Decentralized Intellectual Property Protection Platform With AI-Powered Similarity Detection

Project Id: R25-016

Project Proposal Report

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Sri Lanka Institute of Information Technology

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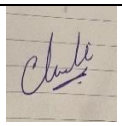
Liyanage C.H	IT21828966	

Signature of the Supervisor
(Dr. Dharshana Kasthurirathna)

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ABSTRACT

In an era marked by rapid technological innovation and the exponential growth of digital content, the challenges of safeguarding intellectual property (IP) have become more complex and multifaceted. This project introduces a cutting-edge decentralized platform that leverages blockchain and AI/ML technologies to revolutionize IP protection and related patent discovery. Utilizing blockchain's immutability and transparency, the platform ensures tamper-proof IP registration and transactions, while advanced semantic search algorithms and machine learning models facilitate the discovery of related patents, fostering innovation by identifying tangentially connected intellectual properties. The novelty of this system lies in its ability to integrate real-time AI/ML capabilities for detecting text, image, and multimedia similarities, ensuring adaptive model learning through new data and user feedback. By addressing the limitations of traditional centralized IP protection systems, such as reliance on manual processes and vulnerability to tampering, this platform represents a transformative approach to securing intellectual property rights. This initiative stands at the intersection of technology, innovation, and legal frameworks, paving the way for a secure and equitable environment for creators, researchers, and industries.

Keywords – Blockchain, Semantic Search, Intellectual Property Protection, AI/ML, Patent Discovery

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1. INTRODUCTION

1.1. Background & Literature survey

The increasing digitalization of content has presented new challenges for intellectual property (IP) protection, including piracy, plagiarism, and unauthorized usage. Blockchain technology, with its decentralized, immutable, and transparent ledger, has emerged as a transformative solution to address these issues. By enabling tamper-proof registration, transparent transaction monitoring, and evidence preservation, blockchain significantly enhances the efficiency and reliability of IP management systems. [1], [2]

AI integration into blockchain-based IP protection systems has further augmented their capabilities. AI algorithms facilitate real-time detection of IP infringements and provide semantic similarity checking for multimedia and textual content. For instance, AI-driven systems have been proposed to detect plagiarism and unauthorized use while adapting continuously through feedback and new data, making them robust against evolving threats . [3]

Blockchain technology's application in digital copyright management has been extensively researched. Liya Luo highlights its role in safeguarding copyrights by automating registration and monitoring processes through smart contracts. These contracts streamline the enforcement of rights, significantly reducing legal and operational costs for content creators and organizations.[4] Similarly, Na Li explores the use of Non-Fungible Tokens (NFTs) in representing digital music assets on a blockchain. NFTs activate smart contracts to ensure transparent and fair compensation for usage, providing a technological foundation for effective copyright management.[4]

Another critical application of blockchain in IP protection is the development of semantic search algorithms for related patent discovery. These algorithms enable the identification of tangentially related innovations, promoting collaboration and advancing research

efforts. The immutable nature of blockchain records ensures the traceability of ownership and facilitates automated licensing.[3], [2]

Despite its potential, challenges such as the need for standardized legal frameworks and enhanced cryptographic measures remain. Advanced techniques, such as homomorphic encryption and zero-knowledge proofs, have been proposed to improve the security and scalability of blockchain-based IP protection systems.[4] This literature underscores the transformative role of blockchain and AI technologies in IP protection. By addressing existing inefficiencies and fostering innovation, these systems pave the way for a more secure and equitable environment for creators and innovators.

1.2. Research Gap

While the field of intellectual property (IP) management has witnessed notable advancements with the advent of digital technologies, a significant gap remains in the development of comprehensive systems that integrate real-time, context-aware patent discovery with secure data management. This gap is particularly evident in the limited application of AI-driven semantic search algorithms in combination with blockchain technology to facilitate efficient, transparent, and legally compliant IP discovery processes. Existing research highlights the benefits of blockchain in securing IP rights and the potential of AI in enhancing data retrieval accuracy. However, there is a lack of unified frameworks that holistically address the challenges of patent redundancy, inefficient discovery mechanisms, and data tampering risks.

The research literature, including the work of Luo [1], underscores the transformative potential of blockchain technology in safeguarding intellectual property through immutable records and secure transactions. Similarly, Na Li [4] explores the integration of AI and blockchain in protecting music IP, showcasing how AI can improve the detection of content similarities. However, these studies fall short of providing a cohesive model that leverages AI for semantic patent discovery while utilizing blockchain for data integrity and transparency. The Decentralized IP Protection Research Overview [3] offers

valuable insights into current IP management practices, yet it does not fully address the dynamic nature of patent discovery and the need for real-time contextual analysis. Additionally, Asikin et al. [2] examine the role of blockchain in IP rights management from a legal perspective but do not explore its application in enhancing patent discovery processes.

