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SPPM: Health Care Card – Swasthya Protection Prevention Mission

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Abstract:

"Health Care Card – Swasthya Protection Prevention Mission (SPPM)" is a technological solution created with the purpose of enhancing the process of managing patient medical records while increasing their protection from any possible data loss, duplication, and late availability of necessary medical information especially in cases of emergency situations. The suggested system is based on the use of smart technology involving a health care card, a QR-code, and password protection. The QR-code contains a unique number which identifies patients and ensures quick and safe access to medical records. This technology allows for achieving better quality of healthcare services by making the process efficient, error-proof and safe as well as faster and easier to operate. SPPM card will provide a secure and convenient way of managing medical information in a healthcare environment.

Introduction

There is currently a great deal of transformation occurring in the health care realm with the use of technological advancements that are intended to improve the overall efficiency, accuracy, and access to medical services. However, a great deal of the health care systems in the world especially developing nations are still utilizing a traditional, paper-based system to manage their patient medical records. This creates a multitude of issues such as fragmentation of the records system, difficulty managing these records, and vulnerability to issues that can arise such as loss of information, loss of record integrity (i.e., records not being secure), duplicate records, and lengthy delays in gaining access to vital patient information. All these inefficiencies create issues related to misdiagnosis, delayed treatment, and decreased quality of care during urgent medical situations where effective care can only be provided if the physician has immediate access to the patient's accurate history of care.

In recent years, the concept of using digital health solutions has received considerable attention and widespread recognition as an excellent way to address the limitations of current health care records management systems.

The Health Care Card – Swasthya Protection Prevention Mission (SPPM) has been developed as a smart and secure way to help modernize the way we manage patient medical records. The SPPM is a digital health card with embedded QR code technology that allows a unique patient identification number to be stored within the QR code. The QR code provides access to a centralized digital database where detailed patient information (e.g., medical history, prescriptions, allergies, past treatments) can be securely stored and accessed.

The SPPM system provides high levels of data security and patient privacy using password authentication techniques to limit access to healthcare providers assigned by law. The two-layer security solution protects highly sensitive medical data, provides users with a sense of trust in the confidentiality of their personal health information; and allows healthcare providers to efficiently document all new diagnoses, treatments, and medical observations in real-time.

The implementation of the SPPM card offers numerous benefits. It reduces the need for manual paperwork; thus, it decreases the potential for human errors and the administrative workload. Additionally, this system enables quicker access to data needed during emergency situations, which could provide timely care to save lives. Additionally, the SPPM card enables systems to be used more seamlessly between different healthcare venues and facilitates the transfer of information between facilities, as well as scalability to meet the requirements of all healthcare organizations from small offices to large hospitals.

The implementation of the SPPM system has also incorporated modern technologies like QR codes for identifying patients and securely authenticating them. The SPPM system is consistent with the vision of transforming health care delivery into a digital environment by increasing the organization's overall effectiveness and providing each patient with a higher quality of service through a continuity of care and accurate medical records. This endeavor will ultimately provide a more secure, reliable, and accessible health care infrastructure that will result in better health outcomes and enhanced quality of life.

Access to sensitive data by only authorized healthcare professionals is ensured through password-based authentication; therefore, a dual-layer security framework enhances the confidentiality and integrity of each medical record while minimizing opportunities for unauthorized access through data breaches. The digital nature of this system enables real-time updates of patient data so that all healthcare facilities have current information on their patients at any time.

The SPPM system has many advantages over traditional methods: it dramatically decreases the administrative burden, reduces paper use, and reduces manual error potential. Additionally, it provides instant access to critical patient information, improving the speed and reliability of care. Ultimately, the SPPM system was designed to be scalable; therefore, it may be utilized in diverse healthcare settings such as rural community clinics, urban hospitals, or large medical networks.

The SPPM card utilizes current technological advancements in QR code identification, secure authentication and digital data management. This card serves as a key component to achieving the overall goal of digitally transforming healthcare by providing an integrated medical record management system that allows for secure and efficient exchange of patient information no matter where the patient is located. Ultimately, the purpose of this project is to improve patient safety, enhance clinical decision-making and create a more dependable and efficient healthcare system.

Motivation

The main reason for the creation of the SPPM (Swasthya Protection Prevention Mission) Health Care Card is to create a more efficient, digital alternative to the traditional system of paper-based healthcare records. Traditional patient records can be very challenging to manage — easily lost or damaged or taking a long time to retrieve. All of these problems can slow down patient access to treatment and adversely affect the quality of care for patients. This is especially true in an emergency situation where immediate access to accurate information about the patient's medical history, allergies and current treatments are necessary for making timely and effective decisions regarding the patient's care. Also, without good data management,

double records and inconsistent records result in excessive medical testing and increased costs in healthcare.

