A PROJECT REPORT ON

MACHINE LEARNING BASESD CHILD IMMUNIZATION SYSTEM

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CERTIFICATE

This is to certify that the project report entitles

"MACHINE LEARNING BASED CHILD IMMUNIZATION SYSTEM"

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ABSTRACT

In this project report, we present a system that uses machine learning to handle healthcare challenges and uses a single platform to store and retrieve complete kid medical history data. It contains information on the child's mandatory vaccination regimen as well as past medical history records. To remind parents to provide their child with health protection, reminders are also given about the importance of timely vaccines. Parents and doctors can access the child's medical records online at any time and from any location using Web-based technology with the necessary privileges. This work enables both parents and physicians to offer higher-caliber medical treatment. Finally, the data gathering can be further examined to identify disease trends and patterns, opening up new opportunities for engineering and medical research that will improve quality of life. One of the key infrastructure components in creating smart cities, a project recently undertaken by the Indian government, is smart healthcare. This highlights the requirement for creating clever solutions to deliver higher-caliber healthcare services to all populations. As a result of inadequate healthcare, malnutrition, and subpar sanitation—all of which are preventable—India has the worst rate of child mortality in the whole world. It has been determined that children require vaccines, thus one of the responsibilities of parents is to give their kids the appropriate shots when they need them. The post aims to make it easier for parents to remember to use a website that serves as a vaccination planner. Multiple diseases cannot be predicted using the same method by a single analysis. According to the observation and survey, there isn't much of an issue, and it might be fixed by developing an immunisation plan for kids and reminding their parents to follow it. Children can be protected against diseases that can be prevented by vaccination through the crucial public health intervention of childhood immunisation. But many developing nations still have low immunisation rates, and many kids still lose their lives to diseases that can be prevented by vaccines. We suggest a strategy for immunising children that makes use of machine learning to increase vaccination coverage and decrease vaccine-preventable infections in order to solve this problem.

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INTRODUCTION

01.INTRODUCTION

The introduction of a child immunization system project involves presenting an overview of the project's goals and objectives, as well as its expected outcomes. The project's primary focus is to implement an effective and efficient system for delivering vaccinations to children. This project aims to ensure that all children receive the appropriate vaccinations at the recommended ages, ultimately reducing the incidence of preventable diseases and improving overall public health. The project involves collaboration between healthcare professionals, government agencies, and other stakeholders to ensure its success. By introducing this child immunization system project, we can help protect the health and well-being of children and promote a healthier community. The author is putting out a method for forecasting certain ailments. The mother cannot determine the toddler's immunization schedule at each stage, the toddler's track record of growth cannot be known at any moment if the check-up card is destroyed or lost, and the toddler's medical history is impossible to know and difficult to trace. It is required to establish an information system care service that is web-based as an alternative to resolving current issues. In this research, the author presents a general system to deal with healthcare issues, which uses a single platform to store and retrieve comprehensive kid medical history data. It contains information on the child's mandatory vaccination regimen as well as past medical history records. To remind parents to provide their child with health protection, reminders are also given about the importance of timely vaccines. Every year, immunisation prevents 2 to 3 million fatalities from diphtheria, tetanus, pertussis, and measles. However, if vaccination rates were increased globally, an additional 1.5 million deaths 5 may be avoided.

India is the second most populous country in the world, around a fifth of the world’s population. Providing quality healthcare to all is a huge challenge and it is complex. Of the total population, 29.7% represent children under age 15. They represent future generation of the country. Ensuring their healthy growth and development is a primary concern. According to World Health Organization reports, 1.5 million children die every year due to vaccine preventable diseases. In case of medical emergency, lack of availability of previous medical history records can cause delay in the medical treatment. Also, delay in giving vaccines increases the risk of a seizure and leaves children at risk. for diseases longer. To address these issues, a Machine Learning based system is proposed to store and retrieve the child medical records with mandatory vaccination schedule for each child based on their date of birth and as per the vaccination chart provided by Indian Academy of paediatrics. A web application with access to both parents and doctor are proposed with necessary privileges. Below diagram illustrate that the details of child and infants ages for the vaccinations.

1.1 OVERVIEW

The need for vaccinations in children has been established, and it is one of the duties of parents to administer the necessary vaccinations to their children on time. The purpose of the article is to make it simpler for parents to remember to use an online vaccination planner website. A single analysis cannot forecast more than one disease using a same system. Following the observation and survey, there is not much of a problem, and it may be resolved by creating a schedule for child immunizations and a parental reminder.

1.2 MOTIVATION

A Machine Learning based system to address healthcare issues, where a common platform to store and retrieve complete child medical history information. It includes mandatory vaccination schedule details of child along with the previous medical history records. Reminders to provide timely vaccinations to their child are also provided to alert parents to give their child health protection. Using Web based technology, parents and doctors get access of the child's medical reports online anywhere, anytime with required privileges. This work helps both parents and doctors to provide better quality healthcare services. Finally, the collection of data can further be analysed to find the trends and pattern of diseases, and this can pave a new beginning in the field of engineering and medical research for better and quality living. Child immunization is one of the core infrastructure elements in building smart cities, an initiative taken up by Indian government recently. This emphasizes the need for developing smart solutions to provide better quality healthcare services to all masses. As India has the highest number of child mortality in the world due to inadequate healthcare, malnutrition, and poor sanitation, all of which can be prevented.

1.3 PROBLEM DEFINITION AND OBJECTIVE

Three problems were encountered and the first one is as we all know nowadays, we are busy with our daily chores and parents with more than one kid tends to forget some important things such as the dates of their children's vaccination, as we can see there are no proper vaccination tracking planner applications or system in India which can be used to remind us on when the next vaccination is supposed to be done for their kid. Secondly, the existing projects up to today do not have online backup so far which would be easier for the user to access, besides they only have data's stored in database only which can only be accessed by admin. The third problem is that most of the existing websites and planner applications doesn't provide the information of the paediatrics together with their information, so parents who has a busy schedule finds it difficult to fix an appointment with the doctor to put the vaccination for their kids on time. almost every child is

incompletely protected and one out of every three children is a dropout from the immunization program. Delay in giving vaccinations may have adverse effects on children.

To provide the quantitative and qualitative vaccination, collating all the vaccination details of child along with previous medical history can effectively address the issue. Hence, a Machine Learning Based platform store and retrieve the medical records and vaccination schedule details of children are needed to provide better healthcare services. The collective medical records of children can provide an opportunity for doing extensive research in finding various patterns and analysis in future in the technical fields such as engineering and medicine. The main goal of the system is to provide vaccination details of the child with respect to the child's date of Birth and to maintain a common database on child's complete medical history. To remind parents on the timely vaccination shots, a reminder system is also proposed using SMS on the type and date of vaccination. It mainly helps parents and their children to avoid delay in giving vaccination.

1.4 PROJECT SCOPE & LIMITATIONS

The scope of a child immunization project involves designing and implementing a program to ensure that children receive appropriate vaccines to protect them against various diseases. The project aims to achieve high immunization coverage rates, reduce the incidence of vaccine-preventable diseases, and improve overall child health. The project may include activities such as conducting awareness campaigns to educate parents and caregivers about the importance of immunization, training healthcare workers on proper vaccination techniques, procuring and distributing vaccines, monitoring vaccination coverage rates, and conducting follow-up visits to ensure that children receive all necessary doses.

Limitations of a child immunization project may include factors such as limited financial resources, insufficient healthcare infrastructure, inadequate staffing, low community awareness and acceptance of immunization, vaccine hesitancy, and challenges with vaccine storage and transportation in remote or under-resourced areas.It is important for project planners to consider these limitations and develop strategies to address them to ensure the success of the child immunization project.

1.5 METHODOLOGY OF PROBLEM SOLVING

1. Identify the problem: The first step is to identify the problem related to child immunization. This could be a low immunization rate, poor vaccine coverage, vaccine hesitancy, lack of access to vaccines, or any other issue related to child immunization.

2. Gather information: Once the problem has been identified, gather information about the issue. This can be done through research, data analysis, and talking to healthcare professionals and community members.

3. Analyse the information: Analyse the information to understand the root causes of the problem. Look for patterns and trends in the data, identify any barriers to immunization, and understand the attitudes and beliefs of the community towards vaccination.

4. Develop a plan: Based on the analysis, develop a plan to address the problem. This could include strategies such as increasing vaccine awareness through education campaigns, improving access to vaccines, or addressing vaccine hesitancy through targeted communication efforts.

5. Implement the plan: Implement the plan by working with healthcare professionals, community leaders, and other stakeholders to put the strategies into action.

6. Monitor and evaluate: Monitor the progress of the plan and evaluate its effectiveness. Make adjustments as needed to ensure that the plan is achieving its intended goals.

CHAPTER 02

LITERATURE SURVEY

02. LITERATURE SURVEY

Shirin Hasan et al[1] interpreted how one such program, called "e-Vaccine," was created, how it works, and how to utilize it to speed up the vaccination process and help parents and doctors better maintain. their children's immunization treatment plans. It uses Aadhaar Verification to authenticate users, enables users to schedule vaccination appointments at hospitals in their states, and sends timely updates and

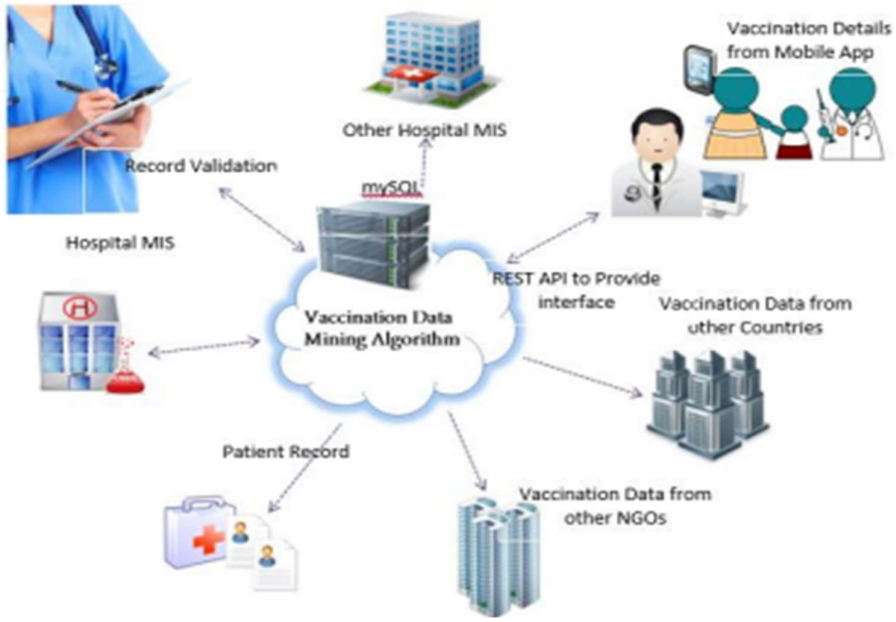


FIG 1.1 : Vaccination Data Mining[1]

reminders for immunizations that are approaching. Users can browse their profiles, update the vaccination histories of their children, and add new children to their records using the program after logging in using OTP verification.

Uzair Aslam Bhatti et al [2] Interpreted that Vaccination for kids has been a necessity for them and it is one of the responsibilities of parents to completely give all the vaccines for their appropriately on the right date as well. Sometimes due to the busy schedules of the parents they tend to forget about their kids' vaccinations. It would be easier if the parents are having a vaccination planner which can be carried wherever they go, with them. Three issues were also discovered, the first of which is the fact that, as we are all too aware, parents of multiple children frequently forget crucial details like the dates of their children's vaccinations. As it stands, India lacks a proper system or application for tracking vaccinations that can be used to remind parents of when their child's next shot is due. Second, the projects that are now in existence only contain data that is saved in databases and can only be accessed by administrators. Online backup would make it easier for users to access these

projects. The third issue is that the majority of websites and planner programmes don't include paediatric information, making it difficult for parents with busy schedules to schedule an appointment with a doctor to get their children's vaccinations done on time. According to data from the World Health Organisation, 1.5 million children per year pass away from vaccine-preventable causes. In case of medical emergency, lack of availability of previous medical history records can cause delay in the medical treatment. Also, delay in giving vaccines increases the risk of a seizure and leaves children at risk for diseases longer. To address these issues, a generic system is proposed to store and retrieve the child medical records with mandatory vaccination schedule for each child based on their date of birth and as per the vaccination chart provided by Indian Academy of paediatrics, 2016. A web application with access to both parents and Doctor are proposed with necessary privileges. Considering the drastic increase in number of mobile usages, the same is provided in android based mobile application. Reminders on timely vaccination are also proposed to parents regularly till the vaccination coverage of child is complete. Capturing and storing medical records in a common database can skip the need of carrying paperwork and can help in providing efficient and qualitative treatment to child. Applying analytics on the data can help in research findings in future.

Santoshi Kumari et al [3] interpreted It is one of the duties of parents to totally administer all the immunisations for their children suitably on the correct date as well. Vaccination for children has been a must for them. Due to their hectic schedules, parents occasionally neglect to get their children vaccinated. It would be simpler if the parents had a portable immunisation schedule that they could take with them wherever they went. It would be simpler for the parents to have an online vaccination planner website because the internet plays such a significant role in our lives. There are currently no websites designed specifically for vaccine planner, but there are those that only include it as one of their functions.To lessen the burden on parents, a parental reminder and planner for children's vaccinations is being created. Additionally, this online scheduler was created just for children's vaccines. This kids vaccination planner contains options including a vaccination calendar and a text message reminder. In addition, this system includes a list of paediatricians who are on-call at the nearby hospital, together with the doctors' contact details and areas of expertise. Additionally, traditional web-based systems only use databases to store data, but this system has a special function called Google Backup that guards against the loss of database-stored data. This Kids Vaccination Planner is therefore crucial for everyone.when they are most susceptible and before they are exposed to potentially life-threatening diseases.

Riyadi Purwanto et al[4] Author interpreted that, Lack of access to prior medical history documents in an emergency can delay receiving medical care. Delay in vaccination administration also raises the chance of a seizure and exposes kids to disease for a longer period of time. In order to resolve these problems, a general system is suggested for the storage and retrieval of paediatric records for each child, together with the mandatory vaccination schedule for each kid based on their date of birth and in accordance with the vaccine schedule supplied by the Indian Academy of Paediatrics, 2016. It is suggested that a web application with the required privileges be made available to parents and doctors. The same is offered in an android-based mobile application due to the sharp surge in mobile usage.

Siti Nazazihah Rahma et al [5] stated that, the many ML techniques used to diagnose diseases like diabetes and heart disease are covered in this study. The majority of models have produced outstanding outcomes because they explain the characteristic in detail. According to earlier studies, SVM significantly improves performance for detecting heart disease by 94.60%. Diabetes has been accurately identified as a naive Bayes condition. The highest categorization precision of 95% is provided. The survey demonstrates the advantages and disadvantages of these algorithms. This survey document also includes a set of tools created by the AI community. These methods offer potential for a better decision-making process as well as being very helpful for the examination of specific situations.

Akkem Yaganteeswarudu [6] It will then help minimize the risk of having a high emergency case on their child's health. A close monitoring on their child's immunization progress may also be of great help to prevent unwanted implications on the health of their child. A developmental milestones and health tips feature were add to be well informed.

Dr. P.Hamsagayathri et al[7] gives a thorough comparison of three algorithms' performance on a medical record, with each method producing an accuracy of up to 95%. The performance is analysed through confusion matrix and accuracy score. Artificial Intelligence will play even more important role in data analysis in the future due to the availability of huge data produced and stored by the modern technology.

Gloren S. Fuentes at al[8] The goal of this paper is to help parents to receive SMS messages that provide time specific information about their children vaccination appointment for their children. ((CVRS-V-SMS-A) may assist parents in making sure that their children receive their vaccinations on time. This would lead to immunize children against diseases and prevent the spread of diseases.

Munira Ferdous at al[9] Multi disease prediction model is used to predict multiple diseases at a time. Here based on the user input disease will be predicted. The choice will be given to user. If the user wants to predict particular disease or if the user doesn't enter any disease type, then based on user entered inputs corresponding disease model will be invoked and predicted. The advantage of multi disease prediction model in advance can predict the probability of occurrence of various disease and also can reduce mortality ratio.

Asam Hamed Abbas et al[10] The objective of this paper is to give readers all the information they need to know about machine learning algorithms used in the healthcare industry. From the literature, we created a data table about the accuracy of machine learning algorithms for various diseases, followed by a step-by-step process to complete and systematize this survey paper. A list of the best machine learning algorithms for accurately predicting diseases is the result of this work. With the accuracy of the algorithms all included in one comprehensive paper, this output will assist the researcher and the practitioner in understanding the contribution of machine learning algorithms in the field of health care.

Sneha Grampurohit et al[11] paper teaches us the vaccination rate for each district in each Indian state. The agencies can use this information to assess the effectiveness of their immunisation programme, and state governments can use it to ensure that the vaccination programme in their jurisdictions is improved and that everyone receives the necessary treatment. If the right vaccine is not administered, it can protect kids from infections and other risks that could endanger their lives.

CHAPTER 03

SOFRWARE REQUIRMENT SPECIFICATION

03.SOFTWARE REQUIREMENT SPECIFICATION

3.1.1 USER INTERFACES (FUNCTIONAL REQUIREMENTS)

• Front End: HTML, CSS BOOTSTRAP

• Back End: SQLlite3

3.1.2 HARDWARE INTERFACES (HARDWARE REQUIREMENTS)

• Processor: Core 2 Duo or Above

• RAM: 1GB or Higher

• HDD: Minimum 5GB Free Space on HDD

• Graphics Card: 2GB or Higher

• Internet Connection

3.1.3 SOFTWARE INTERFACES (SOFTWARE REQUIREMENTS)

• Programming Languages: PYTHON

• Web Base Technology: HTML, CSS, Django

• Operating System: Windows 7 or Higher Version, Android OS

• Database Connectivity: Sqllite3

• IDE: visual studio code

• framework: Django Specification

3.4NONFUNCTIONAL REQUIREMENTS

3.4.1 PERFORMANCE REQUIREMENTS

1. Response time: The system should be able to respond to requests quickly, especially when scheduling appointments and generating reminders for upcoming vaccinations.

2. Capacity: The system should be able to handle a large number of requests and appointments at any given time, especially during peak vaccination periods.

3. Reliability: The system should be available and functioning properly at all times, with minimal downtime or errors.

4. Scalability: The system should be able to scale up or down as needed to accommodate changes in demand, such as in the case of a new outbreak.

5. Security: The system should be secure and protect the personal and medical information of the children and their families.

6. Usability: The system should be easy to use for healthcare providers and caregivers, with a user-friendly interface and intuitive navigation.

7. Data Management: The system should be able to store and manage data effectively, including vaccination records, appointment schedules, and reminders.

8. Reporting: The system should be able to generate reports and provide insights into vaccination rates, missed appointments, and other important metrics.

3.4.2 SAFETY REQUIREMENTS

1. Privacy and confidentiality: the system should be designed with strict privacy and confidentiality measures in place to protect the personal and medical information of the children and their families.

2. Adverse reactions reporting: the system should have the capability to record and report any adverse reactions to vaccines, as this is important for monitoring the safety and effectiveness of vaccines.

3. Access control: the system should have access controls in place to ensure that only authorized healthcare providers and caregivers have access to the system and the information it contains.

4. Immunization tracking: the system should be able to track each child's immunization history to ensure that they receive the appropriate vaccines at the appropriate times, and to prevent over-vaccination or missed vaccinations.

5. Vaccine storage and handling: the system should provide guidelines for proper storage and handling of vaccines, to ensure that they remain safe and effective.

6. Vaccine management: the system should have procedures in place to manage vaccine inventory, including tracking vaccine expiration dates and identifying expired or recalled vaccines.

7. Quality control: the system should be subject to quality control measures to ensure that it operates correctly and does not pose any risks to children receiving vaccinations.

3.4.3 SECURITY REQUIREMENTS

1. Authentication: The system should require strong authentication methods, such as two-factor authentication, to ensure that only authorized healthcare providers and caregivers have access to the system and the information it contains.

2. Authorization: The system should have access controls in place to ensure that users can only access the information and functions that are relevant to their roles and responsibilities.

3. Encryption: The system should encrypt sensitive data, such as personal and medical information, both in transit and at rest, to prevent unauthorized access or interception.

4. Backup and Recovery: The system should have backup and recovery procedures in place to ensure that data can be restored in the event of a security breach or other disaster.

5. Audit trails: The system should maintain audit trails of all user activity, including login attempts, access to data, and changes to data, to help identify any security breaches or inappropriate access.

6. Vulnerability testing: The system should undergo regular vulnerability testing to identify and address any security weaknesses.

7. Incident response: The system should have an incident response plan in place to address security incidents, including procedures for reporting incidents and mitigating their impact.

8. Compliance: The system should comply with relevant security and privacy regulations and standards, such as HIPAA and GDPR, to ensure that sensitive data is protected appropriately.

3.4.4 SOFTWARE QUALITY ATTRIBUTES

1. Reliability: The system should be reliable, meaning it should operate correctly and consistently without crashing or producing incorrect results.

2. Maintainability: The system should be easy to maintain, meaning it should be easy to modify or update as needed, and should not require excessive effort to fix errors or add new features.

3. Scalability: The system should be scalable, meaning it should be able to handle increasing amounts of data and traffic as the number of users and records grows.

4. Usability: The system should be easy to use, meaning it should have a user-friendly interface and intuitive navigation, with clear instructions and feedback for users.

5. Performance: The system should be able to perform well, meaning it should be able to process large amounts of data and handle multiple user requests quickly and efficiently.

6. Security: The system should be secure, meaning it should protect the personal and medical information of the children and their families, and prevent unauthorized access or tampering.

7. Compatibility: The system should be compatible with different hardware and software configurations, to ensure that it can be used by a wide range of users.

8. Portability: The system should be portable, meaning it should be able to run on different platforms and devices, and be easy to install and configure.

3.5 SYSTEM REQUIREMENTS

1.User Management: The system should support user authentication and authorization to ensure that only authorized healthcare providers and caregivers can access and use the system.

2.Immunization Scheduling: The system should support immunization scheduling and provide healthcare providers and caregivers with the ability to view and modify immunization schedules as needed.

3.Reminder Notifications: The system should provide reminder notifications to healthcare providers and caregivers to ensure that immunizations are administered on schedule.

4.Data Management: The system should support the management and storage of immunization data, including data entry, retrieval, and analysis.

5.Reporting: The system should provide reporting capabilities to allow healthcare providers and caregivers to generate reports on immunization status and other relevant data.

6.Interoperability: The system should support interoperability with other healthcare systems, such as electronic health record systems, to ensure seamless data exchange and integration.

7.Security: The system should implement appropriate security measures, including data encryption, access controls, and auditing, to protect against data breaches and unauthorized access.

8.Performance: The system should be designed to handle high volumes of data and users, with fast response times and minimal downtime.

3.5.1 DATABASE REQUIREMENTS

1. Data Model: The system should have a well-defined data model that can accommodate all necessary information about the children and their immunization history, including personal details, medical information, and immunization records.

2. Data Integrity: The system should ensure data integrity, meaning that the data in the database is accurate and consistent with the actual immunization records.

3. Data Security: The system should provide appropriate data security measures to protect sensitive information in the database, such as personal and medical information.

4. Data Access: The system should have access control measures to ensure that only authorized users can access and modify data in the database.

5. Data Backup and Recovery: The system should have regular and reliable backup and recovery procedures to ensure that data can be restored in the event of a system failure or other disaster.

6. Data Retention: The system should have defined data retention policies to ensure that data is retained for the appropriate length of time according to legal and regulatory requirements.

7. Data Reporting: The system should provide reports and analytics that summarize the immunization status of children, as well as trends and patterns in immunization data.

8. Data Migration: The system should be designed to support easy data migration from legacy systems or other sources, as needed.

3.5.2 SOFTWARE REQUIREMENTS (PLATFORM CHOICE)

1. Web-based Platform: A web-based platform is a common choice for such systems, as it can be accessed by healthcare providers and caregivers from any location and device with internet access.

2. Mobile App: A mobile app can also be a viable platform choice, particularly if the system is intended for use in remote or rural areas where access to web-based platforms may be limited.

3. Cloud-based Platform: A cloud-based platform can provide scalability, flexibility, and cost-effectiveness for hosting the system and managing data.

4. Open-Source Frameworks: An open-source framework can offer a cost-effective and customizable solution, allowing the development team to modify and extend the platform to meet the specific requirements of the Child Immunization System project.

5. Integration with Existing Systems: The platform choice should also consider the need to integrate with existing healthcare systems or electronic health record (EHR) systems to ensure efficient data exchange and interoperability.

3.5.3 HARDWARE REQUIREMENTS

1. Servers: Depending on the platform choice, servers may be required to host the system and manage data. The number and specifications of servers will depend on the expected traffic and data volume.

2. Storage Devices: Storage devices such as hard drives or solid-state drives may be required to store data, depending on the expected data volume and the chosen platform.

3. Networking Equipment: Networking equipment such as routers and switches may be required to facilitate communication between the system components and with other healthcare systems.

4. Mobile Devices: If the platform choice includes a mobile app, mobile devices with appropriate specifications may be required for testing and deployment.

5. Workstations: Workstations may be required for healthcare providers and caregivers to access and use the system, with appropriate specifications to ensure smooth operation and compatibility with the chosen platform.

6. Backup and Recovery Devices: Backup and recovery devices may be required to ensure data safety and minimize downtime in the event of a system failure or other disaster.

3.6 ANALYSIS MODELS: SDLC MODEL TO BE APPLIED

1. Waterfall Model: The Waterfall Model is a linear and sequential SDLC model that involves phases such as requirements gathering, design, implementation, testing, and maintenance. This model may be appropriate for the Child Immunization System project if the requirements are well-defined, and the system architecture is stable.

2. Agile Model: The Agile Model is an iterative and incremental SDLC model that involves short development cycles, frequent testing, and continuous feedback from stakeholders. This model may be appropriate for the Child Immunization System project if there is a need for flexibility and frequent updates to the system.

3. Spiral Model: The Spiral Model is a risk-driven SDLC model that involves identifying and addressing risks throughout the development process. This model may be appropriate for the Child Immunization System project if there are significant risks associated with the project, such as data security, scalability, and interoperability.