Table 1 provides a comparative analysis between existing research and the proposed solution, highlighting the novel functionalities introduced by this project. The review reveals that while current studies contribute to individual aspects of IP protection, the proposed platform offers a more integrated and innovative approach by combining AI-driven semantic search with decentralized, blockchain-based data management.

Table 1 : Novelty of the proposed system

Features	Research A [1]	Research B [2]	Research C [3]	Research D [4]	Our Solution
Real-time semantic patent discovery	No	Yes	No	No	Yes
Integration of AI and blockchain for IP management	Yes	Yes	No	No	Yes
Decentralized, tamper-proof metadata storage	Yes	No	No	Yes	Yes
Context-aware patent ranking and visualization	No	No	No	No	Yes
Compliance with global IP legal standards	No	No	Yes	Yes	Yes

Table 1 clearly demonstrates that the proposed system incorporates more innovative functionalities compared to existing studies. This integrated approach not only addresses

the identified gaps but also sets a new standard for efficient, secure, and legally compliant patent discovery and IP management.

1.3. Research Problem

The primary challenge this research aims to address is the development of a blockchain-powered, AI-driven platform capable of providing real-time, semantic patent discovery. The core objective is to assist researchers in identifying contextually related innovations, reducing redundancy, and fostering collaborative breakthroughs while ensuring compliance with legal frameworks. This task is complex and multifaceted, requiring the seamless integration of advanced technologies to overcome inherent challenges in IP discovery and protection. The difficulty lies in achieving real-time, semantic-based discovery that not only identifies directly related patents but also uncovers tangential connections, promoting innovation through contextual exploration. Traditional patent systems are often plagued by inefficiencies, including siloed databases, non-standardized metadata, and limited access to global patent information. These issues lead to duplication of research efforts, inefficiency in IP management, and missed opportunities for innovation. Additionally, ensuring legal compliance in a dynamic global environment demands a robust system that aligns with diverse regulatory requirements.

To navigate these challenges, this research explores the convergence of blockchain and AI technologies. Blockchain's decentralized and immutable architecture provides a secure and transparent framework for registering and managing intellectual property, while AI enables semantic analysis and contextual understanding of patent data. By integrating these technologies, the platform aims to enable researchers to perform semantic searches that reveal relationships between patents beyond mere keyword matching, identifying opportunities for collaboration and reducing the risk of redundancy in research efforts.

The platform must also ensure the privacy and security of sensitive data, incorporating advanced cryptographic techniques such as homomorphic encryption and zero-knowledge

proofs. These measures aim to protect proprietary information while maintaining transparency and trust among stakeholders.

This research builds upon existing frameworks in blockchain and AI, addressing the gap in integrating real-time, semantic patent discovery with decentralized systems. By leveraging the strengths of these technologies, the proposed platform seeks to transform how researchers' access, analyze, and collaborate on intellectual property, ultimately fostering a more innovative and legally compliant ecosystem for global research and development.

2. OBJECTIVES

2.1. Main Objective

The primary objective of this research is to develop a decentralized, AI-powered platform that enables researchers and innovators to identify contextually related patents efficiently. This platform is designed to enhance the intellectual property discovery process by reducing duplication, uncovering novel relationships between existing patents, and fostering innovation. By leveraging semantic search algorithms and blockchain technology, the platform seeks to overcome the limitations of traditional patent discovery systems, which often rely on keyword-based search and centralized databases prone to inefficiencies and potential data tampering. This objective focuses on creating an advanced and scalable solution that not only ensures transparency and reliability but also provides a user-centric approach for exploring intellectual property. Ultimately, the platform aims to streamline innovation by providing researchers with actionable insights into related patents, enabling faster and more effective collaboration in research and development.

2.2. Specific Objectives

In addition to the main objective, the following specific objectives outline the key areas of focus and implementation:

- **Semantic Search Algorithms for Context-Aware Patent Discovery:**

This sub-objective centers on the development and integration of advanced semantic search algorithms to facilitate context-aware patent discovery. Traditional keyword-based searches often fail to capture the nuanced relationships between patents. By leveraging AI-powered semantic algorithms, this platform aims to provide researchers with results that reflect contextual

similarities and relationships, revealing innovations that might otherwise go unnoticed. This capability ensures that the discovery process is thorough, relevant, and directly aligned with researchers' needs.

