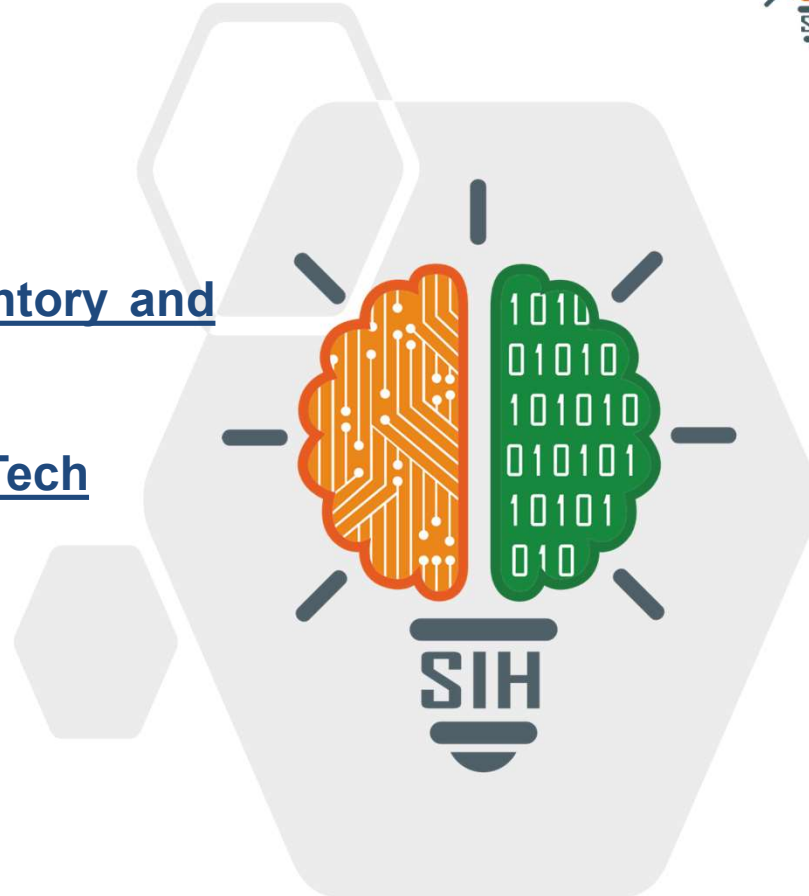


SMART INDIA HACKATHON 2024



- ❑ Problem Statement ID – 1627
- ❑ Problem Statement Title- Drug Inventory and Supply chain Tracking system
- ❑ Theme- Med Tech / Bio Tech / Health Tech
- ❑ PS Category- Software
- ❑ Team ID- 31286
- ❑ Team Name- Access-Denied



**Access
Denied**

MediStock: Drug Inventory and Supply Chain Tracking System



Proposed Solution

The proposed solution for the **Drug Inventory and Supply Chain Tracking System** focuses on developing a centralized platform for real-time monitoring, demand forecasting, and supply chain optimization. The system will automate inventory tracking, sending alerts when stock levels fall below predefined thresholds, and employ **AI-based demand forecasting** to predict future needs based on historical data. It will also track supplier performance, ensuring timely deliveries and quality assurance, while using real-time location tracking via **Web Socket**. and **Leaflet maps** to monitor drug shipments. This will streamline the procurement process, **prevent stockouts**, and ensure efficient drug distribution across healthcare institutions.

Key Focus

- Data validation
- User-Centric Dashboard
- Root cause analysis
- Consumption patterns
- Scalability and Accessibility
- Real-time visualization
- Analysis of Feasibility

System Overview

➤ System Architecture:

- **Frontend:** A web-based interface for users (using React.js).
- **Backend:** A microservices-based architecture (using **Node.js**) to handle various functionalities (e.g., inventory management, shipment tracking, user management).
- **Database:** A distributed database system (e.g., MongoDB for scalability, PostgreSQL for relational data).
- **Integration:** Use RESTful APIs to integrate with existing hospital systems, supplier databases, and logistics systems.
- **Demand Forecasting:** Predict future demand for drugs based on historical data (using time series models like ARIMA or **machine learning models** like XGBoost).

➤ Real-Time Data Processing:

- Use Apache Kafka for real-time data streaming and processing to handle large volumes of data from various sources (e.g., IoT sensors in shipments).

