Department of Computer Engineering

Institute Vision

We at SIEM aspire to be a globally recognized Institute that delivers a world class education to outstanding intellectual by nurturing and grooming by their interest, creative abilities and thrusts to acquire a life-long learning so as to imbibe values of their commitment towards society.

Department Vision

The department aims to be recognized in the field of quality education through excellence in teaching, learning, research and innovation for the betterment of society.

EVENT REPORT

On

Expert Talk on on Red Hat certifications

Name of Event: Expert talk on Red Hat certifications

Date of Event: 30/05/2022

Coordinator of Event: Dr. Kamini A. Shirsath

Name and Details of Resource Person: Mr. Sandip Gavit, Software Consultant, Techno-hacks Solution Ltd, Nasik

No of Participants: 45

Details of Participants: Third Year Computer Engineering Students

Program Outcome Mapped: PO1, PO5, PO8, PO9, PO12, PSO1, PSO3

Objective of the Lecture:

The primary objective of this lecture is to introduce the fundamental concepts and principles of quantum computing, explain how quantum computers differ from classical computers, and explore the key areas where quantum computing is expected to have a transformative impact. By the end of the lecture, participants will:

1. **Understand the Fundamental Concepts** of quantum computing, including qubits, superposition, entanglement, and quantum gates.

2. **Grasp the Difference** between classical and quantum computing, specifically how quantum computing leverages quantum mechanics to perform computations.
3. **Learn about Quantum Algorithms** that promise to solve specific problems more efficiently than classical algorithms, such as Shor's algorithm for factoring and Grover's algorithm for search.
4. **Explore Quantum Hardware** and the different approaches to building quantum computers, such as superconducting qubits, trapped ions, and photonic qubits.
5. **Discover the Potential Applications** of quantum computing in fields like cryptography, drug discovery, optimization problems, and artificial intelligence.
6. **Understand the Challenges and Limitations** facing quantum computing, including quantum decoherence, error correction, and scalability.
7. **Get a glimpse of the Future of Quantum Computing**, including current developments, commercial quantum computers, and potential breakthroughs.

Expected Outcomes of the Lecture:

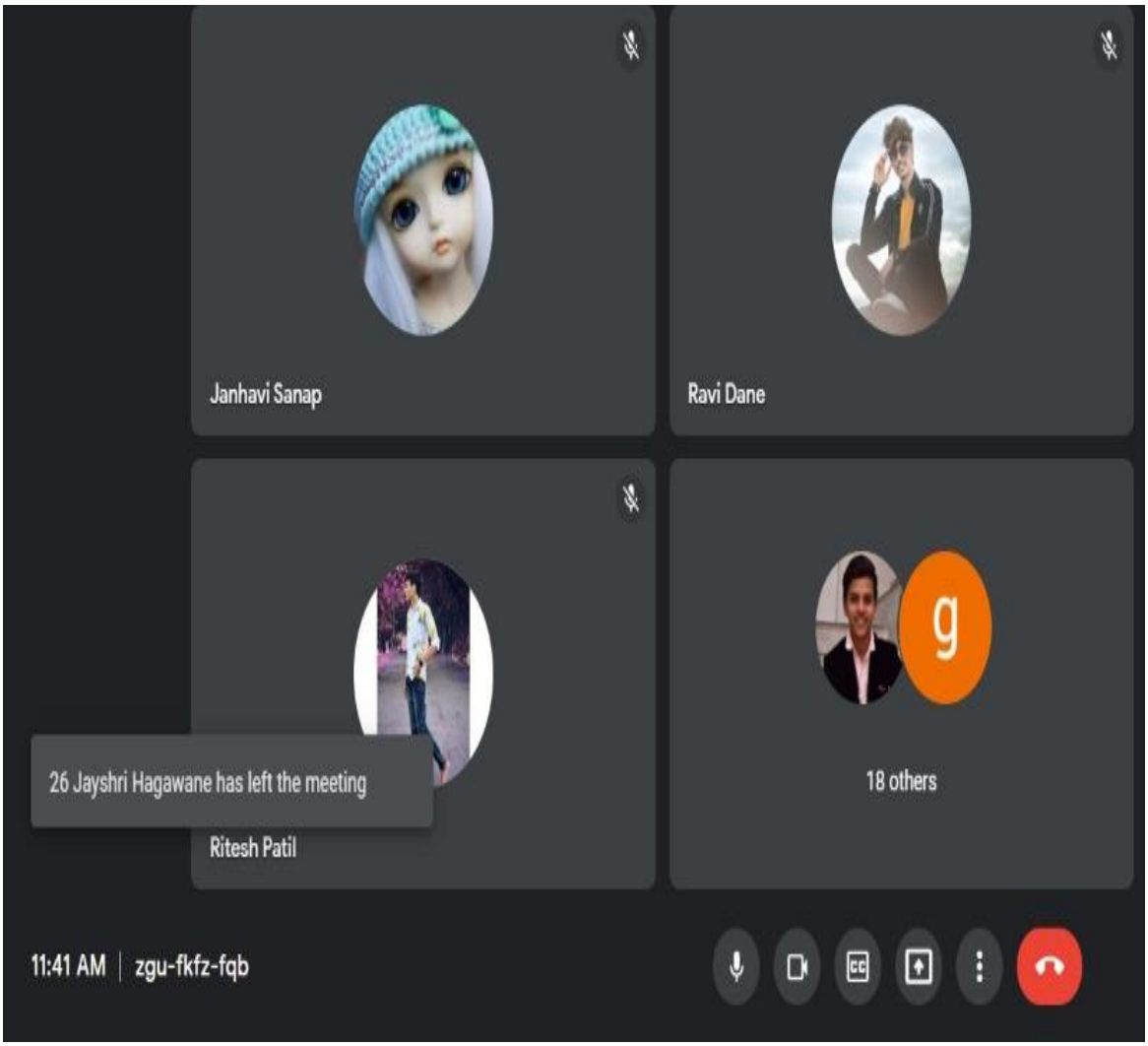
By the end of the lecture, participants will have achieved the following outcomes:

1. **Deep Understanding of Quantum Computing Basics**:
    - Participants will understand what qubits are, how they differ from classical bits, and how superposition and entanglement give quantum computers their unique power.
    - They will be able to explain key quantum phenomena like **superposition** (a qubit being in a combination of both 0 and 1 states simultaneously) and **entanglement** (two qubits being interdependent in a way that changes to one qubit affect the other, no matter the distance between them).
2. **Clear Comparison with Classical Computing**:
    - Attendees will be able to articulate the differences between classical and quantum computing models. They will understand why quantum computers are not just "faster" classical computers, but fundamentally different in how they process information.
    - Participants will also understand **quantum parallelism** and how quantum computers can solve certain problems exponentially faster than classical computers.
3. **Familiarity with Quantum Algorithms**:
    - Attendees will have a high-level understanding of key quantum algorithms like **Shor's algorithm** (for integer factorization) and **Grover's algorithm** (for unstructured search), and how these algorithms could potentially revolutionize fields like cryptography and data mining.
    - They will also learn how quantum computers could solve complex problems in polynomial time that would take classical computers exponential time.
4. **Introduction to Quantum Hardware**:
    - Participants will be introduced to the various physical implementations of quantum computing hardware, including **superconducting qubits**, **trapped ion qubits**, and **topological qubits**.

- They will understand the challenges related to building stable quantum hardware, such as **quantum decoherence**, **error rates**, and **scalability**.

5. **Exploration of Quantum Computing Applications**:
   - The lecture will provide insights into the potential applications of quantum computing in various industries, including:
     - **Cryptography**: How quantum computers could break traditional encryption schemes and lead to quantum-safe cryptography.
     - **Optimization**: Using quantum algorithms for optimization problems in logistics, finance, and supply chain management.
     - **Drug Discovery**: How quantum computing can model molecular interactions to accelerate drug development.
     - **Artificial Intelligence**: How quantum computing could enhance machine learning and data analysis.
6. **Awareness of Current Challenges and Limitations**:
   - Participants will gain an understanding of the current **challenges facing quantum computing**, including issues like **quantum error correction**, **decoherence**, and the limitations in quantum algorithms.
   - They will understand why **fault-tolerant quantum computing** is still a work in progress, and what is being done to address these issues.
7. **Vision for the Future of Quantum Computing**:
   - Participants will leave with a forward-looking perspective on the development of quantum computing technologies, including current initiatives by companies like IBM, Google, Microsoft, and D-Wave, as well as governmental research bodies.
   - They will understand the timeline for **quantum supremacy** (when quantum computers outperform classical computers in practical tasks), and the long-term impact quantum computing might have on industries and society.

Photos:



Head of Computer Department