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Healthconnect: A Centralized Digital Platform for Real-Time Monitoring of PHCS and Sub-Centers

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ABSTRACT: Primary Health Centres (PHCs) and Sub-Centres constitute the foundation of rural and semi-urban healthcare in India. Despite their vital function in providing essential health services, these facilities frequently encounter challenges such as inconsistent staff attendance, absence of real-time monitoring, and delays in service reporting. These problems impede efficiency, diminish accountability, and adversely impact the overall quality of healthcare delivery. HealthConnect is a centralized, web-based digital platform developed utilizing the MERN stack (MongoDB, Express.js, React.js, Node.js), aimed at addressing these operational challenges. The system facilitates real-time attendance tracking through GPS and biometric verification, ensuring transparency and minimizing manual errors. In instances of absenteeism, automated notifications are dispatched to supervisory officers, enabling prompt intervention and enhanced workforce accountability. Beyond attendance monitoring, HealthConnect provides interactive dashboards that showcase real-time service reports and performance analytics. These resources assist healthcare administrators in making informed decisions, optimizing resource allocation, and efficiently tracking key performance indicators. By digitizing operations and facilitating real-time oversight, HealthConnect improves transparency, accountability, and administrative efficiency across public healthcare facilities. It acts as a scalable solution that can substantially enhance service delivery in rural and semi-urban healthcare systems.

KEYWORDS:: Medical history, AES-256 encryption, centralization, data integrity, healthcare.

I. INTRODUCTION

India's healthcare system ranks among the largest globally, catering to a population exceeding 1.4 billion individuals. A considerable segment of this demographic lives in rural and semi-urban regions, where Primary Health Centres (PHCs) and Sub-Centres are crucial in providing essential healthcare services. These facilities constitute the foundation of the public health delivery framework and are tasked with addressing the preventive, promotive, and basic curative requirements of millions. Nevertheless, despite their vital role, PHCs and Sub-Centres frequently encounter numerous operational challenges that significantly impede their effectiveness.

Some of the most urgent concerns include inconsistent staff attendance, insufficient real-time supervision, ineffective service reporting, and a lack of accountability mechanisms. These issues not only disrupt the continuity of services but also undermine public trust in government-operated healthcare services. The lack of timely data, coupled with manual record-keeping methods, results in administrative delays and a deficiency in transparency during decision-making processes. Over time, these inefficiencies contribute to a marked decline in the overall quality of healthcare delivered at the grassroots level. To tackle these ongoing challenges, this project introduces a web-based digital solution called HealthConnect. This platform is built using the MERN stack—MongoDB, Express.js, React.js, and Node.js—which offers a contemporary, scalable, and high-performance environment for developing robust web applications. HealthConnect aims to digitize the operational workflows of PHCs and Sub-Centres, facilitating real-time monitoring and data-driven management. The platform is focused on enhancing transparency, accountability, and efficiency across various aspects of public healthcare facilities.

OBJECTIVES

The main goal of this initiative is to create HealthConnect, a centralized digital platform designed to improve operational efficiency and service delivery within public healthcare facilities, especially in rural and semi-urban areas.

The system is intended to facilitate real-time attendance monitoring of healthcare personnel through GPS and biometric technologies, thus minimizing manual errors and enhancing workforce accountability. HealthConnect also strives to simplify administrative tasks by producing automated notifications in instances of absenteeism, enabling prompt action by supervisory bodies. Furthermore, the platform offers healthcare administrators interactive dashboards and real-time analytics to aid in data-driven decision-making, optimize resource distribution, and track key performance indicators. By developing a scalable and flexible solution, the project aims to enhance transparency, accountability, and the overall quality of healthcare services in underserved regions.

II. LITERATURE SURVEY

The paper “A blockchain enabled sharing platform for personal health records” [1] covers the challenges of managing patient health records across multiple organizations, emphasizing the need for secure and consent-driven solutions. It reviews encryption methods and access control models, highlighting the limitations of traditional models in distributed systems like PHR. It discusses the adoption of blockchain, particularly Hyperledger Fabric, to address these challenges. Additionally, it touches on patient self-governance and the trend of zero-trust security models. Overall, the survey provides background for the proposed blockchain implemented PHR sharing platform with user-controlled security and privacy.

The paper “A blockchain-based scheme for secure storage and sharing of medical records” [2] highlights the growing role of IoT in healthcare, emphasizing its use in patient monitoring and data collection. Security concerns regarding medical data collected through IoT devices are identified, leading to the proposal of an AI and blockchain-enabled solution for enhanced cybersecurity. The review discusses prior research, noting limitations such as scalability issues and centralized trust. Overall, it provides background on the challenges in securing medical IoT data and sets the stage for the proposed cybersecurity solution.

The paper “Research on medical data storage and sharing model based on blockchain” [3] addresses medical data security and sharing challenges using blockchain and homomorphic encryption. Previous studies explored blockchain for data sharing and access control. However, they often lacked efficient data transmission and were limited to specific institutions. This paper proposes a blockchain-based model with homomorphic encryption to ensure secure storage and transmission of medical data. It aims to overcome previous limitations, offering decentralized storage, privacy, and efficient data processing.

The paper “Med EHR-Electronic health Record using Blockchain” [6] proposes the Recent technological advancements are reshaping healthcare, addressing issues such as security and user experience. Despite improvements, challenges persist regarding data integrity and ownership. Blockchain offers a decentralized solution, enhancing trust and security in healthcare systems. Its adoption in cryptocurrency domains underscores its potential to revolutionize healthcare, enabling a patient-centric approach and refining electronic healthcare record precision. Blockchain addresses the challenge of effective data sharing by ensuring authenticity and integrity through its decentralized and immutable nature.