- **Blockchain-Based Transparent and Tamper-Proof Metadata Storage:**

To ensure the integrity and security of patent data, blockchain technology will be employed to create a decentralized, immutable ledger for storing metadata. This sub-objective focuses on leveraging blockchain’s unique characteristics decentralization, transparency, and immutability to address the challenges of data tampering and inconsistency. By providing a secure and verifiable record of patent-related information, the platform fosters trust among stakeholders and guarantees the reliability of the stored data.

- **Integration of Decentralized Storage for Scalable Document Management:**

Efficient management of large volumes of patent documents is critical for the success of the platform. This sub-objective seeks to integrate decentralized storage solutions that ensure scalability and resilience. Using technologies such as IPFS (InterPlanetary File System) or similar decentralized frameworks, the platform will provide fast and reliable access to patent documents while minimizing centralized bottlenecks and reducing risks associated with single points of failure.

- **Real-Time Patent Ranking Based on Relevance and Contextual Similarity:**

This sub-objective aims to implement dynamic ranking algorithms that prioritize patents based on their relevance and contextual similarity to user queries. By

employing AI models to analyze and rank search results, the platform ensures that users can quickly identify the most pertinent patents. This ranking system will be adaptive, learning from user interactions and continuously improving its relevance assessment over time.

- **Intuitive Visualizations for Simplified Exploration of Related Patents:**

Patent data can often be complex and challenging to navigate. This sub-objective focuses on creating intuitive and interactive visualizations to help users explore related patents more effectively. Tools such as graph-based interfaces, interactive maps, and clustering techniques will be employed to present complex relationships in an easily digestible format. These visual aids will empower users to uncover patterns, dependencies, and opportunities for collaboration, enhancing the overall user experience.

By addressing these specific objectives, the research endeavors to create a comprehensive platform that redefines the process of patent discovery, bridging the gap between cutting-edge technology and the growing needs of researchers and innovators.

3. METHODOLOGY

The proposed methodology outlines the systematic steps required to develop and implement a decentralized, AI-powered platform for semantic patent discovery. These steps are designed to ensure the integration of blockchain and AI technologies to create a robust and user-centric system.

Data Collection and Preprocessing

The initial phase involves gathering a comprehensive dataset of patent documents from multiple sources, such as publicly available patent databases, research repositories, and industry-specific archives. This data will then undergo preprocessing, which includes:

- **Data Cleaning:** Removing duplicate or irrelevant records, normalizing formats, and ensuring consistency across metadata fields.
- **Content Structuring:** Segmenting patent documents into logical units, such as titles, abstracts, claims, and citations, to facilitate efficient analysis.
- **Metadata Standardization:** Aligning data with global standards to improve compatibility and search accuracy.

This step is critical for preparing the dataset for semantic analysis and blockchain integration.

Semantic Search Implementation

Advanced natural language processing (NLP) techniques will be employed to analyze the preprocessed patent data and implement context-aware semantic search algorithms. Key tasks include:

- **Keyword and Keyphrase Extraction:** Identifying crucial terms and phrases from patent documents to build a robust search index.
- **Concept Mapping:** Using AI models to identify relationships between patents based on their technical and contextual similarities.

- **Semantic Clustering:** Grouping patents with overlapping themes to enhance search precision and reveal hidden connections.

The semantic search functionality will be fine-tuned to provide users with highly relevant and contextually enriched results.

Blockchain Integration for Metadata Storage

To ensure data transparency and security, a blockchain framework will be implemented for storing and managing metadata. Key activities include:

- **Smart Contract Development:** Writing smart contracts to automate data validation, access control, and usage tracking.
- **Decentralized Ledger Deployment:** Setting up a blockchain network to maintain an immutable record of patent metadata, ensuring reliability and trustworthiness.
- **Integration of Cryptographic Techniques:** Employing advanced encryption methods, such as zero-knowledge proofs and homomorphic encryption, to protect sensitive data.

This step will ensure that the platform is both secure and compliant with legal standards.

Decentralized Storage for Patent Documents

The platform will incorporate decentralized storage solutions, such as IPFS, to manage large volumes of patent documents efficiently. This phase includes:

- **Scalability Design:** Configuring the storage system to handle increasing data loads without compromising access speed or integrity.
- **Document Retrieval Optimization:** Implementing caching and indexing techniques to enable fast and seamless document retrieval for end-users.