4. V-Model: The V-Model is a variant of the Waterfall Model that involves testing activities at each phase of the development process. This model may be appropriate for the Child Immunization

CHAPTER 04

SYSTEM DESIGN

04 SYSTEM DESIGN

4.1 SYSTEM ARCHITECTURE

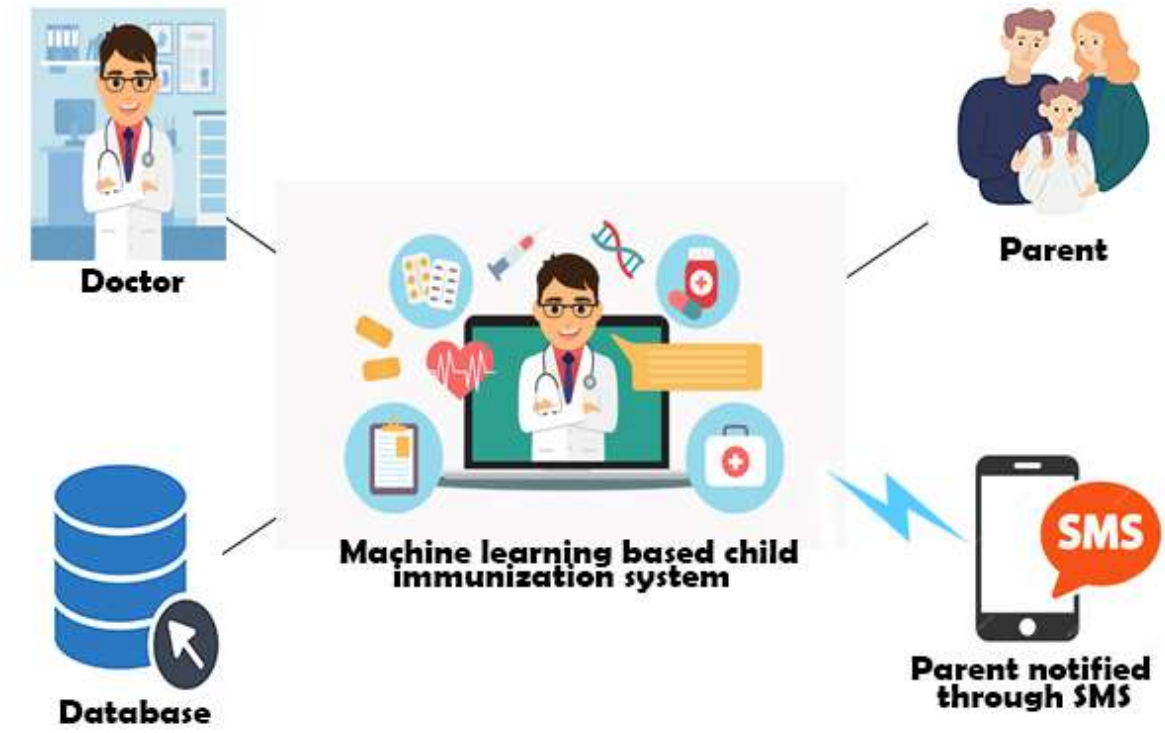


FIG 1.2 :- SYSTEM ARCHITECTURE

1. User Interface Module:

This module will handle the interaction between the system and the users. It will consist of the following sub-modules:

a. Parent Module: This module will allow parents to access their child's immunization records, schedule appointments, receive reminders, and update their contact information.

b. Doctor Module: This module will allow healthcare professionals to access their patient's immunization records, recommend vaccines, and schedule appointments.

c. Admin Module: This module will allow system administrators to manage user accounts, monitor system performance, and configure system settings.

2. Database Module:

This module will store all the data related to the child's immunization records, including their vaccination history, upcoming vaccination schedule, and any other relevant information. It will consist of the following sub-modules:

a. Vaccination Record Module: This module will store all the information related to a child's vaccination history, including the vaccine name, dose, date of administration, and administering healthcare professional.

b. Immunization Schedule Module: This module will store the recommended immunization schedule based on the child's age, medical history, and other factors.

c. Patient Information Module: This module will store the patient's personal and medical information, including their name, date of birth, address, and medical history.

3. Vaccine Recommendation Module:

This module will help healthcare professionals to recommend the right vaccines based on the child's age, medical history, and other factors. It will consist of the following sub-modules:

a. Vaccine Recommendation Engine: This module will use algorithms to recommend the appropriate vaccines based on the child's immunization history and notify healthcare providers about any missed or upcoming vaccinations.

b. Vaccine Information Module: This module will provide information on various vaccines, including the vaccine name, disease it protects against, dosage, and side effects.

4. Reporting Module:

This module will generate various types of reports related to child immunization, such as vaccine coverage, missed or delayed vaccines, and vaccine effectiveness. It will consist of the following sub-modules:

a. Report Generation Engine: This module will generate reports based on the data stored in the database module.

b. Report Management Module: This module will allow healthcare professionals to access and manage the generated reports

5. Integration Module:

This module will enable the system to integrate with other health information systems to share data and improve healthcare outcomes. It will consist of the following sub-modules:

a. Data Exchange Module: This module will facilitate the exchange of data between the child immunization system and other health information systems.

b. Integration Management Module: This module will allow system administrators to manage the integration of the child immunization system with other health information systems.

6. Security Module:

This module will handle data security and privacy, including authentication, authorization, and encryption of sensitive data. It will consist of the following sub-modules:

a. Authentication and Authorization Module: This module will ensure that only authorized users can access the system and data.

b. Encryption Module: This module will encrypt sensitive data to ensure data privacy and security.

c. Audit Module: This module will record all system activities for monitoring and auditing purposes.

1. Presentation Layer: The Presentation Layer is the user interface layer that provides a visual representation of the system to healthcare providers and caregivers. This layer may include a web-based interface, a mobile app interface, or both.

2. Application Layer: The Application Layer is the logical layer that processes user input and implements business logic. This layer may include modules for user authentication, immunization scheduling, reminder notifications, data analysis, and reporting.

3. Data Layer: The Data Layer is the database layer that stores and manages data. This layer may include a centralized database or a distributed database depending on the expected data volume and the chosen platform.

4. Integration Layer: The Integration Layer is the layer that facilitates communication between the Child Immunization System and other healthcare systems. This layer may include APIs, middleware, or other integration tools to ensure seamless data exchange and interoperability.

5. Security Layer: The Security Layer is the layer that ensures the confidentiality, integrity, and availability of the system and its data. This layer may include measures such as data encryption, access controls, and auditing to protect against data breaches and unauthorized access.

4.2 MATHEMATICAL MODEL

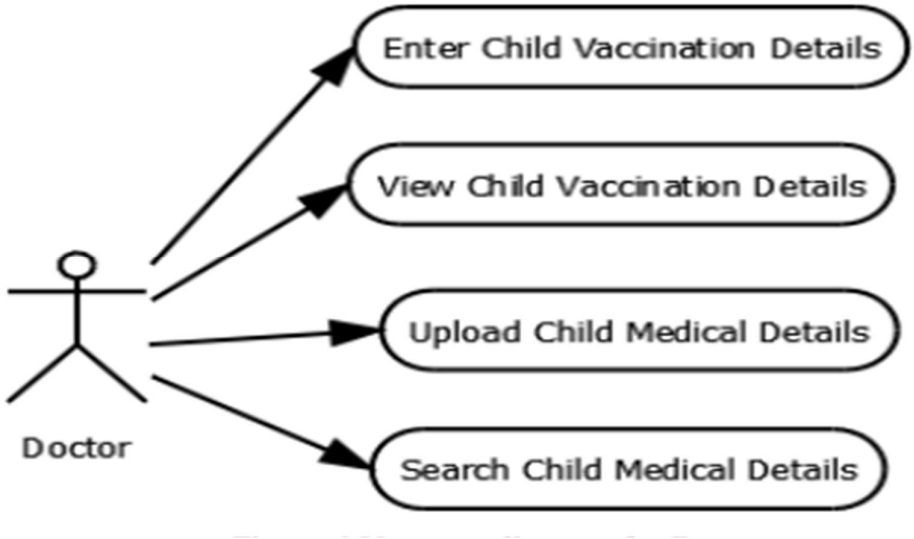


FIG 1.3 : - Doctor Entity Diagram[4]

1. Susceptible (S) - individuals who have not been vaccinated and can contract the disease

2. Infected (I) - individuals who have contracted the disease and are currently infected

3. Recovered (R) - individuals who have recovered from the disease and are immune to further infection

$$dS/dt = - \beta SI$$

$$dI/dt = \beta SI - \gamma I$$

$$dR/dt = \gamma I$$

where β is the transmission rate of the disease, γ is the recovery rate, and t is time. The model assumes that the total population (N) remains constant and that individuals move between compartments according to the rates described by these equations.

4. Vaccinated (V) - individuals who have been vaccinated and are immune to the disease

The modified model is called the SIRV model, and its equations are:

$$dS/dt = - \beta SI$$

$$dI/dt = \beta SI - \gamma I$$

$$dR/dt = \gamma I + \mu V$$

$$dV/dt = \varphi S - \mu V$$

where μ is the rate at which vaccinated individuals lose their immunity, φ is the rate at which susceptible individuals are vaccinated, and all other symbols have the same meaning as in the SIR model.

This model can be used to evaluate the effectiveness of different vaccination strategies, such as varying the vaccination rate or the timing of vaccinations. It can also be used to estimate the number of individuals who need to be vaccinated to achieve herd immunity, which is the point at which enough individuals are immune to the disease that it cannot spread easily within the population.

4.3 DATA FLOW DIAGRAMS

Level 0 DFD:

At the highest level, the child immunization system can be represented as a simple process that involves data inputs, processing, and outputs. The DFD diagram shows the external entities that interact with the system, such as parents, healthcare providers, and immunization registries.

At the highest level of the DFD, the child immunization system is depicted as a single process that interacts with two external entities: parents/guardians and healthcare providers. The system receives inputs from these entities in the form of appointments, medical history, and other relevant information. The system processes this data and generates outputs, such as vaccination reminders, vaccination recommendations, and appointment scheduling.

In the DFD level 0 diagram admin can manage the user ,update the data ,send request to the database for getting the data

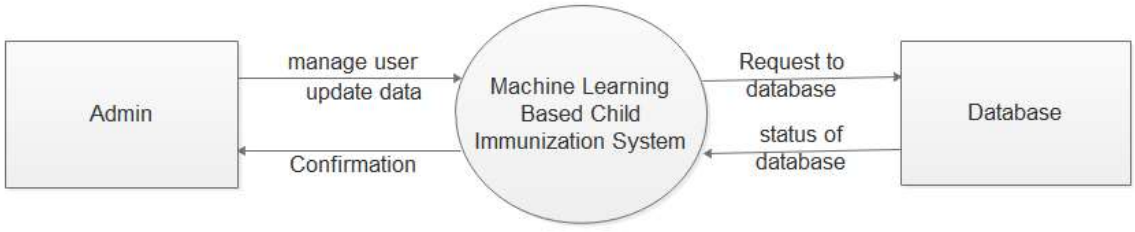


FIG 2.1: - Level 0 DFD

Level 1 DFD:

At the next level, the DFD diagram can be expanded to show the processes that are involved in the child immunization system, such as appointment scheduling, vaccination, and record keeping.

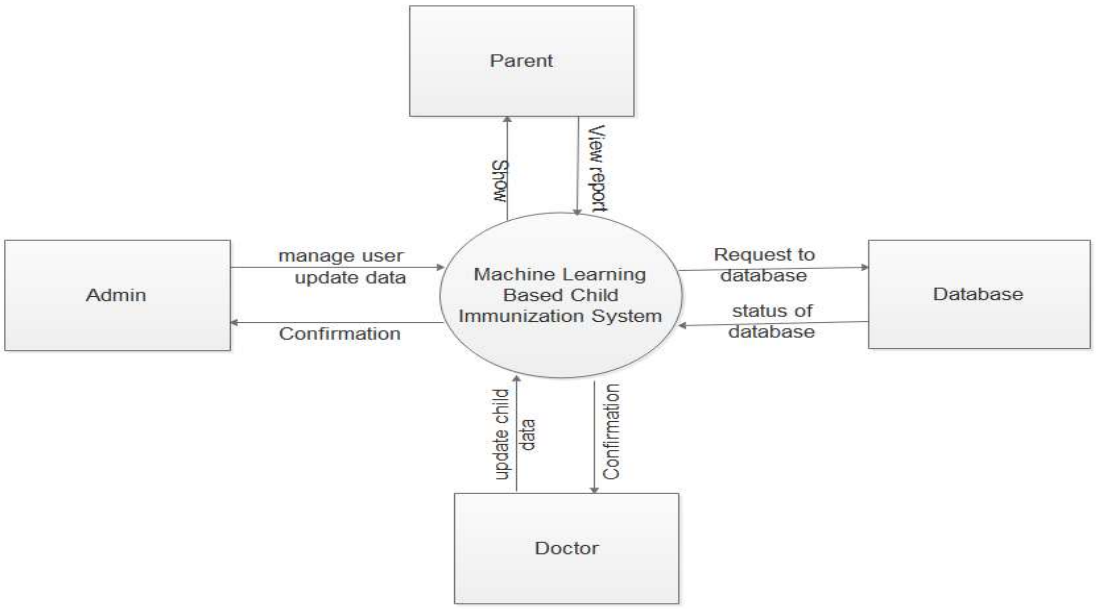


FIG 2.2 :- Level 1 DFD

The above DFD diagram shows the flow of information and data among different entities and processes involved in the child immunization system project. It is important to note that these diagrams may differ depending on the specific requirements and functionalities of the system.

The Level 1 DFD provides a more detailed view of the data flow within the system. The external entities (parents/guardians and healthcare providers) interact with the system through a user interface module. This module allows them to input and view data related to the child's immunization records, medical history, and appointments. The system's database module stores all the data related to the child's immunization records, medical history, and appointments. This module also interacts with the machine learning module, which analyses the data in the database to generate recommendations for vaccinations.

4.4 ENTITY RELATIONSHIP DIAGRAMS

An Entity-Relationship Diagram (ERD) is a graphical representation of the entities, relationships, and attributes involved in a system. In a child immunization system project, an ERD can be used to model the entities involved in the system, such as children, vaccines, healthcare providers, and immunization records, and the relationships between these entities. Here are some examples of an ERD for a child immunization system:

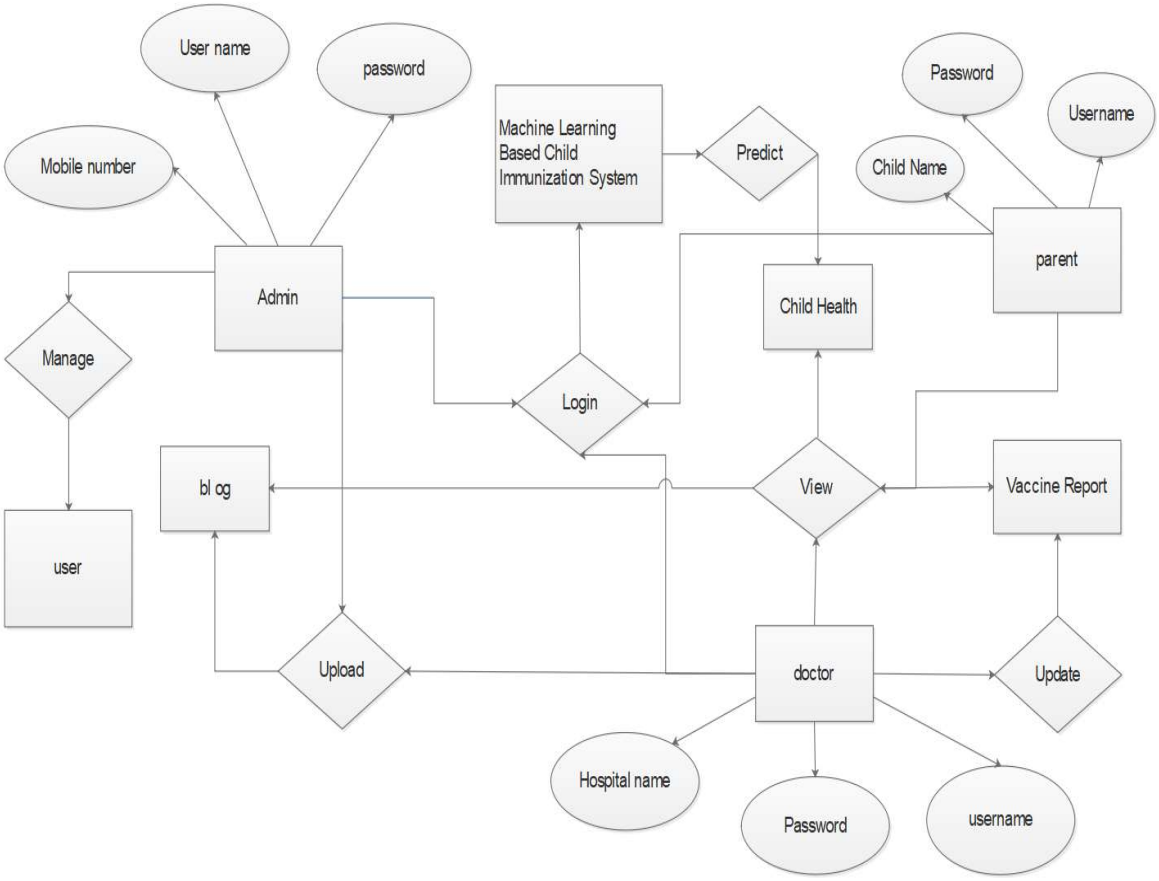


FIG 3.1: - Entity Relationship Diagram

The above ERD diagram shows the relationships between different entities involved in the child immunization system. The Child entity represents information about the child receiving the immunization, the Vaccine entity represents the vaccine itself, and the Healthcare entity represents the healthcare provider administering the vaccine. The immunization entity represents the immunization record, which includes information about the child, vaccine, healthcare provider, and the immunization date. the ER diagram is a graphical representation of the entities and their relationships within the system. Here's an overview of the entities and relationships in the child immunization system project:

Entities:

1. Child: This entity represents the child receiving the immunization. It has attributes such as name, date of birth, gender, and address.

2. Immunization Record: This entity represents the record of each immunization given to the child. It has attributes such as the type of immunization, the date it was administered, the dosage, and the lot number.

3. Medical History: This entity represents the medical history of the child. It has attributes such as previous illnesses, allergies, and chronic conditions.

4. Healthcare Provider: This entity represents the healthcare provider responsible for administering the immunization. It has attributes such as name, address, and contact information.

5. Appointment: This entity represents the appointments scheduled for the child to receive the immunization. It has attributes such as the date, time, location, and status.

6. Vaccination Recommendation: This entity represents the recommended immunizations for the child based on their medical history and immunization record. It has attributes such as the type of immunization, the dosage, and the frequency.

Relationships:

1. Child-Immunization Record: This is a one-to-many relationship between the child entity and the immunization record entity. Each child can have multiple immunization records, but each record is associated with only one child.

2. Child-Medical History: This is a one-to-one relationship between the child entity and the medical history entity. Each child has only one medical history record.

3. Healthcare Provider-Immunization Record: This is a one-to-many relationship between the healthcare provider entity and the immunization record entity. Each healthcare provider can administer multiple immunizations, but each immunization record is associated with only one healthcare provider.

4. Child-Appointment: This is a one-to-many relationship between the child entity and the appointment entity. Each child can have multiple appointments, but each appointment is associated with only one child.

5. Healthcare Provider-Appointment: This is a one-to-many relationship between the healthcare provider entity and the appointment entity. Each healthcare provider can have multiple appointments, but each appointment is associated with only one healthcare provider.

6. Child-Vaccination Recommendation: This is a one-to-many relationship between the child entity and the vaccination recommendation entity. Each child can have multiple vaccination recommendations, but each recommendation is associated with only one child.

The ER diagram helps to provide a visual representation of the entities and their relationships within the system, which can be used to design and implement the system's database schema.

4.5 UML DIAGRAMS

UML diagrams can be used to model the structure and behaviour of a software system, including a child immunization system project. Here are some examples of UML diagrams that can be used in the design and development of a child immunization system:

1. USE CASE DIAGRAMS:

Use case diagrams are used to depict the interactions between the system and its users. They are used to identify the different actors involved in the system and the actions they can perform. In the case of the child immunization system, the actors might include healthcare providers, parents or guardians, and administrators. Use case diagrams can help to identify the various use cases that the system needs to support, such as scheduling appointments, administering immunizations, and viewing medical records.

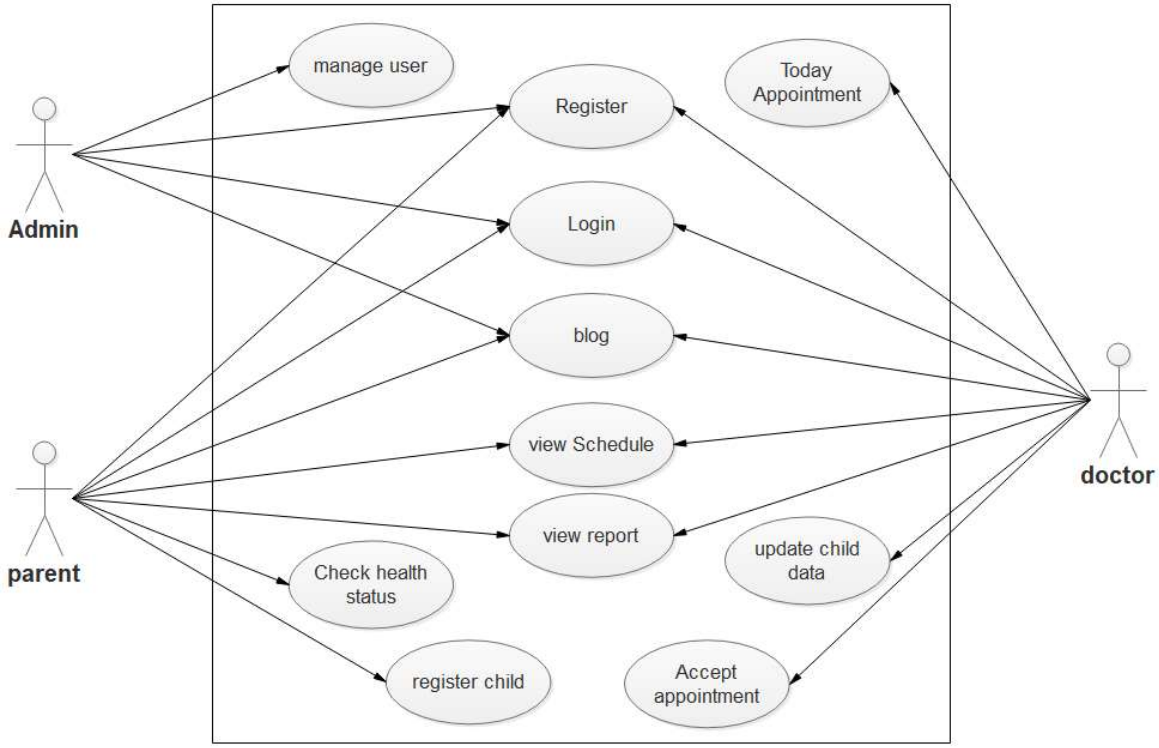


FIG 3,2 : - USECASE Diagram

2. CLASS DIAGRAM:

A class diagram can be used to model the classes and their relationships in a child immunization system. Classes can include Child, Vaccine, Healthcare Provider, and Immunization Record, and relationships can include associations, inheritance, and aggregation.

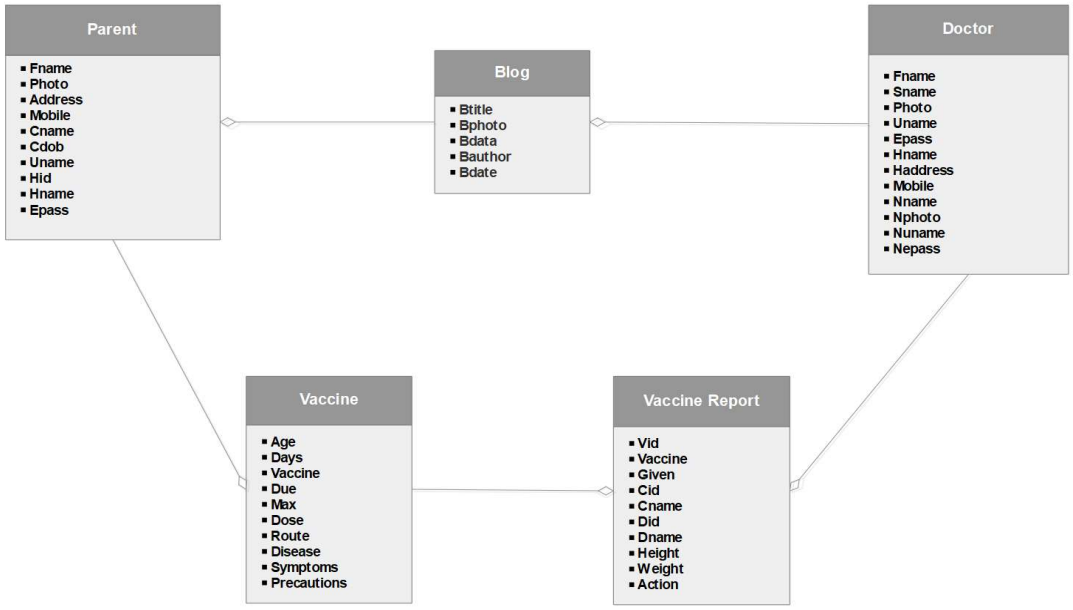


FIG 3.2 : - CLASS Diagram

Class diagrams are used to depict the classes, attributes, and relationships between objects in the system. They help to show how the system is organized and how the different components interact with each other. In the child immunization system, class diagrams might be used to show the classes for entities such as Child, Immunization Record, Medical History, Healthcare Provider, Appointment, and Vaccination Recommendation, and the relationships between them.