Security and confidentiality of sensitive medical patient data are two of the most significant drivers behind the SPPM technology. Most current EMR systems do not contain robust authentication methods, which makes them very susceptible to being compromised through unauthorized access and data breaches. With the rapid growth of technology, the digital transformation of the EMR industry is growing at an extraordinary rate, causing a great demand for a secure and efficient healthcare management system that is readily available. The SPPM solution will solve this problem with the introduction of a smart health card using QR codes along with password authentication to provide quick and secure access to patient health information. By reducing the number of administrative errors, as well as the amount of administrative burden placed on the EMR user, the SPPM will also deliver increased efficiencies in the entire healthcare system, as well as improved satisfaction to all users within the healthcare system, and help develop a scalable and modern digital healthcare system.

Objective

The main goal of the Health Care Card-Swasthya Protection Prevention Mission (SPPM) is to create a reliable, effective, and easy-to-use digital system for managing patient medical records. Currently, most places use old-fashioned (paper) methods for recording patients, but we would like to move toward a "smart health card" that includes QR code technology and can be used to quickly and accurately access patient information. The second primary goal of the SPPM system is to protect patient data through using secure password-based authentication systems (to allow only authorized personnel to have access to or change sensitive medical records) and to keep records from being lost or damaged due to administrative workload and human error through maintaining one centralized and well-maintained database instead of many scattered databases. The SPPM system will also support real-time updating of medical records; increase the speed and quality of healthcare delivery, especially in emergencies, by providing immediate access to critical patient information; increase the amount of communication and coordination among healthcare providers; and create a scalable solution that can be used by various healthcare facilities, thereby building a more effective and modern digital healthcare system. Lastly, the SPPM project is committed to decreasing manual errors in the delivery of healthcare services. Data Entry and Records based on paperwork often lead to the loss of records, errors in recording, and inefficient operation. The introduction of automated processes for storing and retrieving data would provide an improvement in accuracy/reliability of all data processes.

In addition to creating a user-friendly platform for both doctors and patients within the healthcare field, this project will provide physicians with their own interface for separate communication to manage and administer healthcare services efficiently.

This project proposes to design a future scalable and future integrable system by developing an application that can ultimately work with mobile health applications, cloud-based storage, biometric technologies, and national electronic health records databases.

The primary objectives of this project are to improve the efficiency of healthcare delivery, improve patient safety through better data security, and support the transition of the healthcare industry into the digital age.

Related Work:

Many researchers and companies have put forward technology-driven solutions intended to digitize the healthcare system of managing medical records to provide better identification of patients and make healthcare systems more accessible. Much of the work done thus far has sought to develop solutions based on the following types of technology: electronic health records (EHRs), QR codes, cloud-based healthcare management solutions, artificial intelligence (AI), and biometric identification systems.

i. QR code based healthcare system

Studies examining the use of QR code technology in delivering healthcare have provided evidence supporting the use of QR codes as a method for improving patient's ability to be identified as well as improving the access to that person's medical record (or other related records). In addition, research shows that QR codes can improve the efficiency of delivering healthcare, thereby reducing delays, and eliminating manual errors on paper-based patient records. In many cases, however, there are no adequate means of verification (or authenticating the patient) before a healthcare provider retrieves a patient's record using the QR code. These concerns may pose significant risks to the confidentiality and/or the security of the individual's medical record and/or other related information.

ii. Electronic Health Record Systems (EHR)

Electronic Health Record systems are electronic, computer-based systems that contain large amounts of digital patient data and an organization's medical records stored in one place. EHRs are known for improving communication between different health care divisions of an organization, allowing for centralized storage, improving the coordination of health care services, decreasing administrative burden to physicians and other health care professionals, and providing better care to patients. However, large EHR systems need a lot of costly hardware (infrastructure) and need strong cybersecurity protocol.

iii. Cloud-Based Health Care Management Systems

Health care organizations are now using cloud-based technology in their management of remote data storage and remote accessibility. Cloud-based health care systems enable different centers of a health care organization to have access to the same electronic medical records. Research indicates that cloud technologies provide the opportunity for greater scalability, provide data backups, and make it easier for patients to access medical services. Conversely, organizations that rely on the cloud will face problems accessing the record if the Internet goes down and may also face security issues because they have not implemented proper encryption protocols.

