RESEARCH ARTICLE OPEN ACCESS

Smart Health Card Using Android Technology

Prof. Amol Jadhav[1], Sambodhi Wagh[2], Ajay Padghan[3], Nirjala Naik[4], Saniya Shaikh[5]

1Assistant Professor, Department of Information Technology, Zeal College of Engineering and Research, Pune, India

2,3,4,5 B.E. Students, Department of Information Technology, Zeal College of Engineering and Research, Pune, India

ABSTRACT

The rapid growth of digital technology in healthcare has created a need for efficient and reliable patient data management systems. Traditional paper-based records often result in issues such as data loss, duplication, and delays in accessing critical information. To address these challenges, this study proposes a Smart Health Card system developed using Android technology. The system enables secure storage and quick retrieval of patient medical records through a mobile application integrated with cloud storage. Each patient is assigned a unique digital identity linked with a QR code or NFC tag, allowing instant access to medical information during emergencies. In addition, a machine learning model is incorporated to predict possible diseases based on patient data. The proposed system improves data accessibility, enhances decision-making, and reduces administrative workload, thereby contributing to a more efficient healthcare system.

Keywords :- *Smart Health Card, Android Application, Cloud Storage, QR Code, Digital Medical Records*

I. INTRODUCTION

Efficient management of patient information plays a crucial role in delivering quality healthcare services. Conventional record-keeping methods, which rely heavily on paper documentation, often lead to challenges such as misplaced records, duplication, and difficulty in sharing information across different healthcare providers. These limitations can delay treatment and affect patient outcomes, especially in emergency situations.

With the advancement of mobile applications and cloud computing technologies, digital solutions have become more practical and effective in healthcare systems. A Smart Health Card system provides a modern approach to storing and accessing patient data electronically. By using an Android-based application connected to a centralized database, healthcare professionals can retrieve patient information quickly and accurately. This system enhances efficiency, improves data security, and supports better healthcare delivery.

With the advancement of mobile applications and cloud computing, digital healthcare solutions have gained significant importance. A Smart Health Card system offers a modern approach by storing patient data electronically and making it accessible whenever needed.

In this system, an Android application is used as the primary interface, while a cloud server stores all patient records securely. Each patient is assigned a unique ID linked with a QR code or NFC tag, enabling healthcare professionals to access medical information quickly without manual paperwork. This approach improves efficiency, accuracy, and accessibility in healthcare services.

II. LITERATURE REVIEW

Literature Review – 1. Fang D., Duan L., et al. (2024) presented a novel interpretable deep learning model known as the Hierarchical Attention Network (HAN) for identifying medical conditions from clinical text data. The main focus of their research was not only to improve prediction accuracy but also to enhance transparency in decision-making. The model uses multiple levels of attention mechanisms to identify the most relevant words and sentences within Electronic Health Records (EHRs). By highlighting important medical terms, the system allows healthcare professionals to understand how predictions are generated. Their experimental results showed that the model performs effectively in detecting diseases such as chronic kidney disease, demonstrating both high accuracy and better interpretability compared to traditional models.

Literature Review – 2 . Dhinakaran D., Edwin Raja S., et al. (2024) proposed an advanced disease prediction framework that integrates artificial intelligence-based feature selection with attention-driven neural networks. The primary objective of their study was to improve prediction performance by eliminating irrelevant and redundant medical data. Their approach focuses on selecting only the most significant health features, which helps in reducing computational complexity while increasing accuracy. The system achieved an accuracy of approximately 95% along with improved evaluation metrics such as precision and F1-score. This research highlights the importance of combining intelligent feature selection with deep learning techniques to develop efficient and reliable healthcare prediction systems.

Literature Review 3– Liao L., et al. (2024) developed a comprehensive healthcare platform that operates on both mobile and web environments using Electronic Health Records (EHR). The aim of their system was to provide real-time chronic disease prediction along with personalized health recommendations. The platform enables continuous interaction between patients and healthcare providers by maintaining updated medical records. It is integrated with hospital backend systems, allowing seamless data exchange and improving the accuracy of predictions. The study demonstrates that such digital platforms enhance accessibility, support remote healthcare services, and improve overall patient care through timely insights.