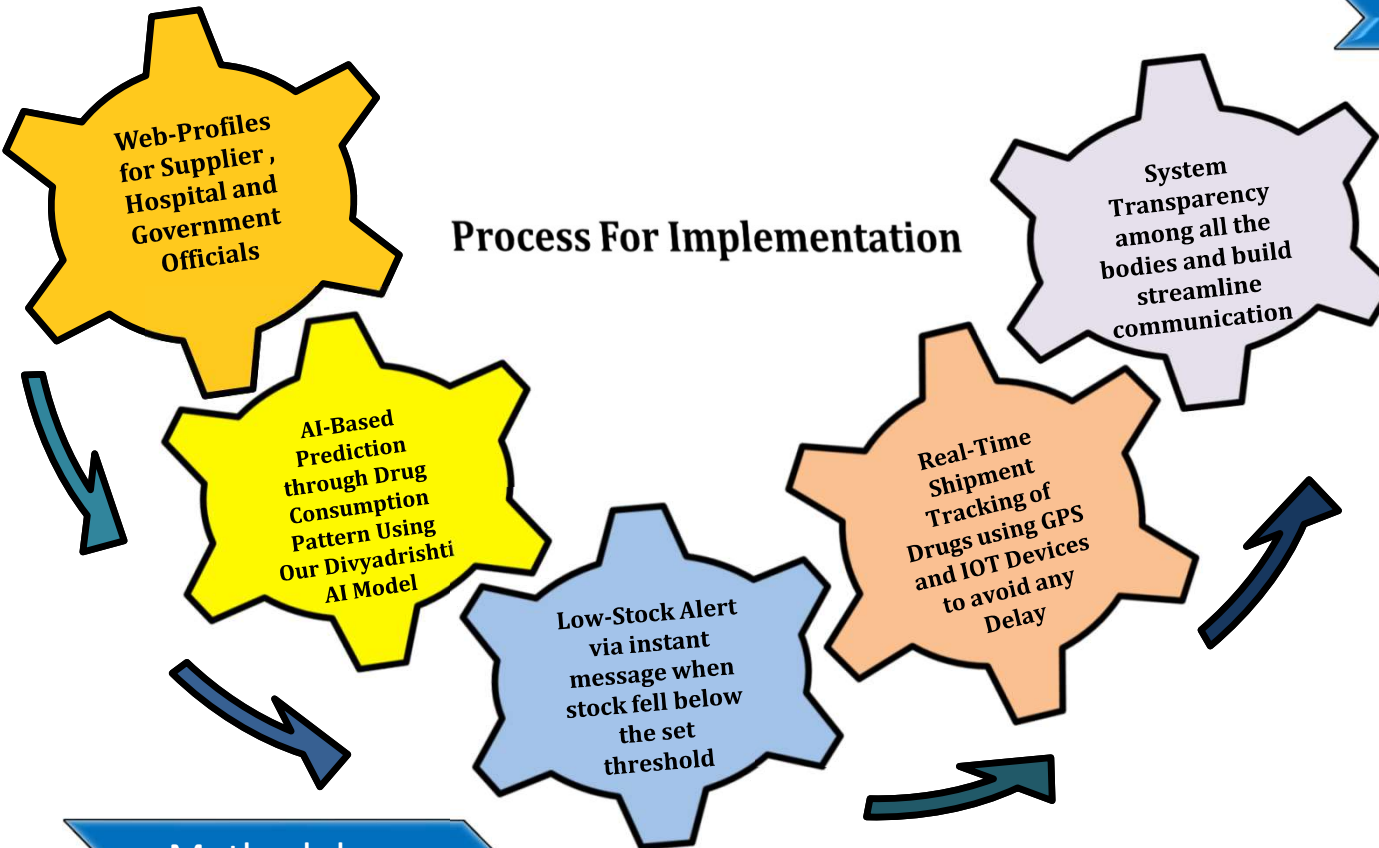
Access
Denied

TECHNICAL APPROACH

Technologies Used

- Frontend:** HTML, CSS, Bootstrap, Tailwind CSS, JavaScript and React.js for building the user interface.
- Backend:** Node.js with Express for API development.
- Database:** MongoDB for scalability, PostgreSQL for relational data.
- Real-Time Data Processing:** Apache Kafka for streaming and processing real-time data.
- Machine Learning:** TensorFlow for predictive modeling and analysis.
- Cloud Services:** AWS or Azure for hosting, storage, and scalability.