The paper “Centralized Concurrency of Medical Records” [7] proposes a Personal Health Records (PHRs) are vital for consolidating patients' health data to provide a comprehensive view of their well-being. However, integrating this data from various electronic health systems poses challenges. Adhering to patient-defined privacy policies is crucial when accessing sensitive PHR data, requiring careful consideration in PHR architecture design. Cloud computing offers scalability, accessibility, and elasticity, making it suitable for PHR systems. This study conducts a scoping review of integrated, reliable, and cloud-based PHR systems to address complexities in healthcare data integration and privacy.

The paper “A Blockchain-Based Architecture for Interoperable Healthcare Data Exchange” [9] introduces a decentralized data-sharing solution using blockchain to improve healthcare interoperability and patient data control. It tackles challenges in accessing and transferring healthcare data between providers due to system incompatibility. Leveraging Hyperledger Fabric, patients can manage their data securely, enabling seamless sharing. The architecture facilitates creating, updating, and sharing transactions while ensuring patient ownership. With multi-signature

transactions and integration with existing decentralized models, the approach offers a promising solution for healthcare data management.

III. EXISTING SYSTEM

Public healthcare institutions in India, especially Primary Health Centres (PHCs) and Sub-Centres located in rural and semi-urban regions, continue to depend significantly on manual methods for operational activities such as managing attendance, reporting services, and supervising staff. The current system is devoid of real-time monitoring features, which complicates the ability of higher-level administrative authorities to oversee daily operations across widely distributed facilities. Attendance is frequently documented in paper registers, which are susceptible to manipulation, loss, or damage. Additionally, there are significant delays in the compilation and reporting of healthcare data to supervisory entities, resulting in a lack of accountability, inefficiency in resource distribution, and ultimately, a deterioration in service quality.

In the absence of a centralized platform or automated system, health administrators find it challenging to make data-informed decisions, track key performance indicators, or react promptly to emergencies such as staff absenteeism or shortages in supplies. The lack of digital oversight mechanisms greatly restricts the transparency and responsiveness of the existing system..

IV. PROPOSED SYSTEM

The proposed system, HealthConnect, is a centralized, web-based platform developed utilizing the MERN stack (MongoDB, Express.js, React.js, and Node.js). It aims to revolutionize the administrative framework of Primary Health Centres (PHCs) and Sub-Centres by providing real-time monitoring, automated reporting, and performance analytics within a single, cohesive interface.

A notable feature of HealthConnect is its real-time attendance tracking, which employs GPS-enabled devices and biometric verification to guarantee that attendance data remains accurate and resistant to tampering. In instances of staff absence or tardiness, the system automatically generates alerts that are dispatched to supervisory officers, allowing for prompt intervention.

Additionally, the platform features interactive dashboards that present live service data, assisting administrators in overseeing healthcare delivery and recognizing patterns or irregularities. HealthConnect facilitates performance tracking for both individuals and facilities, delivering insights into resource utilization, patient inflow, the effectiveness of outreach programs, and more.

By digitizing and centralizing essential operations, HealthConnect greatly improves transparency, accountability, and administrative efficiency within the public healthcare sector..

V. METHODOLOGY

MODULES DESCRIPTION

1.SUPERADMIN MODULE

The SuperAdmin module is responsible for managing the highest level of system operations and overseeing all healthcare sites connected to the platform.

Key Functions:

- Create and manage multiple hospital/PHC sites across districts or regions.
- Assign and manage Admin-level users for each healthcare site.
- Monitor real-time activity logs and receive alerts across all connected facilities.

2.ADMIN MODULE

Admins are responsible for managing individual healthcare sites such as PHCs or Sub-Centres. This module enables administrative control over internal staff and resource tracking.

Key Functions:

- Register and manage Doctors and Nurses associated with the facility.
- Track and update the status of medical inventory and equipment.
- Generate and export site-specific operational reports in Excel format.
- Monitor staff attendance and ensure service delivery logs are maintained properly.

3. DOCTOR MODULE

Doctors use this module to interact with patients, maintain medical records, and update their daily attendance.

Key Functions:

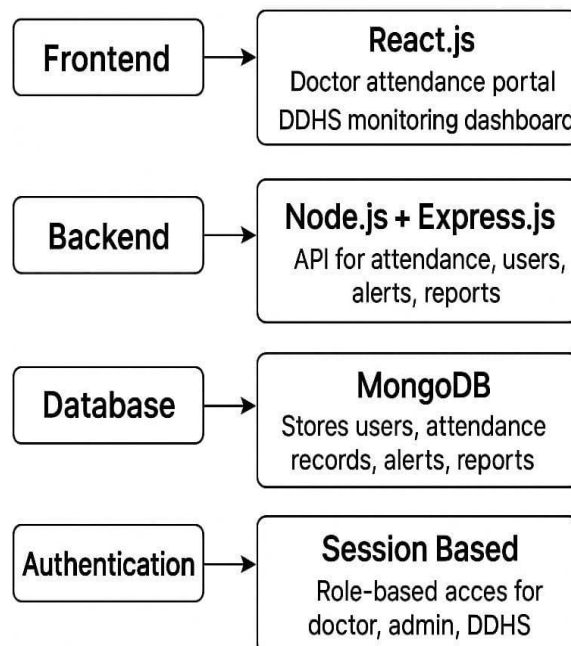
- Record consultation details including symptoms, diagnosis, and treatment.
- Prescribe medicines and log disease/condition information into the system.
- Mark attendance via GPS-based verification to ensure on-site presence.
- Access previous patient records for follow-up or historical analysis.