Literature Review – 4 . Ding D., et al. (2024) introduced an innovative approach using large language multimodal models to predict chronic diseases over a long-term period of five years. Their research focused on combining different types of medical data, including clinical text, laboratory reports, and patient history, to improve prediction accuracy. The multimodal model is capable of analyzing complex and heterogeneous datasets, making it highly effective for early disease detection. The results showed reliable performance, especially in predicting conditions like diabetes. This study emphasizes the growing importance of integrating multiple data sources and advanced AI models to build robust and future-ready healthcare prediction systems. It provides real-time disease prediction and personalized health insights to users. The system was integrated with hospital backend systems, ensuring continuous data flow and accurate predictions.

Recent advancements in digital healthcare technologies have encouraged researchers to explore innovative methods for managing patient medical information more effectively. Several studies have investigated the use of mobile applications, cloud computing, and electronic health record systems to improve the accessibility and reliability of healthcare data.

Earlier research by Sharma et al. examined the role of smartphone applications in storing and managing patient medical records. Their study demonstrated that mobile health applications allow individuals to monitor their health information and share it easily with healthcare providers. However, issues related to data standardization and interoperability between healthcare systems were identified as significant challenges.

Gupta and Kumar proposed a cloud-based health record management system that enables centralized storage of patient information. Their work showed that cloud technology allows hospitals to access updated medical records from multiple locations while reducing data redundancy. Nevertheless, the study emphasized the importance of strong security mechanisms to protect sensitive medical data.

Another study conducted by Ramesh and colleagues explored the use of QR code-enabled health cards to facilitate rapid access to patient information in emergency situations. The results indicated that QR codes significantly reduce the time required to retrieve medical records. However, the implementation of such systems requires standardized data formats across hospitals.

Researchers have also investigated Android-based healthcare applications that integrate patient records with appointment scheduling and prescription management. These systems provide a user-friendly interface for both patients and healthcare professionals, although maintaining system security and software updates remains an ongoing challenge.

More recent studies have incorporated artificial intelligence and machine learning techniques to support disease prediction using medical data. AI-driven models can analyze patterns in patient information to identify potential health risks and assist doctors in making informed decisions. Despite these advancements, challenges such as data privacy, network dependency, and system integration continue to require further research.

Overall, existing literature highlights the growing importance of digital healthcare platforms that combine mobile applications, cloud storage, and intelligent data analysis.

III. PROPOSED METHODOLOGY

Healthcare institutions still face significant challenges in managing patient records efficiently due to reliance on traditional methods. Paper-based systems are prone to errors, data loss, and delays in accessing important medical information. Additionally, the lack of a centralized platform makes it difficult to share patient data between hospitals and healthcare providers. In emergency situations, the unavailability of medical history can lead to incorrect or delayed treatment. Therefore, there is a need for a secure, digital, and easily accessible system that can store and manage patient health records while also supporting intelligent disease prediction.

Before the data is used for prediction, it undergoes a preprocessing stage in which duplicate entries are removed, missing values are handled, and data formats are standardized. This step improves the reliability and consistency of the dataset used for analysis.

Following preprocessing, relevant medical features are selected to enhance the accuracy of disease prediction. Important parameters such as blood pressure levels, cholesterol values, body mass index, and symptom patterns are analyzed to identify the most significant predictors.

Fig. 2. Architecture of Smart Health Card Using Android Technology

A Convolutional Neural Network (CNN) model is then trained using labelled medical datasets to detect patterns associated with different diseases. Through iterative training and optimization techniques such as dropout and hyperparameter tuning, the model achieves a prediction accuracy of approximately 87 percent, making it suitable for real-time application. The trained model is integrated with an Android mobile application, which serves as the user interface of the system. Patients can register within the application, enter their symptoms, upload medical reports, and view prediction results generated by the AI model.

All patient records are stored in an encrypted cloud database, allowing authorized healthcare professionals to access information remotely. The Smart Health Card assigned to each user contains a QR code or NFC tag, enabling doctors to retrieve medical data instantly by scanning the card during consultations or emergency situations.

To ensure the confidentiality of medical data, security measures such as encrypted communication, authentication mechanisms, and secure APIs are implemented within the system.

The diagram shows the workflow of a Smart Health Card system with disease prediction. The process starts with user registration and login, after which personal details and medical history are stored in a database. The user then enters current symptoms, which are cleaned through preprocessing and analyzed using feature extraction. These features are given to a CNN model for training and testing to predict possible diseases. Finally, the system displays the predicted results and also provides additional support like doctor suggestions, medicines, and diet plans.

