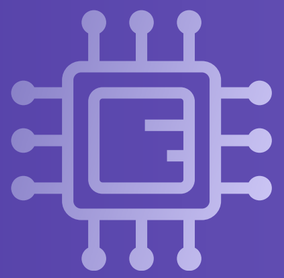
Azərbaycan TEXNİKİ Universiteti

A Study of Blockchain Security and its Use in Cyber Protection

Teacher: Jafar Sadigzadeh
By Mansuma Garayeva

Content

- Blockchain is a revolutionary technology behind Bitcoin, but it’s more than just cryptocurrency.
- It provides strong security for data, making hacking very difficult.
- Today, we’ll explore how blockchain improves cybersecurity and protects businesses, governments, and individuals.



What is Blockchain?

Definition:

- A decentralized digital ledger (like a record book) that stores data in blocks.
- Once data is recorded, it cannot be changed (immutable).

✓ ***Decentralized –*** No single company/bank controls it.

✓ ***Transparent*** – All users can see transactions (but not personal details).

✓ ***Secure*** – Uses cryptography (advanced math) to protect data.

For example: Bitcoin uses blockchain to record transactions securely.

How Does Blockchain Work?

Transaction Request (e.g., sending cryptocurrency).

Verification by multiple computers (nodes) in the network.

Added to a Block (with a unique code called a hash).

Block Added to Chain Now permanent and unchangeable.

Why is Blockchain Secure?

Cryptography

- Each block has a unique hash (like a fingerprint).
- Changing data changes the hash → Alerts the network.

Decentralization

- No single point of failure (unlike banks).
- Hackers must attack 51% of the network (nearly impossible).

Immutability

- Once data is recorded, it cannot be altered or deleted.

Common Cyber Threats Today

Hacking & Data Breaches

- Attackers steal passwords, credit cards, and personal data.

Ransomware

- Hackers lock files and demand money to unlock them.

Phishing Scams

- Fake emails/websites trick users into giving passwords.

Why Blockchain Helps?

Makes data tamper-proof and harder to hack.

Blockchain in Cybersecurity

For example: Estonia uses blockchain to protect citizens' medical records.

How It Protects Data:

✓ ***Secure Identity Verification*** – No more stolen passwords.

✓ ***Fraud Prevention*** – Transactions cannot be faked.

✓ ***Decentralized Storage*** – No central server to hack.

Blockchain vs. Traditional Security

Traditional Security	Blockchain Security
Centralized (easy to hack)	Decentralized (hard to hack)
Passwords can be stolen	Uses **digital signatures**
Banks can reverse fraud	Transactions **cannot be changed**

Use Cases of Blockchain in Cyber Protection

Secure Voting Systems

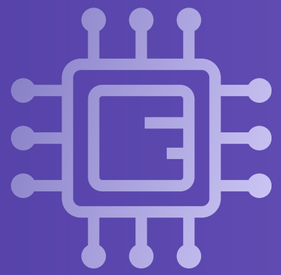
- Prevents election fraud (votes cannot be changed).

Healthcare Data Protection

- Medical records are encrypted and safe from hackers.

Supply Chain Security

- Tracks products from factory to customer (no fakes).



Smart Contracts for Security

For example:

- If a payment is received → Goods are automatically shipped.
- No fraud risk because the code cannot be cheated.

What Are Smart Contracts?

- Self-executing contracts written in code (no middlemen).

Challenges of Blockchain Security

❌ ***Slow Transactions*** – Bitcoin takes ~10 minutes per transaction.
❌ ***High Energy Use*** – Mining requires powerful computers.
❌ ***Human Errors*** – If private keys are lost, money is gone forever.

Future of Blockchain in Cybersecurity

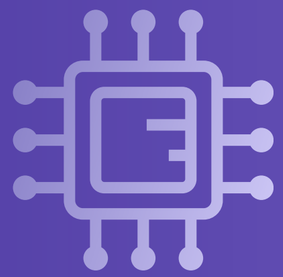
🔮 ***Predictions:***

- More banks & governments will adopt blockchain.
- Quantum computing may break current security (but new solutions will come).
- Blockchain + AI = Even stronger cybersecurity.

Why Blockchain Matters

Blockchain is ***the future of cybersecurity***— making the internet safer for everyone.

- ✅ Unhackable data storage.
- ✅ No more fraud in transactions.
- ✅ Protects privacy & identity.



Real-World Example – Blockchain in Banking

For example: **Ripple (XRP)** helps banks transfer money globally in **3 seconds** (vs. 3 days).

- ***Problem***: Traditional banks face hacking (e.g., $1 billion stolen yearly).
- ***Solution***: Banks like **JPMorgan Chase** use blockchain to:
  - Secure transactions with **encrypted ledgers.**
  - Reduce fraud in cross-border payments.

Blockchain for Personal Data Protection

- ***Problem:*** Over 24 billion passwords were leaked in 2023.
- ***Solution***: Blockchain-based identity systems:
  - Self-Sovereign Identity (SSI): You control your data (not Facebook/Google).
  - Example: Microsoft’s ION uses Bitcoin’s blockchain to protect logins.

Governments Using Blockchain

Estonia

Stores health records on blockchain (0 breaches since 2012).

Dubai

Aims to be 100% blockchain-powered by 2030.

USA

Pentagon tests blockchain to stop military data leaks.

Can Blockchain Be Hacked?

- ***51% Attack Risk:*** If hackers control 51% of the network (very expensive).
- ***Smart Contract Bugs:*** Code errors can be exploited (e.g., $60M DAO hack).
- ***Human Weakness:*** Phishing scams still steal crypto wallets.

Thank You