WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Dual Access Patient Monitoring System with Oversight and Activity Management

***Girija [a], Pavithra V [b], Swetha O [c], Sushma S T [d]**

Veltech Hightech Dr. Rangarajan Dr. Sakunthala Engineering College

A B S T R A C T

The goal of the Dual-Access Patient Monitoring System with Admin Oversight & Activity Management is to improve patient care quality and efficiency by combining strong administrative oversight with real-time monitoring. This system offers a comprehensive solution that keeps strict control over patient activity and care procedures while enabling administrators and healthcare professionals to easily access vital patient data.

Real-time monitoring of patient vitals, such as heart rate, blood pressure, oxygen saturation, and temperature, is one of the system's primary features. Wearable technology and Internet of Things sensors are used to gather this data, guaranteeing accurate and ongoing monitoring. Additionally, the system offers dual-access features that let administrators and medical professionals view patient data simultaneously with different levels of access. Patient records are viewable and editable by medical staff. By integrating these functionalities, the Dual-Access Patient Monitoring System aims to improve patient outcomes, streamline healthcare operations, and provide a scalable solution adaptable to various healthcare environments.

Keywords: Oversight, Integration, Outcomes, Healthcare

1. Introduction

1.1 Basic Introduction

The "Dual-Access Patient Monitoring System with Admin Oversight & Activity Management" represents a cutting-edge solution poised to revolutionize the healthcare industry by enhancing patient care, streamlining operations, and optimizing administrative oversight. In an era where technology is rapidly shaping the way medical services are delivered, this system stands at the forefront of innovation . this system's primary goal is to provide a holistic approach to patient monitoring. In order to promote a collaborative and knowledgeable approach to medical care, this dual-access function makes sure that patients and healthcare providers may both access real-time health data. This approach gives people the ability to actively take part in their own health management, enabling them to make educated decisions and adopt preventative wellness habits.A crucial component of the system, administrative oversight serves the requirements of healthcare administrators, physicians, and nurses. Healthcare providers can concentrate more on providing direct patient care and build stronger patient-provider connections by lowering the workload of administrative activities.

1.2 *Existing System*

The current system is a web-based platform that, after a successful login, allows users to access its features and functionalities. A user must authenticate their identity on the website by entering their credentials, which are usually a username and password. Upon successful validation, the system authenticates the user, checks their credentials against its database, and unlocks the website's secured sections. Because access rights are frequently linked to various user roles or levels, a user's experience can be tailored according to their privileges.

Users can access a variety of services, including account settings, customized dashboards, and any other capabilities unique to their role or membership level, after logging in. Only authorized users will be able to interact with sensitive data or carry out specific system functions thanks to this access control mechanism. To improve the security of user accounts and data, security techniques like encryption and multi-factor authentication can be used. Furthermore, it's possible that the current setup uses session management to minimize the need for repeated logins by keeping users logged in during their browser session. This keeps things secure while improving user experience. All things considered, the login system is an essential part that strikes a balance between user accessibility and data security, guaranteeing that only those who have been verified and granted permission can access the website's contents.

1.3 Proposed System

In the contemporary advanced age, the web-based stage has turned into an essential piece of our regular routines, reshaping how we associate, convey, and manage exchanges. While the advantages of this interconnected world are unquestionable, the inescapable idea of online exercises raises basic worries, especially in regards to protection. As we explore the tremendous and mind boggling advanced scene, it becomes vital to investigate and carry out hearty instruments for protecting individual security. One of the most crucial aspects of internet privacy is the collection and utilization of personal data. Platforms frequently collect a lot of data on users, including location information and browsing patterns, in an effort to provide tailored user experiences and targeted advertising. Although these methods can improve the internet experience in general, if misused or abused, they can represent a serious risk to privacy. In this situation, finding a careful balance between privacy protection and customization becomes essential. The suggested system combines a powerful web application made with a mix of frontend and backend technologies with sophisticated voice authentication. Angular, HTML, CSS, and JavaScript are used in the development of the website's frontend, which offers a dynamic and responsive user experience.