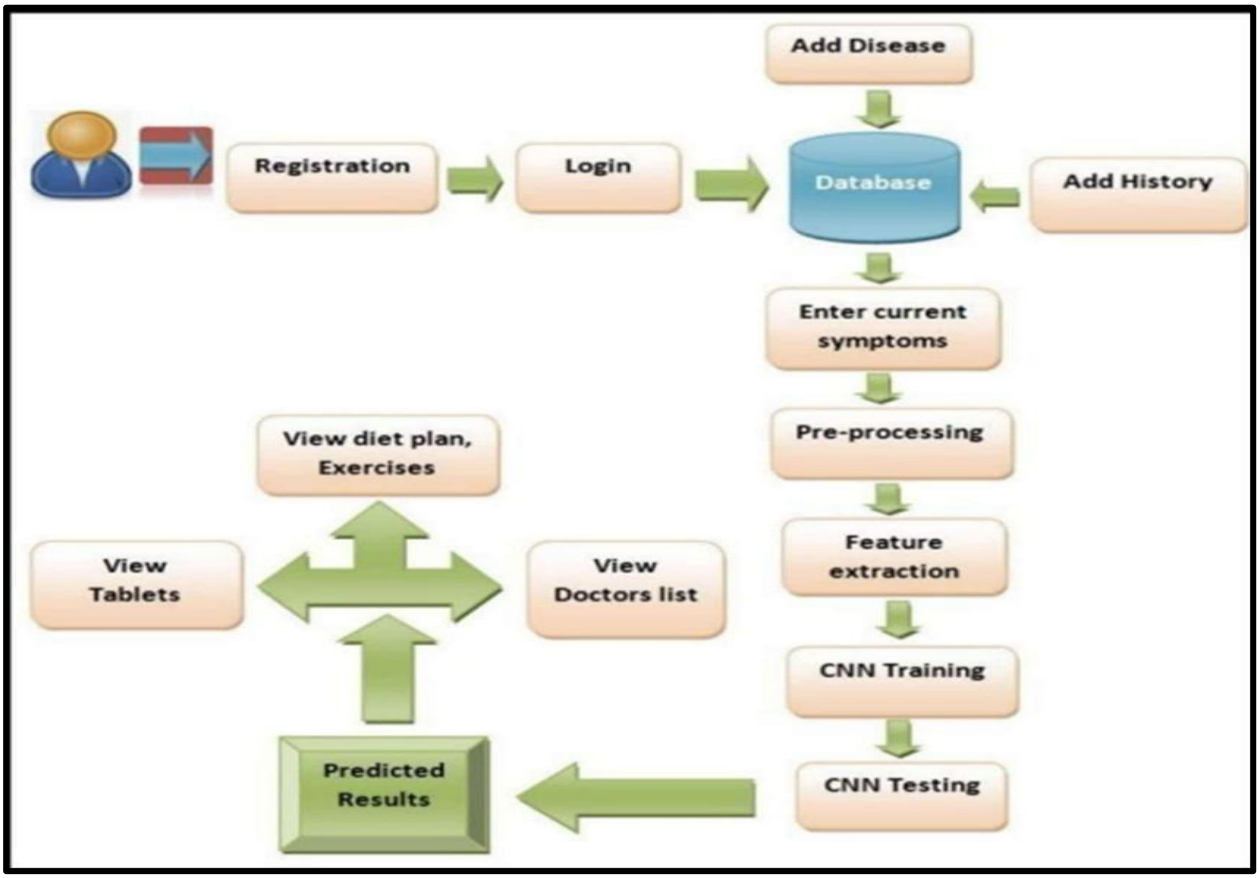

Fig. 2. Architecture of Smart Health Card Using Android Technology

A. Architecture Flow of Smart Health Card System

1) **User Registration and Authentication**: The system begins with the user creating an account through the Android application. During registration, the user provides essential information such as name, age, and contact details. Once the registration process is completed, the user logs into the system using their credentials. This step ensures that only authorized users can access the system and maintains data security.

2) Database Storage: After successful login, the user's information is securely stored in a centralized database or cloud storage system. The database maintains all important records, including personal information, medical history, and details of previously diagnosed diseases. This organized storage allows quick access and efficient management of patient data whenever required.

3) Add Disease / Medical History: The user or healthcare provider can record previous illnesses and medical background in the system. This historical information helps the system make more accurate predictions by using past health data.

4) Enter Current Symptoms: The user inputs present symptoms such as fever, headache, or fatigue. These symptoms act as the primary input for disease prediction.

