International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 05 | May 2020 www.irjet.net p-ISSN: 2395-0072

Digital Tracking of Children Health Status and Immunization Services

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Abstract - *Vaccination is one that is important for every individual since vaccination gives immunity and helps to prevent from various diseases. Migration among cities, states, rural to urban, it is essential to track the health record so that health services can reach up to such people in the form of continuum of care. Immunization of children is one important field where we can provide full immunization coverage to such community who are often left behind. In this regard, we present a software application named Child Immunization Tracker, where we register every child being born in a particular area along with the parent details by using their biometrics and track the child for every immunization scheduled by alerting them using deep learning algorithms like MARSplines and Logistic Regression and also maintaining the record of the same for the child.*

Key Words: **Child Immunization Tracker, Deep learning algorithm, Immunization scheduling**

1. INTRODUCTION

Digital tracking of children health status and immunization is one which can be used to receive messages about the vaccinations that have to be taken. It also alerts the user about a certain outbreak in a particular area. The messages are sent to the particular registered user's mobile in the form of SMS. The Child Immunization Tracker project is mainly done to provide a proper reminder for the user to remember their kid's vaccines and give the appropriate vaccines to their kids on time. In addition, this system also helps to keep an updated record of the vaccines which are given to the kids of the users in a schedule form. Furthermore, the benefits of creating Children Immunization Tracker is to help the user to be reminded on the upcoming vaccination by sending an alert via text message to them, so that they will not tend to forget the vaccination and also will have a tab on what has been given and what is to come.

2. LITERATURE SURVEY

2.1 Jeev: A Low-Cost Cell Phone Application for Tracking the Vaccination Coverage of Children in Rural Communities published in 2013 by IEEE International Conference on Healthcare Informatics

Jeev, a software application is used to track the vaccination coverage of children in rural communities. Jeev synergistically combines the power of smart phones and the ubiquity of cellular infrastructure, QR codes, and national identification cards. They present the design of Jeev and highlight its unique features along with a preliminary evaluation of its performance. They plan to pilot test Jeev in a rural population to study its effectiveness and identify socio-cultural issues that may arise in a large-scale deployment. Jeev does not use any biometric data. It is based on a client-server model and uses low cost text messaging. Data captured by different clients can be synchronized on the server in real-time. They presented a preliminary evaluation of Jeev's performance and energy consumption using the National Immunization Survey datasets to show its efficiency.

2.2 Real Time Access to Online Immunization Records and its Impact on Tetanus Immunization Coverage in the ED published in 2016 Second International Conference on Cognitive Computing and Information Processing (CCIP)

The main objective of this paper was to evaluate the impact of online access to the state Immunization Information Systems (IIS) on the immunization practices of emergency department (ED) providers in a pediatric academic tertiary care center. To improve the coverage, informatics experts have suggested the importance of including and allowing inpatient systems for ordering and documenting immunizations, support for two-dimensional barcode technology for documenting, exchange of immunization data with a health information exchange or an immunization repository such as GRITS and more importantly, access to immunization forecasting tools with reminders to improve immunization coverage of hospitalized patients. Providing interactive reminders and alerts at POC for clinicians to reduce "missed opportunities" to vaccinate, should be looked into,

balancing any alert fatigue that may be triggered due to too many alerts. Also, models are developed to precisely evaluate online decision support systems such as (IIS), for their utility and impact to modify short-term and long-term patient outcomes.

2.3 Immunize - Baby Steps for smart healthcare published in 2017 International Conference on Innovations in Green Energy and Healthcare Technologies (IGEHT)

They presented in this paper, a generic system to address healthcare issue, 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 and Mobile 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. Using java servlet technology, java Server Pages (JSP) in the server side and java script, j-query at client side, web based application is developed. Here, JSP pages are used for the presentation layer, and servlets for processing tasks. Servlet acts as a controller responsible for processing requests and is responsible for deciding the JSP page to forward request. JSP page retrieves objects created by servlet and extracts dynamic content for insertion within a template. Using MySQL database, data is stored and retrieved.

2.4 Use of Mobile Phone and Facility-based Server Technology in Routine Immunization and Disease Surveillance Activities in Nigeria: Strengthening Polio Surveillance published in 2018 International Conference on Smart Computing and Electronic Enterprise (ICSCEE)

This study's objective is to document and assess the use of mobile phone and facility-based server technology in the supportive supervision of routine immunization and disease surveillance activities in Nigeria. The results showed a significant improvement over the paper-based collection processes and this was realized within a secured data collation environment with optimum timeliness, security and quality control. The study concluded that the premise-based server is cost effective compared to total cloud cost over 5 years .Visualizations on the facility based server have ensured the ability to triangulate real-time data with dashboards for every day follow-up of data from the field which can be very useful in emergencies and outbreak responses. The visualizations of data coming from the field is a robust and veritable tool to make faster and better decisions for polio surveillance and routine immunization support.