4. NURSE/PATIENT MODULE

This module allows nurses to assist in patient data collection, monitor vitals, and perform regular follow-ups. In some setups, it may also serve as a simplified interface for patient-side information.

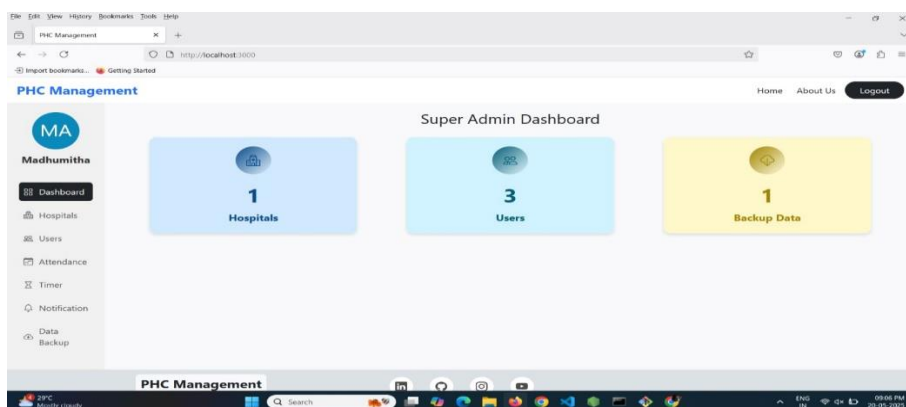
Key Functions:

- Record demographic details and vital parameters (e.g., blood pressure, temperature, pulse).
- Assist in daily data entry for check-ups, immunizations, maternal care, and chronic patient monitoring.
- Mark attendance using GPS location services to verify presence at the assigned healthcare facility.
- Contribute to maintaining up-to-date digital records for every patient to support continuity of care.

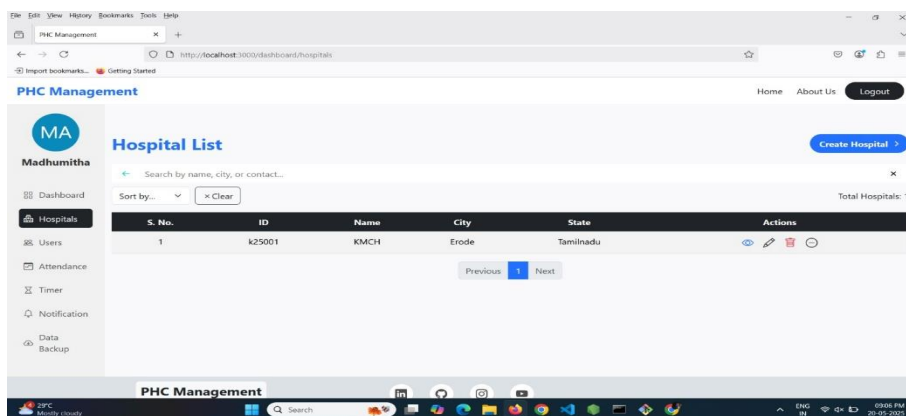
VI. SYSTEM ARCHITECTURE

VII. EXPERIMENTAL RESULTS

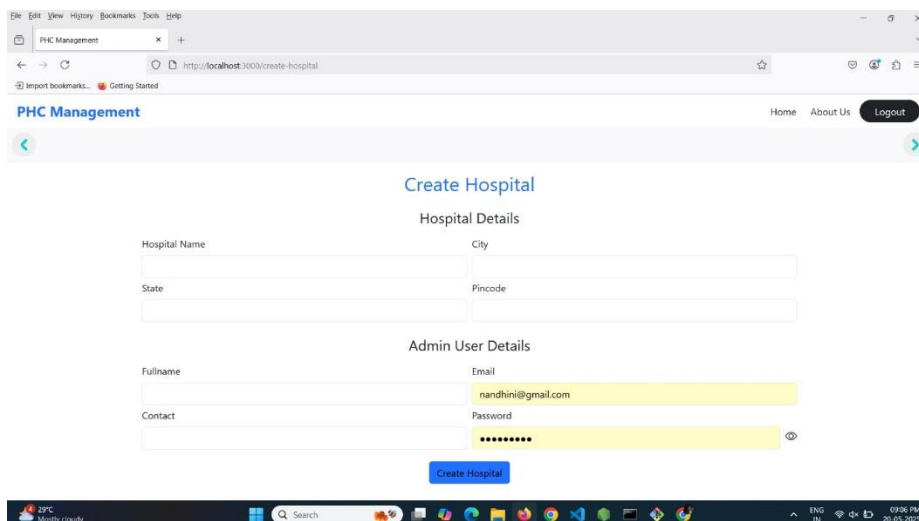
SUPER ADMIN DASHBOARD



HOSPITAL



CREATE HOSPITAL



Create Hospital

Hospital Details

Hospital Name: City:

State: Pincode:

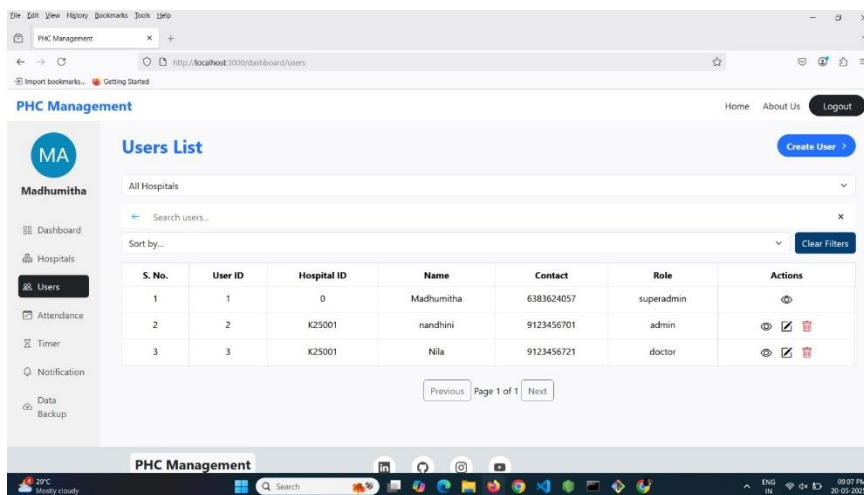
Admin User Details

Fullname: Email:

Contact: Password:

[Create Hospital](#)

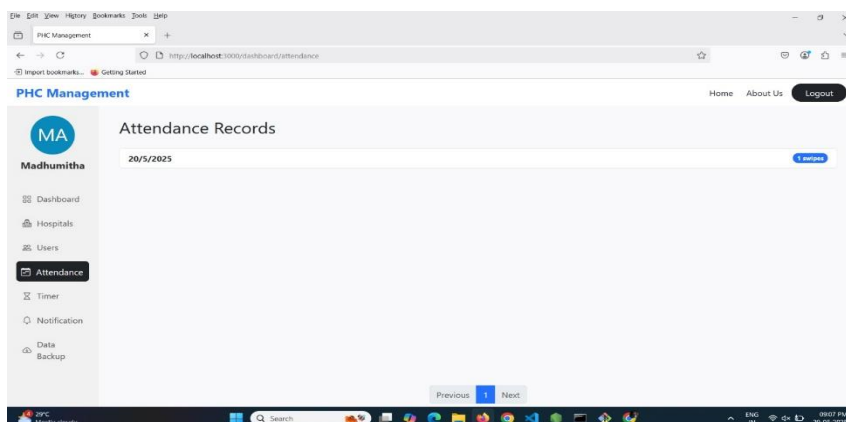
USERS



The screenshot shows the 'Users List' page in the PHC Management system. The page includes a sidebar with navigation options: Dashboard, Hospitals, Users (selected), Attendance, Timer, Notification, and Data Backup. The main content area displays a table of users with columns: S. No., User ID, Hospital ID, Name, Contact, Role, and Actions. There are three users listed: Madhumitha (superadmin), nandhini (admin), and Nila (doctor). A 'Create User' button is visible in the top right corner.

S. No.	User ID	Hospital ID	Name	Contact	Role	Actions
1	1	0	Madhumitha	6383624057	superadmin	
2	2	K25001	nandhini	9123456701	admin	
3	3	K25001	Nila	9123456721	doctor	

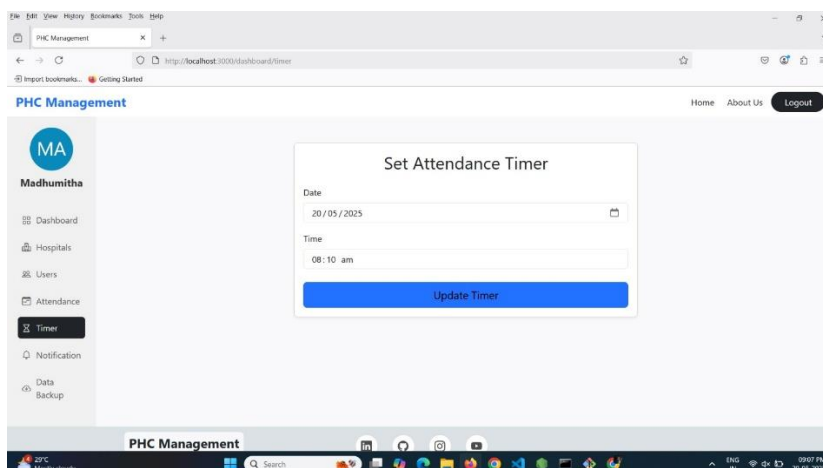
ATTENDANCE RECORDS



The screenshot shows the 'Attendance Records' page in the PHC Management system. The page includes a sidebar with navigation options: Dashboard, Hospitals, Users, Attendance (selected), Timer, Notification, and Data Backup. The main content area displays a table of attendance records for the date 20/5/2025. There is one record listed for user 1 (Madhumitha) with a status of 'Present'.

