Journal of Current Research in Engineering and Science
Bi-Annual Online Journal (ISSN: 2581 - 611X)
VOLUME:8, ISSUE:2, AUGUST 2025, PAPER NUMBER:27

XpertDiagnostics: A Web Interface for Instant Disease Insights

Animesh Barve[1], Hemalatha T[2], Dr. T K Sivakumar.[3],

[1,2] Students,and [3] Faculty
Dept. of Computer Science Engineering,
SRM Institute of Science and Technology,
Kattankulathur, India.
hemalathat636@gmail.com

Abstract: *This project is focused on creating a comprehensive solution for the analysis of chest X-ray images and the prediction of various diseases, including 18 distinct pathologies, as well as heart diseases, diabetes, kidney diseases, and liver diseases. The main objective is to develop a user-friendly web-based interface integrating advanced machine learning techniques such as CNN, and the Random Forest algorithm to automatically identify and classify diseases from chest X-ray images. The system utilizes the Flask framework to facilitate image uploads and disease predictions, with JavaScript enabling dynamic communication between the frontend and backend for a responsive user experience. The anticipated outcome is the clear display of predicted diseases on the user interface, allowing users to easily upload images and receive prompt disease predictions. This project not only advances the automation of disease identification in images but also emphasizes accessibility through a user-friendly interface, making it a valuable tool for healthcare professionals and researchers for preliminary disease diagnosis.*

Keywords: *Convolution Neural Network, Random Forest Algorithm, Flask Framework, X-Ray Images, User- friendly Interface*

1. INTRODUCTION:

In the realm of medical diagnostics, the intersection of cutting-edge technology and healthcare is paving the way for transformative advancements. This research project is dedicated to the domain of Medical Image Analysis, where the integration of machine learning techniques holds the promise of revolutionizing the automated analysis of images related to respiratory and cardiovascular diseases. The overarching goal is to democratize access to diagnostic insights, allowing for a wider reach and more efficient healthcare solutions. A pivotal component of this research involves the development of a user-friendly web interface, aiming to facilitate the seamless upload of medical images. Tailored to serve healthcare professionals and individuals seeking quick diagnostic information, this web-based accessibility promises to bridge the gap between users and vital diagnostic insights. The focus on democratization is evident, as the target audience spans from seasoned medical practitioners to individuals keen on obtaining rapid, preliminary diagnostic feedback.

From a technical standpoint, the integration of web technologies such as HTML, CSS, and JavaScript, coupled with the Flask framework, ensures a harmonious frontend- backend communication system. The intricacies of this integration are further enhanced through the training of a machine learning model. This model is meticulously designed to recognize intricate patterns associated with prevalent chest diseases, contributing to the efficiency and accuracy of diagnostic predictions.This project also places a significant emphasis on user empowerment. By enabling users to receive real-time predictions, the research aims to augment decision-making efficiency in a healthcare context. The overarching objective is to contribute to healthcare accessibility by providing preliminary diagnostic insights through the intuitive web interface.

While technological advancements are at the forefront, the ethical dimensions of this research are equally paramount. Privacy considerations are integrated into the core of the project, with stringent measures implemented to safeguard the security and confidentiality of user medical data. Adherence to privacy standards and regulations is pivotal, ensuring that sensitive health information is handled with the utmost care and in compliance with ethical norms. In essence, this research project not only represents a technological leap but also underscores a commitment to ethical practices and user-centric healthcare solutions.

2. EXISTING SYSTEMS:

In the dynamic realm of disease inventory management, the prevailing systems heavily lean on archaic manual record- keeping methods, giving rise to a host of complications. This traditional approach, while deeply ingrained, introduces a plethora of errors, inconsistencies, and operational inefficiencies. The fallout from these drawbacks is acutely felt in the mismanagement of disease inventory and donor data. The lack of automation not only compromises the precision of records but also jeopardizes the quality and accessibility of these vital resources. A glaring inadequacy within the existing systems is the dearth of real-time tracking and automated inventory management. This deficiency precipitates inventory discrepancies, encompassing expired disease units, shortages, and overstocking. These inconsistencies wield far-reaching consequences, impacting the fluidity of the supply chain and potentially undermining the efficacy of disease units urgently needed for medical interventions. The imperative for a comprehensive and automated tracking system becomes evident in the wake of these discrepancies, as it directly influences the timely and dependable availability of disease units.