Real-Time Patent Ranking System

A dynamic ranking system will be developed to prioritize patents based on their relevance and contextual similarity. This process involves:

- **Relevance Scoring Algorithms:** Utilizing AI models to calculate relevance scores based on user queries and semantic features of patents.
- **Feedback-Based Learning:** Refining the ranking system through user interaction data to continuously improve search accuracy and satisfaction.

Visualization Tools for Patent Exploration

Interactive visualization tools will be created to simplify the exploration of related patents. These tools will include:

- **Graph-Based Interfaces:** Visualizing patent relationships through nodes and edges, allowing users to explore connections intuitively.
- **Thematic Clustering Maps:** Highlighting clusters of related patents using color coding and spatial grouping.
- **Interactive Dashboards:** Enabling users to filter, sort, and explore patents dynamically.

Adaptive Feedback Loop

A continuous feedback mechanism will be implemented to refine the platform's performance based on user interactions. Key aspects include:

- **User Interaction Analysis:** Monitoring search behavior, click patterns, and document engagement to understand user preferences.
- **Algorithm Updates:** Using machine learning techniques to incorporate user feedback into the semantic search and ranking algorithms, ensuring continuous improvement.

Testing and Validation

The final phase involves extensive testing and validation to ensure the platform meets performance, security, and usability requirements. Activities include:

- **Usability Testing:** Engaging end-users to provide feedback on the system's interface and functionality.

- **Performance Benchmarking:** Assessing the platform's scalability, response time, and data security measures.
- **Legal Compliance Review:** Ensuring the platform adheres to global IP regulations and data protection laws.

This comprehensive methodology ensures the successful implementation of a decentralized, AI-powered platform for semantic patent discovery, fostering innovation and improving access to intellectual property insights.

3.1. System Architecture

3.1.1. Software Solution

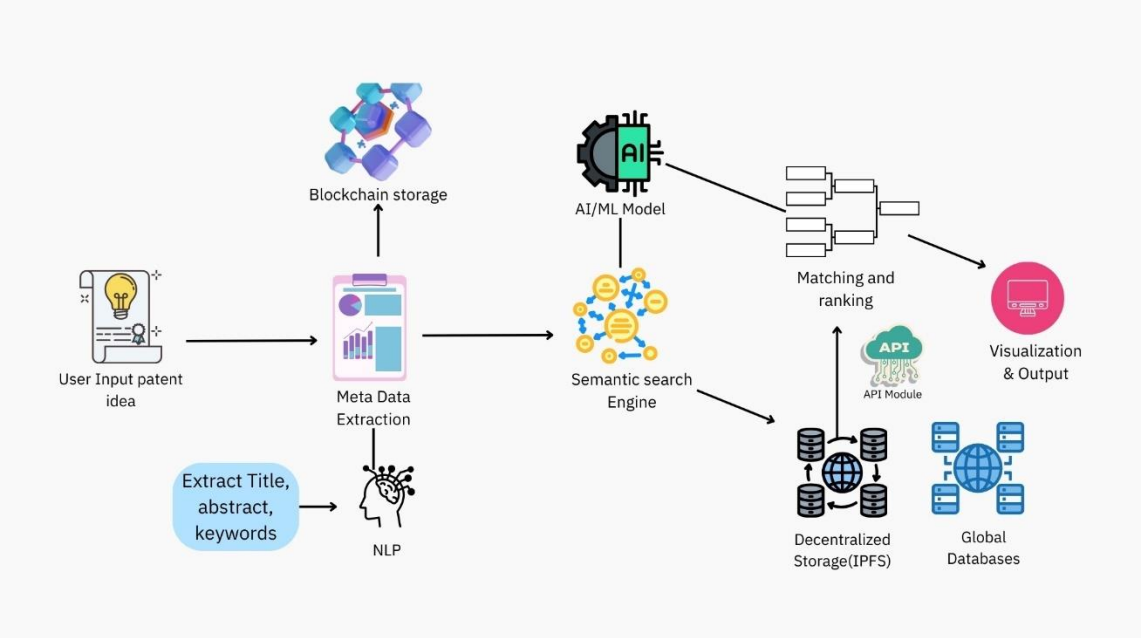

Figure 1:System overview diagram

3.2. The flow of the project

3.2.1. Requirement gathering and analysis

The process of collecting requirements is a critical initial step in developing a decentralized, AI-powered platform for semantic patent discovery. This stage ensures that the system effectively fulfills its objectives and meets stakeholder needs. A systematic approach is employed to gather and analyze all necessary requirements before the development phase begins. Various techniques are utilized to ensure the comprehensive identification of functional, technical, and user-centric needs, including:

- **Reviewing Academic Literature and Case Studies:** Examining existing research on patent discovery systems, blockchain integration, and AI-driven semantic search algorithms provides a solid foundation for understanding the current landscape. This review helps identify limitations in existing solutions and outlines opportunities for the proposed platform.