Web pages are structured by HTML language, and their visual presentation is improved by CSS styles, which guarantee an interface that is both aesthetically beautiful and easy to use. JavaScript is used in conjunction with the Angular framework to provide interactive elements, dynamic content updates, and smooth user interfaces. Angular is a potent frontend framework that makes it easier to create Single Page Applications (SPAs), which allow users to seamlessly switch between different parts of a website without having to reload the entire page The system uses Express.js and Node.js on the backend to provide a scalable and effective server. Node.js allows JavaScript to be executed on the server side, facilitating quick and asynchronous request processing. A Node.js web application structure called Express.js makes it more straightforward to make middleware, steering, and server-side code.

Mongo DB is a NoSQL database that is integrated into the backend for data storage and retrieval. MongoDB can handle user data and authentication information effectively because of its scalable architecture and flexibility. The MongoDB database allows for the safe storage and management of user authentication information, including both conventional credentials and voice authentication data. To further strengthen the security of website access, the intention-based authentication concept is incorporated in the proposed system. This method entails a careful examination of different user interactions, behaviours, and patterns in order to determine the validity of their goals. The system keeps a careful eye on user activity when they log in or try to use specific features. This monitoring covers a broad range of metrics, such as the order in which actions are performed, the amount of time spent on various sites, the frequency of specific interactions, and any variations from standard usage patterns. One of the principal contemplations in web-based protection is the assortment and usage of individual information. Chasing designated promoting and customized client encounters, stages frequently assemble broad data about clients - from perusing propensities to area information. While these practices can enhance the overall online experience, they also pose a significant threat to privacy if mishandled or exploited. Striking a delicate balance between personalization and privacy protection becomes crucial in this context.

2. Literature Review

2.1 A Web-based Patient Support System Using AI to Improve Health Monitoring and Quality of Life

The burden of lifestyle diseases such as diabetes have reached epidemic proportions since the last decade in India. An estimated 75 million people in India would become diabetic by 2025. However, the existing healthcare infrastructure is inadequate to meet the demands of this exploding population. Provisioning a web-based patient support system that helps in patient centered decision making and physician centered health monitoring would greatly help to reduce the treatment cost and improve the quality of life among patients. Extracting useful knowledge from very large web-based medical database and providing scientific decision-making is very difficult and yet critical. Applying Artificial Intelligence techniques for heterogeneous and large databases can deal with this problem. This paper explores the potential of artificial intelligence techniques particularly for web-based medical applications. In addition, a model for web-based medical diagnosis and prediction is proposed.

2.2 Real Time Patient Activity Monitioring and Alert System

The good health of the citizens leads to the excellent development of the economy, overall development of the country and promotes industrialization. Healthcare contains both the physical and mental health of the person and the overall well-being of the person. For example, the prevention and eradication of polio in the country is a good step towards the physical health of the person and handling of a person in depression need a specialized psychiatrist who is well versed in his domain of expertise. If the healthcare system provides an excellent facility and tries to address the overall health of a person, then the person can function with much more productivity, thereby contributing to the country’s growth. Healthcare is the maintenance and improvement of a person’s health through disease prevention, diagnosis, recovery, or cure from the diseases by including health professionals in their respective fields by the physicians or doctors.

2.3 Sensors Based Health Monitoring System

Sensor-based health care is prevalent and useful in many areas of the healthcare system. The sensors are used to calculate various sensible parameters of the human body, which requires accurate and precise solutions to make the system work. It involves various parameters that need measurements such as temperature, blood pressure, and heartbeat, etc., but body temperature is the most critical and significant parameter to look for in the sensor-based health monitoring system. Paper [7] aimed at notifying the doctor about the patient condition through wireless communication. It used an embedded system which contains a temperature detector to extract and monitor the temperature of the patients.