3. SEQUENCE DIAGRAM:

A sequence diagram can be used to model the interactions between objects in a child immunization system. It can show the order of messages between objects and their responses. sequence diagrams are used to show the interactions between objects or components in the system over time. They help to illustrate the flow of data and control in the system. In the child

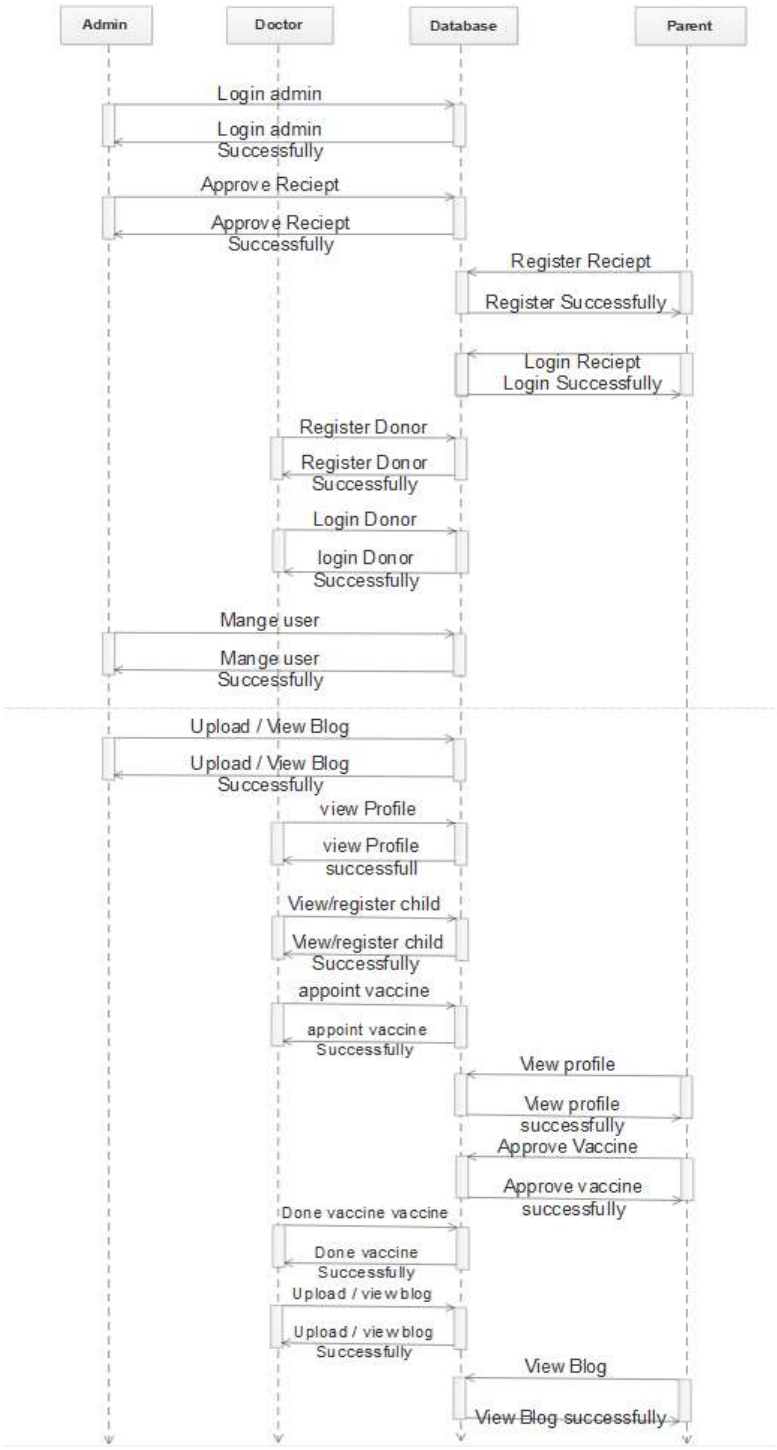


FIG 3.3: - Sequence Diagram

4. ACTIVITY DIAGRAMS: Activity diagrams are used to show the flow of activities or processes within the system. They help to illustrate the steps involved in a particular process or use case. In the child immunization system, activity diagrams might be used to show the steps

involved in scheduling an appointment, administering an immunization, or generating a vaccination recommendation.

1.Admin Activity:

Admin module can be managed to both parents and doctor modules. Admin module has a authority to make changes in the system as per requirements. Admin can manage the user, view profile, upload blogs by using his credential. Admin can do the following activities,

- Login
- Manage user
- View profile
- Upload blog
- Logout

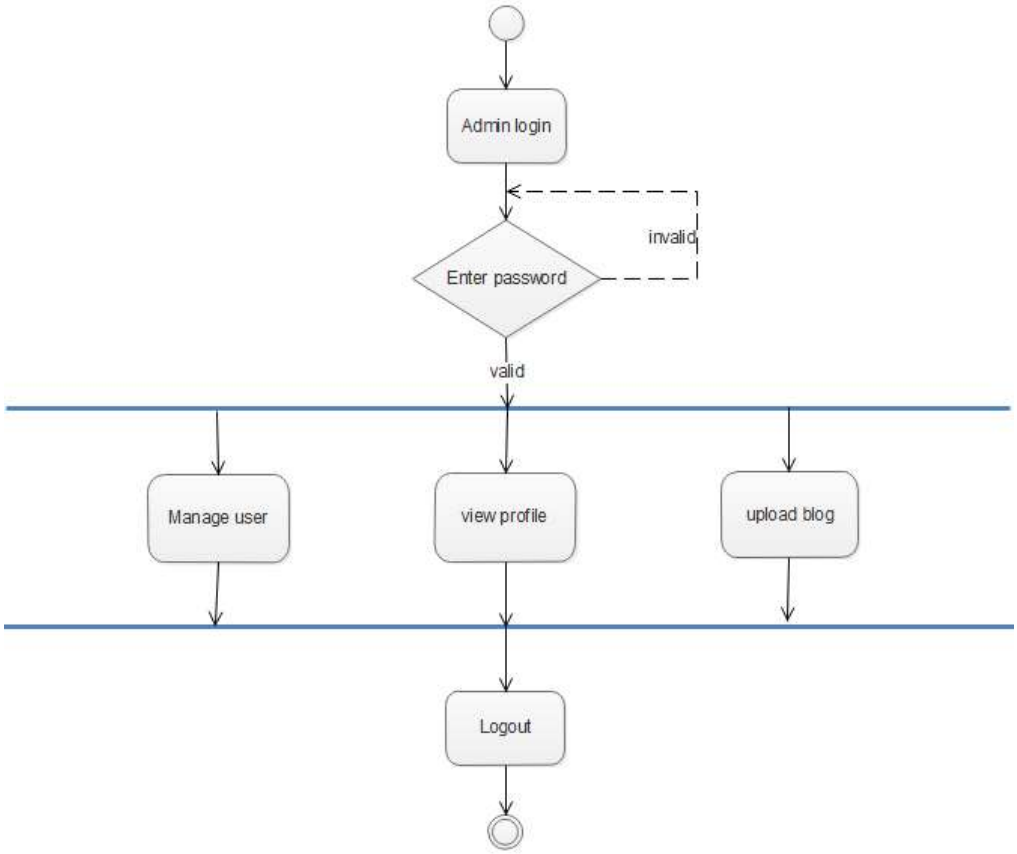


FIG 4.1 : - Admin Activity

2.Doctor Activity:

This module will allow healthcare providers to view the immunization records of children, administer vaccines, and record immunizations. They can also view the vaccination schedules of children and generate reports. doctor activity diagram plays an important role for making child vaccinated on time to time. Doctor can do following activities,

- Accept child appointment
- Update child data
- View profile
- View report
- Today appointment

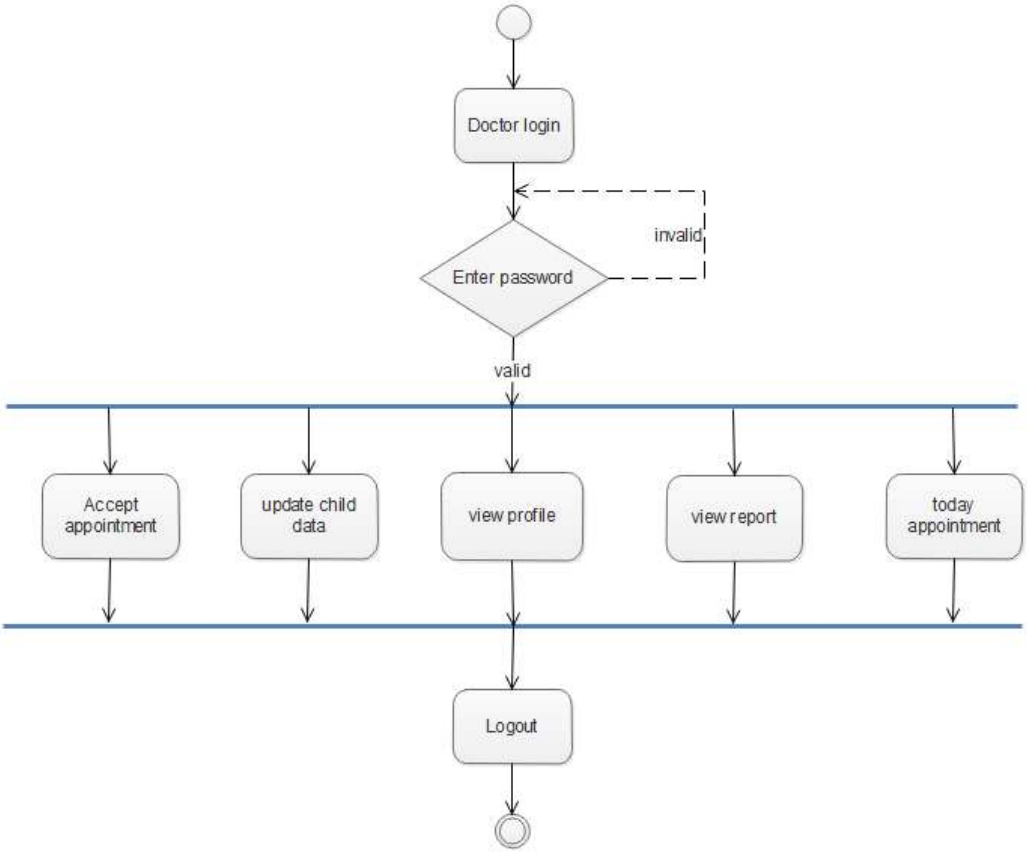


FIG 4.2 : - Doctor Activity

2.Parent Activity:

This module will allow parents to register themselves and their children, view vaccination schedules, and book appointments for vaccinations. They can also view the immunization records of their children and receive reminders for upcoming vaccinations. Parent can do following activities,

- Login
- Register Child
- Check Schedule
- View Profile
- Check report and predict health status
- Read blog
- Logout

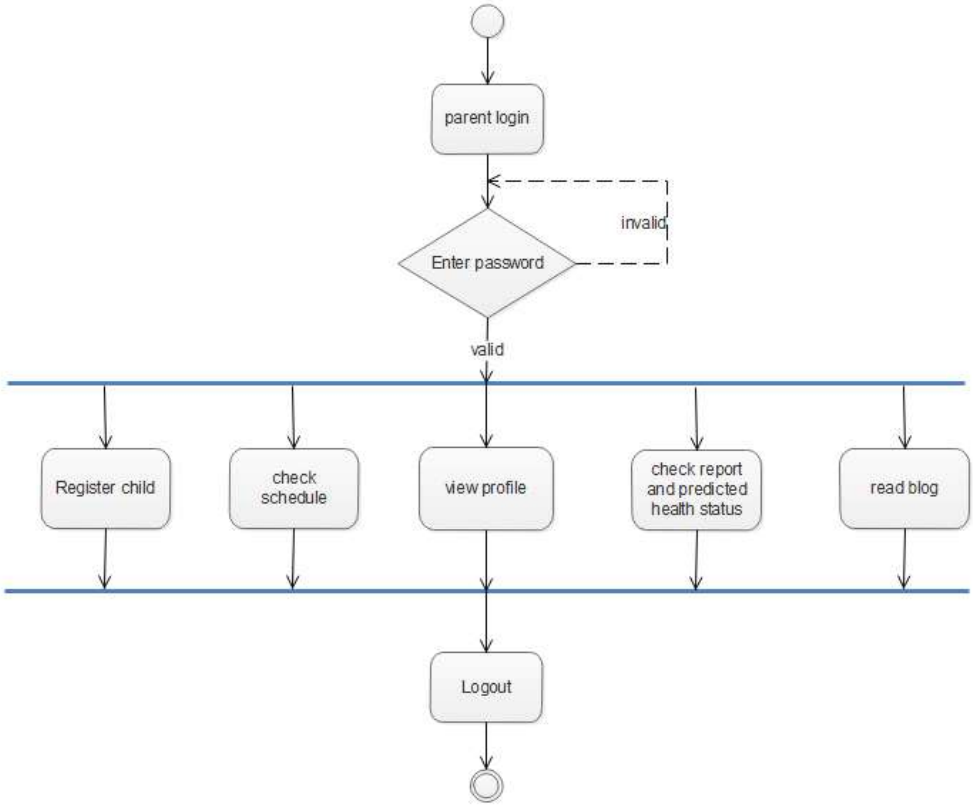


FIG 4.3: - Parent Activity

CHAPTER 05
PROJECT PLAN

05 PROJECT PLAN

5.1 PROJECT ESTIMATE

1. Project Analysis and Planning:

   - Requirement gathering and analysis: 30 hours

   - Project planning and scope definition: 20 hours

   - Risk assessment and mitigation planning: 10 hours

2. System Design and Architecture:

   - Database design and setup: 20 hours

   - User interface design: 30 hours

   - System architecture design: 20 hours

3. Development:

   - Backend development: 100 hours

   - Frontend development: 80 hours

   - Integration with external systems: 40 hours

   - User authentication and access control: 30 hours

4. Testing and Quality Assurance:

   - Test case creation: 20 hours

   - Functional testing: 40 hours

   - Integration testing: 30 hours

   - Performance testing: 20 hours

   - Bug fixing and quality assurance: 30 hours

5. Documentation and Training:

   - System documentation: 20 hours

   - User manuals and guides: 20 hours

   - Training materials preparation: 10 hours

6. Deployment and Support:

- Deployment to production environment: 10 hours
- User training and support: 20 hours
- Post-deployment maintenance and support: 40 hours

Total Estimated Effort: 570 hours

5.1.1 RECONCILED ESTIMATES

1. Project Analysis and Planning:

- Requirement gathering and analysis: 40 hours
- Project planning and scope definition: 30 hours
- Risk assessment and mitigation planning: 15 hours

2. System Design and Architecture:

- Database design and setup: 30 hours
- User interface design: 40 hours
- System architecture design: 30 hours

3. Development:

- Backend development: 160 hours
- Frontend development: 120 hours
- Integration with external systems: 60 hours
- User authentication and access control: 40 hours

4. Testing and Quality Assurance:

- Test case creation: 30 hours
- Functional testing: 60 hours
- Integration testing: 40 hours
- Performance testing: 30 hours
- Bug fixing and quality assurance: 40 hours

5. Documentation and Training:

- System documentation: 30 hours
- User manuals and guides: 30 hours
- Training materials preparation: 20 hours

6. Deployment and Support:

- Deployment to production environment: 20 hours
- User training and support: 40 hours
- Post-deployment maintenance and support: 60 hours

Total Reconciled Estimated Effort: 950 hours

5.1.2 PROJECT RESOURCES

1. Project Manager:

- Responsible for overall project management, coordination, and communication.
- Allocates tasks, monitors progress, and ensures timely delivery.
- Manages project budget, resources, and risk mitigation.
- Collaborates with stakeholders to gather requirements and ensure project alignment.

2. Business Analyst:

- Conducts in-depth analysis of the immunization system requirements.
- Works closely with stakeholders to gather and document project requirements.
- Translates business needs into functional specifications for the development team.
- Assists in defining project scope, objectives, and success criteria.

3. Development Team:

- Backend Developers: Responsible for developing the server-side logic, database integration, and API implementation.
- Frontend Developers: Responsible for designing and developing the user interface and user experience.

- Integration Specialists: Responsible for integrating the immunization system with external systems, if required.

- Quality Assurance Engineers: Conduct testing, create test cases, and ensure system functionality and quality.

- Security Specialists: Ensure data security and implement user authentication and access control measures.

4. Database Administrator:

- Responsible for designing and managing the database infrastructure.

- Sets up the database, ensures data integrity, and optimizes performance.

- Performs backup and recovery procedures and monitors database security.

5. User Experience (UX) Designer:

- Creates intuitive and user-friendly interface designs.

- Conducts user research, creates wireframes, and prototypes.

- Collaborates with the development team to implement the user interface design.

6. Technical Writers:

- Responsible for documenting system specifications, user manuals, and guides.

- Prepare training materials and help documentation for users and administrators.

7. Deployment and Support Team:

- Handles the deployment of the immunization system to the production environment.

- Provides user training and support during and after the implementation.

- Offers post-deployment maintenance and troubleshooting assistance.

8. Infrastructure and System Administrators:

- Responsible for managing the hardware, networking, and server infrastructure required for the system.

- Ensure system availability, scalability, and performance.

5.2 RISK MANAGEMENT

1. Risk Identification:

- Conduct a thorough analysis of potential risks and issues that could affect the project.
- Identify risks related to requirements changes, technical challenges, resource constraints, time delays, data security, and integration with external systems.

2. Risk Assessment:

- Evaluate the impact and likelihood of each identified risk.
- Prioritize risks based on their severity and potential impact on project objectives.
- Assign a risk rating to each identified risk to determine the level of attention and mitigation required.

3. Risk Mitigation Strategies:

- Develop strategies to mitigate and reduce the impact of identified risks.
- Collaborate with stakeholders to address requirements changes and minimize scope creep.
- Implement proper change management processes to handle modifications to project scope.
- Ensure the availability of skilled resources and address any resource constraints proactively.
- Implement regular communication channels to manage expectations and address project concerns promptly.
- Establish robust data security measures and adhere to relevant regulations and compliance standards.
- Conduct thorough testing and quality assurance to identify and resolve technical challenges.
- Implement redundancy measures and backup plans to mitigate risks related to system failures.
- Collaborate closely with external systems' stakeholders to ensure smooth integration and minimize integration risks.

4. Risk Monitoring and Control:

- Regularly monitor identified risks throughout the project lifecycle.
- Update risk assessments as the project progresses and new risks emerge.

- Implement risk control measures to address identified risks promptly.
- Establish a clear communication plan to report and escalate risks to stakeholders and decision-makers.
- Conduct periodic project reviews to assess the effectiveness of risk mitigation strategies.
- Maintain open lines of communication with stakeholders to address any new risks or concerns.

5. Contingency Planning:

- Develop contingency plans for high-impact risks that cannot be completely mitigated.
- Identify alternative approaches, backup resources, and fallback options.
- Document contingency plans and ensure relevant team members are aware of them.
- Regularly review and update contingency plans as project circumstances change.

6. Risk Documentation and Reporting:

- Maintain a comprehensive risk register documenting identified risks, their assessment, and mitigation strategies.
- Create risk reports to provide stakeholders with visibility into project risks and mitigation efforts.
- Communicate risk status, updates, and any changes to stakeholders regularly.

5.2.1 RISK IDENTIFICATION

1. Requirements Changes:

- Risk: Changes in project requirements or scope can impact project timelines and budget.
- Mitigation: Establish a robust requirement gathering process and change management system. Involve stakeholders and conduct thorough analysis before approving any changes.

2. Technical Challenges:

- Risk: Complex integration requirements, scalability issues, or technical limitations may arise during system development.
- Mitigation: Conduct a detailed technical feasibility assessment. Involve experienced developers and architects to address potential technical challenges and plan for appropriate solutions.

3. Resource Constraints:

- Risk: Inadequate availability or allocation of resources (such as skilled developers, project managers, or testers) can result in delays or compromised quality.

- Mitigation: Ensure proper resource allocation planning, considering the project's needs. Anticipate resource requirements and address any constraints proactively through recruitment, outsourcing, or resource sharing.

4. Time Delays:

- Risk: Unexpected delays in development, testing, or deployment phases can impact the project schedule and deliverables.

- Mitigation: Develop a realistic and well-defined project timeline. Regularly monitor progress, identify potential bottlenecks, and take corrective actions promptly. Allow buffer time for contingencies.

5. Data Security:

- Risk: Breaches in data security or unauthorized access to sensitive immunization records can pose a significant risk to privacy and compliance.

- Mitigation: Implement robust security measures, including secure data storage, encryption, access controls, and regular security audits. Comply with relevant data protection regulations and privacy policies.

6. Integration Challenges:

- Risk: Difficulties in integrating the child immunization system with existing healthcare systems or external databases can cause data inconsistencies or operational disruptions.

- Mitigation: Conduct thorough integration analysis and engage with stakeholders of

5.2.2 RISK ANALYSIS

1. Risk: Incomplete or Changing Requirements

- Impact: Delays in project timeline, increased development efforts, and compromised system functionality.

- Likelihood: Moderate

- Mitigation: Conduct thorough requirements gathering, involve stakeholders early, document and validate requirements, and implement a change management process to handle any changes.

2. Risk: Technical Challenges

- Impact: System development delays, unexpected issues, and compromised system performance.

- Likelihood: Moderate

- Mitigation: Conduct a detailed technical feasibility study, engage experienced developers and architects, allocate adequate time for technical analysis, and have contingency plans for addressing technical challenges.

3. Risk: Resource Constraints

- Impact: Delays in project timeline, decreased productivity, and compromised system quality.

- Likelihood: High

- Mitigation: Perform a resource capacity analysis, allocate resources effectively, identify potential resource gaps early, consider outsourcing options, and provide training or skill enhancement opportunities for the team.

4. Risk: Data Security Breaches

- Impact: Compromised privacy, legal and regulatory issues, loss of trust, and reputational damage.

- Likelihood: High

- Mitigation: Implement robust data security measures, conduct regular security audits, encrypt sensitive data, establish access controls, comply with relevant regulations (e.g., GDPR), and provide training on data protection practices.

5. Risk: Integration Challenges

- Impact: Data inconsistencies, operational disruptions, and delays in system integration.

- Likelihood: Moderate

- Mitigation: Conduct thorough integration analysis, engage with stakeholders of external systems, establish clear integration interfaces and protocols, conduct comprehensive testing, and maintain effective communication with external system owners.

6. Risk: User Adoption and Resistance

- Impact: Low user adoption, poor system utilization, and lack of stakeholder engagement.

- Likelihood: Moderate

5.3 PROJECT SCHEDULE

1. Project Initiation Phase:

- Requirements gathering and analysis: 2 weeks

- Stakeholder meetings and project kick-off: 1 week

- Project planning and resource allocation: 1 week

2. System Design and Architecture Phase:

- Database design and setup: 2 weeks

- User interface design: 3 weeks

- System architecture design: 2 weeks

3. Development Phase:

- Backend development: 6 weeks

- Frontend development: 5 weeks

- Integration with external systems: 3 weeks

- User authentication and access control implementation: 2 weeks

4. Testing and Quality Assurance Phase:

- Test case creation: 1 week

- Functional testing: 2 weeks

- Integration testing: 2 weeks

- Performance testing: 1 week

CHAPTER 06
PROJECT IMPLEMENTATION

06 PROJECT IMPLEMENTATION

6.1 OVERVIEW OF PROJECT MODULES

1. Parent Module:

This module will allow parents to register themselves and their children, view vaccination schedules, and book appointments for vaccinations. They can also view the immunization records of their children and receive reminders for upcoming vaccinations.

2. Doctor Module:

This module will allow healthcare providers to view the immunization records of children, administer vaccines, and record immunizations. They can also view the vaccination schedules of children and generate reports.

3. Immunization Registry Module:

This module will allow authorized personnel to access the immunization records of children across different healthcare providers and locations. It can also track vaccine inventory and monitor immunization coverage rates.

4. Appointment Scheduling Module:

This module will allow parents to book appointments for vaccinations, view available appointment slots, and receive reminders for upcoming appointments.

5. Reporting Module:

This module will allow authorized personnel to generate reports on vaccination coverage rates, vaccine inventory levels, and immunization trends. These reports can help public health officials to make informed decisions and policies related to immunization.

6. Authentication and Authorization Module:

This module will ensure that only authorized users have access to the system and its modules. It can also provide role-based access control to ensure that users only have access to the modules and data they need.

7. Integration Module:

This module will allow the child immunization system to integrate with other healthcare systems, such as electronic health records (EHR) systems and health information exchanges (HIE). This

integration can help to ensure that immunization records are up-to-date and accurate across different healthcare settings.

These modules can be further divided into sub-modules depending on the specific requirements of the child immunization system project.

6.2 TOOLS AND TECHNOLOGIES USED

The tools and technologies used for a Child Immunization System project, here are some of the common tools and technologies that used:

1. Database Management Systems: The child immunization system project may require a database to store information related to children, their immunization records, and healthcare providers. Popular database management systems include SQLite.

2. Programming Languages: The project may require the use of one or more programming languages to develop the application or web-based system. Common programming languages used for this type of project include Python.

3. Web Development Frameworks: The project may require a web-based interface for healthcare providers or caregivers to access the immunization records. Popular web development frameworks include Django.

4.APIs and Web Services: The project may need to integrate with other systems or applications to retrieve or share data. APIs (Application Programming Interfaces) and web services such as RESTful APIs or SOAP can facilitate this integration.

5. Cloud Infrastructure: The project may require a cloud-based infrastructure to host the application or database. Popular cloud platforms include Amazon Web Services (AWS), Microsoft Azure, and Google Cloud.

6. Security Tools: The project may require security tools to protect sensitive information such as encryption libraries, firewalls, and intrusion detection and prevention systems.

7. Testing and Deployment Tools: The project may require testing tools such as Selenium or Appium for automated testing, and deployment tools such as Docker or Kubernetes for containerization and deployment.

6.3 ALGORITHM DETAILS

1. Vaccine scheduling algorithm:

This algorithm can determine the recommended schedule for administering vaccines to a child based on their age, medical history, and other factors. It can take into account the timing and frequency of each vaccine and ensure that the child receives the appropriate vaccines at the right time.

2. Reminder algorithm:

This algorithm can generate reminders for parents or healthcare providers when a child is due for a vaccine or has missed a scheduled vaccine. It can take into account the child's immunization history and vaccination schedule to provide personalized reminders.

Logistic Regression

Logistic regression is a supervised machine learning algorithm mainly used for classification tasks where the goal is to predict the probability that an instance of belonging to a given class. It is used for classification algorithms its name is logistic regression. it’s referred to as regression because it takes the output of the linear regression function as input and uses a sigmoid function to estimate the probability for the given class.

Terminologies involved in Logistic Regression

Independent variables: The input characteristics or predictor factors applied to the dependent variable’s predictions.

Dependent variable: The target variable in a logistic regression model, which we are trying to predict.

Logistic function: The formula used to represent how the independent and dependent variables relate to one another. The logistic function transforms the input variables into a probability value between 0 and 1, which represents the likelihood of the dependent variable being 1 or 0.

Odds: It is the ratio of something occurring to something not occurring. it is different from probability as probability is the ratio of something occurring to everything that could possibly occur.

Log-odds: The log-odds, also known as the logit function, is the natural logarithm of the odds. In logistic regression, the log odds of the dependent variable are modeled as a linear combination of the independent variables and the intercept.