iv. Biometric Authentication in Healthcare

Biometric authentication technologies can be beneficial for enhancing the identity of patients in health-related scenarios that rely on the use of biometric identifiers, such as fingerprint scans, facial recognition, and iris recognition, to enhance patient safety and security through accurate identification and reduce identity fraud. Biometric authentication technologies also usually require sophisticated hardware to be implemented and, therefore, the costs associated with implementing these technologies can be relatively high.

v. Artificial Intelligence in Healthcare Systems

AI-based healthcare systems have been developed to provide predictive healthcare solutions through the analysis of medical data to support the decision-making of health professionals and enable the early detection of disease. In addition, there is evidence from current literature that AI can improve healthcare decision-making through better early detection of disease. However, AI-based healthcare systems typically require access to a large volume of digitally-accurate datasets and significant computational resources for their operation to provide successful outcomes.

The literature review has indicated that digital healthcare technologies can provide substantial improvements in the effectiveness of healthcare management processes as well as provide better care for patients. Therefore, the SPPM proposed healthcare card system will form a basis for digitally securing patient data while providing an opportunity to mitigate existing barriers that are experienced by current system users, as it proposes to incorporate the use of QR code technology in conjunction with other secure forms of patient authentication, thus providing an affordable, scalable, and secure solution for digital delivery of healthcare and patient data.

Research Gap:

Despite the development of numerous digital health technologies, improvements in the area of healthcare management using technology are still lacking due to many limitations of existing technologies. Most current digital health technology is designed to support only one or more specialized areas of healthcare, such as electronic health records (EHRs), cloud based systems, or biometric authentication. Unfortunately most current digital health technologies do not provide easy-to-use, secure and low-cost solutions consistent with current standards for delivering patient care.

The primary limitation of current digital health technologies and delivery models, therefore, is their reliance on costly infrastructures or challenging implementation requirements. Many digital health systems and solutions require large servers and/or cloud-based computing infrastructures as well as specialized technical support that is difficult to obtain. As a result, many rural and small healthcare providers have difficulty acquiring access to current digital health technologies and delivery models. Healthcare access to the patient's healthcare data during times of emergency or disaster is an important area in terms of the research gaps identified. Currently, many health care systems that have been deployed do not allow the user to easily access the relevant patient information in a timely manner due to their use of portable identification systems. Often, health professionals have to wait too long to access important patient information, which negatively impacts the quality of treatment and/or safety of patients who are relying on their health professional to provide safe, timely treatment during an emergency.

Many existing health information systems also face significant data security and privacy issues. Digital health information systems do improve how health information is managed; however, many current systems do not provide strong, secure methods for authenticating users to protect the privacy of patients' health data and/or provide for the security of patients' health data from unauthorized access, data breaches and/or identity theft.

Some current health care information systems are also too complicated for many of the nontechnical end-users to operate. Complex user interfaces and complex work flow processes limit the ability of the nontechnical end user to operate health care information technologies. A need exists for the creation of a health care information system that offers a new user-friendly interface while maintaining strong data security and efficiency in its use.

Several studies have investigated different aspects of theory and analysis or have provided fixed models to use within the health service industry. Many of these studies, however, do not provide an implementation model that could be applied directly to a health service facility. Additionally, there is typically little or no consideration given to how to integrate patient identification and/or authentication, medical record storage, and fast access to medical data into one distribution system.

The SPPM healthcare card system will address this void. By integrating several elements: QR code technology, password-based authentication, and electronic health records into a single overall healthcare management system, the SPPM provides a secure; quickly accessible; easily usable means for accessing

a patient's electronic health record at the time of service. It also maintains a low implementation cost and is scalable for future service expansion.

Proposed Work:

The Health Care Card - Swasthya Protection Prevention Mission (SPPM) is a newly developed digital health care management system created to provide a very secure and efficient way of managing health care. This system will allow patients to replace their traditional paper-based health care records with a smart health care card that uses QR codes to give authorized health care personnel access to patient health records in a very fast and secure manner.

With this new system, patients will be given a health care card that has their own QR code and secure ID. The QR code will have the patient's unique identification number stored on it, and this unique number will be linked to their health records stored in the database. To obtain a patient's health information, authorized health care professionals will scan the patient's QR code using their health care QR code scanner or mobile device, and they will have immediate access to the patient's health records.

The use of password authentication guarantees secure access to sensitive patient data within the system. The healthcare manager scans a Quick Response Code (QR) and is authorized (their credentials verified) before viewing the patient's medical record. This authentication process enhances the privacy of patient data while preventing unauthorized access to the data.