5) Data Pre-processing: The system processes the entered data to improve its quality. It removes unnecessary or incorrect data (noise). Missing values are handled appropriately. Data is converted into a consistent format for analysis. This step ensures reliable and accurate results.

6) Feature Extraction: The system identifies and selects important attributes from the data. Key features include symptoms, age, and existing medical conditions. Only relevant information is used to enhance model efficiency.

7) CNN Testing / Prediction: The extracted features are passed to a Convolutional Neural Network (CNN) model. It predicts the most likely disease and generates the output as a prediction result

.

8) Predicted Results Display: The system displays the prediction results, including the predicted disease name, confidence level, and severity (mild, moderate, or severe).

9) Recommendations & Support: Based on the disease prediction, the system provides useful guidance and support. It suggests appropriate medicines (tablets), lifestyle and diet adjustments, or recommends consulting a healthcare professional.

IV. RESULT ANALYSIS

The proposed Smart Health Card system demonstrates significant improvement in the management and accessibility of healthcare data. The implemented Convolutional Neural Network (CNN) model achieved an accuracy of approximately 87%, indicating its capability to effectively analyze patient information and predict potential diseases. The integration of QR code and NFC technologies contributed to a substantial reduction in data retrieval time, enabling healthcare professionals to access patient records quickly and efficiently compared to traditional paper-based systems.

The incorporation of QR code and NFC technologies enables healthcare professionals to access patient records quickly without manual data entry. In comparison with conventional paper-based systems, the proposed system reduced patient data retrieval time by more than 60 percent, allowing doctors to access critical information within seconds.

Cloud synchronization ensures that patient records remain consistent and updated across different healthcare facilities. Any modification made by a doctor or patient is automatically reflected in the system, ensuring accurate and reliable information.

User feedback collected during testing indicated that the mobile application provides a convenient interface for accessing health information. Patients are able to monitor their medical records, track previous diagnoses, and review AI-generated predictions through a simple and intuitive dashboard.

Despite these advantages, certain limitations were observed. The accuracy of the prediction model depends largely on the size and quality of the training dataset. In regions where digital medical records are limited, prediction reliability may decrease. Additionally, the system relies on internet connectivity for accessing cloud services. Nevertheless, the results demonstrate that the Smart Health Card system provides an efficient solution for managing patient health records and improving healthcare service delivery.

