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Cryptography and Blockchain Technology

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Abstract: *Cryptography and blockchain are innovations in secure digital interactions. Cryptography ensures data confidentiality, integrity, and authenticity, forming the foundation of communication security. This has enabled blockchain to facilitate decentralized, secure peer-to-peer transactions without intermediaries. These technologies enhance trust, transparency, and resilience against cyber threats in finance, healthcare, supply chains, and identity verification. Key cryptographic concepts like public-private keys, digital signatures, and hashing ensure data integrity and security.The rise of quantum computing threatens traditional encryption, including RSA and ECC, exposing blockchain keys. To counter this, post-quantum cryptographic solutions like lattice-based cryptography (NIST's CRYSTALS-Kyber) and hash-based signatures (SPHINCS+) are being explored. Projects like QANplatform test these to ensure blockchain security.*

Consensus mechanisms like Proof of Work and Proof of Stake support decentralized governance. Cryptography and blockchain continue transforming digital spaces, fostering innovation and protecting information in an interconnected world.

Keywords: Cryptography.

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