S. No.	User ID	Hospital ID	Name	Contact	Role	Attendance
1	1	0	Madhumitha	6383624057	superadmin	Present

TIMER

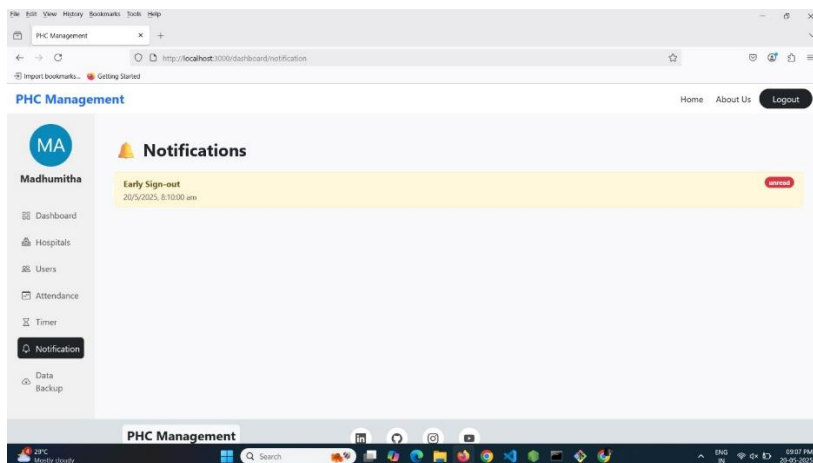


The screenshot shows the 'Set Attendance Timer' page in the PHC Management system. The page includes a sidebar with navigation options: Dashboard, Hospitals, Users, Attendance, Timer (selected), Notification, and Data Backup. The main content area displays a form to set the attendance timer. The form has two input fields: 'Date' (20/05/2025) and 'Time' (08:10 am). There is an 'Update Timer' button at the bottom of the form.

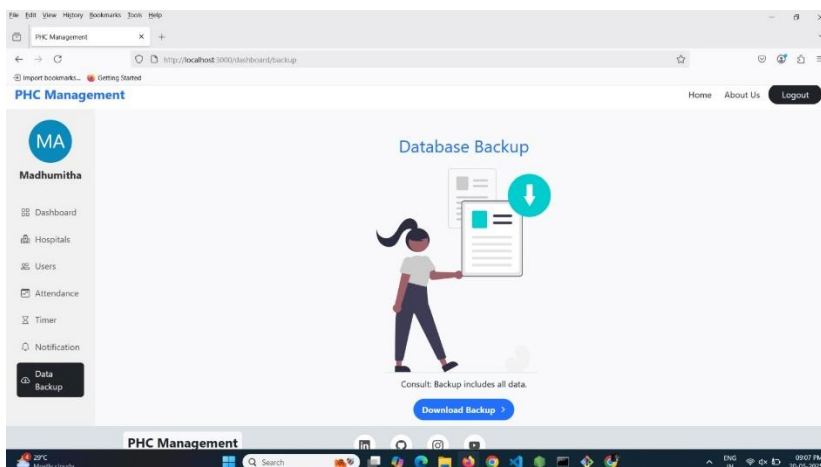
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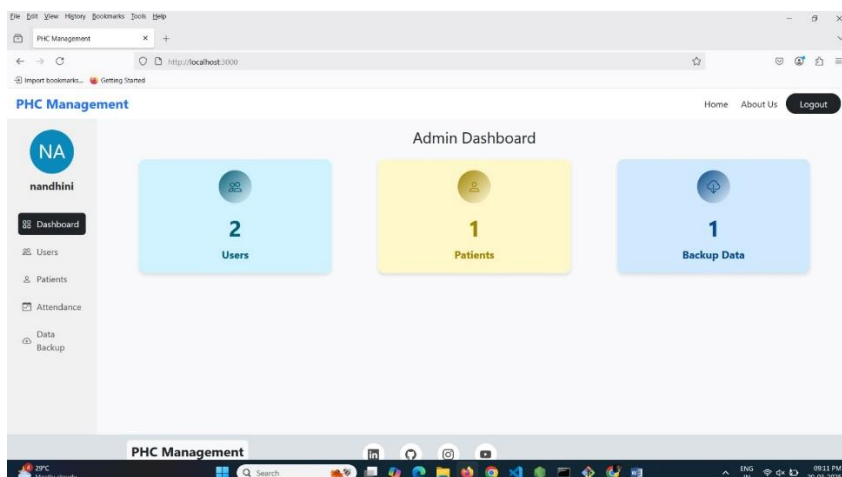
NOTIFICATION