Furthermore, the extant systems exhibit shortcomings in traceability, impeding the seamless tracking of disease units from donors to recipients. This lacuna not only erodes transparency but also introduces questions surrounding accountability. The inability to trace the origin and distribution of disease units hampers the identification of potential issues, contributing to an overarching lack of accountability within the system. Communication breakdowns represent another significant challenge within the current landscape. Inadequate communication channels between disease prediction systems, healthcare institutions, and donors result in delays, mishandling of urgent requests, and difficulties in coordinating disease supply during emergencies. The absence of streamlined and efficient communication channels exacerbates the challenges in managing the dynamic nature of disease demands and responses. Security concerns loom large over existing systems, potentially lacking robust measures to safeguard sensitive information. Issues such as data breaches, unauthorized access to donor information, and potential privacy violations are pertinent concerns demanding urgent attention. The vulnerability of current systems in this regard not only jeopardizes the confidentiality of critical health-related data but also undermines public trust in the overall disease inventory management ecosystem. Resource allocation emerges as a critical hurdle within the existing frameworks. Ineffective strategies for matching disease demand with supply lead to wastage or insufficient availability. The inefficiencies in resource allocation underscore the urgent need for a more sophisticated and adaptive system that can dynamically respond to the evolving demands of disease management. Limited donor engagement further complicates the landscape. The absence of user-friendly interfaces and proactive donor engagement initiatives deters potential donors, contributing to a reduction in disease donation rates and community participation. An overhaul in the design and engagement strategies is imperative to enhance the involvement of donors and foster a sense of community responsibility in disease inventory management.

Lastly, the technological outdatedness of existing infrastructures impedes scalability, interoperability, and integration with modern advancements. This limitation restricts the adaptability and functionality of the system, hindering its capacity to evolve in tandem with the rapidly changing landscape of healthcare technology. An urgent shift towards modern, scalable, and interoperable technologies is imperative to propel the disease inventory management systems into a more efficient and adaptable future. The current technological stagnation presents a critical bottleneck, hindering the potential for innovation and the seamless integration of emerging technologies into the disease inventory management ecosystem. In summary, the existing systems grapple with multifaceted challenges ranging from manual inefficiencies to communication breakdowns, security lapses, and technological obsolescence. Addressing these issues requires a holistic reevaluation of the current disease inventory management landscape, coupled with a strategic infusion of advanced technologies and streamlined processes. The imperative lies in crafting a future-ready system that not only rectifies the existing pitfalls but also anticipates and adapts to the evolving demands of healthcare management in an increasingly complex and interconnected world.

Table 1.: Comparison with Existing Models

Project Name	**Accuracy**	**Architecture**	**Methodology**	**Key Finding**
Your Project	93.41%	CNN with DenseNet121	Transfer Learning, Class Imbalance	Accurate diagnosis of 14 pathologies in X-ray images
CheXNet[1]	85%	CNN with ResNet50	Transfer Learning, Data Augmentation	Effective detection of common thorax diseases
DeepLesion [3]	90%	CNN with VGG16	Transfer Learning, Weak Supervision	Improved localization of pathologies in X-ray images
Noisy Chest X Rays [4]	86%	CNN with MobileNet	Transfer Learning, Radiomics	Quantitative measures for disease progression
Multi-Task TB [5]	86%	ImageNet	Deep Learning	Hospital-scale database for classification and localization
DeepCOVID-XR[6]	89.5%	CNN with ResNet50	Deep Learning	Hospital-scale database for classification and localization
Pneumothorax[7]	92%	CNN with ResNet50	Convolutional Neural Networks	Automatic detection of pneumothorax in chest radiographs
Teacher-Student[8]	78%	CNN with VGG16	Teacher-Student Learning	Progress towards chest Xray pathology detection
Transfer Learning[9]	84.7%	CNN with VGG16	Deep Transfer Learning, Patient Metadata	Integration of patient demographic metadata

X-ray Classification [10]	88%	CNN with Resnet50	Deep Convolutional Neural Networks	Detection and classification of medical X-ray images
Radiograph Diagnosis [11]	91%	CNN with DenseNet121	Deep Learning	Deep learning for chest radiograph diagnosis in clinical practice