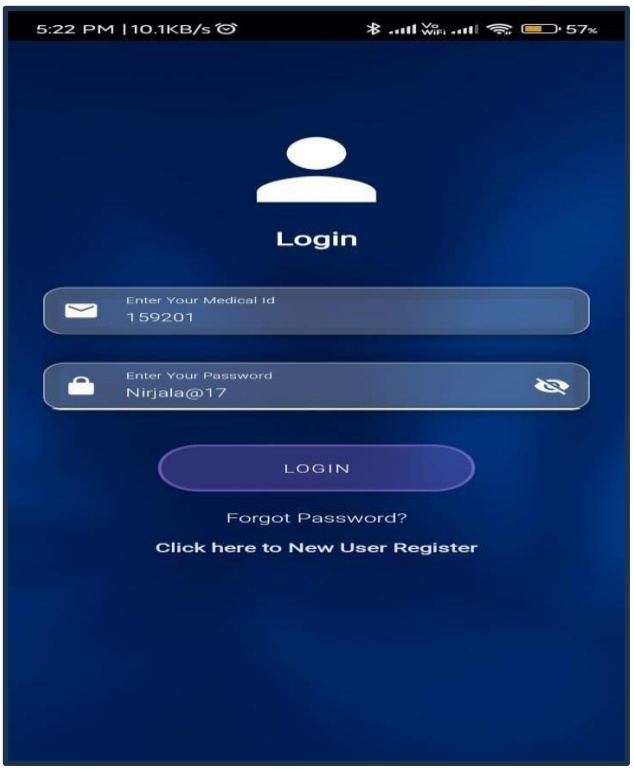

Fig. Login Screen

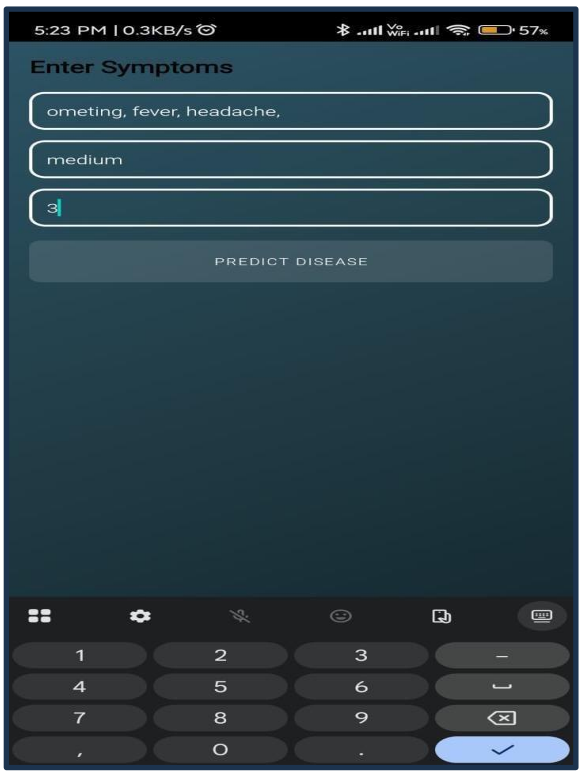

Fig. Enter Symptoms

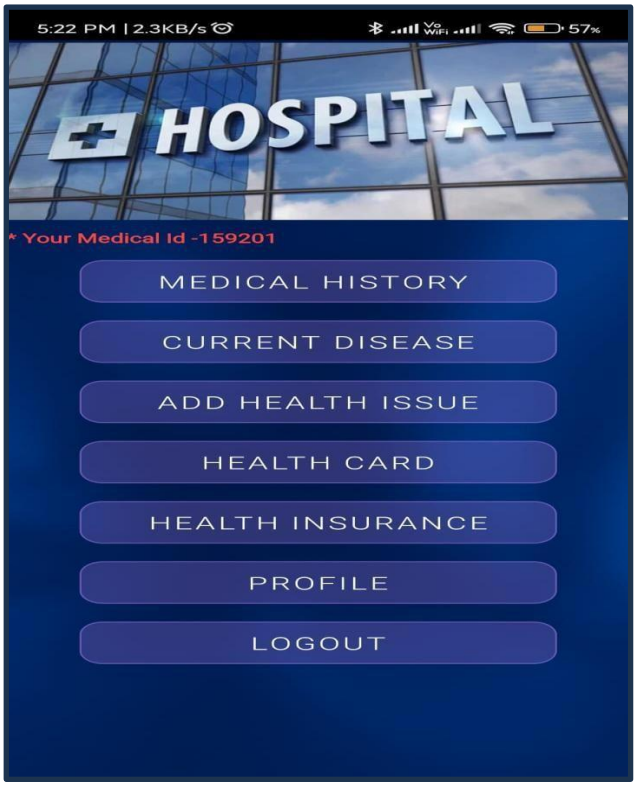

Fig. Categories

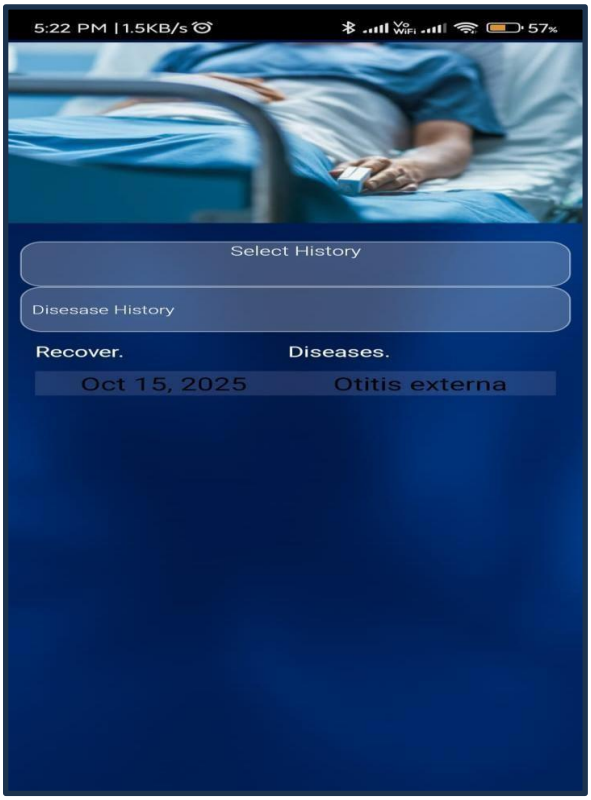

Fig.History

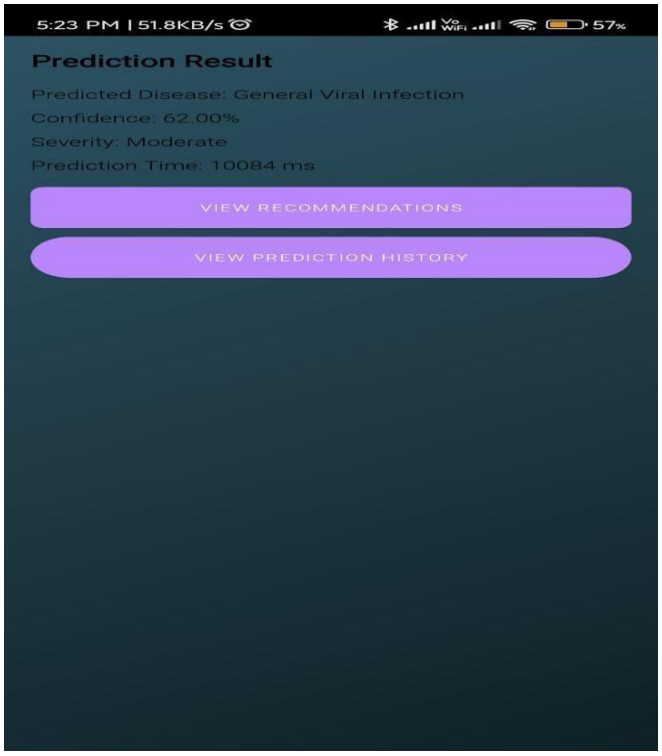

Fig. . Result Display Screen

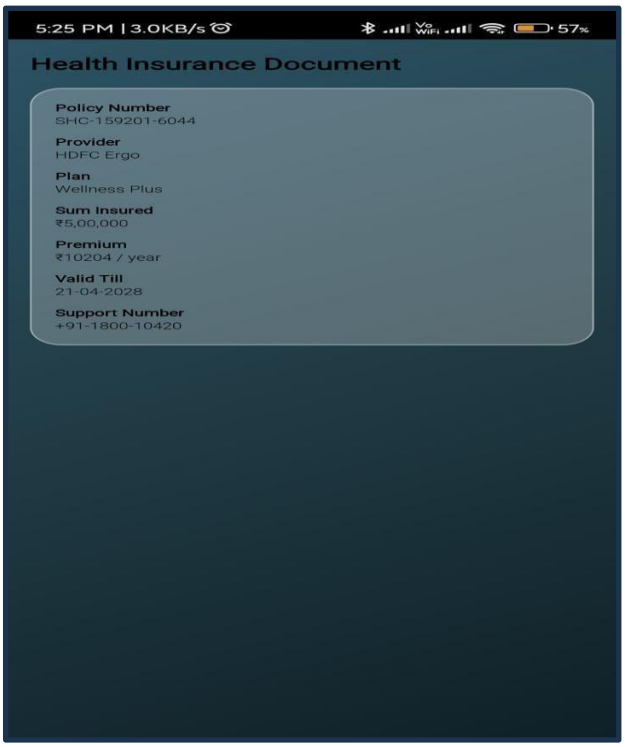

Fig. . Document Screen

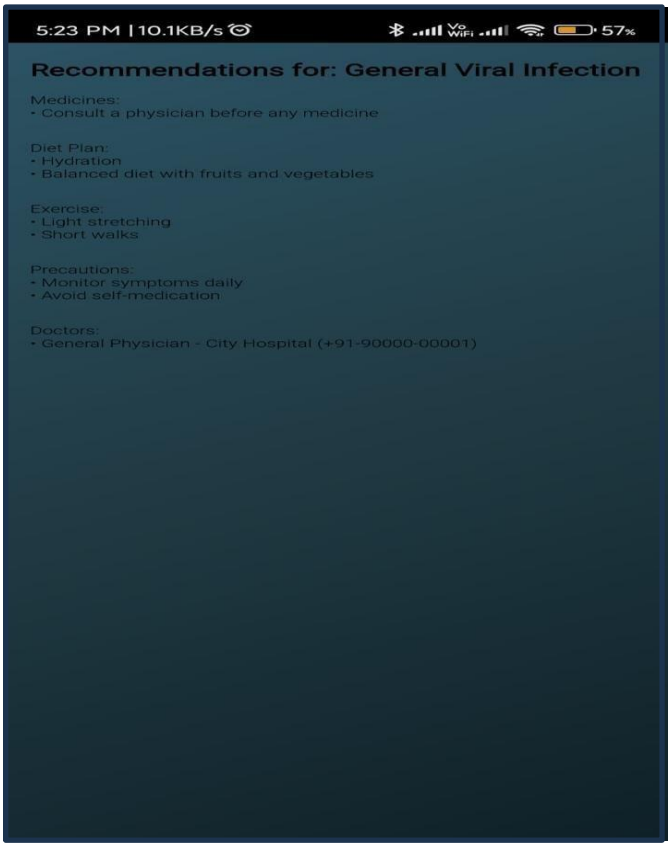

Fig . Recommendation screen

Fig . Payment of Doctor Screen

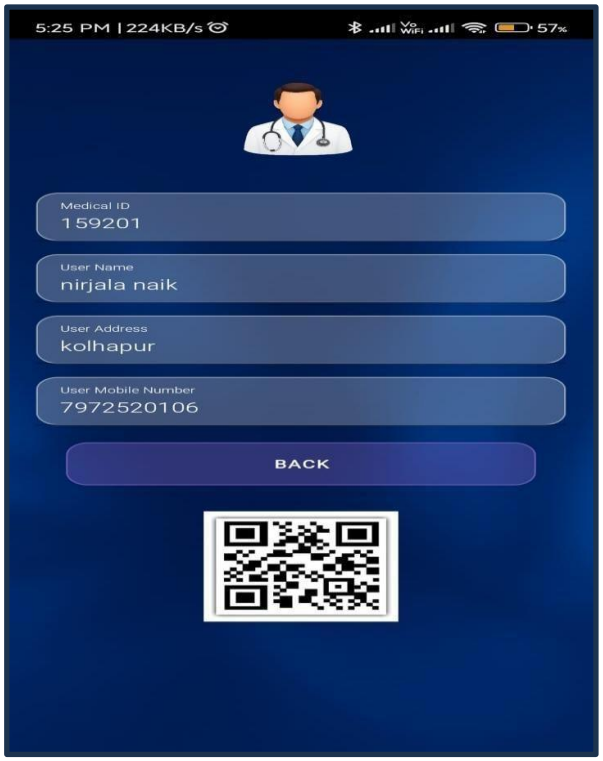

Fig. Info

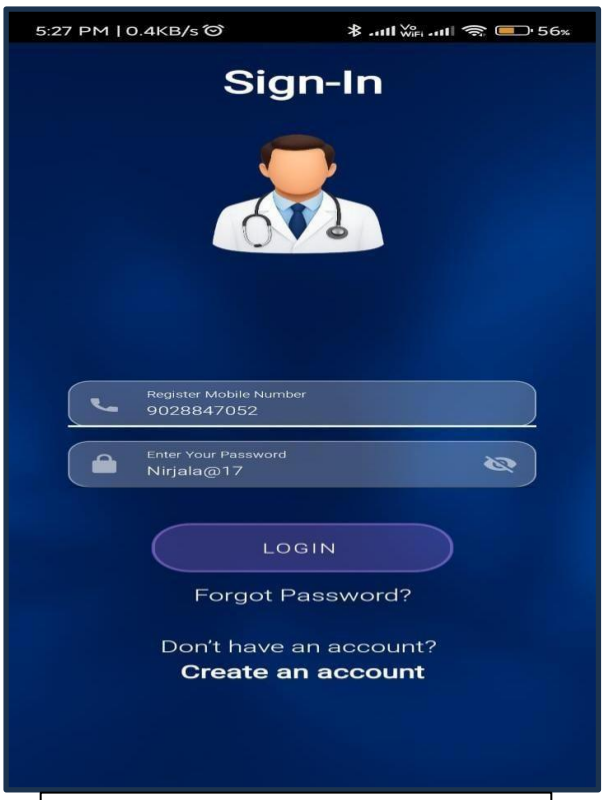

Fig . Sighn Up

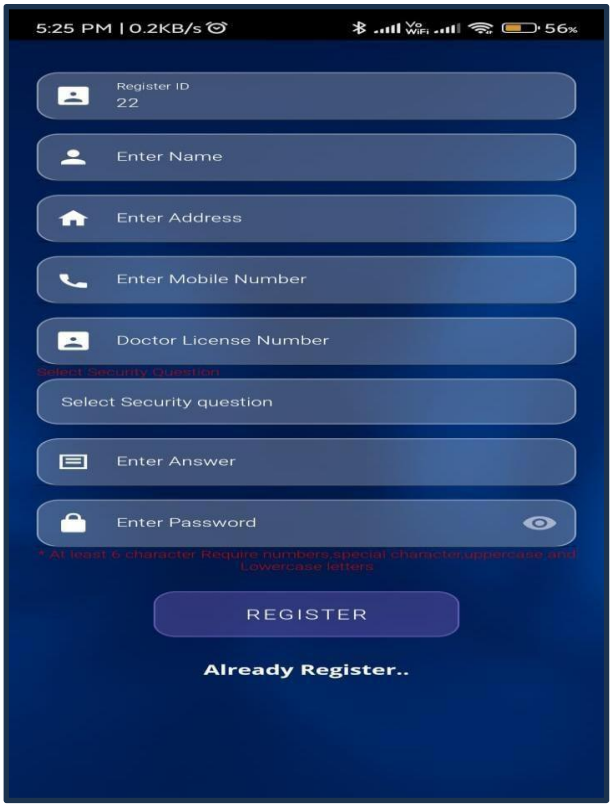

Fig. . Register Screen

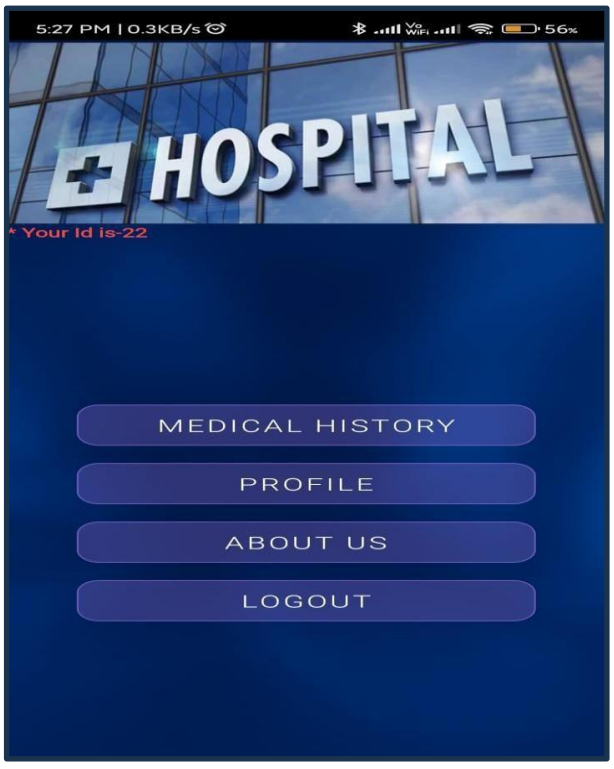