- **Evaluating Existing Patent Management Tools:** Analyzing current platforms and tools used for patent discovery highlights their strengths and weaknesses. This evaluation provides insights into areas that can be improved, such as user experience, data accessibility, and system scalability, ensuring the proposed system offers unique and valuable features.

- **Conducting Stakeholder Interviews and Workshops:** Engaging with researchers, innovators, legal experts, and IP professionals helps capture their specific requirements and expectations. These discussions provide detailed insights into the pain points experienced in current systems, enabling the design of a solution tailored to user needs.

- **Implementing Surveys and Questionnaires:** Surveys are distributed among potential end-users to gather feedback on desired features, usability

preferences, and performance benchmarks. This data ensures the system aligns with the practical needs and expectations of its target audience.

- **Analyzing Legal and Regulatory Requirements:** Ensuring compliance with global intellectual property laws and data protection regulations is a vital component of the system. This analysis helps define requirements for blockchain integration, metadata management, and data security.

- **Technical Feasibility Studies:** Assessing the technical landscape, including available blockchain frameworks, AI models, and decentralized storage solutions, ensures the system is designed using robust and scalable technologies.

The requirements gathered through these methods are organized into functional and non-functional categories, validated with stakeholders, and prioritized based on project objectives. This exhaustive process ensures that all critical aspects of the platform are addressed, from semantic search accuracy to blockchain security and user experience.

In summary, the requirement gathering and analysis phase is fundamental to ensuring that the proposed system aligns with stakeholder expectations, leverages state-of-the-art technologies, and fulfills its objectives of fostering innovation and improving patent discovery efficiency. This thorough process lays the groundwork for the development of a system that meets all specified criteria and delivers measurable value to its users.

3.2.2. Feasibility study

The feasibility of the proposed decentralized, AI-powered platform for semantic patent discovery is assessed across three critical areas: schedule, technical, and economic feasibility.

Schedule Feasibility:

Ensuring the project is completed on time while maintaining high quality is crucial. The development process will be divided into distinct phases, each with clearly defined timelines and milestones. Tools such as Gantt charts will be utilized to track progress and identify any potential delays or challenges early, enabling timely resolution. Specific durations will be assigned to tasks such as data collection and preprocessing, algorithm development, blockchain integration, and testing. Regular reviews and progress assessments will ensure the project stays on track to meet its objectives within the designated timeframe.

Technical Feasibility:

The technical success of the project depends on the expertise of the development team in key areas such as blockchain technology, AI-driven semantic search, and decentralized storage solutions. The team's proficiency in relevant programming languages (e.g., Python, Solidity, JavaScript) and tools (e.g., TensorFlow, IPFS, Ethereum) is critical for implementing advanced algorithms, integrating secure blockchain networks, and designing intuitive visualization tools. The availability of existing technologies, such as pretrained AI models and blockchain frameworks, enhances the technical viability of the project. These resources will be leveraged to create a scalable and robust platform that meets functional and performance requirements.

Economy feasibility:

Maintaining the project within budget constraints is essential for its economic viability. Key cost considerations include labor, computational resources, and infrastructure for blockchain and decentralized storage. To optimize costs, the project will prioritize the development of core functionalities in initial phases while exploring cost-effective technologies for scalability and efficiency. Open-source tools and frameworks will be utilized where feasible, reducing software licensing costs without compromising quality. A strategic budget allocation will ensure resources are effectively utilized to achieve project goals.

In conclusion, the project demonstrates high feasibility across all three areas. A structured timeline, a technically skilled team, and a well-managed budget will ensure the successful implementation of the platform, meeting both stakeholder expectations and project objectives.

3.2.3. Implementation

The implementation of the proposed decentralized, AI-powered platform for semantic patent discovery involves a series of well-defined steps to create an effective and robust system that meets the outlined objectives.