How Logistic Regression works

The logistic regression model transforms the linear regression function continuous value output into categorical value output using a sigmoid function, which maps any real-valued set of independent variables input into a value between 0 and 1. This function is known as the logistic function.

Applying steps in logistic regression modelling

Define the problem: Identify the dependent variable and independent variables and determine if the problem is a binary classification problem.

Data preparation: Clean and pre-process the data, and make sure the data is suitable for logistic regression modelling.

Exploratory Data Analysis (EDA): Visualize the relationships between the dependent and independent variables, and identify any outliers or anomalies in the data.

Feature selection: Choose the independent variables that have a significant relationship with the dependent variable, and remove any redundant or irrelevant features.

Model building: Train the logistic regression model on the selected independent variables and estimate the coefficients of the model.

Model evaluation: Evaluate the performance of the logistic regression model using appropriate metrics such as accuracy, precision, recall, F1-score, or AUC-ROC.

Model improvement: Based on the results of the evaluation, fine-tune the model by adjusting the independent variables, adding new features, or using regularization techniques to reduce overfitting.

Model deployment: Deploy the logistic regression model in a real-world scenario and make predictions on new data.

CHAPTER 07
SOFTWARE TESTING

07 SOFTWARE TESTING

7.1 TYPE OF TESTING

1. Functional testing:

Functional testing ensures that the system meets its functional requirements and works as intended. It can include testing individual functions or features of the system, as well as testing the system as a whole. it is a type of software testing which is used to verify the functionality of the software application, whether the function is working according to the requirement specification. In functional testing, each function tested by giving the value, determining the output, and verifying the actual output with the expected value. Functional testing performed as black-box testing which is presented to confirm that the functionality of an application or system behaves as we are expecting. It is done to verify the functionality of the application.

Goal of functional testing

The purpose of the functional testing is to check the primary entry function, necessarily usable function, the flow of screen GUI. Functional testing displays the error message so that the user can easily navigate throughout the application.

2. Integration testing:

Integration testing ensures that different components of the system work together as expected. It can include testing how different modules of the system interact with each other and with external systems. Integration testing is the second level of the software testing process comes after unit testing. In this testing, units or individual components of the software are tested in a group. The focus of the integration testing level is to expose defects at the time of interaction between integrated components or units. Unit testing uses modules for testing purpose, and these modules are combined and tested in integration testing. The Software is developed with a number of software modules that are coded by different coders or programmers. The goal of integration testing is to check the correctness of communication among all the modules. once all the components or modules are working independently, then we need to check the data flow between the dependent modules is known as integration testing. We go for the integration testing only after the functional testing is completed on each module of the application. we always do integration testing by picking module by module so that a proper sequence is followed, and also we don't miss out on any integration scenarios. First, determine the test case strategy through which executable test cases can be prepared according to test data.

3. User interface testing:

User interface testing ensures that the user interface is user-friendly and easy to use. It can include testing how the system responds to different user inputs and how well it meets the needs of different users. Some of the most significant features of Graphical user interface (GUI) testing are as discussed below: The GUI testing is used to execute the tests in matching or allocate on a Selenium Grid with fixed Selenium Web Driver. The execution of GUI testing will allow us to test the feature of an application from a user's point of view. As a result of Graphical user interface testing, we can get the customize test report. It also produces a consistent object documentation, at the same time for web elements along with the dynamic IDs. Sometimes the internal performance of the system works correctly, but the user interface doesn't; that's why GUI testing is an excellent approach in order to test other types of applications as well.

4. Performance testing:

Performance testing ensures that the system can handle the expected workload and can perform efficiently under different conditions. It can include testing the system's response time, scalability, and reliability under different loads and scenarios. we will do performance testing once the software is stable and moved to the production, and it may be accessed by the multiple users concurrently, due to this reason, some performance issues may occur. To avoid these performance issues, the tester performs one round of performance testing. Since it is non-functional testing which doesn't mean that we always use performance testing, we only go for performance testing when the application is functionally stable.

5. Security testing:

Security testing ensures that the system is secure and can protect sensitive data from unauthorized access or attacks. It can include testing how well the system handles authentication, authorization, and encryption. security testing is an integral part of software testing, which is used to discover the weaknesses, risks, or threats in the software application and also help us to stop the nasty attack from the outsiders and make sure the security of our software applications. the primary objective of security testing is to find all the potential ambiguities and vulnerabilities of the application so that the software does not stop working. If we perform security testing, then it helps us to identify all the possible security threats and also help the programmer to fix those errors. It is a testing procedure, which is used to define that the data will be safe and also continue the working process of the software.

6. Usability testing:

Usability testing ensures that the system is easy to use and meets the needs of its users. It can include testing how well the system meets user expectations, how easy it is to navigate, and how well it supports the tasks that users need to perform. Usability Testing is a significant type of software testing technique, which is comes under the non-functional testing. It is primarily used in user-cantered interaction design on order to check the usability or ease of using a software product. the implementation of usability testing requires an understanding of the application, as it is extensive testing. Generally, usability testing is performed from an end-user viewpoint to verify if the system is efficiently working or not. the primary purpose of executing the usability testing is to check that the application should be easy to use for the end-user who is meant to use it, whereas sustaining the client's specified functional and business requirements. In other words, we can say that Usability testing is one of the distinct testing techniques that identify the defect in the end-user communication of software product. And that's why it is also known as **User Experience (UX) Testing**. It helps us to fix several usability problems in a specific website or application, even making sure its excellence and functionality.

7. Acceptance testing:

Acceptance testing ensures that the system meets the acceptance criteria and is ready for deployment. It can include testing how well the system meets the requirements specified in the project documentation and how well it meets the needs of its users. Acceptance testing is formal testing based on user requirements and function processing. It determines whether the software is conforming specified requirements and user requirements or not. It is conducted as a kind of Black Box testing where the number of required users involved testing the acceptance level of the system. It is the fourth and last level of software testing. user acceptance testing (UAT) is a type of testing, which is done by the customer before accepting the final product. Generally, UAT is done by the customer (domain expert) for their satisfaction, and check whether the application is working according to given business scenarios, real-time scenarios. in this, we concentrate only on those features and scenarios which are regularly used by the customer or mostly user scenarios for the business or those scenarios which are used daily by the end-user or the customer.

7.2 TEST CASES & TEST RESULTS

Admin Module Page

Test Case ID	Test Case Objectives	Input	Expected Result	Actual Result	Status
TC_1	To check activeness of Admin Page	Click on Admin Page	Admin Page should be open and active	Admin Page is getting open and active	Pass
TC_2	To check activeness of Login Button	Click on Login Button	After click Login Button form should be login successfully	After click Login Button form is getting login successfully	Pass
TC_3	To check activeness of selecting user role	Click on select user role	Page should be open and active	User role Page is getting open and active	Pass
TC_4	To check activeness of selecting Admin	Click on Admin option	After click Add Admin role , admin should be login	After click admin role button Admin module is opened	Pass
TC_5	To check activeness of Login User	Click on User Type	After click Admin option should be selected	After click Admin button Username and password should be filled	Pass
TC_6	To check activeness of Forgot Password	Click on Forgot Password link	After Forgot Password it should be changed	After click Forgot Password it is getting changed	Pass

TC_7	To check activeness of Address	Click on Address textbox	After click Address all data should be enter	After click Address all data entered	Pass
TC_8	To check activeness of Login Button	Click on Login Button	After click Login, Admin should be login successfully	After click Login button ,Admin should login successfully	Pass
TC_9	To check activeness of Admin Dashboard	Click on Dashboard	After click Dashboard it should be Displayed	After click Dashboard it will getting Viewed	Pass
TC_10	To check activeness of Profile	Click on profile	Profile will be showed to admin	Profile will be displayed properly	Pass
TC_11	To check activeness of update button	Click on update button	Name, password and mobile number will be updated	All admin data updated successfully	Pass
TC_12	To check activeness of view blog	Click on view blog	After click view blog it should be viewed	After click view blog it display the blogs	Pass
TC_13	To check activeness of Manage user	Click on Manage User	After click Manage User button it will manage users	After click Manage User button it will manage users	Pass
TC_14	To check activeness of logout	Click on logout	After click logout admin should logout from the system	After click logout admin should logout from the system	Pass

Doctor Module Page

Test Case ID	Test Case Objectives	Input	Expected Result	Actual Result	Status
TC_1	To check activeness of Admin Page	Click on Admin Page	Admin Page should be open and active	Admin Page is getting open and active	Pass
TC_2	To check activeness of Login Button	Click on Login Button	After click Login Button form should be login successfully	After click Login Button form is getting login successfully	Pass
TC_3	To check activeness of selecting user role	Click on select user role	Page should be open and active	User role Page is getting open and active	Pass
TC_4	To check activeness of Doctor role button	Click on Doctor role button	After click Add Doctor role , Doctor module page should be open	After click Doctor role button doctor module is opened	Pass
TC_5	To check activeness of Parent role button	Click on Parent role button	After click Add Parent role , Parent module page should be open	After click Parent role button Parent module is opened	Pass
TC_6	To check activeness of add Full Name textbox	Click on add Full Name textbox	After click Full Name textbox Doctor Name should be added	After click Full Name textbox Name is getting added	Pass
TC_7	To check activeness of Short Name	Click on View Short Name	After click View Short Name should be Viewed	After click View Short Name should be Viewed	Pass

TC_8	To check activeness of Upload Profile Photo button	Click on Browse button	After click Browse button local file should be selected	After click photo button profile photo is getting added	Pass
TC_9	To check activeness of Username textbox	Click on textbox	After click Username textbox it should be enter username	After click username textbox is getting Viewed	Pass
TC_10	To check activeness of Add password	Click on Add Password	Add Password should be take valid password	Add password textbox is taking password	Pass
TC_11	To check activeness of Add Retype password	Click on Add Retype Password	Add Retype Password should be take valid password	Add password textbox is taking same as password field	Pass
TC_12	To check activeness of Hospital Name	Click on Hospital Name textbox	After click Hospital Name all data should be enter	After click Hospital Name all data entered	Pass
TC_13	To check activeness of Hospital Address	Click on Hospital Address textbox	After click Hospital Address all data should be enter	After click Hospital Address all data entered	Pass
TC_14	To check activeness of Hospital mobile number	Click on Hospital mobile number textbox	After click Hospital mobile number Numeric value should be enter	After click Hospital mobile number numeric value should entered	Pass
TC_15	To check Activeness of Nurse Name	Click on Nurse Name textbox	After click Nurse Name should be enter	After click Nurse Name should be entered	Pass

TC_16	To check activeness of Upload Nurse Photo button	Click on Browse button	After click Browse button local file should be selected	After click photo button Nurse photo is getting added	Pass
TC_17	To check activeness of Nurse Username textbox	Click on Nurse Username textbox	After click Username textbox it should be enter username	After click Nurse username textbox is getting Viewed	Pass
TC_18	To check activeness of Add Nurse password	Click on Add Nurse Password	Add Password should be take valid password	Add password textbox is taking password	Pass
TC_19	To check activeness of Add Nurse Retype password	Click on Add Nurse Retype Password	Add Retype Nurse Password should be take valid password	Add Nurse password textbox is taking same as password field	Pass
TC_20	To check activeness of Register Button	Click on Register Button	Register Button should be active and register the data	Register Button is getting clicked and register the doctor	Pass

Nurse Module Page

Test Case ID	**Test Case Objectives**	**Input**	**Expected Result**	**Actual Result**	**Status**
TC_1	To check activeness of Nurse Page	Click on Nurse Page	Nurse Page should be open and active	Nurse Page is getting open and active	Pass

TC_2	To check activeness of Login Button	Click on Login Button	After click Login Button form should be login successfully	After click Login Button form is getting login successfully	Pass
TC_3	To check activeness of selecting user role	Click on select user role	Page should be open and active	User role Page is getting open and active	Pass
TC_4	To check activeness of selecting Nurse	Click on Nurse option	After click Add Nurse role , Nurse should be login	After click Nurse role button Nurse module is opened	Pass
TC_5	To check activeness of Login User	Click on User Type	After click Nurse option should be selected	After click Nurse button Username and password should be filled	Pass
TC_6	To check activeness of Forgot Password	Click on Forgot Password link	After Forgot Password it should be changed	After click Forgot Password it is getting changed	Pass
TC_7	To check activeness of Address	Click on Address textbox	After click Address all data should be enter	After click Address all data entered	Pass
TC_8	To check activeness of Login Button	Click on Login Button	After click Login, Admin should be	After click Login button ,Admin should login successfully	Pass

			login successfully		
TC_9	To check activeness of Nurse Dashboard	Click on Dashboard	After click Dashboard it should be Displayed	After click Dashboard it will getting Viewed	Pass
TC_10	To check activeness of Profile	Click on profile	Profile will be showed to admin	Profile will be displayed properly	Pass
TC_11	To check activeness of update button	Click on update button	Name, password and mobile number will be updated	All Nurse data updated successfully	Pass
TC_12	To check activeness of view blog	Click on view blog	After click view blog it should be viewed	After click view blog it display the blogs	Pass
TC_13	To check activeness of Total Appointment	Click on Total Appointment	After click Total Appointment it will showed all appointments	After click Total Appointment it will showed all appointments	Pass
TC_13	To check activeness of View Child	Click on View Child	After click View Child it will showed all Childs	After click View Child it will showed all Childs	Pass
TC_14	To check activeness of New Child	Click on New Child	After click New Child it will add new Child data	After click New Child it will add new Child data	Pass

TC_15	To check activeness of logout	Click on logout	After click logout admin should logout from the system	After click logout admin should logout from the system	Pass

Parent Module Page

Test Case ID	Test Case Objectives	Input	Expected Result	Actual Result	Status
TC_1	To check activeness of Admin Page	Click on Admin Page	Admin Page should be open and active	Admin Page is getting open and active	Pass
TC_2	To check activeness of Login Button	Click on Login Button	After click Login Button form should be login successfully	After click Login Button form is getting login successfully	Pass
TC_3	To check activeness of selecting user role	Click on select user role	Page should be open and active	User role Page is getting open and active	Pass
TC_4	To check activeness of Parent role button	Click on Parent role button	After click Add Parent role , Parent module page should be open	After click Parent role button Parent module is opened	Pass
TC_5	To check activeness of Upload Profile Photo button	Click on Browse button	After click Browse button local file should be selected	After click photo button profile photo is getting added	Pass
TC_6	To check activeness of add Full Name textbox	Click on add Full Name textbox	After click Full Name textbox Doctor Name should be added	After click Full Name textbox Name is getting added	Pass

TC_7	To check activeness of Address	Click on Address textbox	After click Address all data should be enter	After click Address all data entered	Pass
TC_8	To check activeness of mobile number	Click on mobile number textbox	After click mobile number Numeric value should be enter	After click mobile number numeric value should entered	Pass
TC_9	To check activeness of Username textbox	Click on Username textbox	After click Username textbox it should be enter username	After click username textbox is getting Viewed	Pass
TC_10	To check activeness of Add password	Click on Add Password	Add Password should be take valid password	Add password textbox is taking password	Pass
TC_11	To check activeness of Add Retype password	Click on Add Retype Password	Add Retype Password should be take valid password	Add password textbox is taking same as password field	Pass
TC_12	To check activeness of Child Name	Click on Child Name textbox	After click Child Name all data should be enter	After click Child Name all data entered	Pass
TC_13	To check activeness of Child DOB	Click on Child DOB	After click Child DOB data should be enter	After click Child DOB Address all data entered	Pass
TC_14	To check activeness of Hospital mobile number	Click on Hospital mobile number textbox	After click Hospital mobile number Numeric value should be enter	After click Hospital mobile number numeric value should entered	Pass

TC_15	To check activeness of Appointment	Click on Appointment	After click Appointment it will showed all appointments	After click Appointment it will showed all appointments	Pass
TC_16	To check activeness of Check Report	Click on Check Report	After click Check Report it will showed all Reports	After click Check Report it will showed all Reports	Pass
TC_17	To check activeness of SMS	Click on get appointment	After click get appointment SMS message should be come to Parent	After click get appointment SMS message should be come to Parent	Pass

CHAPTER 08

RESULT

08 RESULTS

8.1 Outcomes

1. Improved immunization coverage: A child immunization system can help ensure that children receive all required vaccines on time, which can lead to improved immunization coverage rates and reduced incidence of vaccine-preventable diseases.

2. Enhanced data management: A child immunization system can improve the management of immunization data, including tracking vaccine inventory, monitoring vaccine coverage rates, and generating reports.

3. Increased efficiency: A child immunization system can streamline the immunization process, reducing the time and effort required to track and administer vaccines.

4. Better communication: A child immunization system can improve communication between parents, healthcare providers, and public health officials, making it easier to share information about vaccine schedules, reminders, and adverse events.

5. Improved public health: A child immunization system can contribute to improved public health by reducing the incidence of vaccine-preventable diseases and ensuring that children receive all required vaccines.

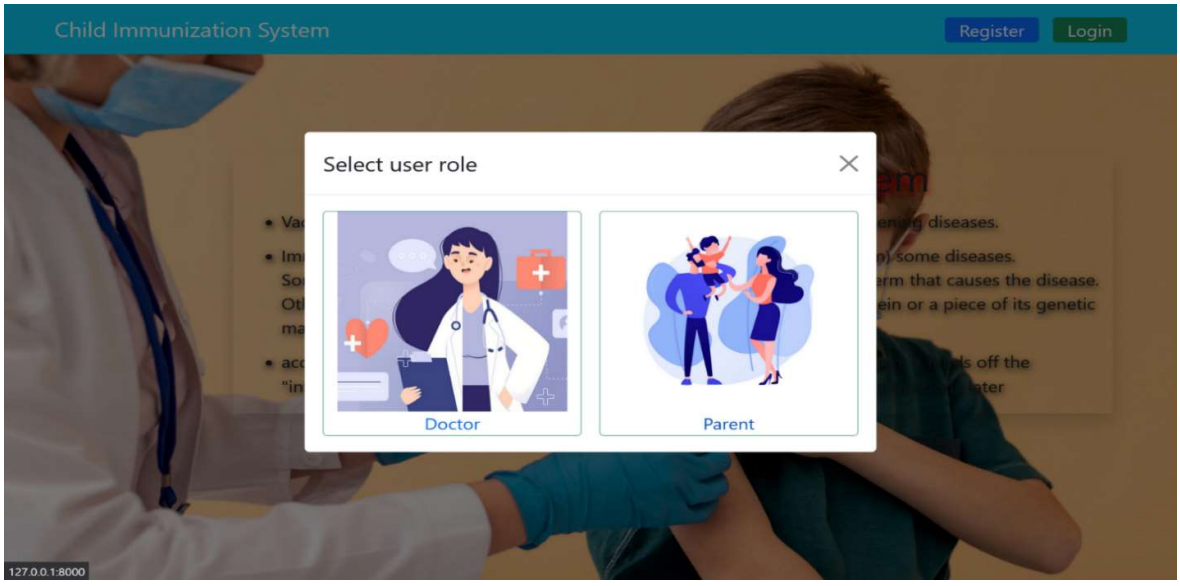
6. Enhanced healthcare delivery: A child immunization system can improve healthcare delivery by providing healthcare providers with access to real-time immunization data, facilitating decision-making, and reducing the risk of vaccine errors.

Overall, a child immunization system project can have a significant impact on public health and healthcare delivery, improving vaccine coverage rates, enhancing data management, and promoting efficient and effective healthcare practices.

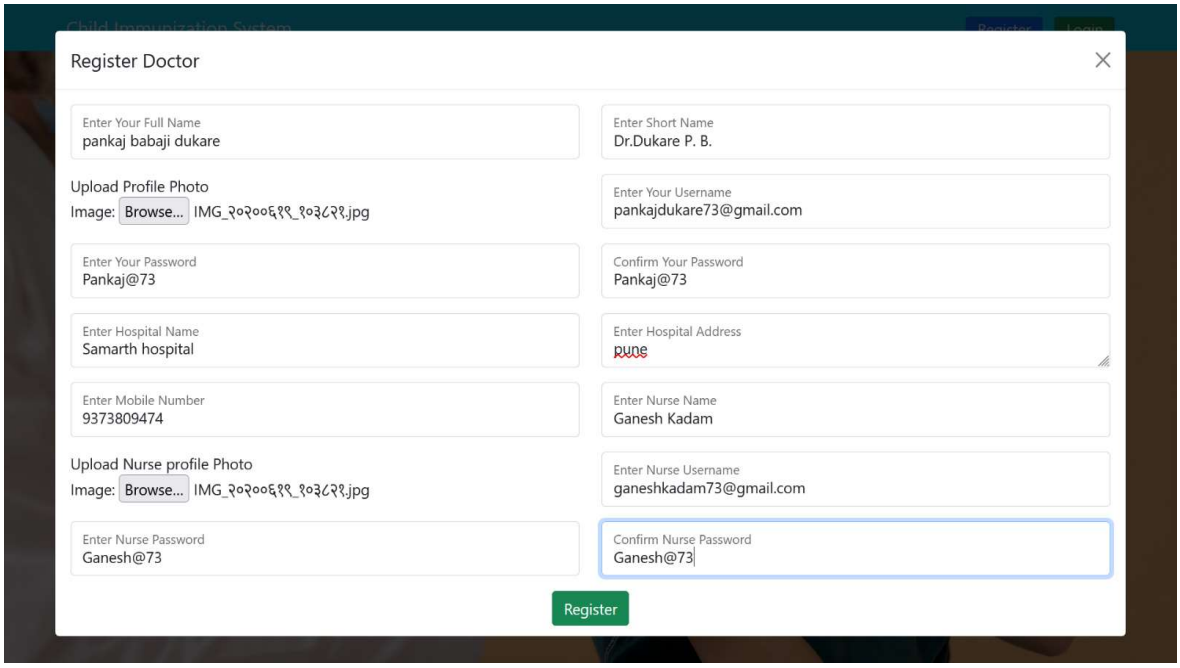
8.2 Screen Shots

The child immunization system project might have a user-friendly interface that allows healthcare providers, parents/guardians, and other authorized users to access the system's functionalities. The interface might have various sections,

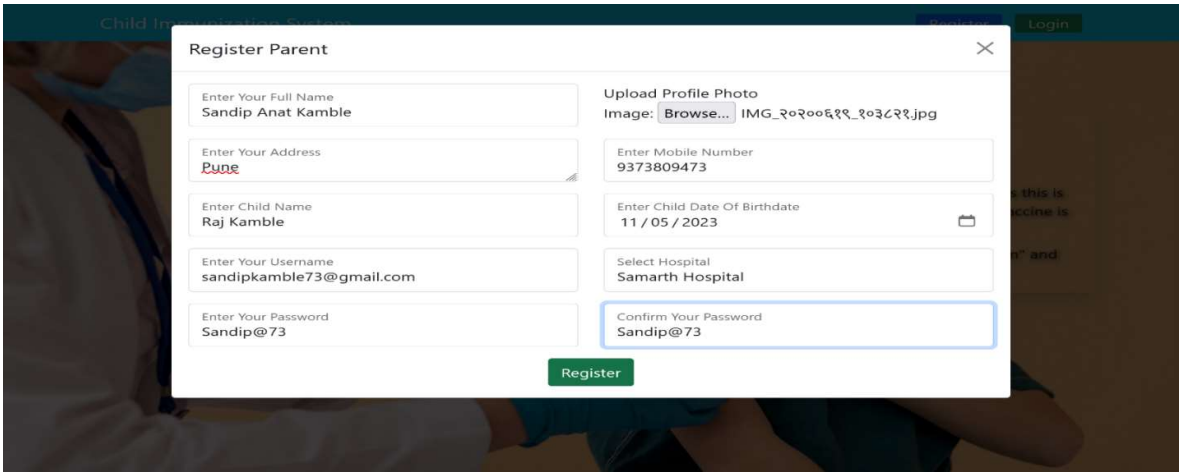
1. **Registration Section:** This section allows users to register a new child by providing their personal information, medical history, and other relevant details.