2.5 Parental Reminder and Planner for Children Vaccination published in 2019 IEEE 9th International Conference on System Engineering and Technology (ICSET)

Main intension of this is project is to make an easier way of reminder for the parents to have an online vaccination planner website. Other than that, it also helps to keep record of the vaccinations which has been given earlier and it's easier to view the record anytime. The methodology that is used to develop this web-based system is by using Agile Unified Process (AUP) it consists of four phases which are inception, elaboration, construction and transition. As an outcome of the observation and survey, there are few difficulty takes place and the resolution can be done by developing this Parental Reminder and Planner for Children Vaccination. As a conclusion, by developing this Kids Vaccination Planner it will become a good initiative to help the parents to keep track of their kids vaccines and this web based system also have some enhancement to be made for the future works. Besides that, this project has an additional backup in Google Cloud which helps to prevent loss of data from the Database.

3. EXISTING SYSTEM

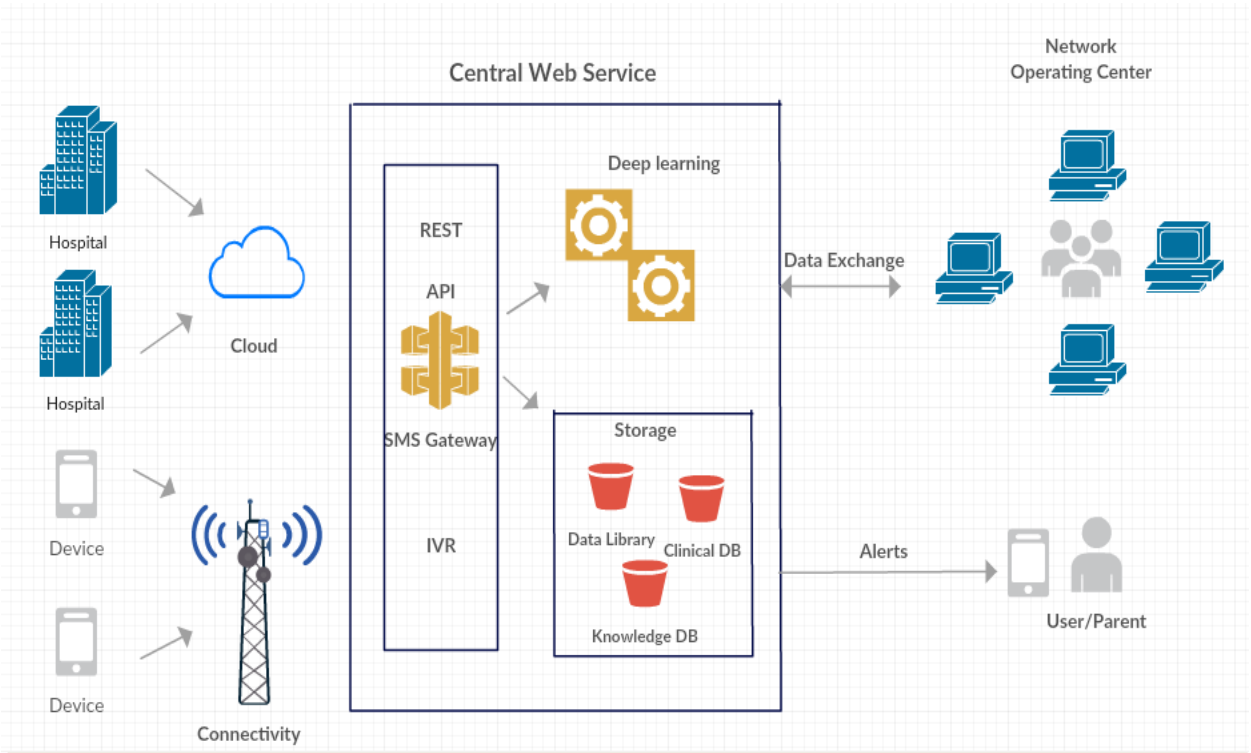
In the existing systems some captures and processes infant fingerprints using fingerprint readers and inexpensive net books while in others the infant's date of birth and database of the infant's complete medical history are maintained. It reminds parents about the timely vaccination shots by using SMS and E-Mail on the type and date of vaccination. 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. It is an android based mobile application. This system has a unique feature which is Google Backup to prevent the data stored in database from being lost but the only limitation of that system is

that it provides the information of the Pediatrics who are working only in the hospitals which are situated in one particular location only.