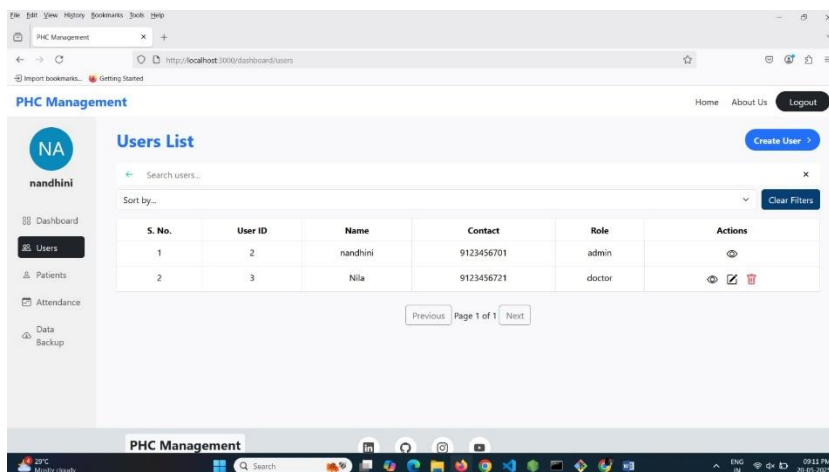
DATABASE BACKUP



ADMIN DASHBOARD



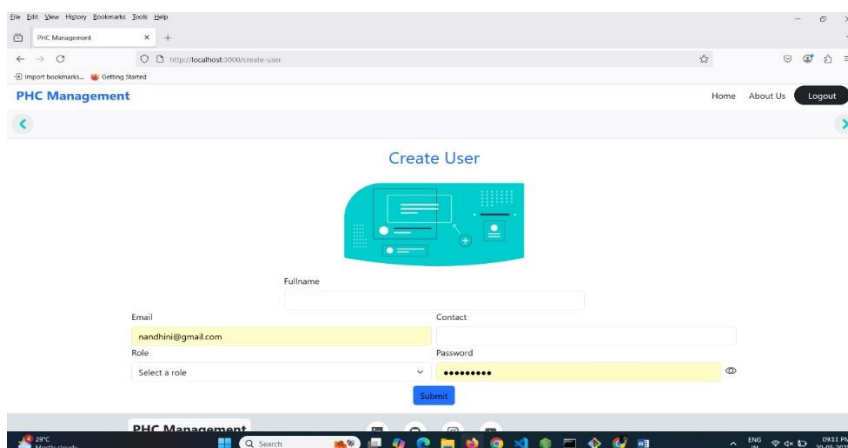
USER LIST



The screenshot shows the 'Users List' page in the PHC Management system. It features a sidebar with navigation options: Dashboard, Users, Patients, Attendance, and Data Backup. The main content area displays a table of users with columns: S. No., User ID, Name, Contact, Role, and Actions. There are two users listed: 'nandhini' (admin) and 'Nila' (doctor). A 'Create User' button is visible in the top right corner.

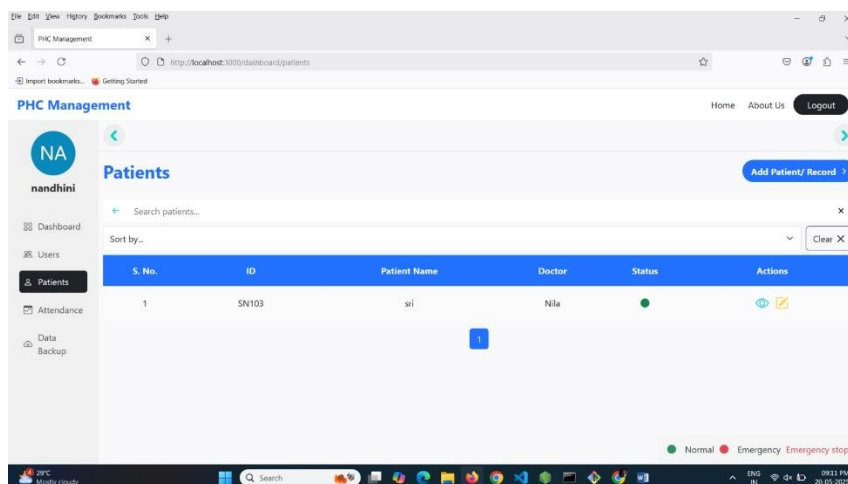
S. No.	User ID	Name	Contact	Role	Actions
1	2	nandhini	9123456701	admin	
2	3	Nila	9123456721	doctor	

CREATE USER



The screenshot shows the 'Create User' page in the PHC Management system. It includes a form with the following fields: Fullname, Email (pre-filled with 'nandhini@gmail.com'), Contact, Role (a dropdown menu), and Password (pre-filled with '*****'). A 'Submit' button is located at the bottom of the form.

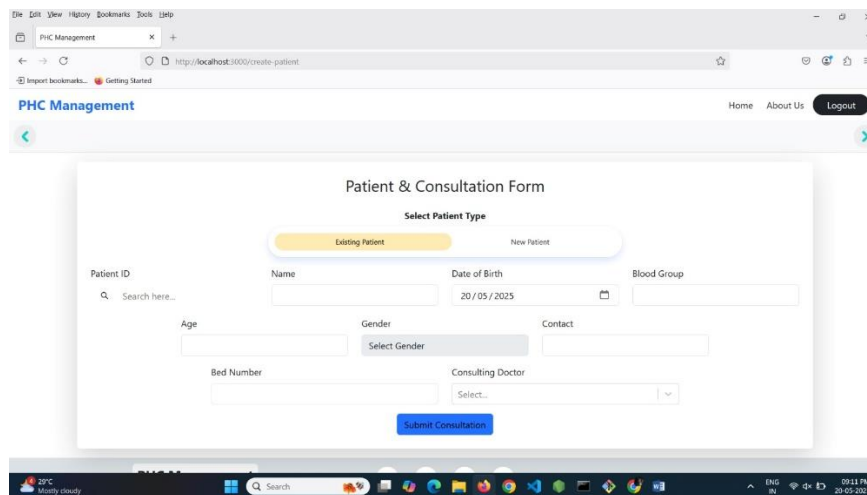
PATIENTS



The screenshot shows the 'Patients' page in the PHC Management system. It features a sidebar with navigation options: Dashboard, Users, Patients, Attendance, and Data Backup. The main content area displays a table of patients with columns: S. No., ID, Patient Name, Doctor, Status, and Actions. There is one patient listed: 'si' (Nila) with status 'Normal'. A legend at the bottom indicates 'Normal' (green dot), 'Emergency' (red dot), and 'Emergency stop' (red dot).