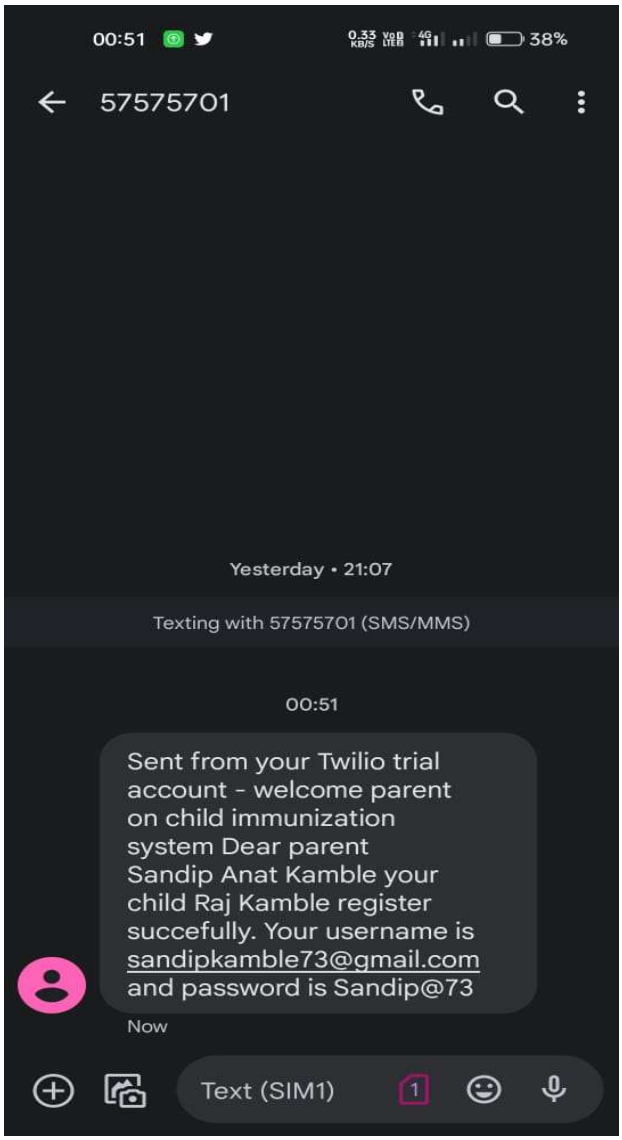
2. Doctor Register



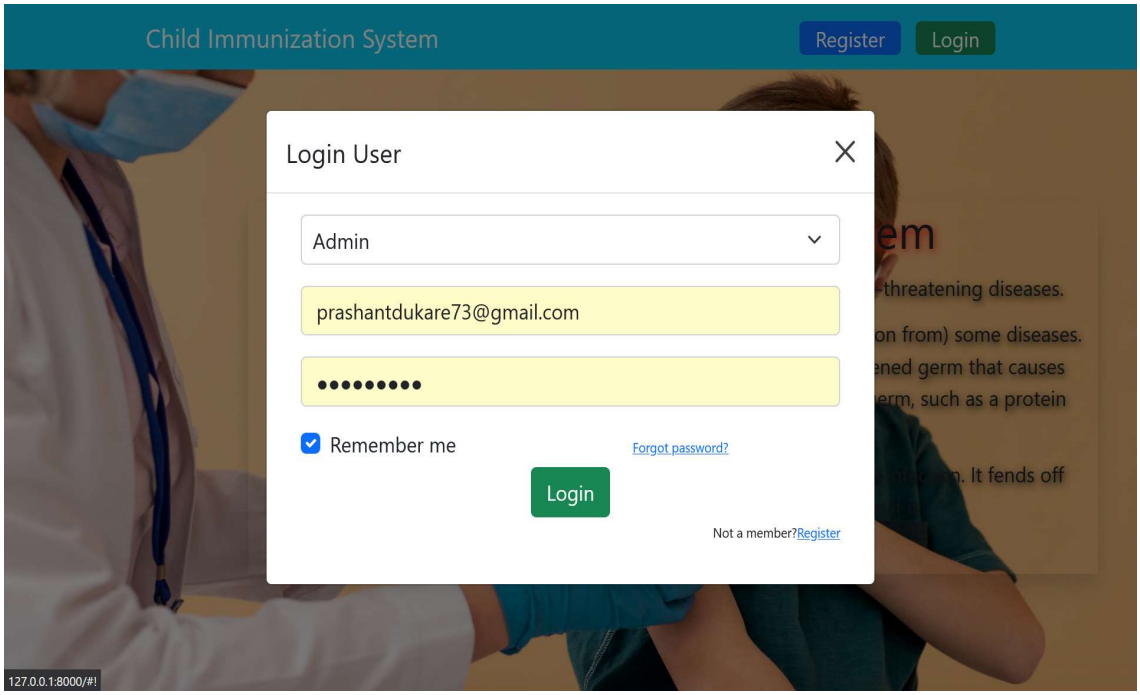
3. Parent Register



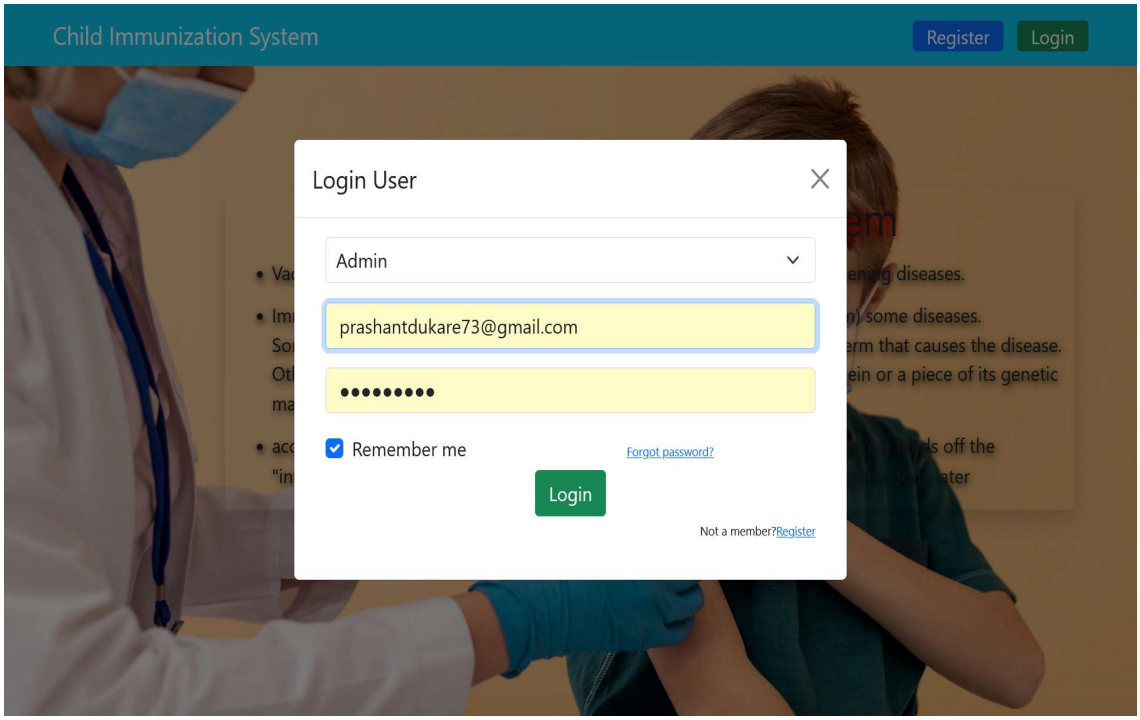
SMS will be generated after the successful registration of child in the system