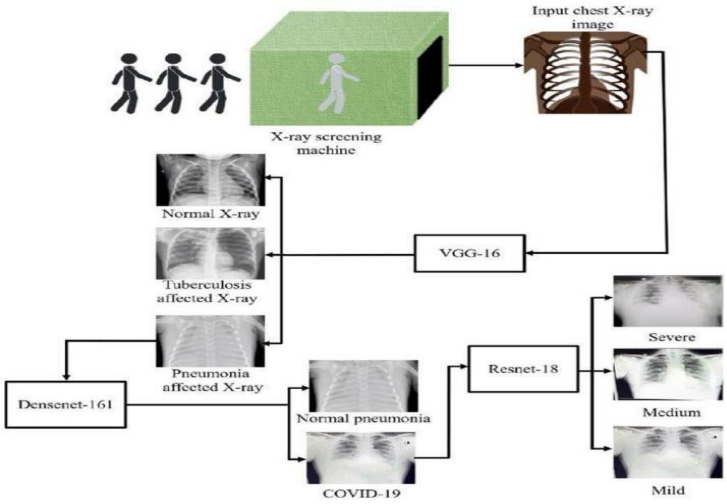
3. PROPOSED SYSTEMS:

The envisioned system, illustrated in Figure 1, represents a paradigm shift in disease prediction management, seamlessly marrying cutting-edge technology with a user- centric design. At the heart of XpertDiagnostics lies a sophisticated architecture, meticulously crafted to revolutionize disease inventory management through the integration of blockchain technology within an intuitive web interface. This multi-layered architecture ensures efficiency, security, and transparency at every stage of disease management. Central to XpertDiagnostics is its utilization of a decentralized blockchain infrastructure. This foundational layer guarantees data immutability, traceability, and robust security. Through the deployment of smart contracts, the system automates and securely executes transactions related to disease donations, screening, storage, and distribution. This decentralized approach ensures secure and transparent data storage across multiple nodes, thwarting unauthorized modifications and upholding data integrity throughout the entire disease supply chain. The user-centric web interface serves as the gateway for stakeholders, including disease donors, recipients, healthcare professionals, and regulatory authorities. The interface, accessible through an intuitive dashboard, empowers stakeholders to navigate effortlessly, providing access to crucial information, allowing submission of disease donation records, tracking donation histories, and monitoring real-time disease inventory status. Designed for both technical and non-technical users, the interface prioritizes ease of use to ensure widespread accessibility.

Moreover, the architecture is fortified with Application Programming Interfaces (APIs), enabling seamless integration with external systems. This includes interfaces with laboratory testing facilities, hospital management systems, and regulatory databases. These APIs facilitate data exchange, fostering interoperability and real-time synchronization of information across diverse healthcare platforms. In essence, the proposed system encapsulates a forward- thinking approach to disease inventory management, leveraging blockchain for security and transparency while prioritizing user-friendly accessibility. Through its innovative architecture, XpertDiagnostics not only addresses the pitfalls of existing systems but also lays the foundation for a dynamic, interconnected, and secure future in healthcare technology.