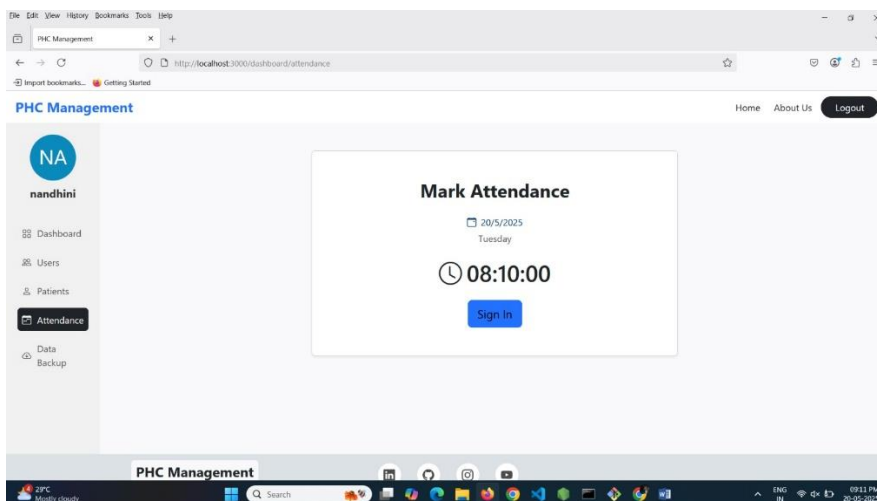
S. No.	ID	Patient Name	Doctor	Status	Actions
1	SN103	si	Nila	Normal	

PATIENTS FORMS



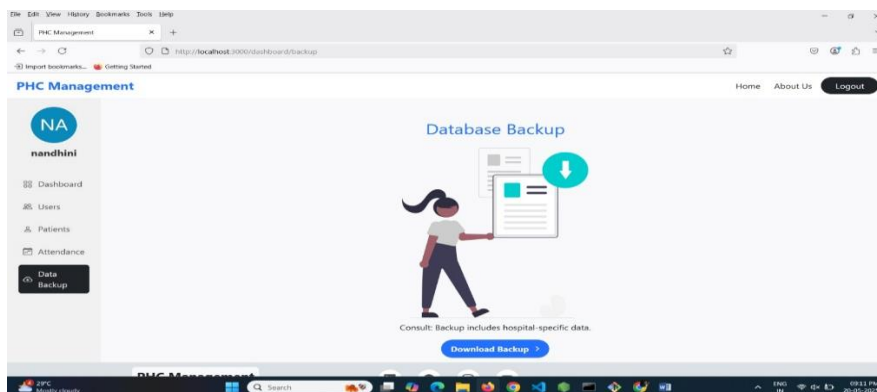
The screenshot shows a web browser window with the URL <http://localhost:3000/create-patient>. The page is titled "PHC Management" and has a navigation bar with "Home", "About Us", and "Logout". The main content area is titled "Patient & Consultation Form". It features a "Select Patient Type" section with "Existing Patient" (selected) and "New Patient" buttons. Below this, there are input fields for "Patient ID" (with a search icon), "Name", "Date of Birth" (set to 20/05/2025), "Blood Group", "Age", "Gender" (with a "Select Gender" dropdown), "Contact", "Bed Number", and "Consulting Doctor" (with a "Select..." dropdown). A "Submit Consultation" button is at the bottom.

MARK ATTENTANCE



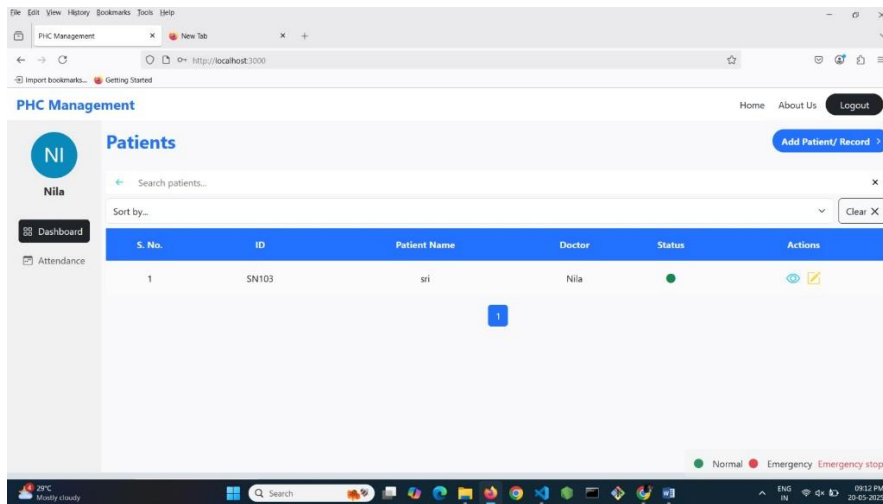
The screenshot shows a web browser window with the URL <http://localhost:3000/dashboard/attendance>. The page is titled "PHC Management" and has a navigation bar with "Home", "About Us", and "Logout". The main content area is titled "Mark Attendance". It displays the date "20/5/2025" and "Tuesday". A large clock shows the time "08:10:00". A "Sign In" button is present. On the left, there is a sidebar with a user profile "nandhini" and a list of menu items: "Dashboard", "Users", "Patients", "Attendance" (highlighted), and "Data Backup".