The new system is comprised of several interrelated modules, which provide for smooth administration and management of health care services. These modules incorporate:

1. User Authentication Module

This module allows users, including patients, doctors, and administrators, to log into the system by using their username and password to securely authenticate their identity. Authentication methods allow for protection of patient data and provide security to the system.

2. QR Code Generation Module

This module generates unique QR codes for each patient's healthcare card that can be used as digital identification for simplifying the retrieval of patient's records.

3. Patient Record Management Module

This module contains and manages all of the patient's medical information, such as their treatment history, prescription history, allergies, reports, and other diagnostic results.

4. Doctor Dashboard Module

By using an intuitive dashboard, physicians have the ability to access and update their patients' medical records, create and generate reports for their patients, and manage patient health-related information.

5. Patient Dashboard Module

Patients will have access to view their medical records, reports, and other health-related information through a secure patient interface.

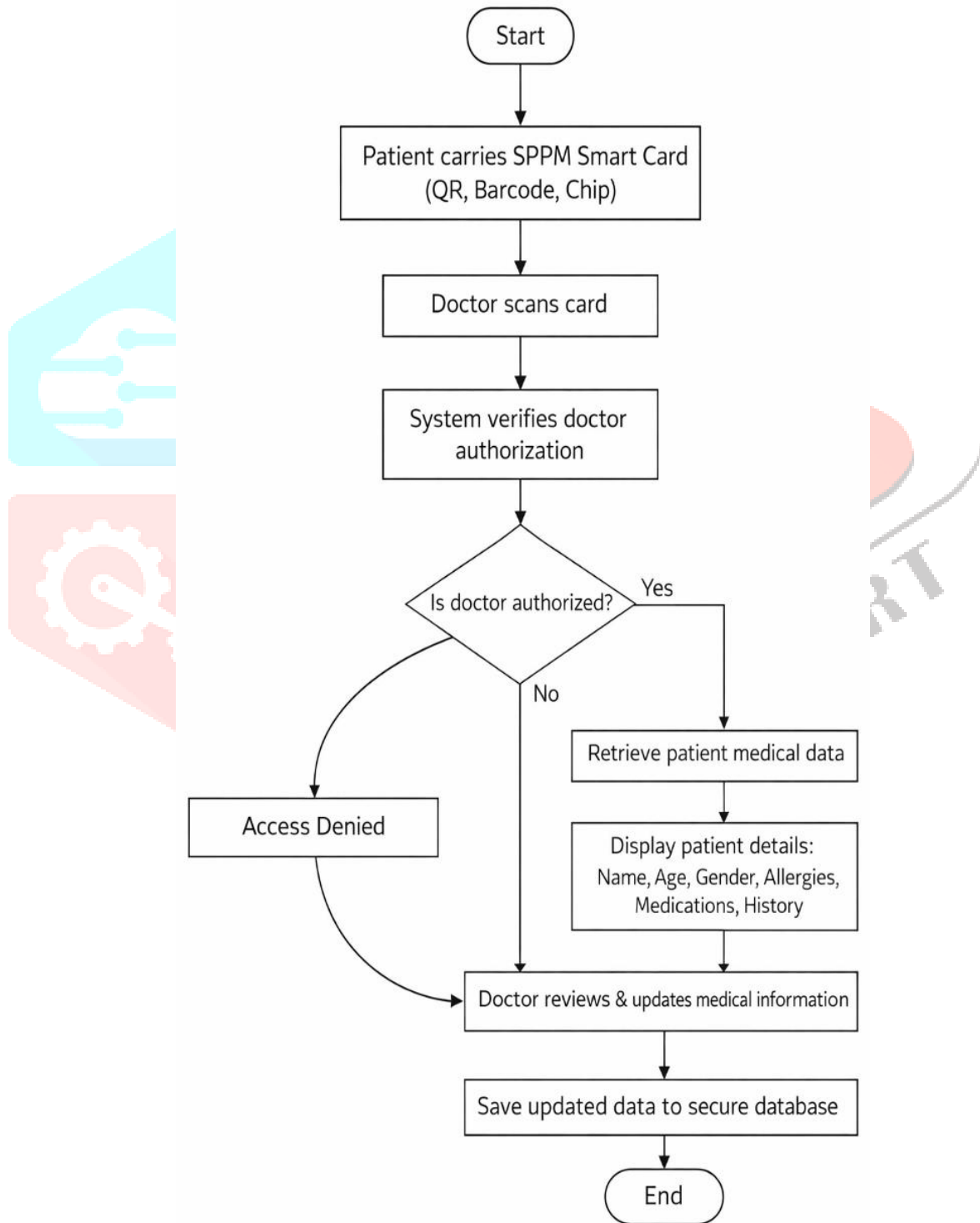
6. Database Management System

The database management system (DBMS) is responsible for the secure storage of all healthcare records and providing an efficient process for the retrieval and updating of patient information.