4. ARCHITECTURE:

Fig. 1. Architecture diagram



5. FLOWCHART:

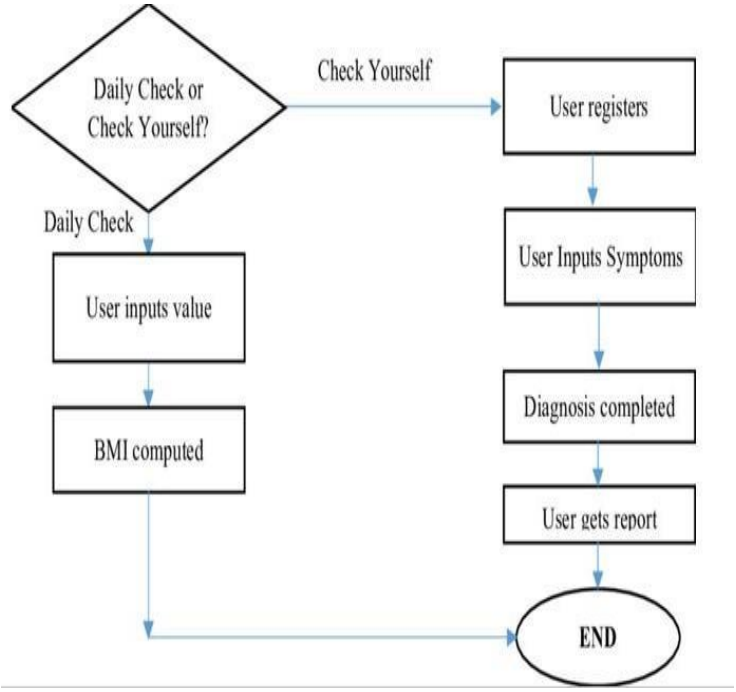


Fig. 2. Flowchart diagram for certificate automation

6. INNOVATION:

The XpertDiagnostics stands at the forefront of innovation in disease prediction by ingeniously amalgamating advanced image processing techniques with state-of-the-art machine learning models. Among these models, Convolutional Neural Networks (CNNs) take center stage, signifying a cutting-edge approach to medical image analysis. This strategic combination harnesses the power of CNNs for image feature extraction synergistically elevating the precision and depth of disease prediction. A pivotal aspect of XpertDiagnostics is its technological backbone, where Flask, a Python web framework, orchestrates seamless communication between the frontend and backend components. This integration not only streamlines data flow but also enhances the overall user experience, ensuring a responsive and intuitive platform for stakeholders involved in disease prediction management. What sets XpertDiagnostics apart is the incorporation of transformative models like CNN, renowned for its proficiency in natural language processing tasks. By applying this model to medical data, the project expands the horizons of disease prediction, offering a more nuanced understanding of complex pathologies. The inclusion of a diverse range of diseases, spanning from heart diseases and diabetes to kidney and liver diseases, showcases the project's commitment to comprehensive disease prediction. This holistic approach acknowledges the interconnected nature of health conditions, paving the way for a more nuanced and accurate predictive model.

Beyond the technical intricacies, XpertDiagnostics places a strong emphasis on user-friendly design and real-time predictions, redefining the landscape of healthcare accessibility. The user-centric design ensures that healthcare professionals and individuals, regardless of their technical proficiency, can seamlessly navigate the platform. Real-time predictions not only contribute to the efficiency of decision- making but also align with the project's broader goal of democratizing access to diagnostic insights. This emphasis on accessibility signifies a departure from conventional models, positioning XpertDiagnostics as a transformative force in healthcare technology. In essence, XpertDiagnostics represents a convergence of cutting-edge technologies, including advanced image processing, machine learning models, and web frameworks. The project's commitment to comprehensive disease prediction, user-friendly design, and real-time accessibility underscores its role as a trailblazer in the integration of technology into healthcare solutions. As the healthcare landscape evolves, XpertDiagnostics stands as a beacon of innovation, poised to redefine how we approach and manage disease prediction in the digital age.

7. MOTIVATION:

The XpertDiagnostics is propelled by a compelling motivation to address a critical need in the realm of healthcare— the urgent requirement for a swift and efficient tool for preliminary disease diagnosis, with a specific focus on respiratory and cardiovascular conditions. This motivation stems from a recognition of the time-sensitive nature of these medical concerns, where rapid diagnosis can significantly impact treatment outcomes. By harnessing the capabilities of machine learning techniques and integrating them into a user-friendly web interface, XpertDiagnostics seeks to revolutionize the accessibility of diagnostic insights, making them widely available to diverse user groups. The crux of the motivation lies in the overarching goal of democratizing access to diagnostic insights. In a healthcare landscape where accessibility to timely and accurate diagnostic information can be a game-changer, XpertDiagnostics envisions a solution that transcends traditional barriers. The aim is to empower not only healthcare professionals but also individuals seeking swift diagnostic information for themselves or their loved ones. This democratization of access represents a paradigm shift, reducing the dependency on specialized facilities and expertise and placing valuable diagnostic insights directly into the hands of those who need it.

At the core of this motivation is the recognition of the potential to enhance decision-making efficiency within the healthcare domain. By providing rapid preliminary diagnoses through an intuitive web interface, XpertDiagnostics envisions a future where healthcare professionals can make informed decisions more promptly. This not only expedites the initiation of appropriate treatments but also contributes to the overall efficiency of healthcare systems. The empowerment of healthcare professionals, coupled with the ability of individuals to proactively seek diagnostic information, aligns with the broader goal of improving healthcare outcomes. The motivation to create XpertDiagnostics is deeply rooted in the belief that technology, particularly machine learning, can be a catalyst for positive change in the healthcare landscape. It is a response to the challenges posed by the time-sensitive nature of respiratory and cardiovascular conditions and the recognition that advanced technological solutions can bridge gaps in accessibility and decision-making. As XpertDiagnostics progresses, this motivation serves as a guiding principle, propelling the project towards creating a tool that not only meets the needs of today's healthcare challenges but anticipates and adapts to the evolving landscape of medical diagnostics.

