

Internship Progress Report

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Program: B.Tech, Computer Science & Financial Technology

Institution: Manipal Institute of Technology

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Period: Summer 2nd June to 4th July

1. Introduction

This report outlines the work completed and knowledge gained during my summer internship at IIT Indore under the supervision of Dr. Ayan Mondal. The internship focused on research and development in decentralized, blockchain-based data exchange systems.

2. Objectives

- To design and implement a secure, decentralized system for peer-to-peer data exchange.
- To integrate blockchain technology (Ethereum smart contracts) with off-chain data sources (SQLite databases).
- To build a robust, auditable, and targeted data sharing platform.

3. Work Completed

3.1 Blockchain Application Development

- Developed a decentralized application using Ethereum smart contracts and Python.
- Enabled secure, targeted data requests and responses between distributed peers.

3.2 Smart Contract Engineering

- Designed and implemented a Solidity smart contract to manage data requests, responses, and peer targeting.
- Ensured that only the intended peer can respond to a given request, enhancing security and selectivity.

3.3 Python Integration

- Built a Python client to interact with the smart contract, listen for blockchain events, and execute SQL queries on local SQLite databases.

- Implemented dynamic gas estimation and transaction confirmation for reliable blockchain interactions.

3.4 Testing and Debugging

- Set up a local Ethereum environment using Ganache and Truffle.
- Created and populated test databases for simulation.
- Identified and resolved issues related to gas management, event filtering, and peer authentication.

3.5 Documentation

- Produced comprehensive technical documentation and user guides for the system.
- Documented all major components, usage instructions, and troubleshooting steps.

4. Key Learnings

- **Blockchain and Smart Contracts:**
Acquired hands-on experience with Ethereum, Solidity, and the deployment of decentralized applications.
- **Secure Data Exchange:**
Learned to design privacy-preserving, auditable, and targeted data sharing protocols using blockchain.
- **Software Engineering Practices:**
Improved skills in modular programming, error handling, and technical documentation.
- **Problem Solving:**
Enhanced ability to debug and resolve complex issues in a research and development context.

5. Conclusion

This internship provided valuable exposure to advanced concepts in blockchain technology and secure data systems. It strengthened my technical skills and deepened my understanding of real-world decentralized applications.