Semantic Search Engine Development

The first phase involves implementing an AI-driven semantic search engine to enable context-aware patent discovery. Preprocessed patent data will be analyzed using natural language processing (NLP) techniques to identify key concepts, themes, and contextual relationships. Algorithms such as word embeddings, neural networks, and transformer-based models will be utilized to generate accurate and meaningful search results. The search

engine will undergo iterative testing to ensure it provides relevant and precise results, tailored to user queries.

Blockchain Integration

To ensure the security, transparency, and immutability of metadata storage, blockchain technology will be integrated into the system. Smart contracts will be developed to automate tasks such as metadata validation, access control, and usage tracking. A decentralized blockchain network will be deployed to maintain a tamper-proof record of patent-related data, ensuring trust and reliability.

Decentralized Storage Implementation

Efficient document management will be facilitated by integrating decentralized storage solutions, such as IPFS (InterPlanetary File System). Patent documents will be stored securely in a distributed manner, ensuring scalability and fault tolerance. Optimizations such as indexing and caching mechanisms will be implemented to provide fast and seamless document retrieval for users.

Real-Time Ranking System

A dynamic patent ranking system will be developed to prioritize results based on relevance and contextual similarity. AI models will analyze user queries and the semantic relationships within the dataset to assign relevance scores. The system will continuously learn from user interactions and feedback to improve the accuracy and relevance of search rankings.

Visualization Tools Development

Interactive visualization tools will be designed to enhance user experience and simplify the exploration of related patents. Features such as graph-

based interfaces, thematic clustering maps, and interactive dashboards will be implemented to present complex relationships in an intuitive and user-friendly manner.

User Interface Design and Integration

A user-centric interface will be developed to ensure ease of use and accessibility. The interface will allow users to search, explore, and interact with patent data effortlessly. Iterative testing with end-users will refine the design, ensuring the interface meets user needs and expectations.

By following this structured approach, the platform will be implemented to effectively address the challenges of traditional patent discovery systems, providing researchers and innovators with a powerful tool to explore intellectual property efficiently and foster innovation.

3.2.4. Testing

The system will undergo extensive testing, including functionality, performance, and security assessments. User feedback will be collected during this phase to identify areas for improvement. Iterative refinements will ensure the platform meets its functional requirements and delivers a seamless experience.

3.3. Project requirements

3.3.1. Functional requirement

- Automatically analyze and identify contextually related patents using AI-driven semantic search algorithms.
- Extract key concepts, metadata, and essential details from patent documents for efficient discovery.
- Highlight relevant patents and innovations based on semantic similarity and contextual relevance.
- Store patent metadata securely in a decentralized, tamper-proof blockchain ledger to ensure data integrity.
- Convert search results and relationships into interactive visual formats, including graphs and clustering maps, for intuitive exploration.
- Rank patents dynamically based on relevance, contextual similarity, and user interaction data.

3.3.2. Non-functional requirement

- The platform should have a fast response time, with search results and visualizations loading within a few seconds to ensure seamless user experience.
- The interface should be intuitive and easy to navigate, allowing researchers and innovators to efficiently explore related patents without unnecessary complexity.
- Include customizable user interface options to cater to individual preferences and workflows, enhancing user satisfaction.
- Ensure compliance with data protection standards and intellectual property laws to maintain the security and privacy of user data and stored metadata.
- Implement robust encryption mechanisms for all blockchain transactions to safeguard sensitive information against unauthorized access.
- Ensure high availability and scalability, supporting a growing number of users and datasets without compromising performance.

- Maintain compatibility with various devices and browsers, ensuring accessibility across different platforms.
- Provide detailed logging and audit trails for all user interactions and system operations to ensure transparency and traceability.
- Adhere to decentralized storage standards to ensure data integrity and resilience against single points of failure.
- Include multi-language support to accommodate a diverse global user base.

3.3.3. Software requirements

Component	**Technology/Tool**
Backend	Python, Node.js, Flask, FastAPI
NLP/AI Models	Hugging Face Transformers, BERT, LaBSE
Vector Search	Elasticsearch
Decentralized Storage	IPFS
Blockchain	Ethereum/Polygon, Web3.js, Solidity
Frontend	React.js, Tailwind CSS, D3.js
API & Data Sources	WIPO API, USPTO API, Google Patents
Security	JWT, SSL/TLS
Deployment	Docker, AWS/GCP, Kubernetes
Monitoring & Logging	ELK Stack

Table 2: Software Requirements

3.4. Commercialization

The commercialization strategy for the decentralized, AI-powered platform for semantic patent discovery is designed to attract researchers, innovators, academic institutions, and legal firms as its primary customer base. To initiate adoption, a 30-day free trial will be

offered, allowing potential users to evaluate the platform's features and effectiveness in addressing their patent discovery needs. This trial period targets researchers, innovation-focused organizations, and academic institutions. Feedback collected during this phase will be instrumental in refining the platform to ensure it meets user expectations.