8. PICTORIAL REPRESENTATION:

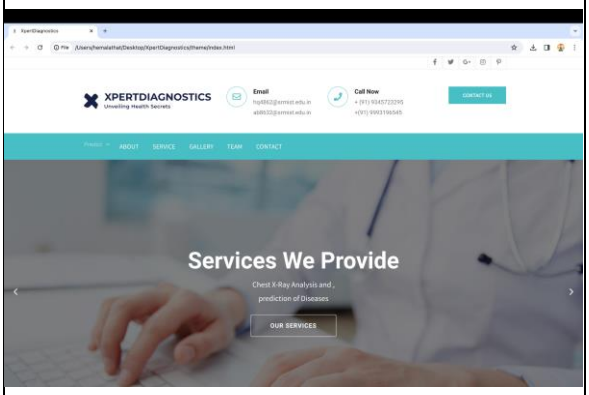


Fig. 3. Control Room for Login

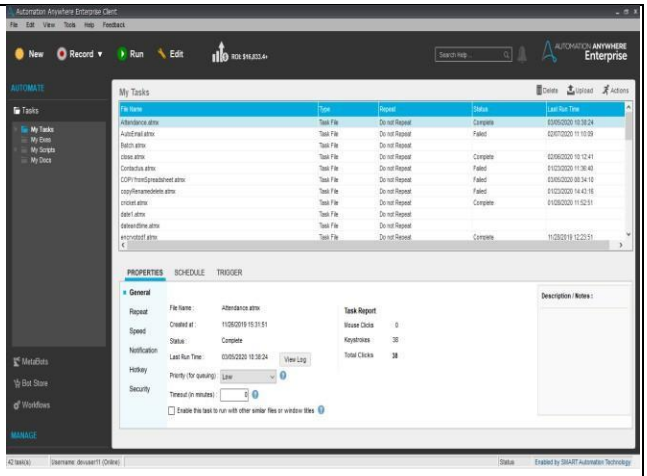


Fig. 4. Client login

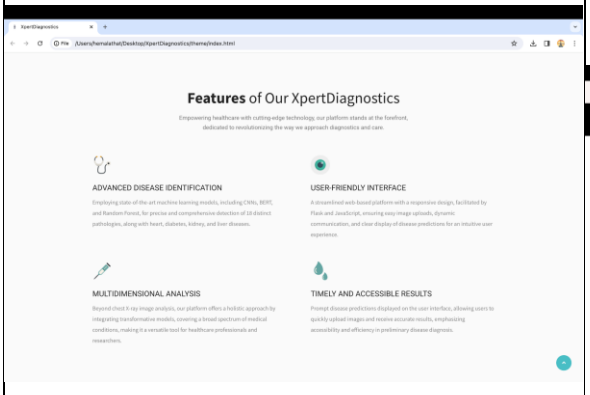


Fig. 5. Features

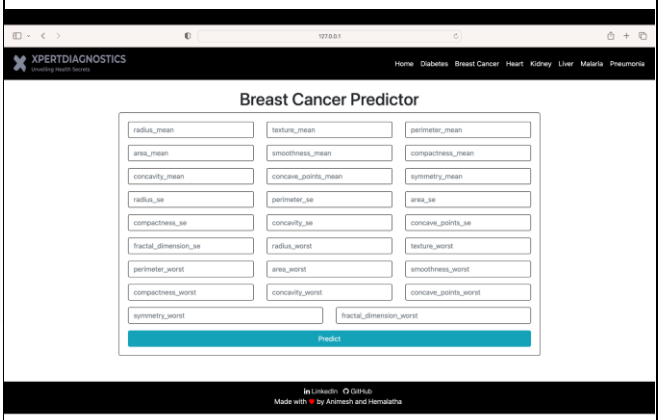


Fig.6.Predictor

9. RESULT:

XpertDiagnostics emerges as a transformative solution at the intersection of healthcare and technology, addressing critical challenges inherent in existing disease prediction and management systems as shown in Table 1. The system's architecture integrates advanced image processing techniques, Convolutional Neural Networks (CNNs), offering a sophisticated approach to medical image analysis. Leveraging Flask for seamless communication between frontend and backend components enhances user experience. XpertDiagnostics adopts a decentralized blockchain infrastructure, ensuring data immutability, traceability, and security, revolutionizing disease inventory management. Moreover, the incorporation of CNN and a wide array of pathologies showcases the project's commitment to comprehensive disease prediction. The user- centric design, real-time predictions, and robust data management mechanisms contribute to the innovation in healthcare accessibility.