DATABASE BACKUP



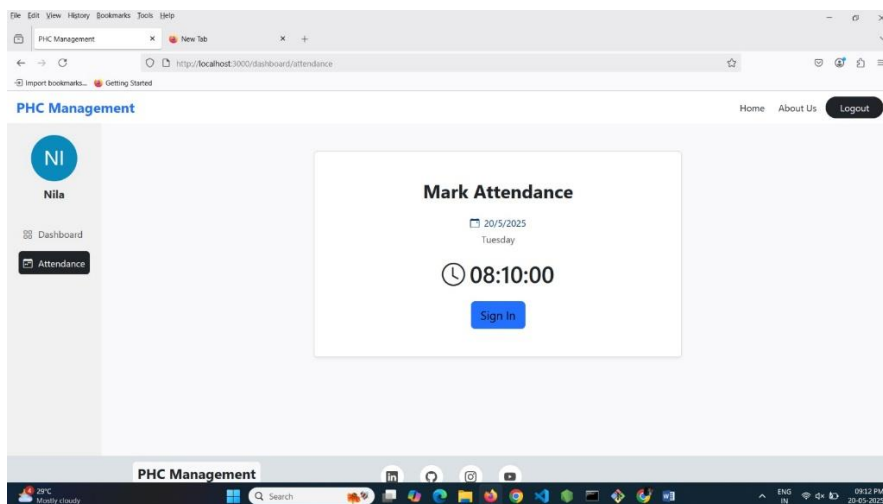
The screenshot shows a web browser window with the URL <http://localhost:3000/dashboard/backup>. The page is titled "PHC Management" and has a navigation bar with "Home", "About Us", and "Logout". The main content area is titled "Database Backup". It features an illustration of a person holding a document with a download icon. Below the illustration, it says "Consult: Backup includes hospital-specific data." and a "Download Backup" button.

DOCTOR DATABASE



S. No.	ID	Patient Name	Doctor	Status	Actions
1	SN103	sri	Nila	Normal	 

MARK ATTENTANCE



Mark Attendance

20/5/2025
Tuesday

08:10:00

[Sign in](#)

VIII. CONCLUSION

The deployment of HealthConnect, a centralized digital monitoring system, tackles numerous significant challenges encountered by Primary Health Centres (PHCs) and Sub-Centres in rural and semi-urban regions of India. By integrating real-time attendance tracking via GPS and biometric verification, the platform improves staff accountability and reduces manual reporting inaccuracies. It also automates the generation of alerts in instances of absenteeism, guaranteeing prompt administrative intervention and enhanced operational oversight. HealthConnect combines data analytics and interactive dashboards to furnish administrators with a comprehensive view of healthcare activities on the ground. These instruments facilitate improved decision-making, resource optimization, and performance monitoring, in alignment with national health governance objectives.

The architecture of the system, built on the MERN stack, guarantees scalability, security, and responsiveness, rendering it suitable for various healthcare facility requirements. This initiative illustrated how AI-driven automation and centralized monitoring can boost transparency, enhance staff management, and raise the overall standard of healthcare

delivery. By digitizing essential operational processes, HealthConnect establishes a sustainable basis for fortifying rural and semi-urban healthcare infrastructure throughout India..

IX. FUTURE WORK

The forthcoming evolution of HealthConnect will prioritize the enhancement of its intelligent automation features and the incorporation of predictive analytics to improve workforce and service planning. Ongoing system utilization and feedback from real-world applications will contribute to refining the effectiveness of the monitoring modules, especially in varied and resource-limited settings. Potential upgrades may involve the integration of telemedicine capabilities, digital patient health records, and mobile accessibility for remote healthcare professionals. The system will also investigate the possibilities of artificial intelligence in predicting service demand trends and identifying irregularities in healthcare delivery patterns. Moreover, strict compliance with data protection regulations will continue to be a key focus, particularly as the platform starts to handle more sensitive health information. Iterative assessment cycles and pilot projects across various regions will inform future enhancements..

REFERENCES

BOOK REFERENCES

1. R. Rajalakshmi and R. S. Sabeenian, "Real-time Smart Healthcare Monitoring System Using Internet of Things," *Journal of Network Communications and Emerging Technologies (JNCET)*, vol. 8, no. 4, pp. 11–17, 2018.
2. D. Tiwari, A. Kushwaha, and A. K. Jaiswal, "IoT Based Healthcare Monitoring System Using Raspberry Pi – A Review," *International Research Journal of Engineering and Technology (IRJET)*, vol. 7, no. 8, pp. 2391–2394, 2020.
3. Meena and D. Poornima, "A Secure Cloud-based Attendance Monitoring System for Rural Healthcare Facilities," *International Journal of Scientific & Engineering Research*, vol. 11, no. 3, pp. 563–567, 2020.
4. World Health Organization (WHO), *Primary Health Care Systems (PRIMASYS): Case Study from India*, Geneva: WHO Press, 2017. [Available Online: <https://www.who.int/publications/i/item/9789241512845>]
5. S. K. Dash, P. P. Sahoo, and S. Mohapatra, "Healthcare Monitoring System Using IoT and Big Data Analytics," in *Handbook of Data Science Approaches for Biomedical Engineering*, Academic Press, 2020, pp. 123–143.

WEBSITEREFERENCES

1. <https://analyticsindiamag.com>
2. <https://indiastack.org>
3. <https://electronichealthreporter.com>
4. https://www.researchgate.net/publication/353945321_Smart_Healthcare_Systems_Review_and_Challenges
5. <https://developer.mozilla.org/en-US/docs/Learn>
6. <https://www.geeksforgeeks.org/introduction-to-mern-stack/>
7. <https://www.who.int/health-topics/digital-health>
8. <https://www.niti.gov.in>
9. <https://nhm.gov.in>
10. <https://main.mohfw.gov.in>



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