The pricing model will feature a tiered structure to accommodate various customer segments.

- **Basic Plan**: tailored for individual researchers or small teams, provides access to core features like semantic search and limited document downloads at an affordable rate.
- **Standard Plan**: designed for mid-sized research teams or institutions, offers additional features such as advanced analytics, extended document access, and moderate blockchain storage at competitive pricing.
- **Premium Plan:** For large organizations and institutions this delivers unlimited access to all features, including full blockchain capabilities, decentralized storage, and priority customer support.
- **Enterprise Plan:** offers customizable solutions for consortia, government bodies, and large enterprises, including tailored integrations, enhanced security, and dedicated support, with pricing determined through consultations based on specific needs.

Promotional campaigns will play a vital role in showcasing the platform's unique capabilities, such as real-time semantic patent discovery, blockchain transparency, and advanced visualization tools. These campaigns will target innovation-driven organizations through industry conferences, webinars, and strategic partnerships. Incentives such as special discounts will be provided to early adopters, customers committing to long-term subscriptions, and entities making bulk purchases, such as research consortia or academic networks.

To further expand its reach, the platform will pursue partnerships with research institutions, intellectual property offices, and innovation hubs. Collaborations with academic publishers and patent databases will enhance the platform's value proposition while increasing visibility in target markets. Additionally, workshops, webinars, and training sessions will be organized to demonstrate the platform’s features and benefits. These educational events will help potential customers understand how the platform can simplify and enhance the patent discovery process. This comprehensive commercialization strategy aims to maximize adoption, establish the platform as an essential tool for intellectual property discovery, and ensure its long-term success in diverse markets.

4. DESCRIPTION OF PERSONAL AND FACILITIES

- **Undergraduate Researchers**

    - **Rathnayake W. K. G. P. M (IT21810350)**: Specializing in Software Engineering. Rathnayake brings expertise in software engineering methodologies, particularly in agile development practices.
    - **Wanigasuriya W. P. S. D (IT21814242)**: Specializing in Software Engineering. Wanigasuriya's focus lies in web application development, with a keen eye for user experience design.
    - **Liyanage C. H (IT21828966)**: Specializing in Software Engineering. Liyanage excels in web application development and has a strong background in CI/CD pipelines and Containerization.
    - **Silva L. J. S (IT21804342)**: Specializing in Software Engineering. Silva brings experience in web development, software testing and quality assurance methodologies, ensuring robustness in the project's deliverables.

- **Supervisory Team**
    - **Dr. Darshana Kasthurirathne: (Senior Lecturer (HG) at the Dept. of Software Engineering, Faculty of Computing)**: Dr. Kasthurirathne provides academic guidance and expertise in software engineering, with a focus on algorithm design and analysis.
    - **Dr. Kalpani Manathunga (Co-Supervisor – Head of Department Software Engineering, SLIIT)**: Dr. Manathunga offers support in software development methodologies, particularly in the areas of project management and software architecture.

4. BUDGET AND JUSTIFICATION

Table 3 : Budget justification

Item	Cost(LKR)	Justification
Web hosting (Frontend)	10000.00	Hosting the React.js-based frontend on cloud services (e.g., AWS, DigitalOcean).
Backend hosting cost (2 VPS servers)	21000.00	For API management, semantic search operations, and blockchain node deployment.
Web Domain Registration	7000.00	Annual cost for securing a domain (e.g., .com, .org).
Elasticsearch (Managed service)	20000.00	For scalable semantic search capabilities. Alternatively, self-hosting reduces cost.
IPFS Node hosting	10000.00	For decentralized patent document storage.
Blockchain (Ethereum Gas Fees)	15000.00	For smart contract deployment and transaction costs on the testnet/mainnet.
API Subscriptions (Patent Data sources)	10000.00	Subscription costs for accessing WIPO/USPTO APIs, if applicable.
AI Model Hosting (Hugging Face/AWS)	18000.00	For deploying pre-trained NLP models for semantic embeddings.
Security (SSL/TLS Certificates)	5000.00	To secure API endpoints and data transmission.
Paper publishing cost	70000.00	For submitting and publishing research papers in journals/conferences.