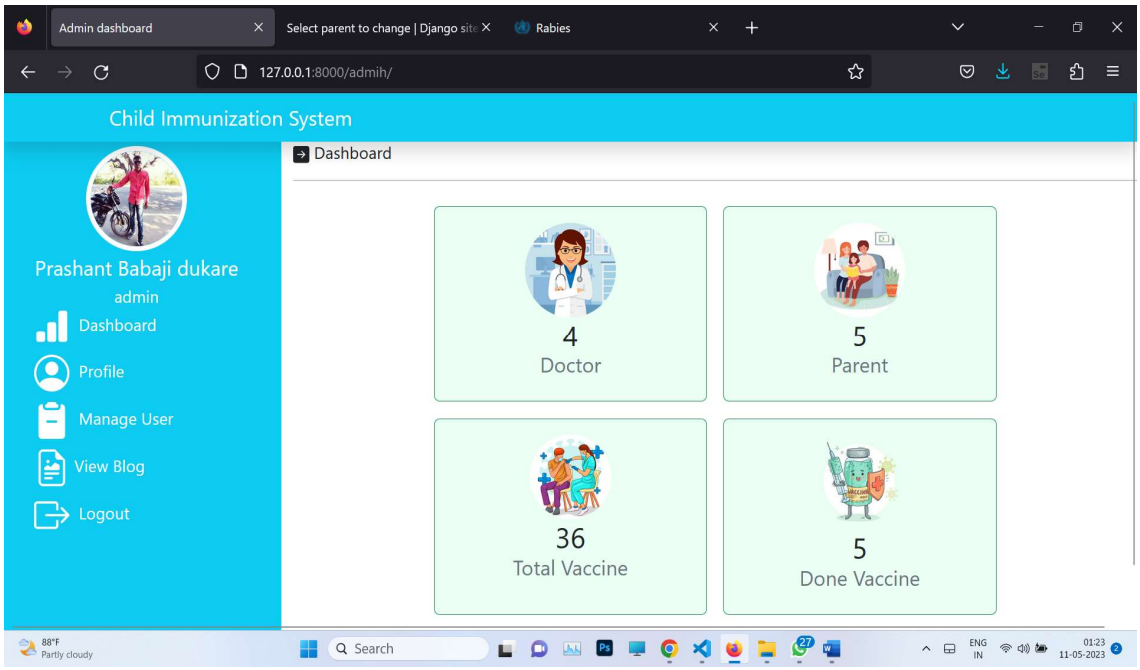
Forgot Password Page



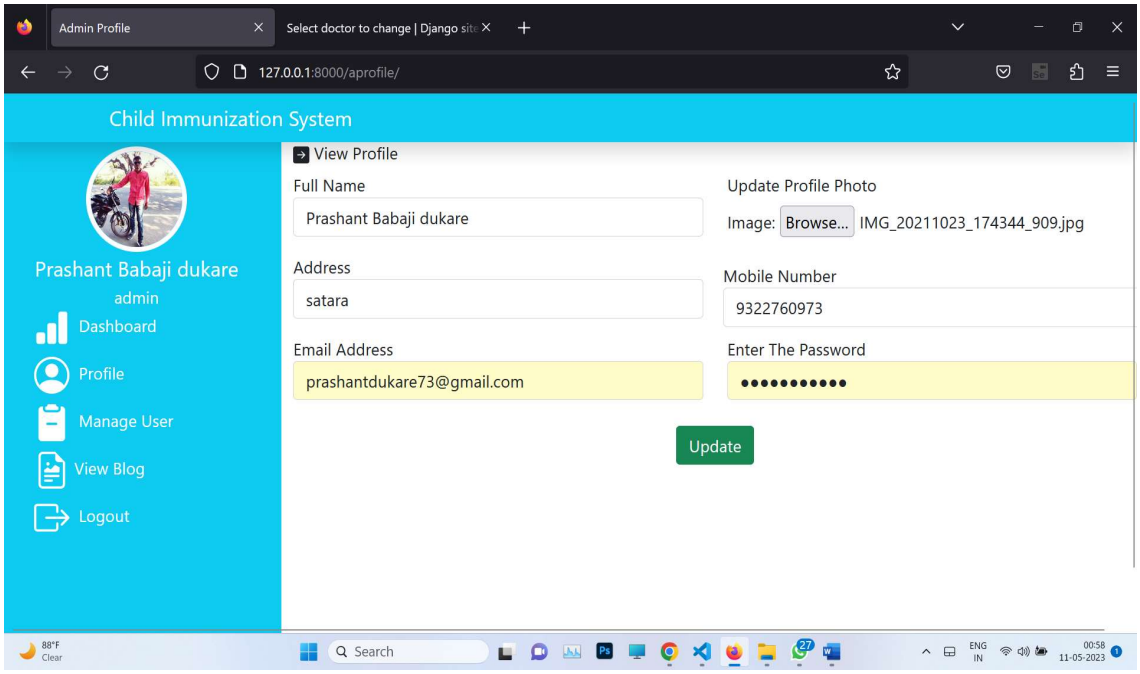
Admin Login



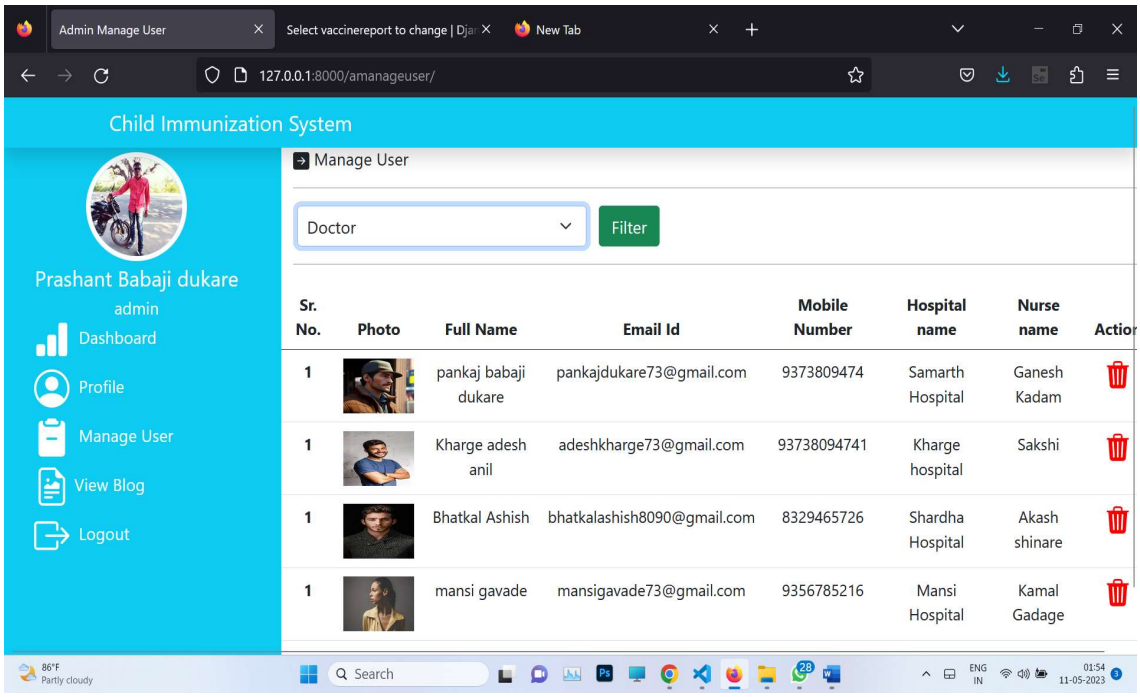
Admin Dashboard



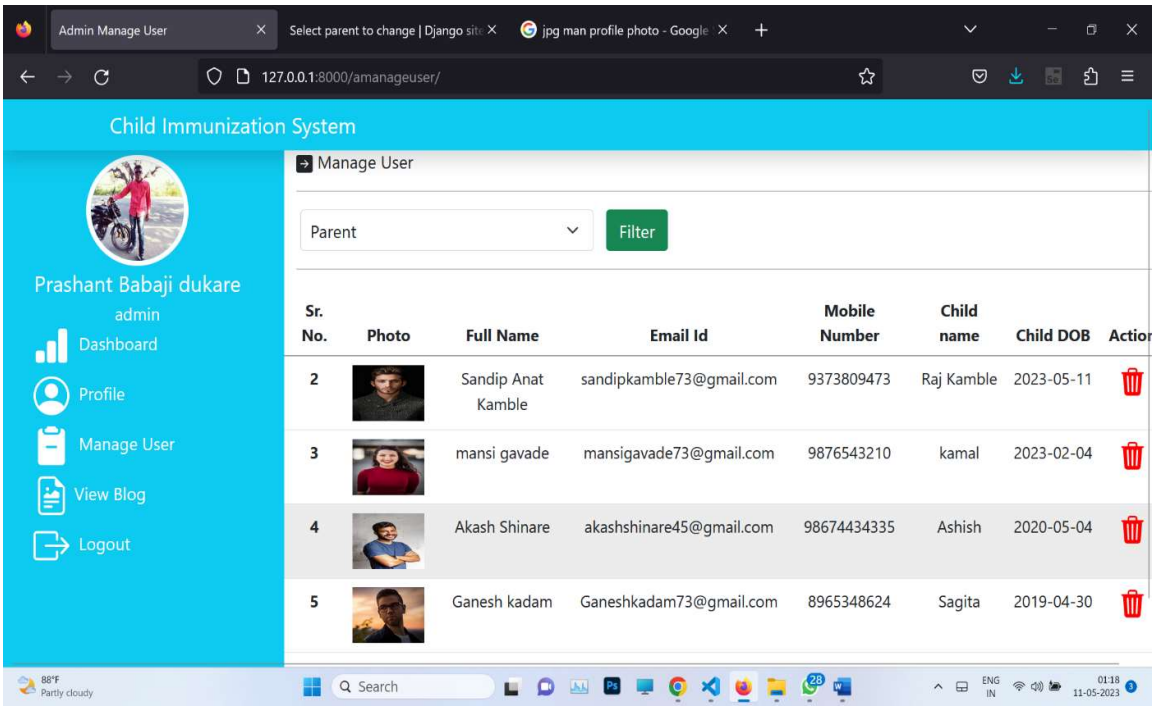
Admin Profile



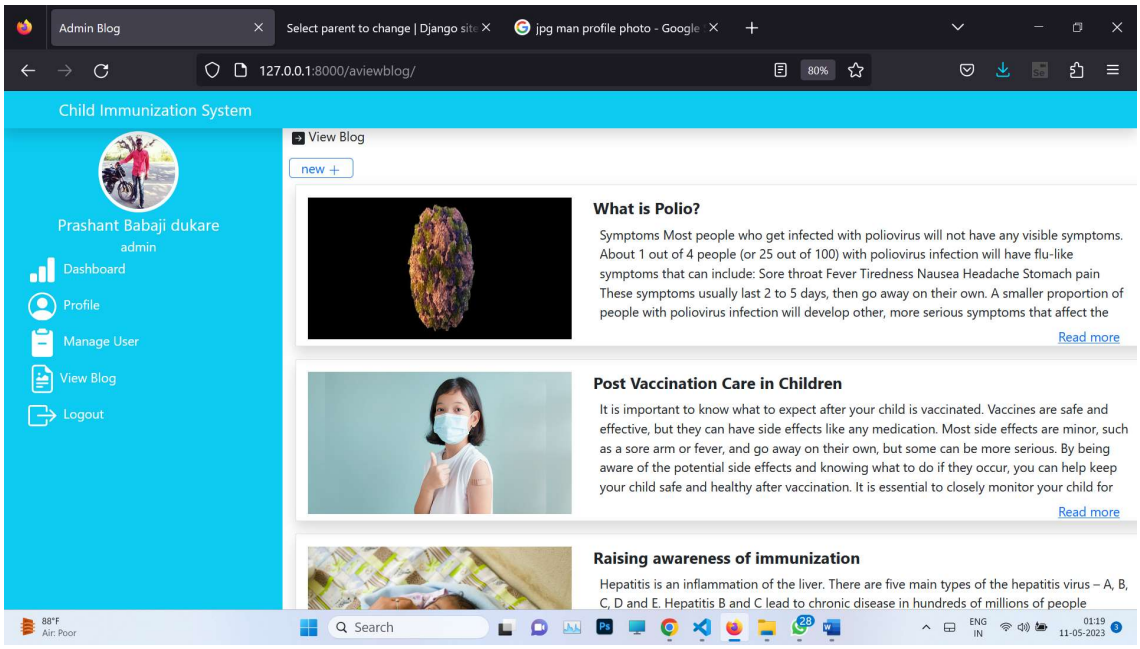
Manage User Doctor



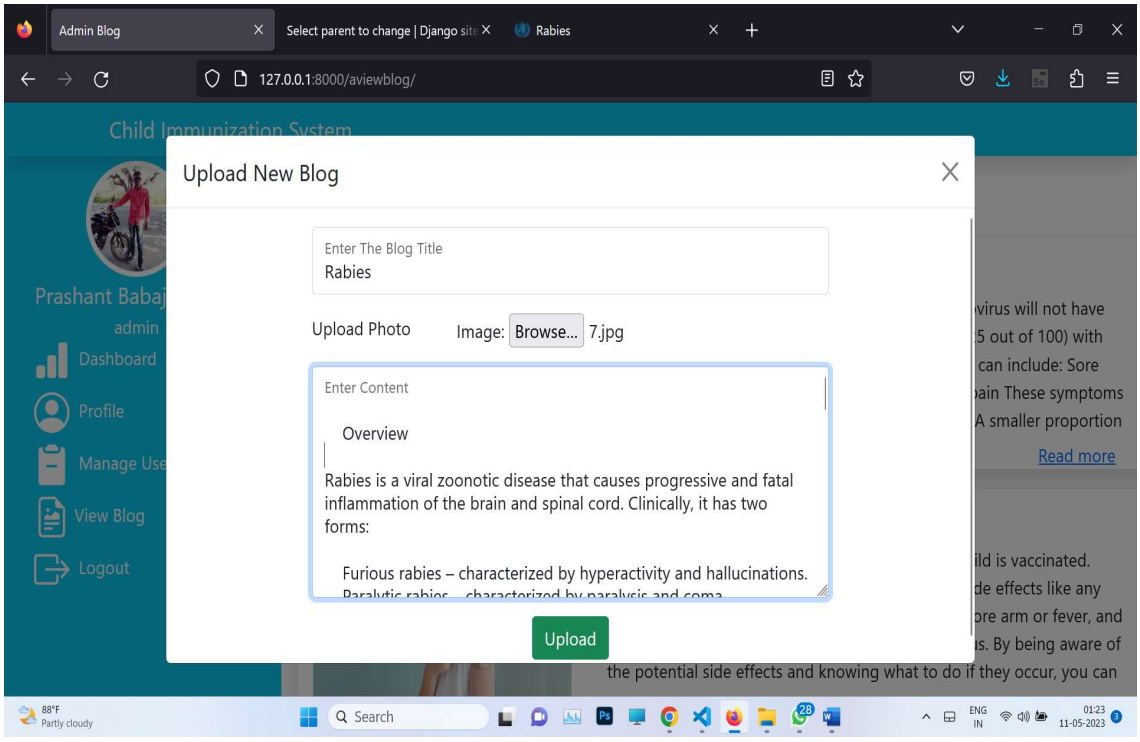
Manage User Parent



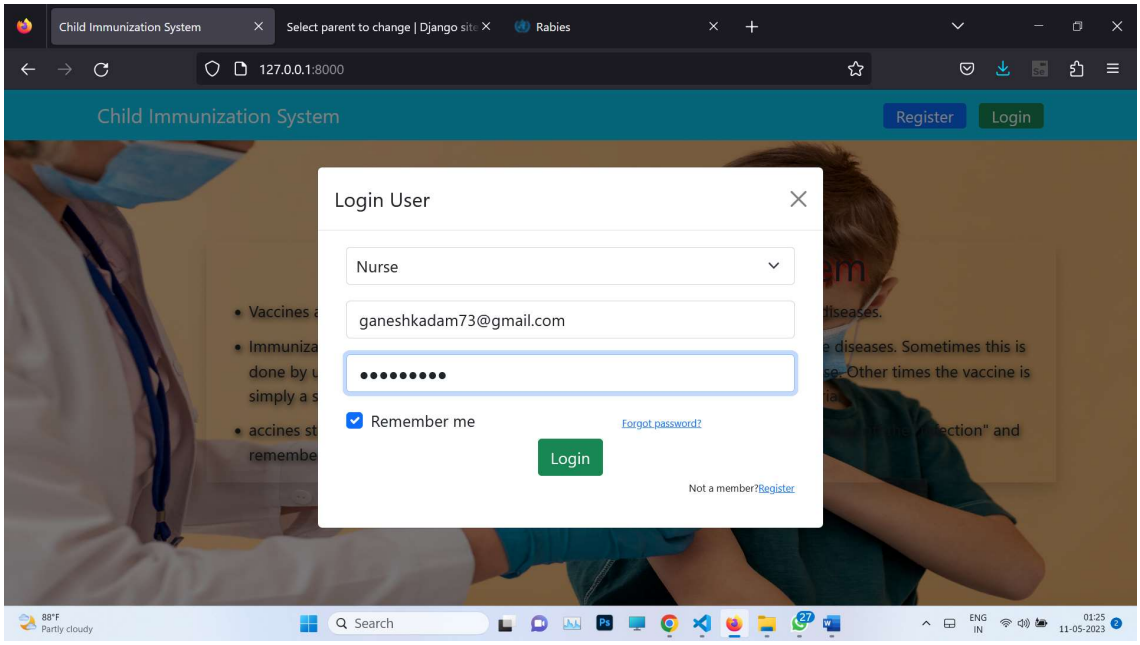
Admin View Blog



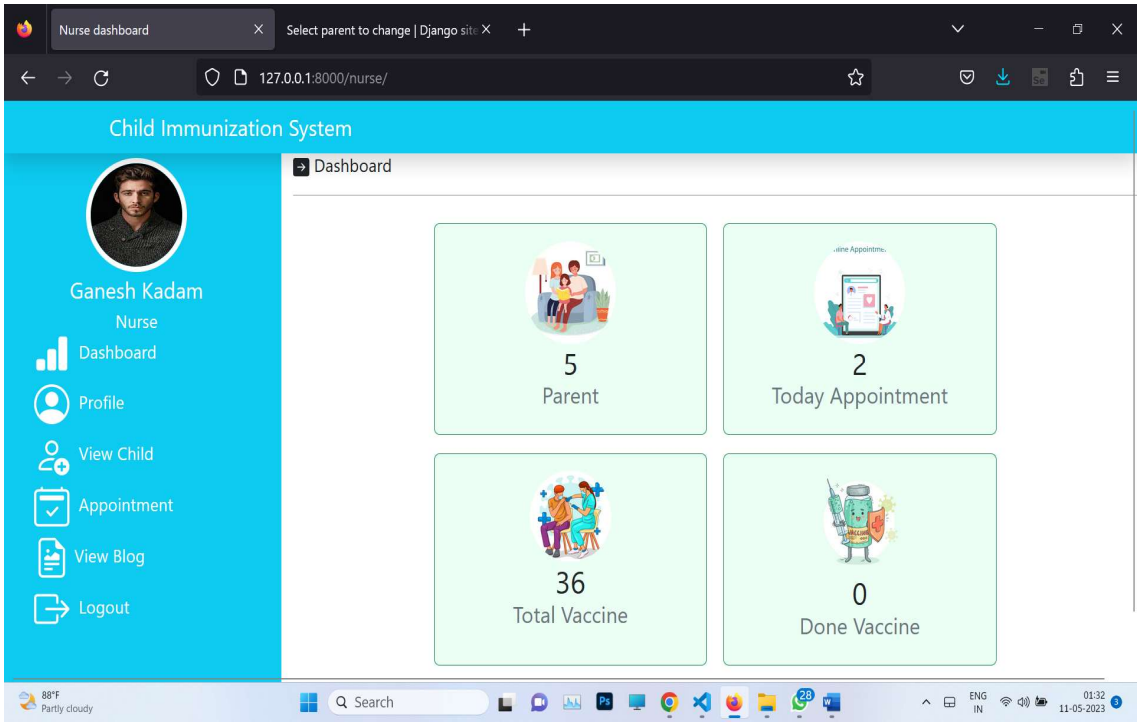
Upload Blog



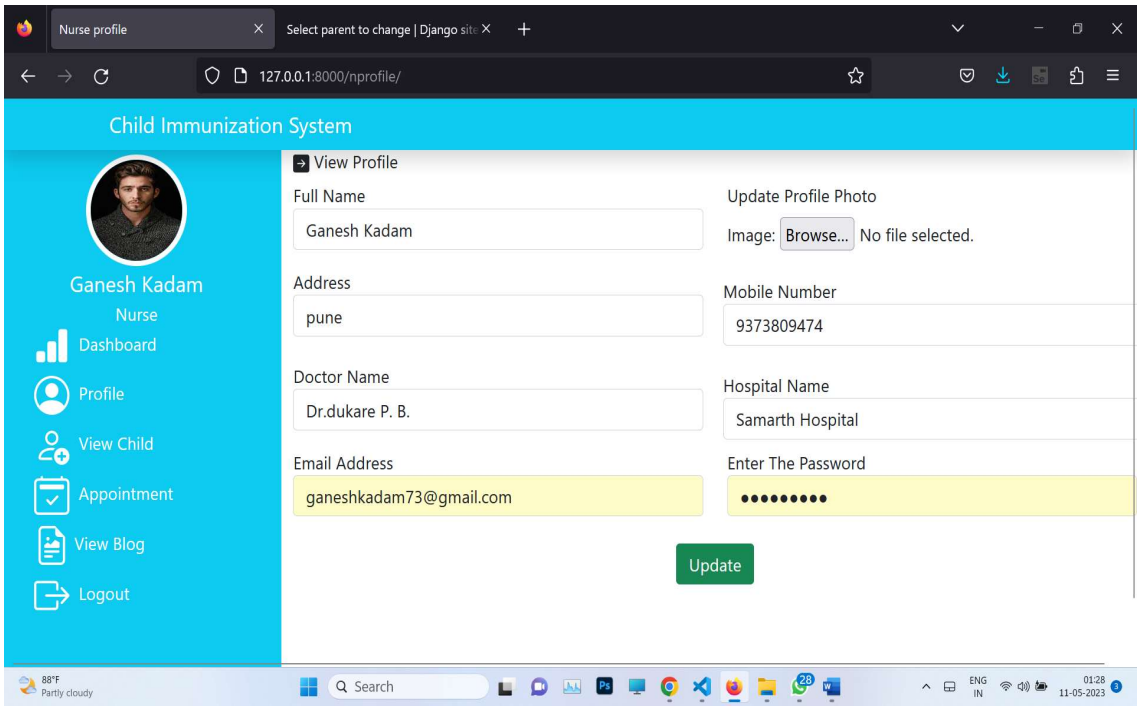
Nurse Login



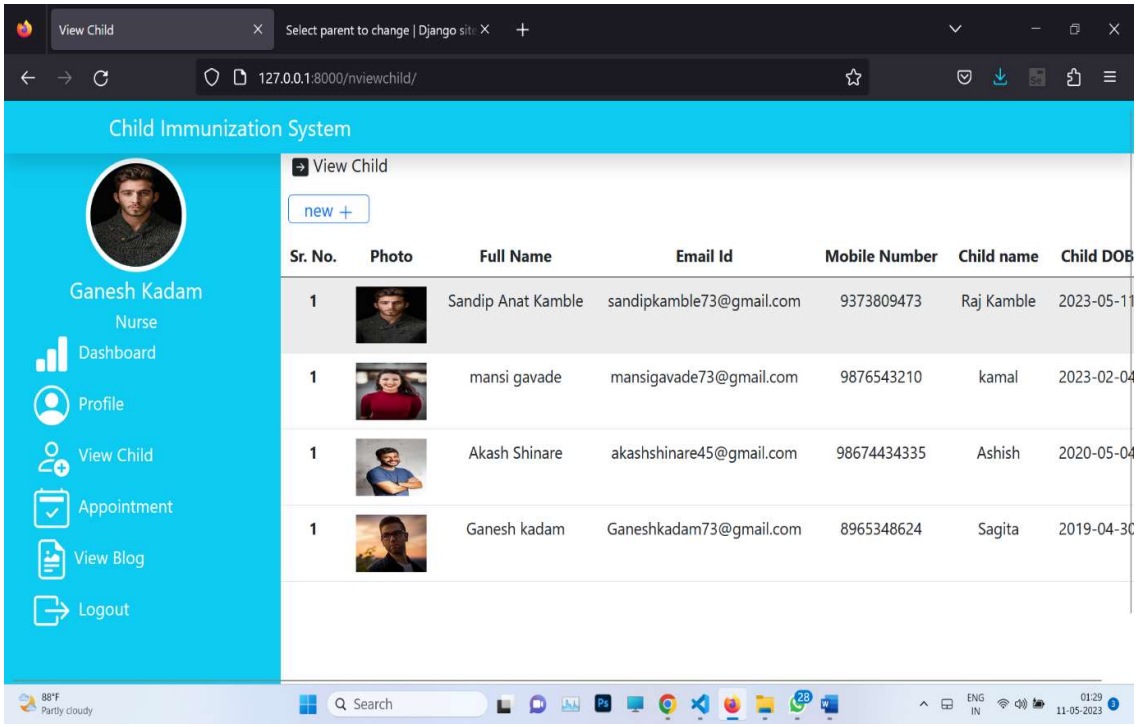
Nurse Dashboard



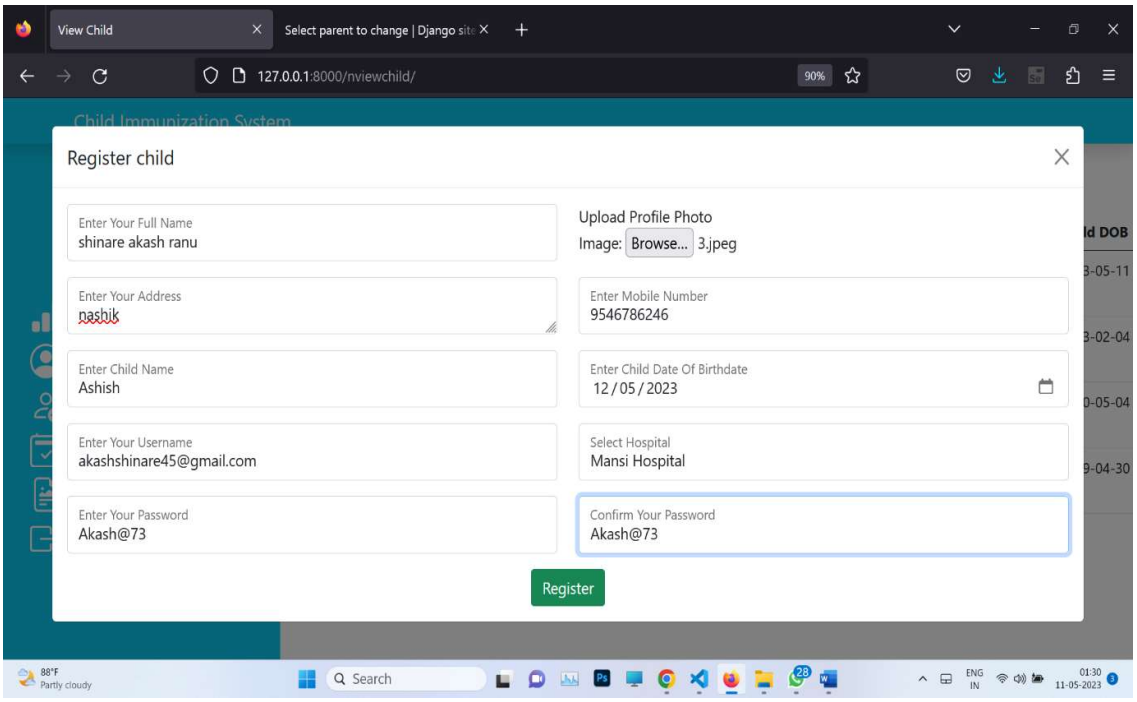
Nurse Profile



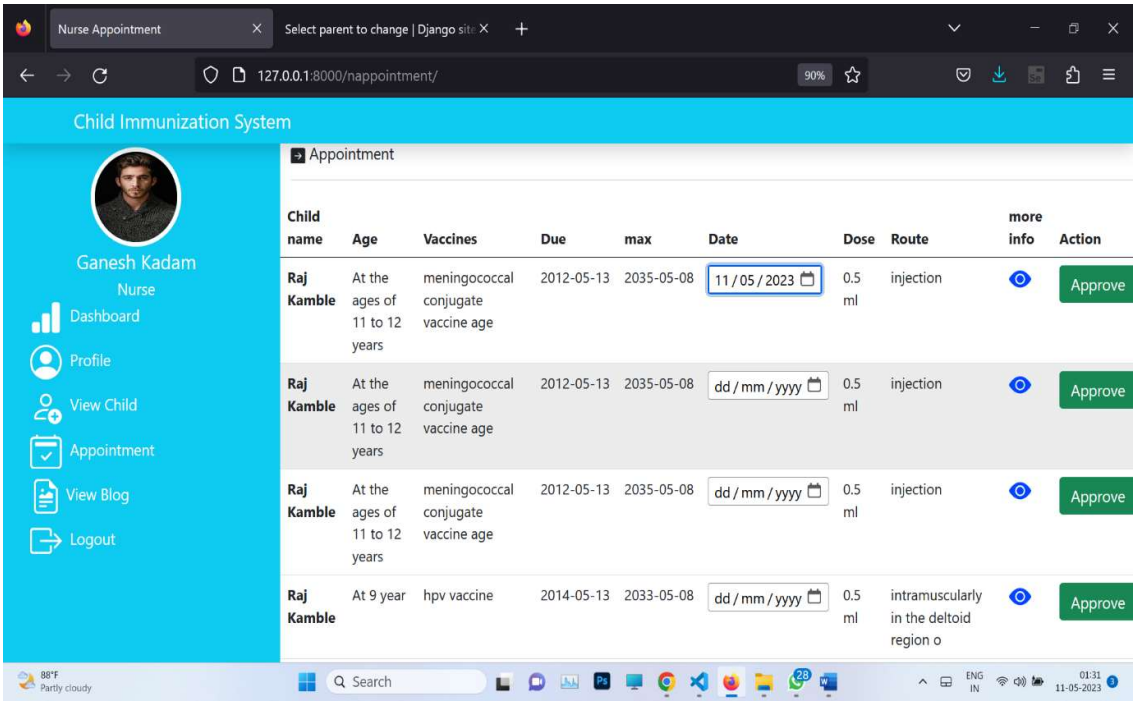
Nurse view child



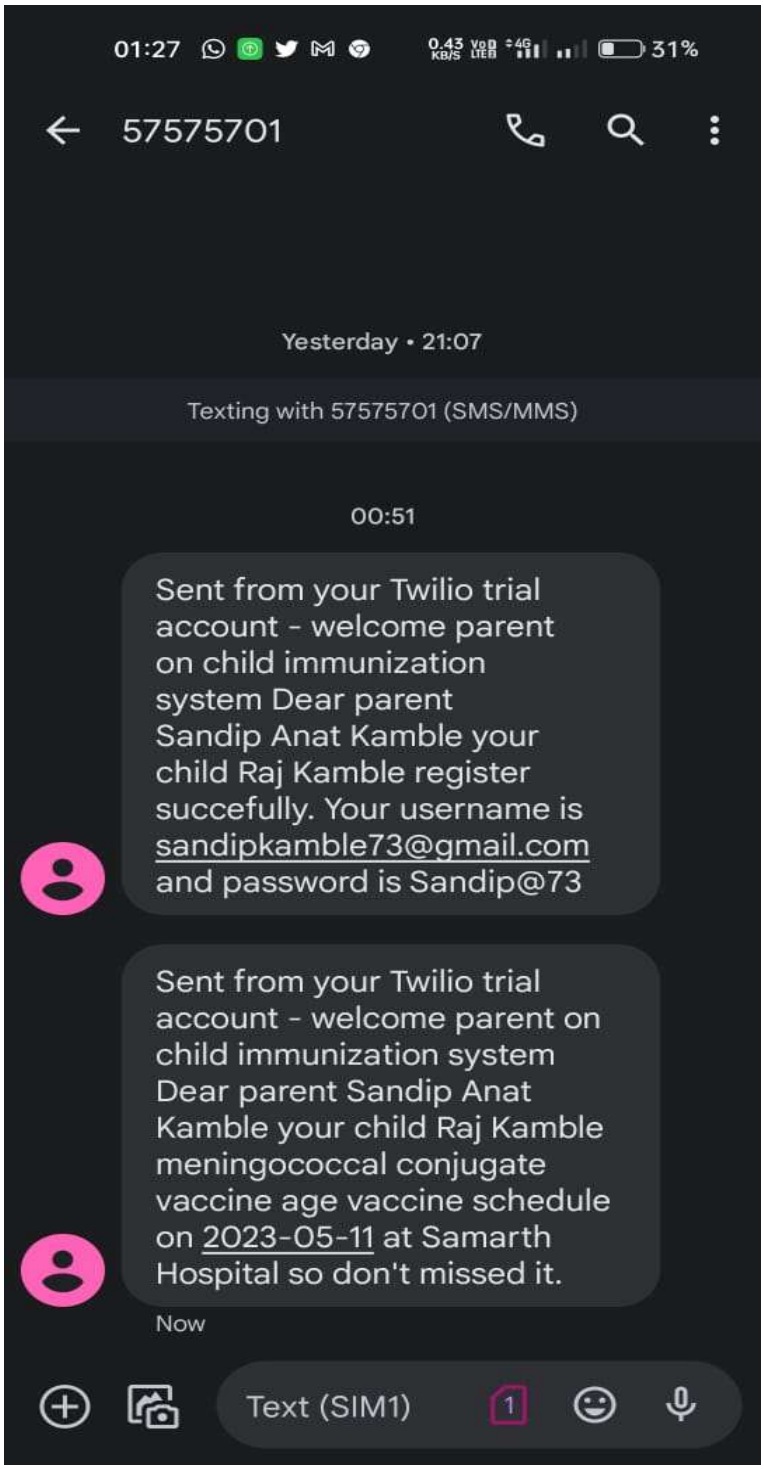
Nurse Register New Child



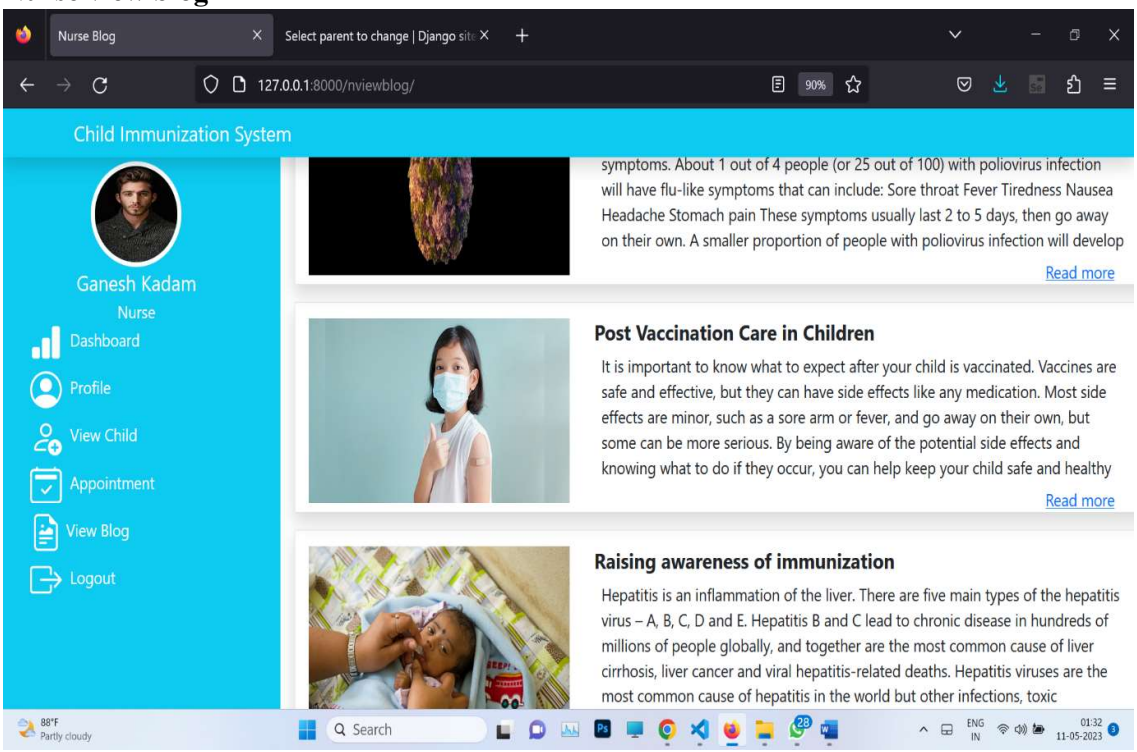
Nurse appointment



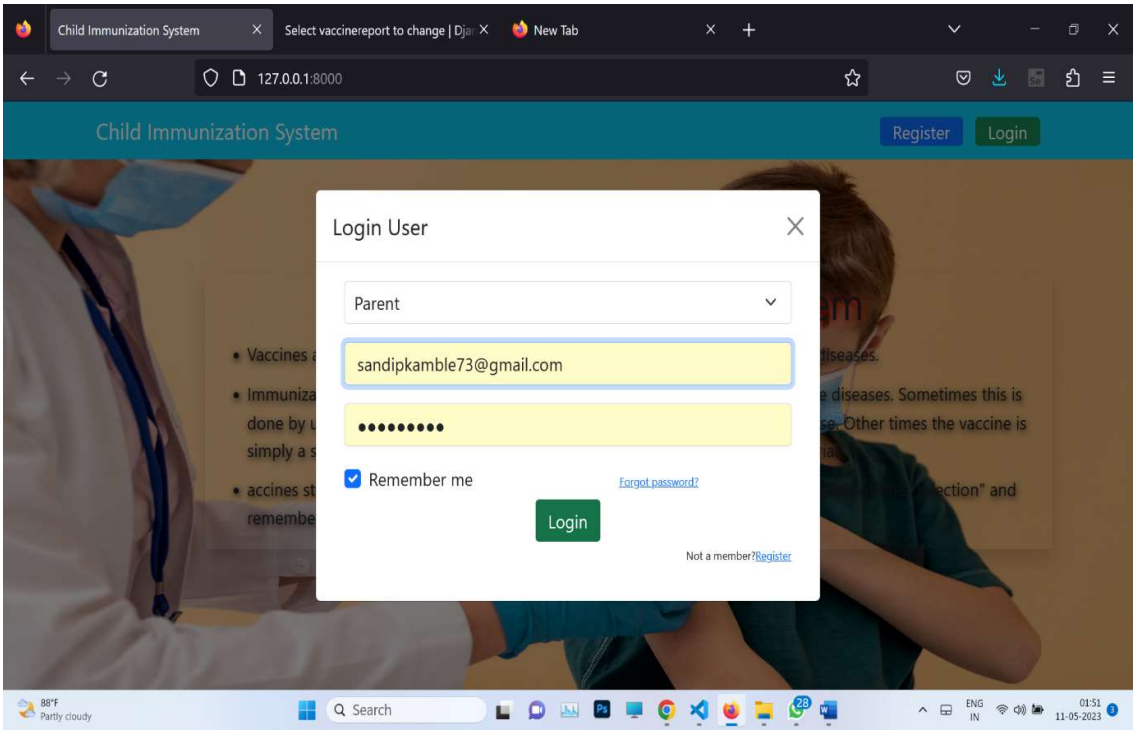
Vaccine schedule SMS



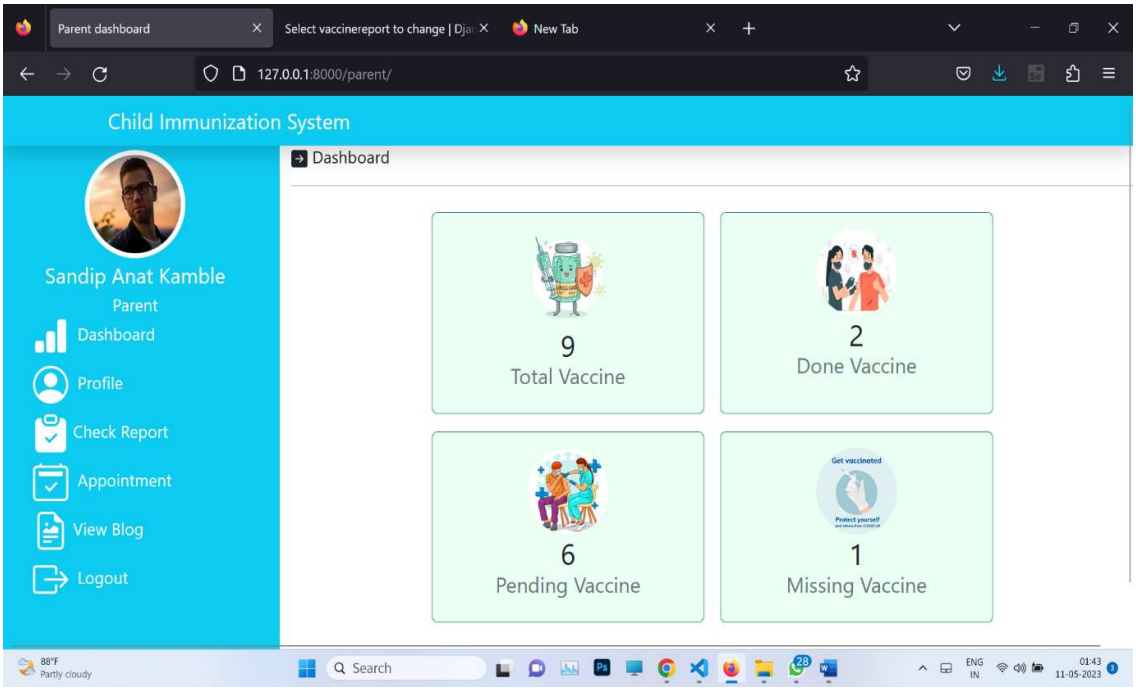
Nurse view blog



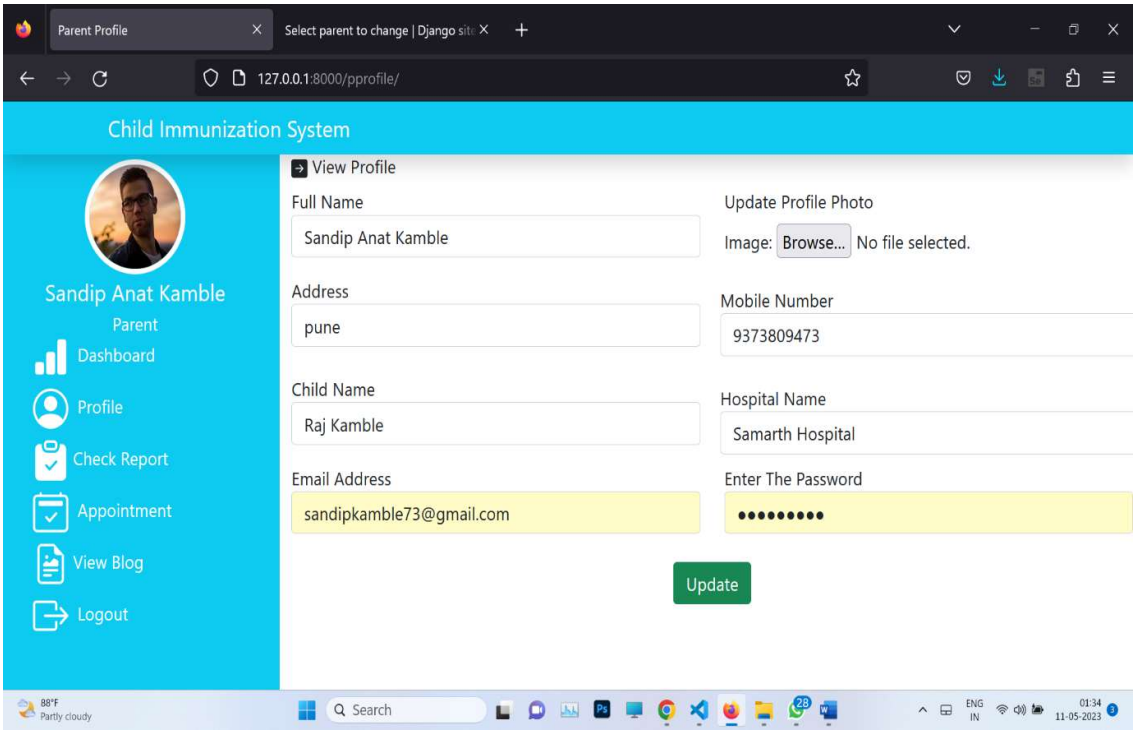
Parent login



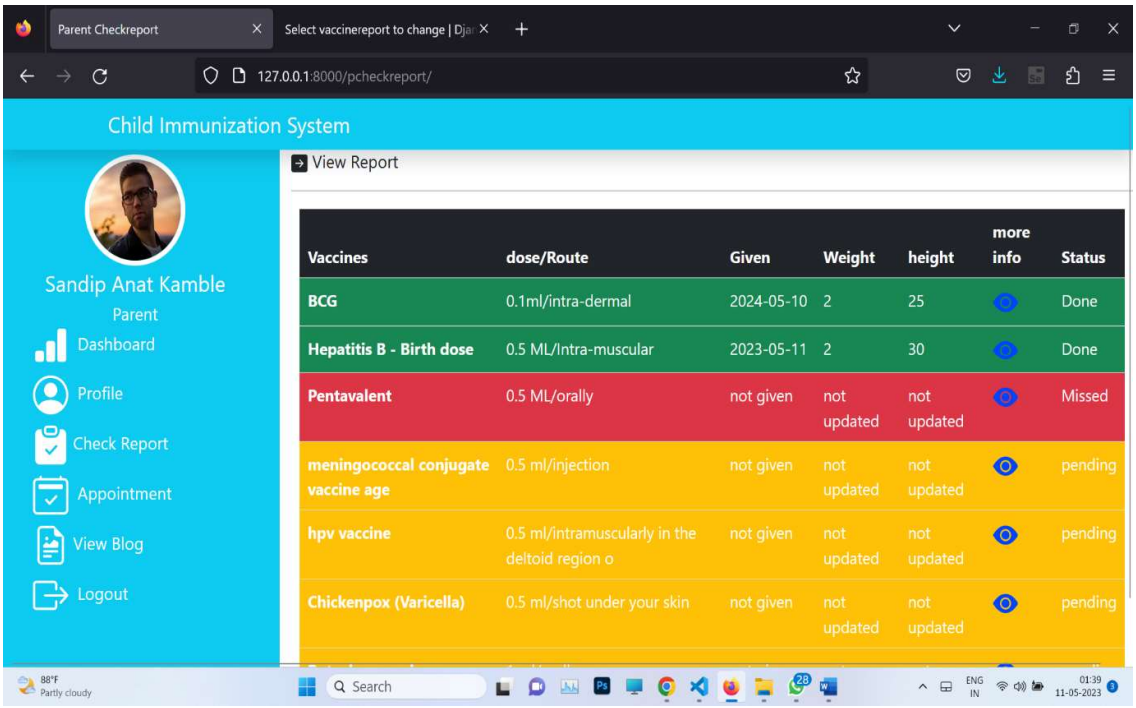
Parent dashboard



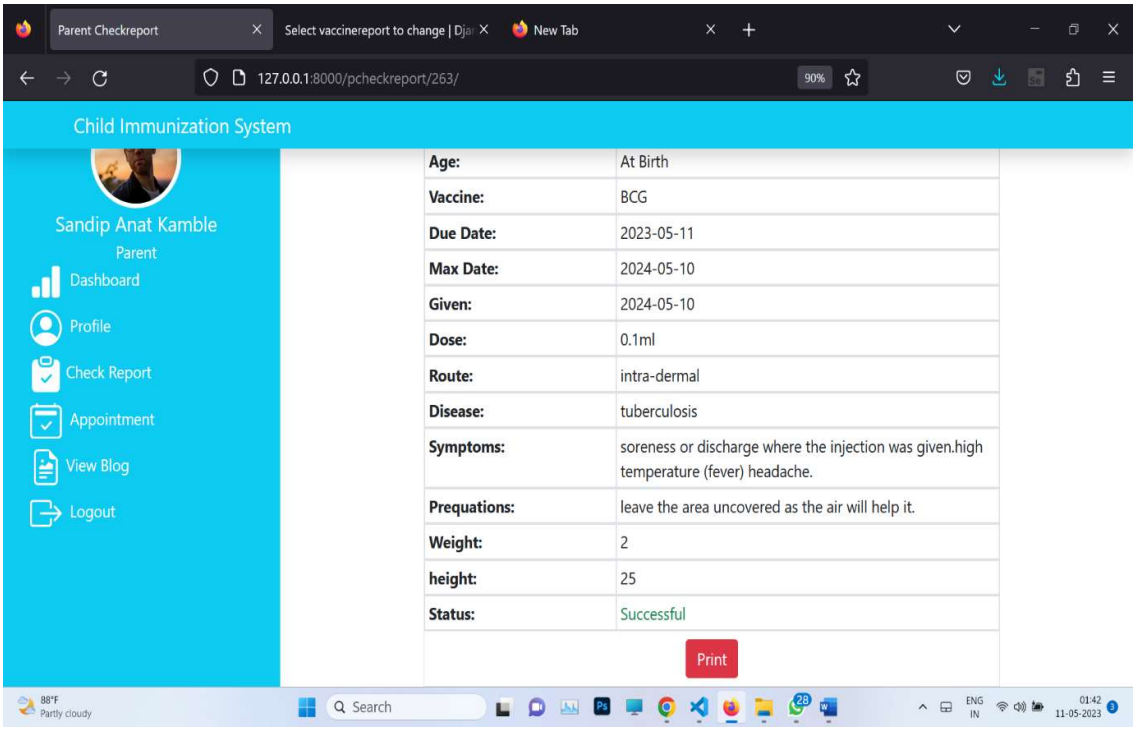
Parent profile



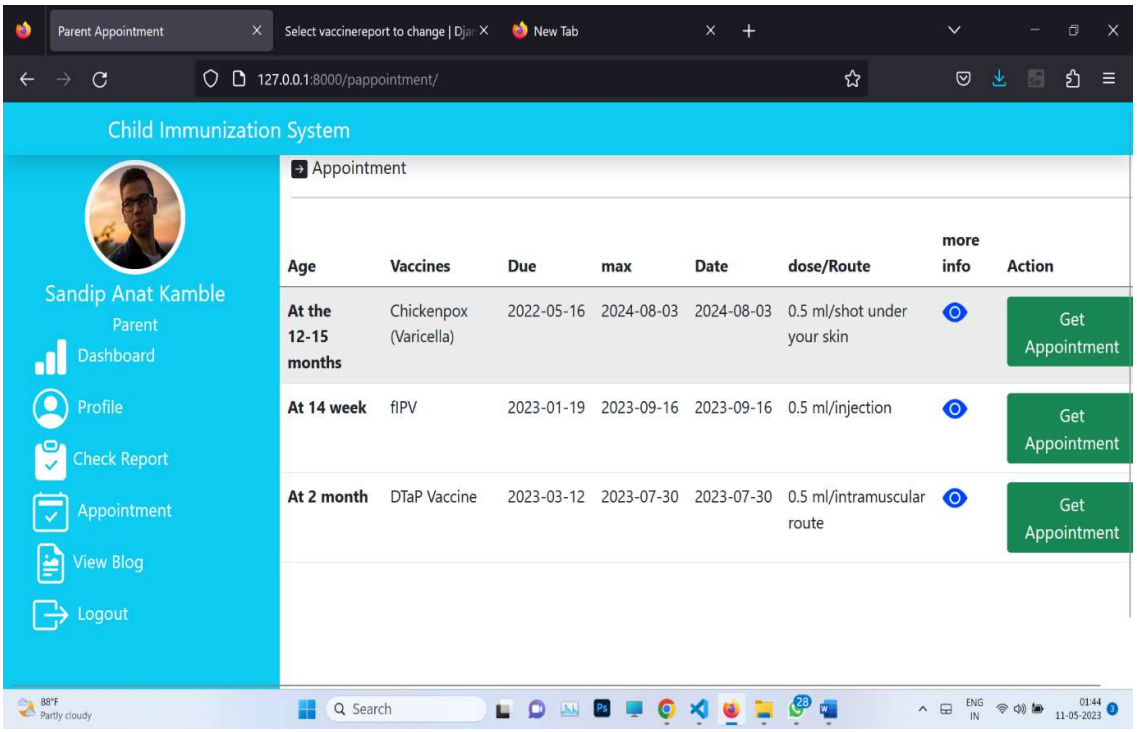
Parent check report



View details



Parent appointment



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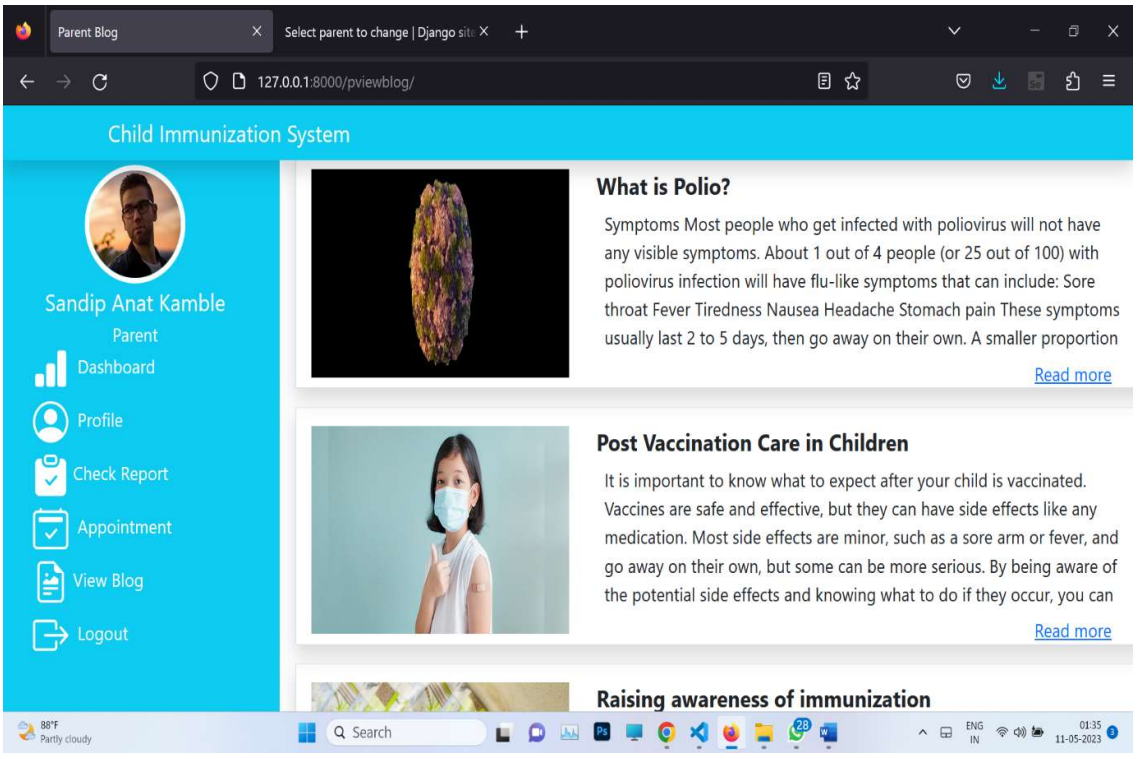

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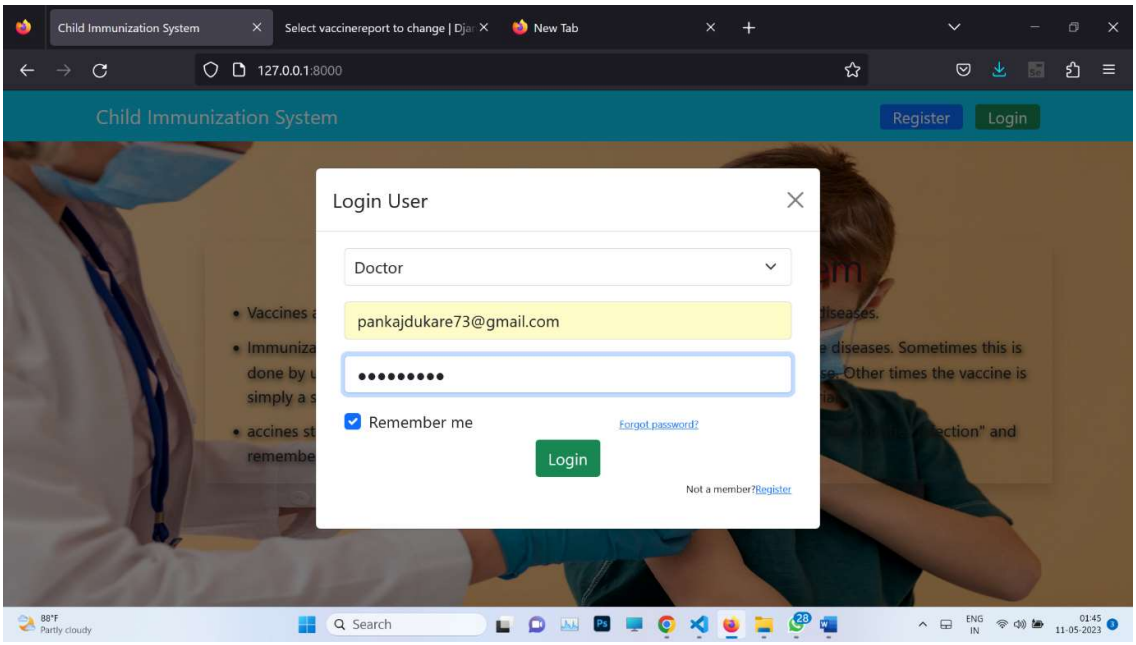

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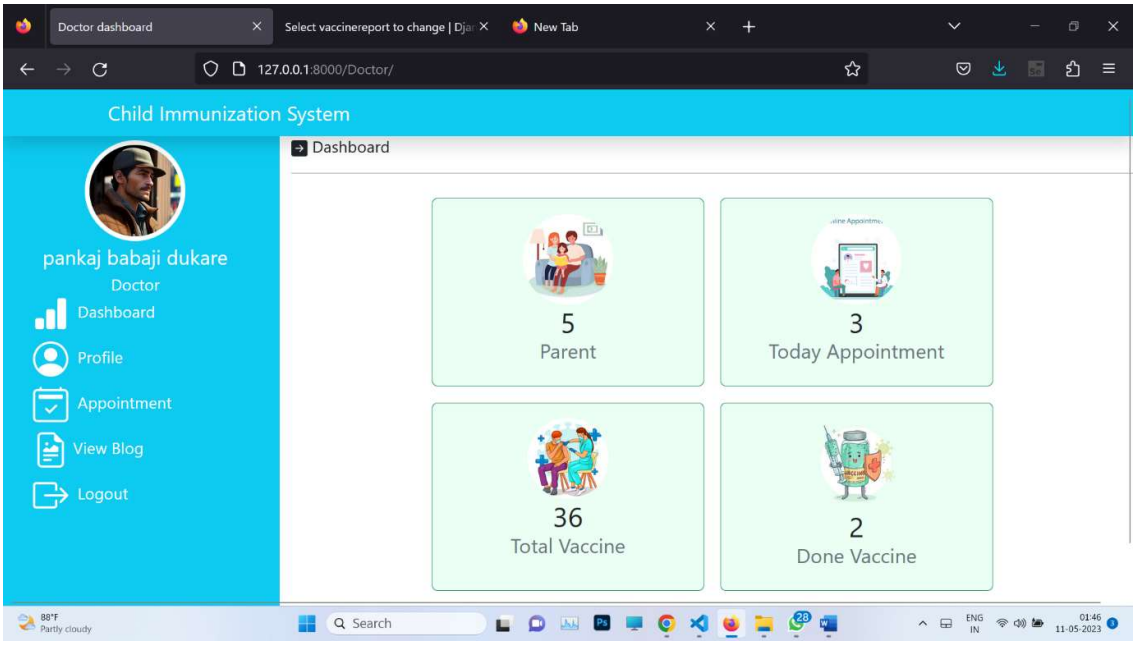

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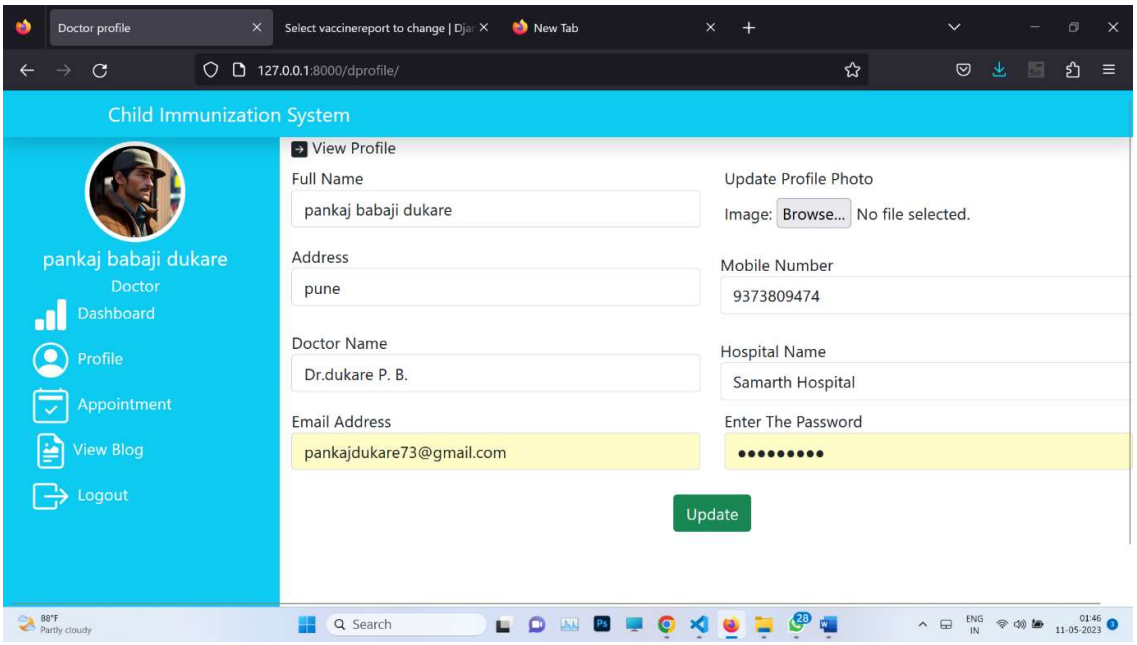

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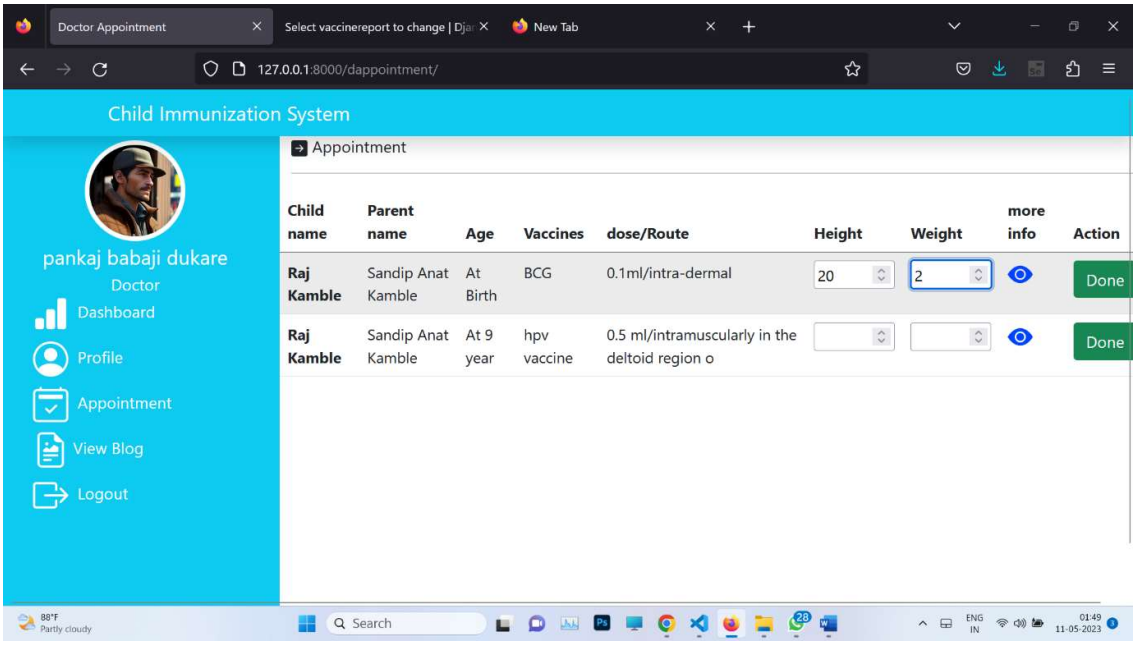
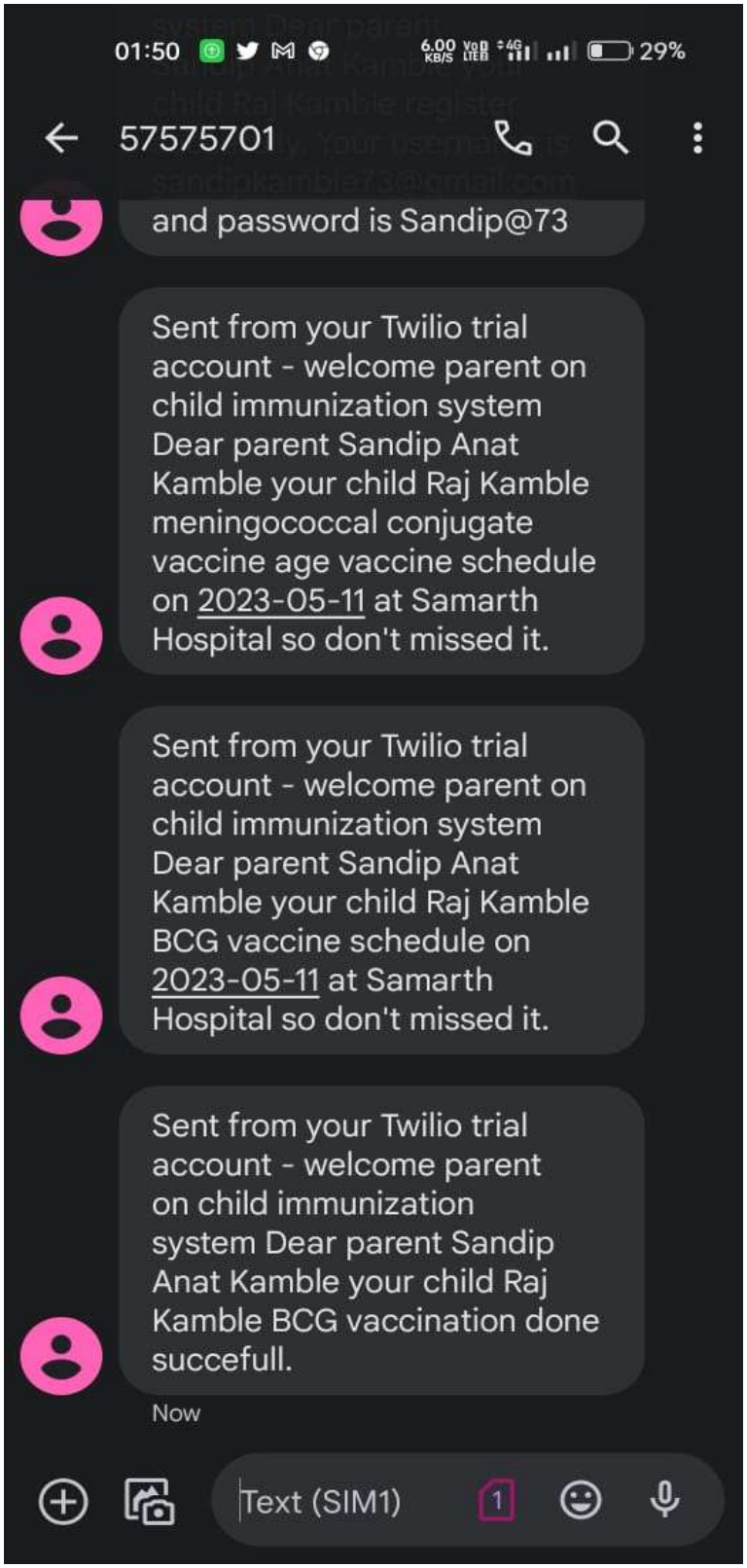
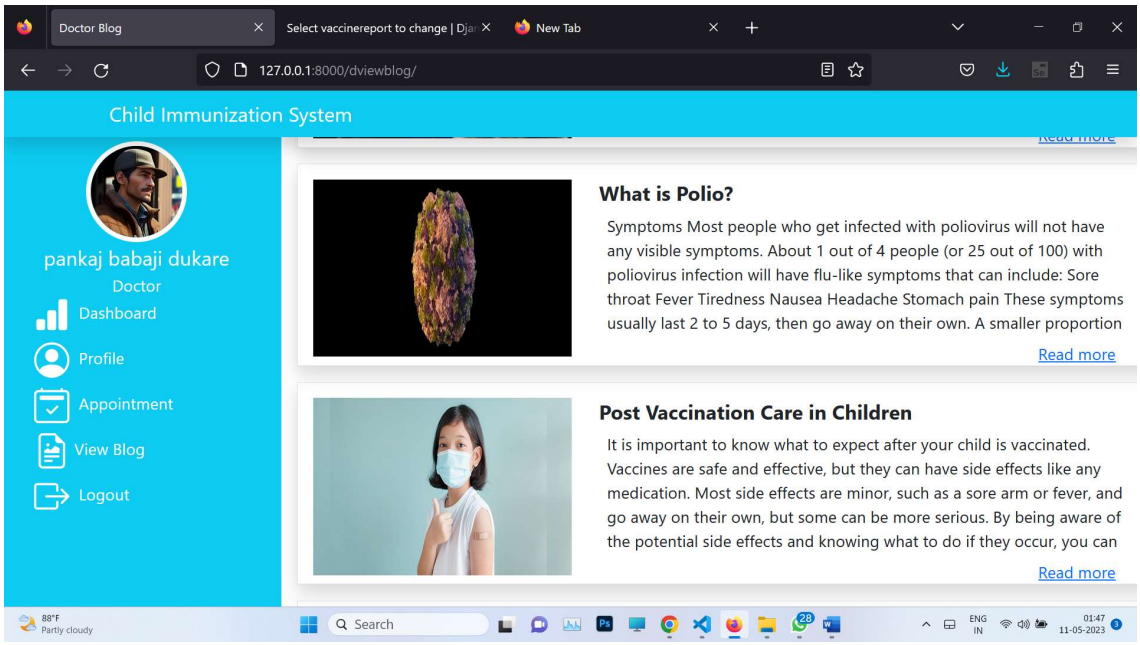


Done vaccination SMS



Doctor view blog



8.3 Applications

There are several applications of a child immunization system project, including:

1. Healthcare delivery: A child immunization system can help to improve healthcare delivery by providing healthcare providers with real-time immunization data, facilitating decision-making, and reducing the risk of vaccine errors.

2. Public health: A child immunization system can contribute to improved public health by reducing the incidence of vaccine-preventable diseases and ensuring that children receive all required vaccines.

3. Data management: A child immunization system can improve the management of immunization data, including tracking vaccine inventory, monitoring vaccine coverage rates, and generating reports.