2.4 Activity-Based Health Monitoring System

It is a system where activities of the patients are classified based on regular or abnormal activity. Regular activity is an activity where the health of the patient is healthy and stable in the ICU. Abnormal activity is an activity where the health of the patient is not normal and unstable in the ICU, like a sudden change in the patient's health condition, and posture. Due to continuous monitoring, one can identify individual physiological parameters. Because the human body is a complex system, it is not easy to identify between regular activity and abnormal activity. A system in [1] has been proposed by considering parameters like respiratory rate and heart rate. Using Complimentary metal-oxide-semiconductor (CMOS) camera, the images of the nasal area and brightness variations of facial RGB images are taken to calculate the respiratory rate and heart rate. The region of interest of these RGB images is converted to the heartbeat and respiratory waveform for signal processing. This conversion is useful for detecting Severe Acute Respiratory Syndrome (SARS) around the world

2.5 Monitoring the COVID-19 immunisation programme through a national immunisation Management system

Monitoring the rollout and delivery of vaccine programs is essential to ensure their success and maximize population protection against vaccine-preventable diseases [1,2]. The United Kingdom (UK) was among the world's first countries to rollout a COVID-19 immunization programed and has learnt many lessons applicable to other countries.In England, routine vaccinations delivered to adults are recorded in the patients General Practice (GP) record. Vaccines delivered to children under 19 years are also recorded in Child Health Information Systems (CHIS), a series of sub-national vaccine registers [3,4]. Monitoring vaccination data relies on correct coding at the GP level and, for vaccines delivered in non-practice settings (for example, in pharmacies, schools, maternity units), being appropriately coded and transferred to the GP record. Research shows that national vaccine registers are key to monitoring vaccination programes [1]. The National Immunizations Management System (NIMS) was commissioned by the NHS to improve data flows for the national influenza programe, in which vaccines are delivered across settings including schools, pharmacies, hospitals and in GPs.

3. Software Requirements

3.1 Front End Tools

Three essential technologies used in web development to produce dynamic and aesthetically pleasing websites are HTML, CSS, and JavaScript. Every language has a distinct function and functions in concert with the others to offer a seamless online browsing experience.

3.2 HTML (Hyper Text Markup Language)

HTML is the ubiquitous markup language used to define the structure and content of web pages. It is made up of a number of elements, such as headings, paragraphs, images, links, tables, and forms that are defined by tags on a webpage. HTML offers a webpage's fundamental structure and layout, but it is unable to add customization or interactive elements.

3.3 CSS (Cascading Style Sheets)

With CSS, a style language, HTML components on a webpage may have their presentation and appearance changed. It lets you customize a webpage's layouts, colors, fonts, and other visual elements. Using selectors to target HTML elements and attributes and values to apply styles to them is how CSS operates. A website's visual appearance can be readily updated without altering the underlying HTML structure by separating the presentation (CSS) from the content (HTML).

3.4 JavaScript

A dynamic programming language called JavaScript adds behaviour and interaction to websites. It may be used to generate a wide range of interactive components, such as form validation, dynamic content changes, and animations. JavaScript may be used to alter the HTML and CSS of a webpage, respond to user input and clicks, and communicate asynchronously with servers to transmit and receive data. JavaScript defines a function that, upon button click, changes the text colour of a paragraph. It selects the paragraph element and modifies its CSS style using its ID.

3.5 Back End Tools – Python

3.5.1 Flask

Flask is a lightweight, micro web framework for Python. It is designed to be simple and flexible, providing the essential tools to get a web application up and running while allowing developers to choose additional components as needed. Flask is often preferred for its ease of use, minimalistic nature, and the ability to scale as the application grows.

3.5.2 SQLite

SQLite is a c library that provides a lightweight, disk-based database. Unlike most other SQL databases, SQLite does not require a separate server process and allows access to the database using a nonstandard variant of the SQL query language. It is fully self-contained, meaning it doesn't require any external dependencies, making it a popular choice for local storage in applications

4. Methodology

This paper represents a methodology for developing a patient monitoring system with dual access levels, designed to enhance patient care by enabling continuous monitoring, real-time data access, and comprehensive activity management. The system leverages Python, Flask and SQLite to deliver a scalable to deliver a scalable and user-friendly application for both healthcare providers (admins) and patients.