Miscellaneous Costs	10000.00	For unforeseen expenses, additional tools, or third-party API integrations.
Total	223000.00	

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5. APPENDICES

5.1. Gantt chart

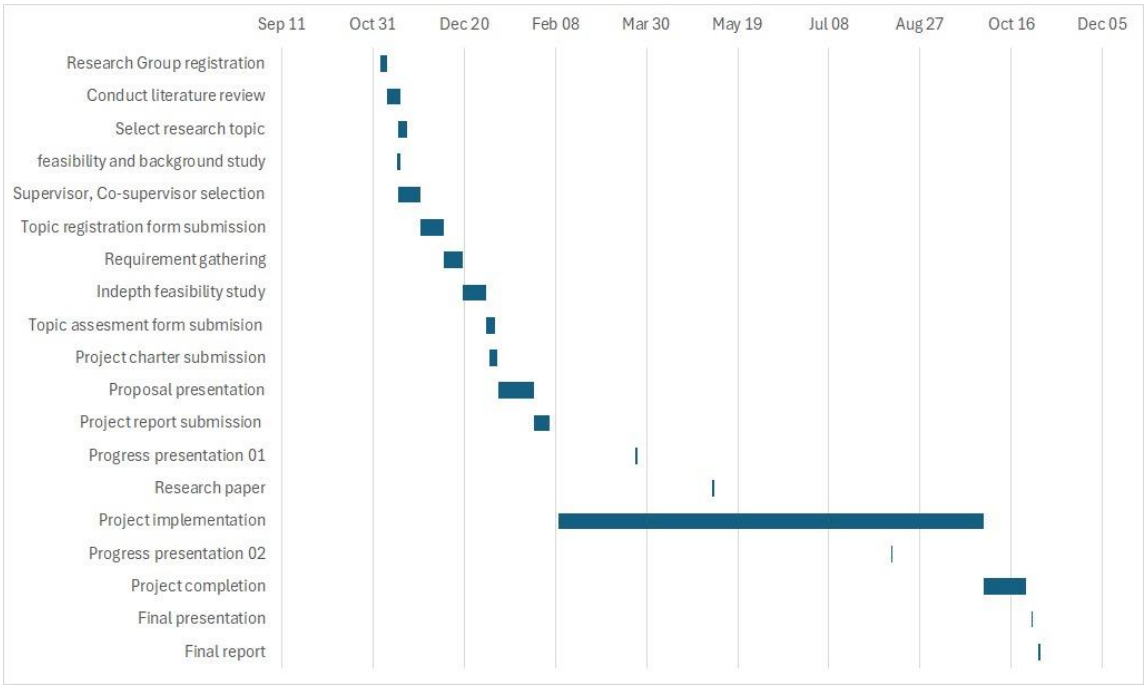

Figure 2 : Gantt Chart

5.2. Work Breakdown Structure

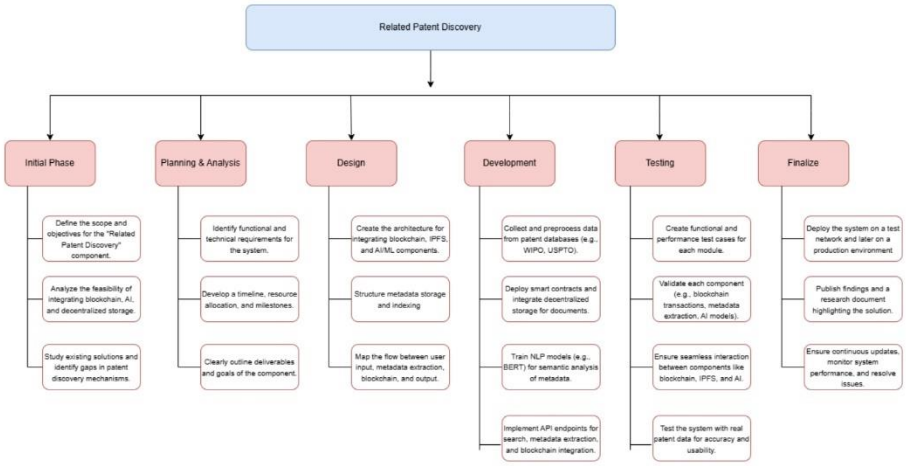

Figure 3: Work Breakdown Structure (WBS)

5.4. Plagiarism Report

Paper Title	Uploaded	Grade	Similarity
Proposal Report - IT21828966	03 Feb 2025 14:45	--	7%

Figure 4: Plagiarism Report