Fig. Categories

V. CONCLUSIONS

This paper presented a Smart Health Card system developed using Android technology to improve healthcare data management. By integrating cloud computing, mobile applications, and machine learning, the system offers a secure and efficient platform for storing and accessing medical records.

The use of AI-based prediction helps in identifying potential health risks, while QR code and NFC technologies enable quick data retrieval. Security measures ensure the protection of sensitive information.

Future enhancements may include integration with wearable devices and blockchain technology for improved transparency and real-time monitoring. Expanding the dataset can further enhance prediction accuracy. Overall, the system represents a step toward smarter, faster, and more connected healthcare services.

ACKNOWLEDGMENT

The authors express their sincere gratitude to Prof. Amol Jadhav for his continuous guidance and support throughout this project. Appreciation is also extended to the Department of Information Technology, Zeal College of Engineering and Research, Pune, for providing necessary resources, facilities, and technical support required for carrying out this research.

Finally, the authors would like to thank their friends and family members for their motivation, encouragement, and support during the entire research and development process.

REFERENCES

[1] Fang D., Duan L., et al., “Interpretable Hierarchical Attention Network for Medical Condition Identification,” IEEE Transactions on Neural Networks and Learning Systems, 2024.

[2] Dhinakaran D., Edwin Raja S., et al., “Optimizing Disease Prediction with AI-driven Feature Selection and Attention Networks,” Frontiers in Artificial Intelligence, 2024.

[3] Liao L., et al., “EHR-Based Mobile and Web Platform for Chronic Disease Prediction,” Journal of Medical Systems, 2024.

[4] Ding D., et al., “Large Language Multimodal Models for 5-Year Chronic Disease Prediction,” IEEE Journal of Biomedical and Health Informatics, 2024.