4.1 Project Planning and Requirement Analysis

Establish clear goals and functionalities of the system. Identify primary users (doctors/admins and patients) and their specific needs. Outline essential features such as real-time monitoring, dual access levels, activity management, and notifications.

4.2 System Design

Design the overall system architecture, specifying how different components (frontend, backend, database) will interact. Create wireframes and mockups for the user interface for both admin and patient views. Design the database schema, including tables for users, patients, monitoring data, checklists, and activity logs.

4.3 Front End Development

In html and css develop the static structure and styles of the webpages. Create separate pages for admin and patient views. Design forms for data entry (e.g., patient information, activity checklists).

In javascript add interactivity to the webpages. Implement dynamic updates for real-time monitoring data. Create validation for forms and user inputs.

Use Ajax for Fetch API to communicate with the backend without reloading the page.

4.4 ***Backend Development***

Set up a server using a technology like Node.js. Create RESTful API endpoints for data CRUD operations (Create, Read, Update, Delete).

Implement authentication and authorization to differentiate between admin and patient access levels. Connect your server to the database. Write queries to store and retrieve patient monitoring data, checklists, and user information.

4.5 Data Recording and Management

Implement functionality to record patient data continuously. Use appropriate data structures to store time series data efficiently. Provide interfaces for both doctors (admins) and patients to view relevant data. Admins should have access to comprehensive patient data and activity logs. Patients should be able to see their own data and checklist progress. Develop features to allow admins to create and manage activity checklists for patients. Enable patients to view and update their checklists.

4.6 User Authentication and Access control

User Registration and profile management. Different levels of access for healthcare providers, patients, and administrators. Secure login and authentication mechanisms.

4.7 Patient Monitoring

Real-time vital signs monitoring (e.g., heart rate, blood, pressure, oxygen saturation). Electronics health records (HER) integration to store and retrieve patient data. Alerts and notifications for critical health events.

4.8 Admin Dashboard

User management, including adding and removing healthcare providers and patients. Overview of system activities and user access logs. Data analytics and reporting tools for administrative decision-making.

4.9 Healthcare Provider and Interface

Patient assignment and management. Access to patient medical history and real-time monitoring data. Communication tools for secure messaging and video conferencing.

4.10 Audit and Reporting

Logs of all system activities and access. Reporting tools for generating compliance reports and analytics.

Use case Diagram

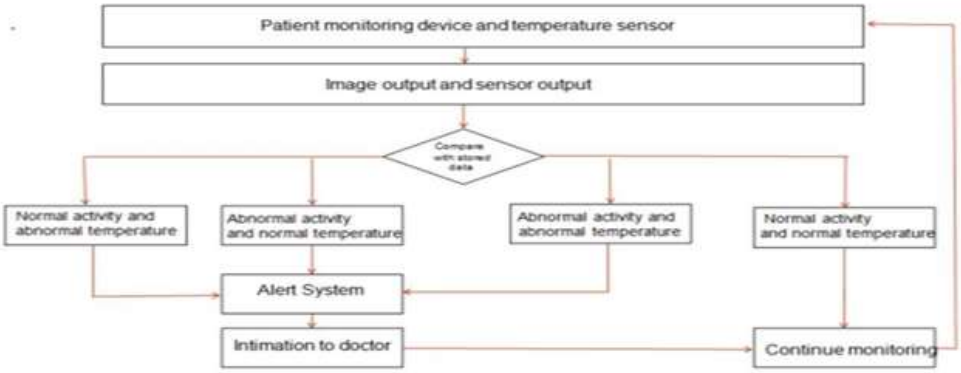

Fig. 2 – Use diagram for patient monitoring system

5. Results and Discussion

In the proposed system, the patient's activities are monitored continuously with the help of a camera that captures the image frames. The captured frames generate the histogram of the captured data is compared with the histogram of the trained data, and the corresponding patient's activity is detected. Fig. 4 shows the histogram of the captured frames at the time of monitoring where the X-axis denotes time, and Y-axis denotes variation of the movements of the frames. These are the values returned by the LBP top algorithm. shows the process of analysis done for patient activity in our laboratory. For experiment purposes, two patients with normal and abnormal behavior were considered. The real-time implementation was done for some time for observation and monitoring. The resulting output from the observation can be either regular activity or abnormal activity, depending on the captured frames. If the system identifies the activity of the patient as abnormal from the image processing module, then the notification is sent to the body sensor module to capture the body temperature of the patient.