Process For Implementation



Methodology

The project will follow the **Agile development methodology**, allowing for iterative development and continuous feedback.

FEASIBILITY AND VIABILITY

Analysis of the Feasibility of Idea

- Technical Feasibility:** The use of modern technologies and cloud infrastructure ensures that the system can handle large volumes of data while being scalable and resilient.
- Operational Feasibility:** The intuitive dashboard and real-time monitoring will streamline operations for hospitals and suppliers, improving efficiency and reducing errors.
- Economic Feasibility:** The cost of cloud infrastructure and development is justified by the expected reduction in waste, improved drug availability, and overall efficiency gains.

Potential Challenges and Risks

- Data Privacy and Security:** Ensuring the system complies with healthcare data regulations (e.g., HIPAA, GDPR) and protecting sensitive medical data.
- System Integration:** Integrating with a variety of existing hospital systems, supplier databases, and logistics platforms.
- User Adoption:** Training healthcare staff and suppliers to effectively use the new system.

Strategies for overcoming these challenges

- Implement **robust encryption** and access control measures.
- Implement a **module for tracking** and analyzing supply chain disruptions .
- **Develop APIs** for seamless integration with existing systems.
- Design offline-first architecture with data synchronization capabilities.
- Establish data governance policies and regular audits.
- **Pilot Implementation:** Testing the system with a few hospitals to gather feedback and make improvements before a full-scale rollout

IMPACT AND BENEFITS

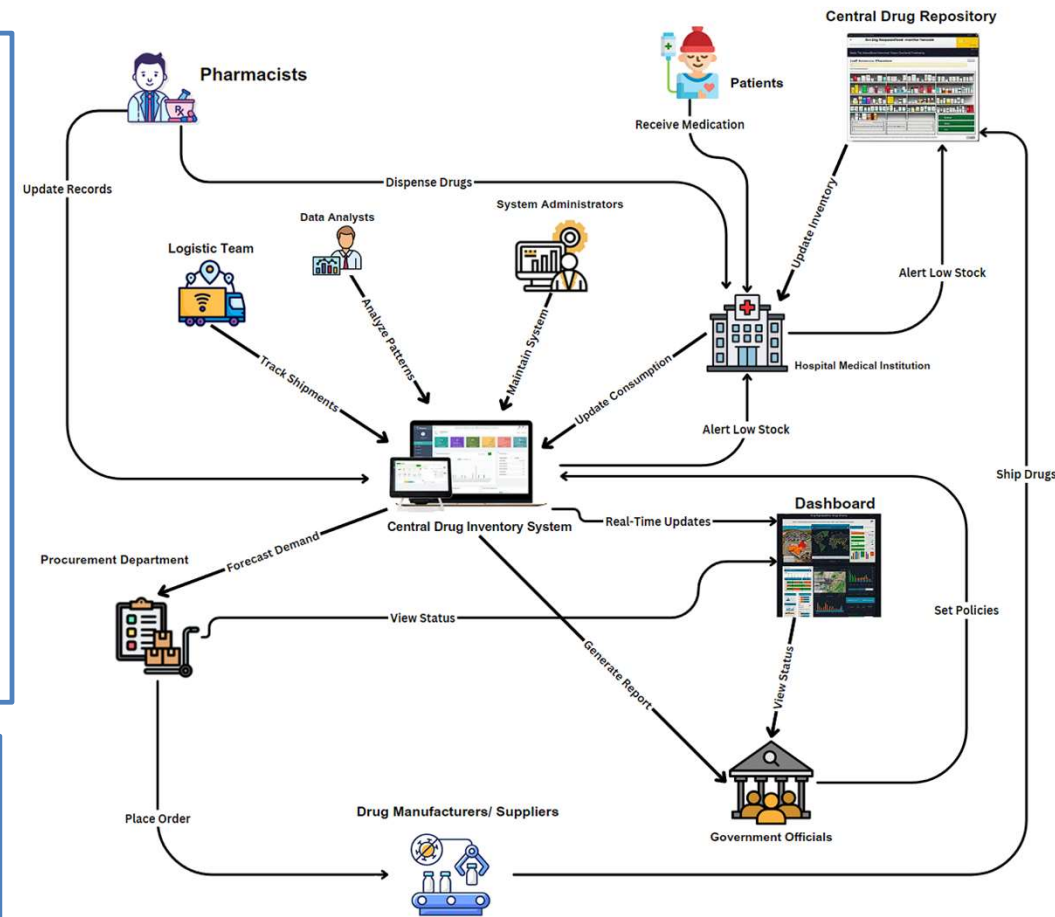
Benefits of the solution

The on-ground benefits of the system includes:

- ❑ **Enhanced Supply Chain Transparency:** Tracks vendor performance, drug availability, and distribution patterns, leading to better decision-making and accountability.
- ❑ **Better Public Health Outcomes:** Ensures critical medications are always available, leading to improved patient care and better health management in hospitals.
- ❑ **Improved Efficiency:** Real-time monitoring and automation reduce manual errors, streamline procurement, and ensure timely delivery of drugs to medical institutions.
- ❑ **Cost Optimization:** Demand forecasting and inventory optimization minimize overstocking or stockouts, lowering storage costs and avoiding wastage of expired drugs.
- ❑ **Risk Mitigation:** Early detection of supply chain disruptions and anomalies helps mitigate risks such as shortages, delays, or counterfeit drugs.+

Potential Impact on the Target

- **Hospitals:** Improved drug availability and operational efficiency.
- **Suppliers:** Optimized deliveries and stronger partnerships
- **Patients:** Better access to essential medicines.
- **Government:** Enhanced regulatory compliance and public health improvements.



Process Flow Architecture

RESEARCH AND REFERENCES

Details / Links of the reference and research work

For Case Study :

- <https://it.delhi.gov.in/>
- <https://dbtindia.gov.in/>
- <https://healthtechindia.in/>

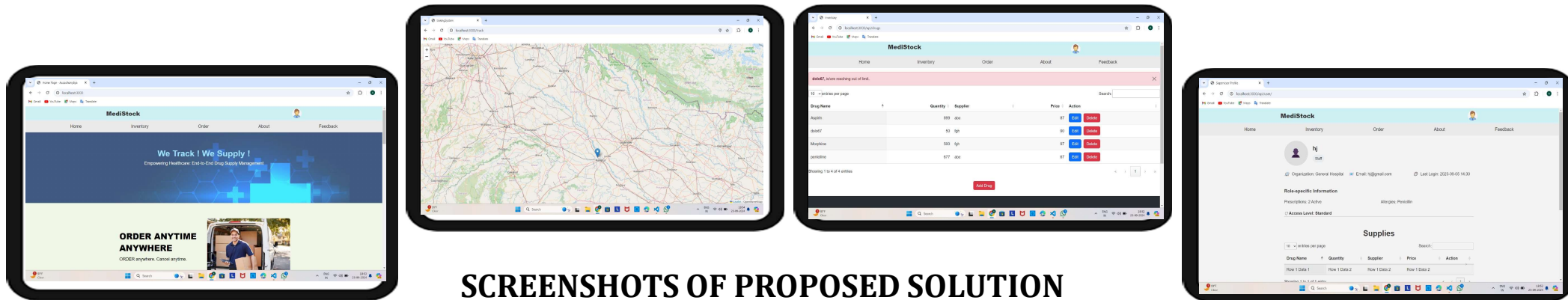
For Research Work :

- <https://www.icmr.gov.in/>
- <https://dmp.unodc.org/>
- <https://www.intellectsoft.net/blog/medication-tracking-software/>

Proto-Type Link : <https://github.com/PrashantShukla7/Drug-Inventory-and-supply-chain>

Related Articles :

- <https://www.weforum.org/agenda/2023/02/why-is-world-experiencing-medicine-shortages-and-how-can-the-generics-industry-address-supply-challenges>
- <https://www.hindustantimes.com/delhi/corruption-shortage-of-medicine-and-beds-key-problems-at-gbpant/story-qwJgclKN7CSapuML8WBpUJ.html>
- <https://www.ndtv.com/india-news/60-children-dead-in-5-days-at-ups-gorakhpur-hospital-where-oxygen-supply-was-cut-10-facts-1736806>



SCREENSHOTS OF PROPOSED SOLUTION