4. Patient engagement: A child immunization system can help to engage patients by providing parents with access to their child's immunization records, reminding them about upcoming vaccines, and facilitating appointment scheduling.

CHAPTER 09
CONCLUSION

09 CONCLUSION

9.1 Conclusion

In conclusion, a child immunization system project is an important initiative that can have a significant impact on public health and healthcare delivery. By ensuring that children receive all required vaccines on time, a child immunization system can contribute to improved immunization coverage rates, reduced incidence of vaccine-preventable diseases, and better healthcare outcomes.

A child immunization system can also provide healthcare providers and public health officials with valuable data on vaccine coverage rates, vaccine inventory management, and adverse event reporting. This data can inform healthcare decision-making, help identify areas where additional resources or interventions are needed, and contribute to the development of more effective public health policies.

Implementing a child immunization system requires careful planning, coordination, and collaboration between healthcare providers, public health officials, and technology experts. The project should be designed to meet the specific needs and requirements of the community it serves, taking into account factors such as healthcare infrastructure, vaccine supply chain logistics, and cultural and linguistic diversity.

Overall, a child immunization system project is a valuable investment in public health and healthcare delivery, with the potential to improve vaccine coverage rates, enhance data management, and promote efficient and effective healthcare practices.

9.2 Future Work

Some potential areas for future work on a child immunization system project include:

1. Integration with electronic health records (EHRs): Integrating a child immunization system with EHRs can improve data management and make it easier for healthcare providers to access and use immunization data. This integration can also help to reduce the risk of vaccine errors and improve patient safety.

2. Development of mobile applications: Developing mobile applications that allow parents to access their child's immunization records, receive reminders about upcoming vaccines, and schedule appointments can help to improve vaccine coverage rates and increase patient engagement.