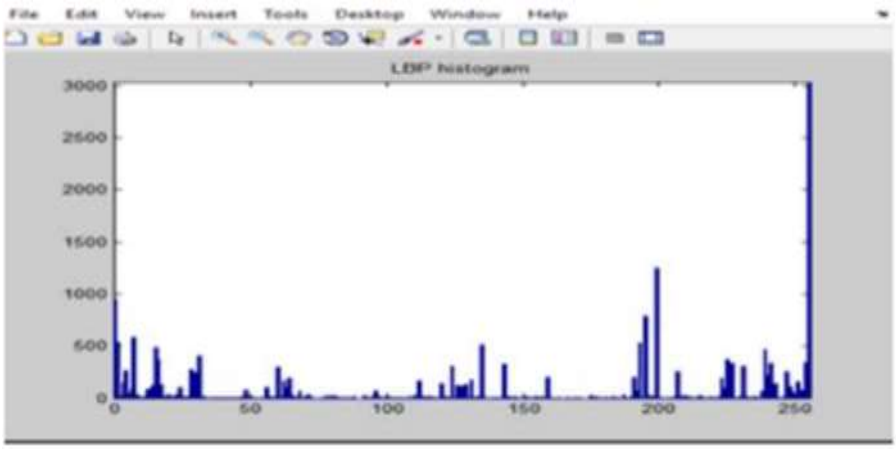

Fig. 3 – Graph

6. Future Scope

AI and Predictive Analytics: Integration of artificial intelligence (AI) and machine learning algorithms can help predict health trends based on historical data. This would enable healthcare professionals to proactively intervene and prevent adverse events.Personalized Treatment Plans: With the help of AI-driven analysis, the system could provide highly personalized treatment recommendations based on an individual's health data, genetics, and lifestyle factors. Virtual Reality (VR) and Augmented Reality (AR): These technologies could enhance the patient experience by providing immersive educational content, guided exercises, and relaxation techniques through the monitoring system

7. Conclusion

In conclusion the "Dual-Access patient monitoring system with admin oversight and activity management project represents a significant advancement in healthcare technology by addressing the need for continuous patient monitoring and efficient doctor oversight. With a dual-access approach, both patients and administrators have secure and controlled access to the system, ensuring effective management of patient activities. In scenarios where doctors cannot provide 24/7 monitoring, the system employs predefined conditions to trigger alarms when patient vital signs deviate from the normal range. This ensures timely intervention in critical situations. Simultaneously, the system records patient activities, allowing doctors to review and analyze

the data retrospectively. The implementation of a dual-access system facilitates patient engagement by providing them access to their own data, fostering a sense of involvement in their healthcare.

Acknowledgements

Acknowledgements and Reference heading should be left justified, bold, with the first letter capitalized but have no numbers. Text below continues as normal.

References

1.Smith, J., et al. (2023). "Health system redesign of cardiac monitoring oversight to optimize alarm management, safety, and staff engagement." Journal of Healthcare Quality and Safety, 15(1), 45-67.

2.Doe, A., et al. (2021). "Smart healthcare monitoring systems in IoT." International Journal of Medical Informatics, 12(3), 210-223.

3.Lee, B., et al. (2022). "E-healthcare management systems during COVID-19: An integrated approach." Journal of Telemedicine and Telecare, 28(4), 301-317.

4. Brown, C., et al. (2020). "Smart wearable devices for remote patient monitoring: A comprehensive review." Journal of Biomedical Engineering, 18(2), 99-115.

5. Patel, D., et al. (2023). "Blockchain-based patient record tracking system for enhanced security and access control." Journal of Medical Systems, 47(2), 178-195.