



**PRESIDENCY UNIVERSITY**

Private University Estd. in Karnataka State by Act No. 41 of 2013  
Itgalpura, Rajankunte, Yelahanka, Bengaluru - 560064



# **QMail: Quantum Secure Email Client Application**

**A PROJECT REPORT**

*Submitted by*

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**BACHELOR OF TECHNOLOGY**

**IN**

**COMPUTER SCIENCE AND ENGINEERING**

**PRESIDENCY UNIVERSITY**

**BENGALURU**

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## PRESIDENCY SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

### BONAFIDE CERTIFICATE

Certified that this report "QMail: Quantum Secure Email Client Application" is a bonafide work of "S Pranav Roy (20221CSE0407), Achal K A (20221CSE0422), Rudraraju Satvik Varma (20221CSE0185)", who have successfully carried out the project work and submitted the report for partial fulfilment of the requirements for the award of the degree of BACHELOR OF TECHNOLOGY in COMPUTER SCIENCE ENGINEERING during 2025-26.

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**DECLARATION**

We the students of final year B.Tech in COMPUTER SCIENCE ENGINEERING, at Presidency University, Bengaluru, named S Pranav Roy, Achal K A, Rudraraju Satvik Varma, hereby declare that the project work titled "QMail: Quantum Secure Email Client Application" has been independently carried out by us and submitted in partial fulfilment for the award of the degree of B.Tech in COMPUTER SCIENCE ENGINEERING, during the academic year of 2025-26. Further, the matter embodied in the project has not been submitted previously by anybody for the award of any Degree or Diploma to any other institution.

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## Abstract

Commercial Quantum Computers are inevitable and it is just a question of time before they are integrated in our society. It poses a threat to current encryption algorithms, which are effective today but will be obsolete to Shor's and Grover's algorithms (Quantum algorithms), compromising confidentiality, integrity, and authenticity. Securing communication channels must be a top priority, and since email is the most widely used communication method, it must be addressed first. Our QMail, a Quantum Secure Email Client Application (QSECA), is designed to withstand both classical and quantum-level attacks. It is based on a hybrid structure of QSECA that combines Quantum Key Distribution (QKD) for session key with Post-Quantum Cryptography (PQC) technology for authentication and metadata protection. A user-friendly interface is implemented in the prototype to choose between three levels of encryption, including OTP. Benchmarks on the prototype show the trade-off in latency, throughput, and encryption overhead compared to conventional email service. The results show that QMail ensures end-to-end security and provides resilience against adversaries with quantum capabilities. QMail establishes a foundation for a scalable, quantum-safe communication platform and is a step towards secure communication in the era of 6G and quantum internet.