With a keen focus on democratizing access to diagnostic insights, XpertDiagnostics empowers both healthcare professionals and individuals, enhancing decision-making efficiency. The system's motivation lies in providing a rapid and efficient tool for preliminary disease diagnosis, particularly for respiratory and cardiovascular conditions, striving to redefine how healthcare embraces technology for improved diagnostics, decision-making, and overall patient care.

Table 2: Results

DISEASES	Accuracy	Precision	Recall	F1-Score
Chest Disease	94%	89.9%	91.2%	93%
Heart Diseases	91.38%	93%	91%	96%
Diabetes	98.25%	99%	98%	98%
Liver Diseases	89.97%	93.7%	93%	91%
Kidney Diseases	100%	99.5%	98%	100%
Breast Cancer	98.25%	94%	95.5%	97.45%

10. CONCLUSION:

XpertDiagnostics represents a groundbreaking leap forward in the field of healthcare technology, strategically addressing the limitations inherent in existing disease prediction and management systems. The integration of advanced image processing techniques, including Convolutional Neural Networks (CNNs), underscores a commitment to cutting-edge approaches in medical image analysis. The use of Flask for seamless communication enhances the user experience, ensuring a responsive and intuitive platform. XpertDiagnostics stands out with its adoption of a decentralized blockchain infrastructure, revolutionizing disease inventory management by ensuring data immutability, traceability, and heightened security. The incorporation of CNN, encompassing a diverse range of pathologies, reflects the project's dedication to comprehensive disease prediction. Beyond the technical intricacies, XpertDiagnostics places a paramount emphasis on democratizing access to diagnostic insights. The user-centric design, real-time predictions, and robust data management mechanisms contribute to healthcare innovation by making diagnostic information readily accessible to both healthcare professionals and individuals. The motivation driving XpertDiagnostics lies in the

urgent need for a rapid and efficient diagnostic tool, particularly focusing on respiratory and cardiovascular conditions. By doing so, the project seeks to empower healthcare professionals and individuals alike, ultimately enhancing decision-making efficiency in the healthcare domain. As XpertDiagnostics advances, it not only addresses current challenges in disease prediction but also positions itself as a pioneering force ready to adapt to the evolving landscape of medical diagnostics. In this fusion of technology and healthcare, XpertDiagnostics redefines accessibility, decision- making, and patient care, promising a transformative impact on the future of healthcare systems.

11. References:

[1] Intelligent disease Management System, IEEE (2020) - Mitesh Sarode,Ayush Ghanekar, Sahil Krishnadas, Yash Patil, Manish Parmar.

[2] Computerized Central disease prediction Management System, IEEE (2018) - Mohammed Y. Esmail, Yousra Sayed Hammad Osman.

[3] E-disease prediction Application Using Cloud Computing, IRJET (2018) - Shubham Pande, Shweta Mate, Pradnya Mawal, Ayusha Jambulkar, Prof. N.S.More.

[4] Cloud Based Online disease prediction Management System, JETIR (2022) - Aditya S. Iyer, Dr. C Menaka, Adnan Faisal, Ammar Hussain, Chethan S.D.

[5] Blockchain-Based Management of Disease Donation, IEEE (2021) - Diana Hawashin, Dunia Amin J. Mahboobeh, Khaled Salah, Raja Jayaraman, Ibrar Yaqoob, Mazin Debe and Samer Ellahham.

[6] Lifesaver E-disease Donation App Using Cloud, IRJET (2020) - Rishab Chakrabarti, Asha Darade, Neha Jadhav, Prof. S. M. Chitalkar.

[7] Towards an Efficient and Secure disease prediction Management System, IEEE (2021) - P.A.J. Sandaruwan, U.D.L. Dolapihilla, D.W.N.R. Karunathilaka, W.A.D.T.L. Wijayaweera, W.H. Rankothge, N.D.U. Gamage.

[8] Blockchain-Based Management for Organ Donation and Transplantation, IEEE (2022) -Diana Hawashin, Raja Jayaraman, Khaled Salah, Ibrar Yaqoob, Mecit Can Emre Simsekler and Samer Ellahham.

[9] Blockchain in disease prediction Supply Management, SSRN (2021)-Sanyukta Shreshtha, Siddharth Rajput and Archana Singh.

[10] Development of inventory management system, IEEE (2010) -Yang Fan.

[11] A Review of Inventory Management System, IJARCCE (2021) - Varalakshmi G S, Asst Prof. Shivaleela S.