4. PROPOSED SYSTEM

This study proposes to implement algorithms which would be used to send SMS to the registered parents/users. Firstly, the input data is acquired from the biometrics of the parents and the first vaccination is provided after the registration when the child is born. The data is sufficient to create a unique CHILD ID and PARENT ID. Secondly, messages are sent through SMS to alert them about the next vaccination prior 2-3 days. Also, when certain outbreaks take place, alert messages are sent and information if any medical camp is organized in that particular region. Accessing the child's data and updating the vaccination is done by the medical practitioner using the biometrics of the parents. The medical practitioner uses his/her email id to login. The parent would have their own account to keep in track of the vaccinations that have been given. This way, the data for the children in the rural area being immunized can be tracked. Since only the biometrics of the parent is used it provides a secure environment.

5. SYSTEM ARCHITECTURE AND MODULES

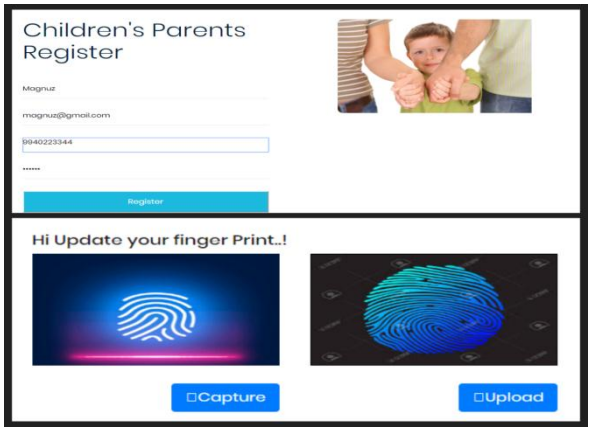


MODULES

- Parent registration
- Fingerprint Authentication
- Child Information
- Admin login
- Verification
- Notification Alert

5.1 Parent Registration

This module contains the registration page which must be filled by the parents .It contains the name, email id , phone number to which the sms must be sent and a password. Then the parent must register their finger print.



5.2 Fingerprint Authentication

In the first module after the parent of the new born child does the registration process with the biometric system. The information about the parent and their child will be stored along with their unique fingerprint. Hence after authentication the parent can access the account.

5.3 Child Information

In this module, the information of the new born child will get updated to the server by the hospital admin or the doctor .Here they will be able to know what vaccinations have been given.

Vaccination Details

Sno	Date	Vaccination	ChildName	Parent Name	Status
1	2020-34-01 01:34:16	Hepatitis B' (HepB)	Nala	Frank	Completed

5.4 Admin login

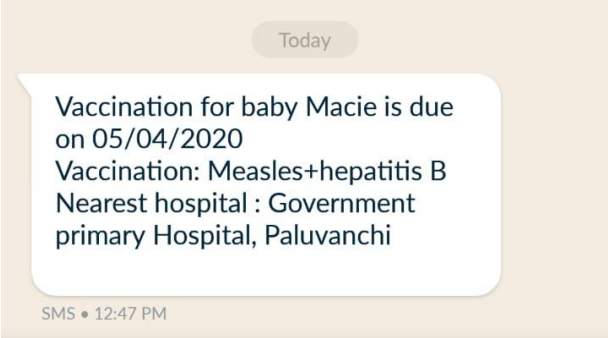
Admin logs in by using their email address, here the admin can enter the vaccination table ,add vaccine details after its been given to the child by using the PARENT ID, send messages to the particular child that needs vaccination and also alert users of certain outbreaks in that particular area.

5.5 Verification

The verification process for the particular parent and the new born child will be done by the server using the parent's fingerprint and the details of the new born will get uploaded along with the vaccination schedule which has been created.

5.6 Notification Alert

Finally, the server will send notification in the form of sms to the parent about the vaccination that has to be given to the toddler until the complete vaccination schedule gets completed. The notification will contain the due date, the type of vaccination to be given along with the nearest hospital.



6. CONCLUSION

This Child Immunization Tracker is done to predominantly provide an efficient reminder for the parents to remember their kid's vaccination. The system also keeps the vaccination record for every child registered and alerts the parents for upcoming vaccines via text messages. Furthermore, it also provides the awareness of outbreak happening around the region and prompts the right vaccination to be given. The algorithms implemented in the project proffer the location accuracy and vaccination alert. This project will be highly beneficial for the users with busy lifestyle as well as the users present in the rural regions.

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