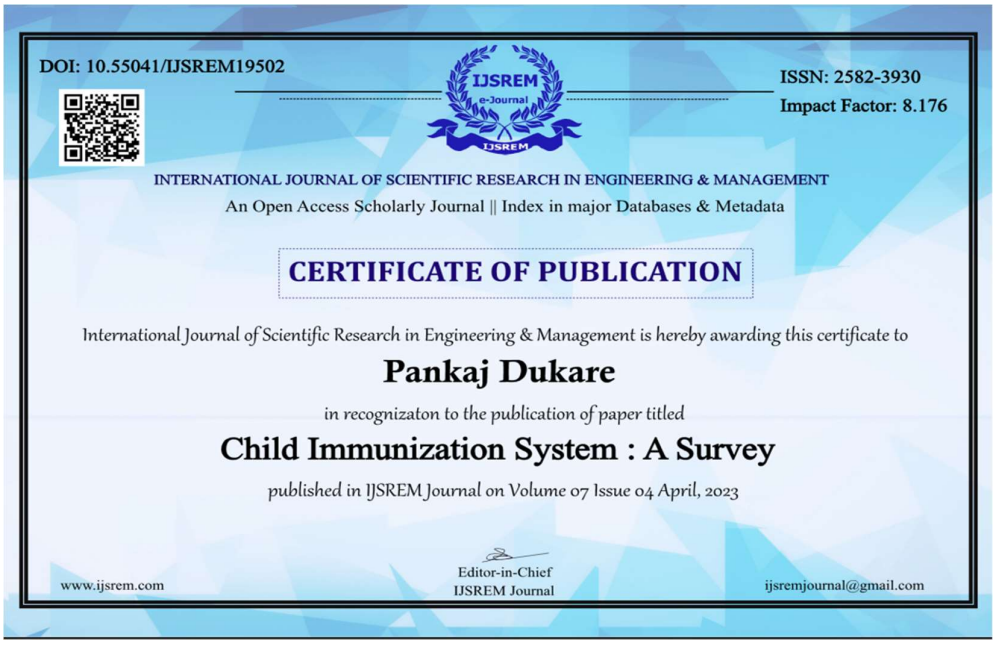
Appendix A: Details of paper publication

Paper Title: Child Immunization System: A Survey

Name of the conference/journal: International Journal of Scientific Research in Engineering and Management (IJSREM)

Comments of reviewers: Paper has been accepted successfully

Certificates:



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INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING & MANAGEMENT

An Open Access Scholarly Journal || Index in major Databases & Metadata

CERTIFICATE OF PUBLICATION

International Journal of Scientific Research in Engineering & Management is hereby awarding this certificate to

Ganesh Kadam

in recognizaton to the publication of paper titled

Child Immunization System : A Survey

published in IJSREM Journal on Volume 07 Issue 04 April, 2023

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Paper :

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Child Immunization System : A Survey

Pankaj Dukare [1], Sandip Kamble [2], Ganesh Kadam [3], Prof. Supriya Kamble [4]

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ABSTRACT

The need for vaccinations in children has been established, and it is one of the duties of parents to administer the necessary vaccinations to their children on time. The purpose of the article is to make it simpler for parents to remember to use an online vaccination planner website. A single analysis cannot forecast more than one disease using a same system. Following the observation and survey, there is not much of a problem, and it may be resolved by creating a schedule for child immunizations and a parental reminder.

INTRODUCTION

The author is putting out a method for forecasting certain ailments. The mother cannot determine the toddler's immunization schedule at each stage, the toddler's track record of growth cannot be known at any moment if the check-up card is destroyed or lost, and the toddler's medical history is impossible to know and difficult to trace. It is required to establish an information system care service that is web-based as an alternative to resolving current issues. In this research, the author presents a general system to deal with healthcare issues, which uses a single platform to store and retrieve comprehensive kid medical history data. It contains information on the child's mandatory vaccination regimen as well as past medical history records. To remind parents to provide their child with

health protection, reminders are also given about the importance of timely vaccines. Every year, immunisation prevents 2 to 3 million fatalities from diphtheria, tetanus, pertussis, and measles. However, if vaccination rates were increased globally, an additional 1.5 million deaths 5 may be avoided.

LITERATURE SURVEY

The author of this paper interpreted on how one such program, called "e-Vaccine," was created, how it works, and how to utilize it to speed up the vaccination process and help parents and doctors better maintain. their children's immunization treatment plans. It uses Aadhaar Verification to authenticate users, enables users to schedule vaccination appointments at hospitals in their states, and sends timely updates and reminders for immunizations that are approaching. Users can browse their profiles, update the vaccination histories of their children, and add new children to their records using the program after logging in using OTP verification [1].

Author Interpreted that Vaccination for kids has been a necessity for them and it is one of the responsibilities of parents to completely give all the vaccines for their appropriately on the right date as well. Sometimes due to the busy schedules of the parents they tend to forget about their kids vaccinations. It would be easier if the parents are having a vaccination planner which can be carried

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wherever they go, with them. Three issues were also discovered, the first of which is the fact that, as we are all too aware, parents of multiple children frequently forget crucial details like the dates of their children's vaccinations. As it stands, India lacks a proper system or application for tracking vaccinations that can be used to remind parents of when their child's next shot is due. Second, the projects that are now in existence only contain data that is saved in databases and can only be accessed by administrators. Online backup would make it easier for users to access these projects. The third issue is that the majority of websites and planner programmes don't include paediatric information, making it difficult for parents with busy schedules to schedule an appointment with a doctor to get their children's vaccinations done on time. According to data from the World Health Organisation, 1.5 million children per year pass away from vaccine-preventable causes. In case of medical emergency, lack of availability of previous medical history records can cause delay in the medical treatment. Also, delay in giving vaccines increases the risk of a seizure and leaves children at risk for diseases longer. To address these issues, a generic system is proposed to store and retrieve the child medical records with mandatory vaccination schedule for each child based on their date of birth and as per the vaccination chart provided by Indian Academy of paediatrics, 2016. A web application with access to both parents and Doctor are proposed with necessary privileges. Considering the drastic increase in number of mobile usages, the same is provided in android based mobile application. Reminders on timely vaccination are also proposed to parents regularly till the vaccination coverage of child is complete. Capturing and storing medical records in a common database can skip the need of carrying paperwork and can help in providing efficient and qualitative treatment to child. Applying analytics on the data can help in research findings in future [2].

It is one of the duties of parents to totally administer all the immunisations for their children suitably on the correct date as well. Vaccination for children has been a must for them. Due to their hectic schedules, parents occasionally neglect to get their children vaccinated. It would be simpler if the parents had a portable immunisation schedule that they could take with them wherever they went. It would be simpler for the parents to have an online vaccination planner website because the internet plays such a significant role in our lives. There are currently no websites designed specifically for vaccine planner, but there are those that only include it as one of their functions.

To lessen the burden on parents, a parental reminder and planner for children's vaccinations is being created. Additionally, this online scheduler was created just for children's vaccines. This kids vaccination planner contains options including a vaccination calendar and a text message reminder. In addition, this system includes a list of paediatricians

Fig. 4. Data mining model to improve immunization problems

who are on-call at the nearby hospital, together with the doctors' contact details and areas of expertise. Additionally, traditional web-based systems only use databases to store data, but this system has a special function called Google Backup that guards against the loss of database-stored data. This Kids Vaccination Planner is therefore crucial for everyone.when they are most susceptible and before they are exposed to potentially life-threatening diseases[3].

An author interpreted that, Lack of access to prior medical history documents in an emergency can delay receiving medical care. Delay in vaccination administration also raises the chance of a seizure and exposes kids to disease for a longer period of time. In order to resolve these problems, a general system is suggested for the storage and retrieval of paediatric records for each child, together with the mandatory vaccination schedule for each kid based on their date

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of birth and in accordance with the vaccine schedule supplied by the Indian Academy of Paediatrics, 2016. It is suggested that a web application with the required privileges be made available to parents and doctors. The same is offered in an android-based mobile application due to the sharp surge in mobile usage [4].

this paper stated that, The many ML techniques used to diagnose diseases like diabetes and heart disease are covered in this study. The majority of models have produced outstanding outcomes because they explain the characteristic in detail. According to earlier studies, SVM significantly improves performance for detecting heart disease by 94.60%. Diabetes has been accurately identified as a naive Bayes condition. The highest categorization precision of 95% is provided. The survey demonstrates the advantages and disadvantages of these algorithms. This survey document also includes a set of tools created by the AI community. These methods offer potential for a better decision-making process as well as being very helpful for the examination of specific situations [5].

system that tracks the condition of health of patient and gathers a sequential health history of the patient which comes handy and efficient for both the medical assistants and patients. Parents will be able to have a close monitoring on their child's health through the web application provided. It will then help minimize the risk of having a high emergency case on their child's health. A close monitoring on their child's immunization progress may also be of great help to prevent unwanted implications on the health of their child. A developmental milestones and health tips feature were added to be well informed [6].

REFERENCES	CONCLUSIONS
Santoshi Kumari, Haripriya. A, Aruna. A, Vidya.D.S, Nithya.M.N[1].	In this paper, a system is suggested with the goal of offering a single platform to store and retrieve medical data of children, together with information on the mandatory vaccination schedule, as the number of children dying from diseases that are preventable by vaccination is notably high.
Uzair Aslam Bhatti1,2,5 , Mengxing Huang1,2, Hao Wang3, Yu Zhang1,2 , Anum Mehmood4,6 , and Wu Di1[2].	In this study, we used a hospital child database to analyse our findings and demonstrate how our machine learning model can track vaccination-related problems.
Shirin Hasan , Mir Mohammad Yousuf, Mubashir Farooq[3].	This system streamlines the process of managing vaccinations by centrally storing user data and medical information.
Dr. P.Hamsagayathri, Mr .S. Vigneshwaran[4].	This paper discusses various techniques of ML for the diagnosis of various diseases such as heart, diabetes diseases. Most models have shown excellent results because they specifically describe the characteristic.

This paper gives a thorough comparison of three algorithms' performance on a medical record, with each method producing an accuracy of up to 95%. The performance is analysed through confusion matrix and accuracy score. Artificial Intelligence will play even more important role in data analysis in the future due to the availability of huge data produced and stored by the modern technology [7].

The goal of this project is to help parents to receive SMS messages that provide time specific information about their children vaccination appointment for their children. ((CVRS-V-SMS-A) may assist parents in making sure that their children receive their vaccinations on time. This would lead to immunize children against diseases and prevent the spread of diseases [8].

Multi disease prediction model is used to predict multiple diseases at a time. Here based on the user input disease will be predicted. The choice will be

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given to user. If the user wants to predict particular disease or if the user don't enter any disease type then based on user entered inputs corresponding disease model will be invoked and predicted. The advantage of multi disease prediction model in advance can predict the probability of occurrence of various disease and also can reduce mortality ratio [9].

objective of this work is to give readers all the information they need to know about machine learning algorithms used in the healthcare industry. From the literature, we created a data table about the accuracy of machine learning algorithms for various diseases, followed by a step-by-step process to complete and systematize this survey paper. A list of the best machine learning algorithms for accurately predicting diseases is the result of this work. With the accuracy of the algorithms all included in one comprehensive paper, this output will assist the researcher and the practitioner in understanding the contribution of machine learning algorithms in the field of health care [10].

The following paper teaches us the vaccination rate for each district in each Indian state. The agencies can use this information to assess the effectiveness of their immunisation programme, and state governments can use it to ensure that the vaccination programme in their jurisdictions is improved and that everyone receives the necessary treatment. If the right vaccine is not administered, it can protect kids from infections and other risks that could endanger their lives [11].

CONCLUSION

The need for vaccinations in children has been established, and it is one of the duties of parents to administer the necessary vaccinations to their children on time. In this paper an author have developed a organized system for child immunization and health care, through which parents, doctors and the system administration can be connected with each other. The objective of this paper is to make the child immunization system digital in which author interpreted providing online assistance, daily healthcare updates, reminders of the vaccination through SMS gateway.

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[5]. Recommendation System for Immunization Coverage and Monitoring

[6] Symptoms Based Disease Prediction Using Machine Learning Techniques

[7] E-healthcare: Child Monitoring Health System (CHMS) with SMS Functionality

[8] Disease Prediction using Machine Learning Algorithms

[9] Children Vaccination Reminder Via SMS Alert

[10] Multi Disease Prediction Model by using Machine Learning and Flask API

[11] Machine Learning Algorithms in Healthcare: A Literature Survey

[12] Child Immunization Using Data Analysis

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Paper Title: Machine Learning Based Child Immunization System

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Paper :

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"Machine Learning Based Child Immunization System"

Pankaj Babaji Dukare[1], Sandip Anant Kamble[2], Ganesh Vishwas Kadam[3], Prof.Supriya Kamble[4]

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Abstract

Author present in this paper, a Machine Learning based system to address healthcare issues, where a common platform to store and retrieve complete child medical history information. It contains information about the child's mandatory vaccination schedule as well as previous medical history records. To remind parents to provide their child with health protection, reminders are also given about the importance of timely vaccinations. Parents and doctors can access the child's medical records online at any time and from any location using Web-based technology with the necessary privileges. This work enables both parents and healthcare providers to offer higher-caliber medical care. Finally, the data collection can be further examined to identify disease trends and patterns, opening up new opportunities for engineering and medical research that will improve quality of life. One of the key infrastructure components in creating smart cities, a project recently undertaken by the Indian government, is smart healthcare. This highlights the requirement for creating clever solutions to deliver higher-caliber healthcare services to all populations. As a result of inadequate healthcare, malnutrition, and subpar sanitation—all of which are preventable—India has the highest rate of child mortality in the entire world.

1.Introduction

India is the second most populous country in the world, around a fifth of the world's population. Providing quality healthcare to all is a huge challenge and it is complex. Of the total population, 29.7% represent children under age 15.They represent future generation of the country. Ensuring their healthy growth and development is a primary concern. According to World Health Organization reports, 1.5 million children die every year due to vaccine preventable diseases. In case of medical emergency, lack of availability of previous medical history records can cause delay in the medical treatment. Also, delay in giving vaccines increases the risk of a seizure and leaves children at risk. for diseases longer. To address these issues, a Machine Learning based system is proposed to store and retrieve the child medical records with mandatory vaccination schedule for each child based on their date of birth and as per the vaccination chart provided by Indian Academy of paediatrics. A web application with access to both parents and doctor are proposed with necessary privileges. Below diagram illustrate that the details of child and infants ages for the vaccinations.

2.Problem

As we all know, nowadays, we are busy with our daily tasks, and parents of multiple children often forget important details like the dates of their children's vaccinations. As we can see, there are no proper vaccination tracking planner applications or systems in India that can be used to remind us on when the next vaccination is supposed to be done for our child. This is the first of three problems that were encountered. Second, current initiatives only save data in databases, which can only be viewed by administrators, and do not yet have online backups that would make it easier for users to retrieve the data. The third issue is that the majority Parents with hectic schedules find it challenging to arrange an appointment with the doctor so that their children may have their vaccinations on time because existing websites and planner applications don't include the information of the paediatrics along with their information. One out of every three kids leaves the immunisation programme, and practically all children are only partially protected. Immunisations that are delayed may have negative impacts on youngsters.

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2.1. Solution

The issue can be efficiently handled by compiling all of the child's vaccination information as well as prior medical history in order to offer the quantitative and qualitative vaccination. Therefore, in order to deliver better healthcare services, a platform built on machine learning is required to store and retrieve information on children's medical histories and vaccination schedules. The combined medical histories of children may be an opportunity for conducting in-depth analysis and study in the technical disciplines of engineering and medicine in the future. The system's primary objective is to offer a child's immunisation history according to the child's date of birth and to maintain a shared database on the child's full medical history. To remind parents on the timely vaccination shots, a reminder system is also proposed using SMS and E-Mail on the type and date of vaccination. It mainly helps parents and their children to avoid delay in giving vaccination.

3.Proposed Architecture

The system's primary objective is to offer a child's immunisation history according to the child's date of birth and to maintain a shared database on the child's full medical history. A mechanism to view these details is proposed, with access available online anywhere and at any time, given the significant growth in mobile usage and internet usage. A reminder system using SMS and E-Mail on the type and date of vaccine is also suggested to help parents remember to get their children their vaccinations on time. It primarily aids parents and their kids in avoiding vaccine delays. Doctor can view the vaccination history details along with previous medical records for providing the right vaccination to the child and can upload and update the latest vaccination shot details in the system. This will help doctors provide better quality treatment and services at the right time. The proposed architecture of the immunization system is client-server architecture with Model View Control pattern. For web application design, Django technology is proposed. Python based technologies are proposed such html, CSS and JavaScript are also proposed. Relational database, MySQL is proposed for storing and retrieving the data.

Vaccination chart as per Indian Academy of Paediatrics is proposed to be considered for reminding parents on regular basis till the completion of the vaccination shots to their child.

3.1 System Architecture

The figure demonstrates how the child immunization system works. doctor can login using username and password and after successful login, doctor can perform various tasks like register child, approve appointment, update report, write blogs. Also, a parent as a user can login to the system with a username and password after his account is created. view profile, schedule vaccine, check report, read blog. It uses MySQL software to keep the records in the most effective and convenient database for information storage. Information entered by the user

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is kept in a database. After populating the database, the system notifies the doctor if a patient fails to take the vaccine on time by sending an alarm a day in advance to the patient's provided contact number. Nurse is the name of another module that works under the doctor to manage child data like appointment approval and status changes. And the system administrator manages all of the abovementioned modules.

Project Modules

1.Admin Module:

Admin module can be managed to both parents and doctor modules. Admin module has a authority to make changes in the system as per requirements. Admin can manage the user, view profile, upload blogs by using his credential

FIG:- Admin Module

2.Parent Module:

This module will allow parents to register themselves and their children, view vaccination schedules, and book appointments for vaccinations. They can also view the immunization records of their children and receive reminders for upcoming vaccinations.

FIG:- Parent Module

3.Doctor Module:

This module will allow healthcare providers to view the immunization records of children, administer vaccines, and record immunizations. They can also view the vaccination schedules of children and generate reports.

FIG:- Doctor Module

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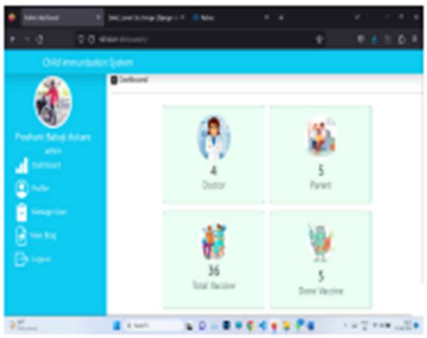
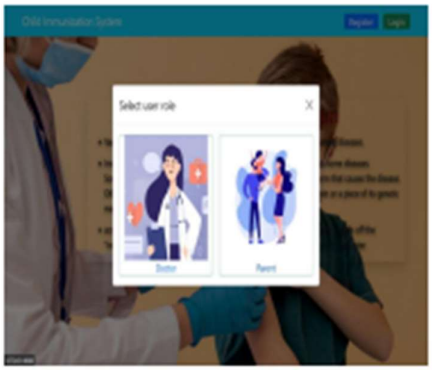
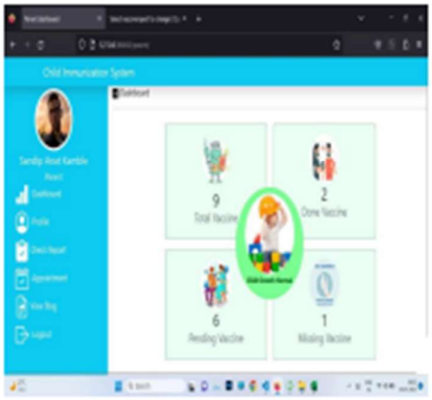
4.Result







5.Conclusion

Hence, we have develop the machine learning based Child Immunization System which helps to alerts parents for providing timely vaccination to their child for giving protection from vaccine preventable diseases are implemented using SMS messages. by using machine learning, the facility to view previous medical records can help in speedy diagnose and action.

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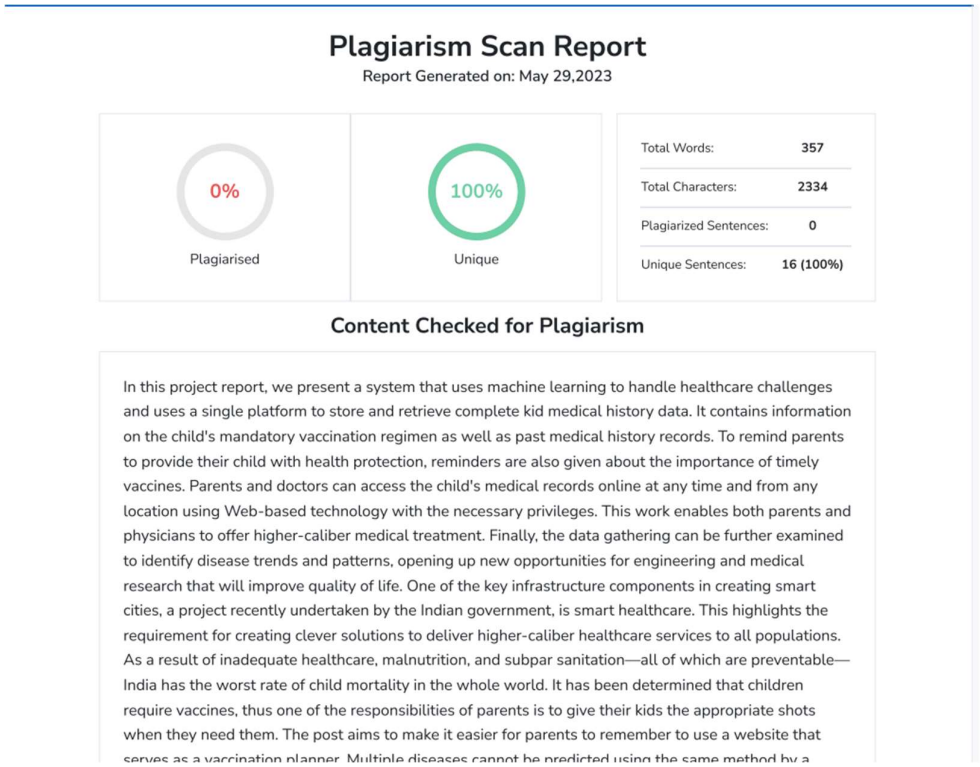
Appendix C: Plagiarism Report of project report.



Plagiarism Scan Report

Report Generated on: May 29,2023

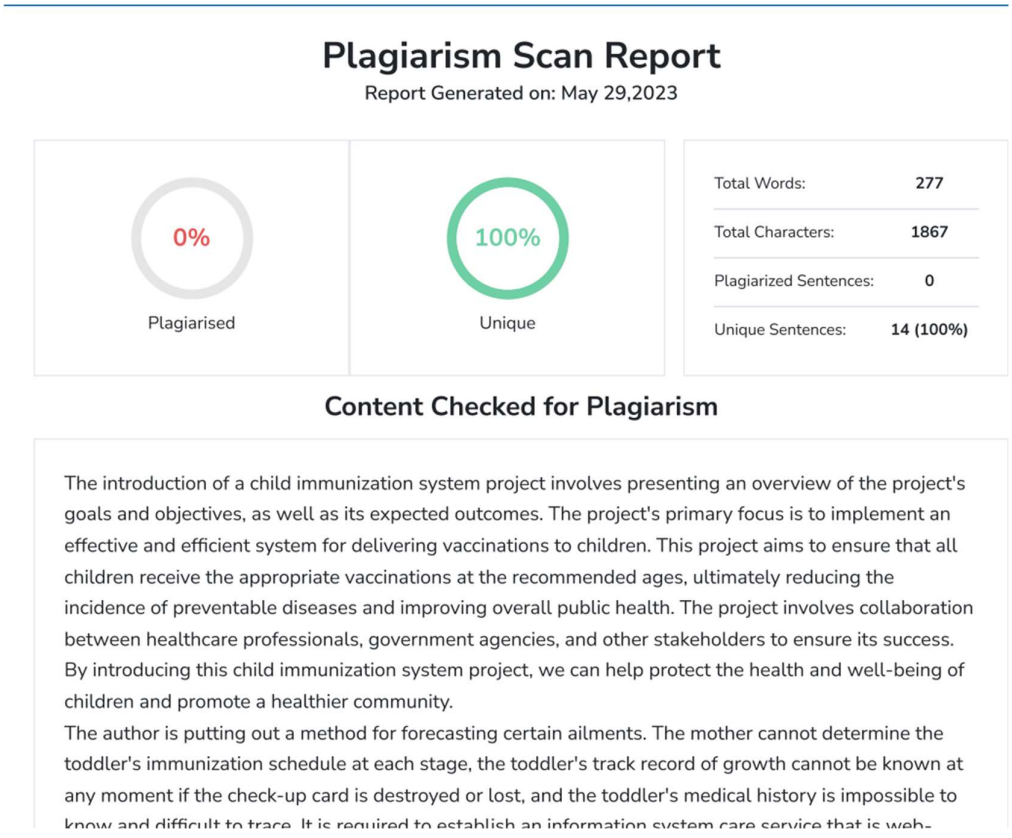
0% Plagiarised

100% Unique

Total Words:	357
Total Characters:	2334
Plagiarized Sentences:	0
Unique Sentences:	16 (100%)

Content Checked for Plagiarism

In this project report, we present a system that uses machine learning to handle healthcare challenges and uses a single platform to store and retrieve complete kid medical history data. It contains information on the child's mandatory vaccination regimen as well as past medical history records. To remind parents to provide their child with health protection, reminders are also given about the importance of timely vaccines. Parents and doctors can access the child's medical records online at any time and from any location using Web-based technology with the necessary privileges. This work enables both parents and physicians to offer higher-caliber medical treatment. Finally, the data gathering can be further examined to identify disease trends and patterns, opening up new opportunities for engineering and medical research that will improve quality of life. One of the key infrastructure components in creating smart cities, a project recently undertaken by the Indian government, is smart healthcare. This highlights the requirement for creating clever solutions to deliver higher-caliber healthcare services to all populations. As a result of inadequate healthcare, malnutrition, and subpar sanitation—all of which are preventable—India has the worst rate of child mortality in the whole world. It has been determined that children require vaccines, thus one of the responsibilities of parents is to give their kids the appropriate shots when they need them. The post aims to make it easier for parents to remember to use a website that serves as a vaccination planner. Multiple diseases cannot be predicted using the same method by a



Plagiarism Scan Report

Report Generated on: May 29,2023

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100% Unique

Total Words:	277
Total Characters:	1867
Plagiarized Sentences:	0
Unique Sentences:	14 (100%)

Content Checked for Plagiarism

The introduction of a child immunization system project involves presenting an overview of the project's goals and objectives, as well as its expected outcomes. The project's primary focus is to implement an effective and efficient system for delivering vaccinations to children. This project aims to ensure that all children receive the appropriate vaccinations at the recommended ages, ultimately reducing the incidence of preventable diseases and improving overall public health. The project involves collaboration between healthcare professionals, government agencies, and other stakeholders to ensure its success. By introducing this child immunization system project, we can help protect the health and well-being of children and promote a healthier community.

The author is putting out a method for forecasting certain ailments. The mother cannot determine the toddler's immunization schedule at each stage, the toddler's track record of growth cannot be known at any moment if the check-up card is destroyed or lost, and the toddler's medical history is impossible to know and difficult to trace. It is required to establish an information system care service that is web-

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