The workflow of the proposed system will begin with a patient attending a healthcare facility. The healthcare provider will then scan the patient’s QR code using the system to gain access to the patient record database, provided that they can successfully authenticate their username/password.

The proposed system will provide numerous benefits, including a reduction in paper utilization, improved efficiency of healthcare delivery, increased safety for patients, faster access to data, security for authentication of authorized users, and improved management of patient information. Furthermore, this system will be easily scalable and will integrate with future healthcare technology, including cloud-based storage, mobile applications, biometric authentication, or AI-based healthcare analytic technologies.

Flowchart:



Algorithm:

Step1: Start

Step2: Scan QR code

Step3: Verify the card by pin, password.

Step4: If valid then Fetch the data, go to step6.

Step5: If it is not valid then Access denied, go to step6.

Step6: End

Advantages and disadvantages:**Advantages***1. Improved Efficiency in Healthcare:*

With the implementation of SPPM's healthcare card system, healthcare providers will experience increased efficiency as a result of smoothing operations through automation and reducing the number of manual paperwork needed for patient records.

2. Instant Access to Medical Records:

The ability to use a QR Code scanning system enables healthcare providers to retrieve a patient's medical history, medications, allergies and treatment information immediately, especially in an emergency where decisions must be made rapidly.

3. Improved Security of Data:

By incorporating password-protected access to digital storage, there is an increase in the level of privacy and security surrounding patient's records. Only those authorized can gain entry to their health records.

4. Reduction in Errors by reducing human intervention:

Manual data entry and paper-based systems create a large number of errors through duplicate records. The digital healthcare card systems will eradicate much of this error, creating an accurate record of healthcare data.

5. Less Paperwork:

By reducing the reliance on physical documents and paper records via the proposed system there will be a significant decrease in both administrative burden and storage requirements.

6. Improved Patient Management:

By using a digital method, providers are better organized with respect to the management of patient information such as treatment history and healthcare reports than would otherwise occur without the SPPM healthcare card system.

7. Future scalability and integrations:

The proposed system is scalable in terms of future enhancements (i.e., cloud storage), allows for biometrically based authentication, enables future AI disease prediction capabilities, and allows integration within the greater scope of healthcare across an entire nation.

Disadvantages*1. Dependence on technology*

To operate effectively, digital devices, scanners, and internet connectivity are all required for the system to function properly. If there are technical issues with any of the devices, or there is a power interruption, this may prevent access to the system.

2. Cost of initial implementation

The cost of implementing the digital healthcare system infrastructure for servers, databases, and scanner technology represents a significant upfront investment.

3. Cybersecurity risks

While the system does include authentication mechanisms, digital healthcare systems are still at risk of cyberattacks, hacking and data breaches if appropriate security measures are not in place.

4. User training requirements

In order for healthcare staff and users to properly use the digital healthcare solution correctly, they will need to be trained.

5. Internet dependency

The integration of cloud computing and the use of online healthcare will have a high degree of dependency on reliable internet connection, which may not always be available in more rural areas.

Although there are certain limitations with this proposed SPPM healthcare card system, its advantages far exceed any disadvantages making it a sound foundation for future digital healthcare infrastructure development.

Applications:

The SPPM healthcare card system can be utilized in various settings and situations of healthcare as well as medical management, offering tangible value to hospitals, clinics, health provider organizations, and the government's healthcare programs on the digital healthcare platform.

1. Hospitals:

The SPPM healthcare card system provides hospitals with an opportunity for enhanced efficiency in the management of patient records. Physicians will be able to obtain patient medical history, medications, allergies, and treatment reports quickly to improve the quality of care that patients receive during both appointments and emergencies.

2. Clinics & Health Care Centers:

Smaller clinics and healthcare centers may adopt the SPPM healthcare card system in order to establish digital electronic patient records without a reliance on large-scale, paper-based filing systems.

3. Use for Emergency Medical Services

Emergency medical teams can use the QR code healthcare card to identify patients quickly and retrieve vital medical history information rapidly in the event they are in an accident or need emergency care at a hospital.

