

Problem 2 Quantum Whisper

Communication and quantum cryptography

Turn quantum key distribution into a working messaging experience.

The theme

Build a functional chat or communication application that integrates a Qiskit implementation of a quantum key distribution protocol, such as BB84. Explore how quantum state preparation, measurement choices, and eavesdropping checks contribute to establishing secret key material. The messaging flow should be usable, not just a standalone circuit demonstration.

Ideas to explore

- What should users see while a key is being established?
- How could the app explain what happens when someone intercepts a transmission?

Prototype requirements

Demonstrate a functioning message exchange, genuine message encryption, a Qiskit-based QKD protocol simulation, and an understandable explanation of the trust and security model.

Scope note. A cloud-circuit simulation is not a physical quantum communication link. Clearly distinguish a simulated QKD application from physically secure QKD, and avoid unsupported security claims.

Judging criteria

- Correct QKD protocol understanding: 30 points
- Functional messaging and encryption: 25 points
- Quantum integration and experiment design: 20 points
- Security model and limitations: 15 points
- User experience and creativity: 10 points