Based Decision Model

Outcome of the Workshop:

The One Week Domain-Specific Hands-On Workshop on "Quantum Computing and Its Open Source Frameworks" effectively fulfilled its planned objectives, resulting in the following key outcomes:

- Students gained a clear understanding of fundamental concepts in quantum computing and quantum information processing.
- Participants acquired hands-on experience in designing, simulating, and executing quantum circuits using open-source frameworks.
- Students developed the ability to implement basic quantum algorithms for problem-solving tasks.
- Participants understood practical applications and limitations of current quantum technologies.
- Students enhanced analytical, programming, and computational thinking skills in the quantum domain.
- Students were motivated to pursue advanced learning, research, and career opportunities in quantum computing and related fields.

The final day of the One Week Domain-Specific Hands-On Workshop on "Quantum Computing and Its Open Source Frameworks" concluded with a formal valedictory session, marking the successful completion of the program. Feedback was collected through a structured questionnaire. Students felt that the workshop was highly informative, practical, and industry-relevant.

Later, Dr. Kuraku Nirmala, Assistant Professor, Department of CSE delivered Vote of Thanks. She expressed her sincere gratitude to the Management, Principal, Head of the Department and the resource person for their support in making the workshop a grand success. She also appreciated the enthusiastic participation of the students throughout the six days. The program ended with the distribution of participation certificates and a positive note to conduct more such skill-oriented workshops in the future.