4. Use in Government Healthcare Programs

Healthcare departments of the government will be able to access their national healthcare databases so they will be better able to provide transparency and efficiency to their patients and help make healthcare more accessible for all citizens in their countries.

5. Use for Telemedicine and Mobile Healthcare

This system can be integrated with mobile healthcare technology as well as with telemedicine technology to allow patients and physicians to retrieve their health care information from any location.

6. Usage in the Management of Health Insurance

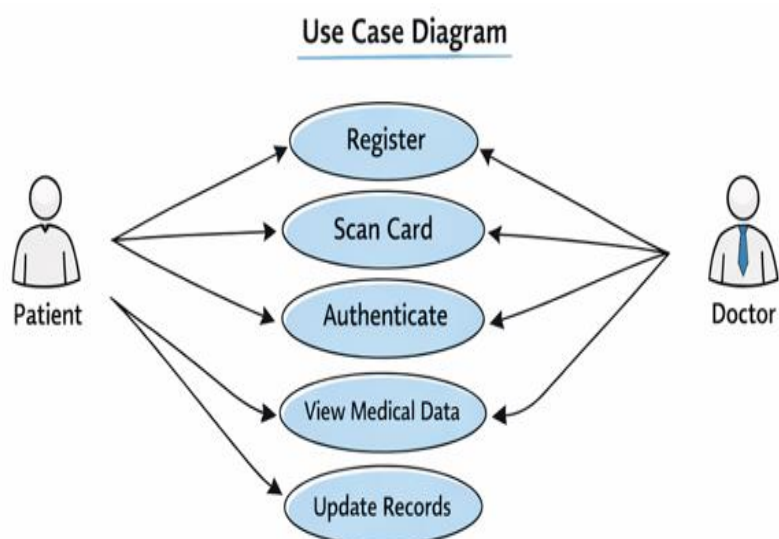
The system enables health insurance companies to improve their efficiency in confirming patient records/the treatment of patients and healthcare claims made by patients.

7. Usage in Smart Hospital Healthcare Infrastructure

The proposed system will create the infrastructure necessary to develop smart hospitals and digital healthcare ecosystems by providing a secure and efficient means to manage medical records.

In general, the SPPM healthcare card provides a flexible and adaptable healthcare solution for modern healthcare environments.

Use case diagram:



Conclusion:

The new digital health care card called the Swasthya Protection Prevention Mission (SPPM) offers an efficient way to improve patient record management, accessibility to reliable health care, and the protection of health care data. The SPPM system greatly overcomes the drawbacks of using traditional paper-based systems through the addition of a QR code-based health care card that integrates secure ways to authenticate a user.

The results of this research show how much improvement can be gained with digital health care technologies in terms of reducing paper usage, decreasing the chances of human error, and allowing speedier access to medical records. When health care professionals are able to quickly access and use the patient's personal health information from the SPPM system, it increases the chance of speedy and accurate treatment during emergency health incidents.

There are individual dashboards for physicians as well as patients which supports good communication and management of the overall health care experience. The systems in place that authenticate a patient before accessing their sensitive health data also help maintain the patient's privacy with regard to their health data.

The SPPM system is also aligned with the overall goal of creating digital health care transformation via smart health care infrastructure. By combining new technology using QR codes with web applications and databases, the SPPM system will provide an effective and scalable means to solve modern health care problems.

The project is a total success as it met the criteria of improving the management of health care, providing a safer environment for patients, creating a higher level of security for patient data, and providing a more efficient level of health care.

Future Scope:

The SPPM Healthcare Card system, designed for health service management, has several potential functional and performance improvements.

- Biometric identification (e.g. fingerprints and face recognition) can enhance patient identification and increase security.
- Implementing the SPPM Healthcare Card System in the cloud would enable remote access to the health records of all patients from any hospital or health service provider, allowing for improved backups and increased availability of the data and resources.
- The SPPM Healthcare Card System could incorporate artificial intelligence (AI) for predictive and analytic determinations of disease and for monitoring patients.
- The creation of mobile apps will help both patients and health service providers access the SPPM Healthcare Card System more easily.
- Connecting the SPPM Healthcare Card System to the national health database will create a single, centralized system for managing health service provider information.
- The next generation of the SPPM Healthcare Card System could provide automated alerts for urgent emergencies and real-time alerts for health-related issues requiring immediate attention.
- The SPPM Healthcare Card System can be used in conjunction with telehealth/telemedicine services.

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