



IJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** IV **Month of publication:** April 2024

DOI: <https://doi.org/10.22214/ijraset.2024.60708>

www.ijraset.com

Call: ☎ 08813907089

E-mail ID: ijraset@gmail.com

Healthcare Virtual Assistant using Generative AI

D.L.Falak¹, Aishwarya Autkar², Saloni Bailkar³, Srushti Bankar⁴, Shraddha Kachare⁵

Computer Engineering, Sinhgad Academy of Engineering, Kondhwa, Pune

Abstract: *Documentation is a clumsy task for the front- desk staff. They've to fill in patient data, schedule appointments, and attend to patient queries. Even healthcare providers must enter EHR data, which takes a lot of time, and they end up spending lesser time with their patients. In the evolving landscape of healthcare administration, the burden of administrative tasks continues to challenge healthcare professionals and institutions. However, with generative AI, doctors can produce clones of patient data and automate form- filling tasks. It can also be integrated with EHR for documentation work. This project introduces a result — a generative artificial intelligence (AI) system designed to ease administrative burdens and enhance operating efficiency. By employing the power of AI, this web- grounded platform aims to streamline administrative processes, automate routine tasks, and facilitate absolute communication between patients, medical staff, and administrative personnel. The proposed website leverages advanced generative AI approaches to tackle crucial administrative challenges. Through natural language processing (NLP) and image analysis, the system interprets unstructured data such as medical notes, images, and documents. It enables automated documentation generation, medical coding and billing, appointment scheduling, and patient inquiries through a responsive and user-friendly interface.*

Keywords: Artificial intelligence (AI), EHR data, Natural Language Processing, etc.

I. INTRODUCTION

In an era marked by technological advancements, we present a solution that harnesses the power of generative artificial intelligence (AI) to address one of the most persistent challenges in the healthcare industry: administrative burden. Our innovative web-based platform is designed to revolutionize healthcare operations by significantly reducing administrative tasks, streamlining processes, and enhancing overall efficiency. Healthcare professionals around the world dedicate a substantial amount of time to administrative duties, diverting their attention from providing quality patient care. Our website is poised to change this paradigm, offering a comprehensive suite of tools and functionalities that automate routine tasks, facilitate seamless communication, and empower medical staff to focus on what truly matters – delivering exceptional patient experiences. Through this revolutionary approach, we aim to redefine healthcare administration and elevate the standards of operational excellence. Other than this such service should provide confidentiality, availability, data sharing, accessible data, reliability, and efficient retrieval of data. It helps you to explore the limitless possibilities of improved healthcare administration and discover how automation can pave the way for a more streamlined and patient-centric future.

II. LITERATURE REVIEW

A healthcare management system is a crucial tool in the healthcare industry for managing patient data, improving healthcare service quality, and enhancing operational efficiency. While the concept of using generative models for healthcare management systems is innovative, it is quite difficult to implement. The paper

[1] provides a comprehensive review of the applications of generative AI models in healthcare. The authors have classified generative AI models into two main types: diffusion models and transformer-based models. These models have been used to analyze diverse forms of data, including medical imaging, protein structure prediction, clinical documentation, diagnostic assistance, radiology interpretation, clinical decision support, medical coding and billing, drug design, and molecular representation. The paper [1] also proposes potential directions for future research to tackle the existing limitations and meet the evolving demands of the healthcare sector. The paper [2] aims to provide a comprehensive review of text generation in healthcare. The authors have identified 90 primary studies from 2015 to 2021 employing the PRISMA frameworks. The authors [2] at the end, also provide some future directions for researchers and guidelines for practitioners based on the findings of this review.

The paper [3] discusses the importance of Electronic Health Record (EHR) systems in improving healthcare quality. It highlights the challenges faced by healthcare facilities in collecting, processing, and storing patient data while maintaining security and privacy. The paper [3] proposes a standard secure EHR framework using standard medical terminology and coding standards to improve the workflow of health services to the population.

The implementation of EHR framework for Indian health system will enable efficient and continuous care to the patient at all levels of healthcare system. The paper [4] discusses the use of Business Process Management (BPM) methodology for optimizing clinical processes. The authors conducted a systematic literature review using ScienceDirect, Web of Science, Scopus, PubMed, and Springer databases and found that BPM is an effective methodology to optimize clinical processes. The paper [4] also highlights the need for better technological support and greater involvement of all clinical staff to realize the full potential of BPM in healthcare. The paper [5] presents a general method for virtual assistant for health monitoring system. First the input in the form of query is given and assistant provides the result. All data is collected and also the past data of patient is saved. Experimental results showed that: compared with traditional methods, the proposed method is more accurate and faster and can be helpful anywhere, anytime, and suitable for a variety of problems of the patients.

III. METHODOLOGY

A. Research Methodology

This study starts by adopting an exploratory approach, which means it aims the author wants to identify what is happening, gain new insights, ask questions, and deal with issues of a qualitative nature. The results of this study will follow with a health care medical records system proposal.

B. SDLC

The Software Development Life Cycle (SDLC) is a structured process that enables the production of high- quality, low-cost software, in the shortest possible production time. The goal of the SDLC is to produce superior software that meets and exceeds all customer expectations and demands. The 7 Phases of SDLC (Software Development Life Cycle) -

- 1) Stage 1: Project Planning. The first stage of SDLC is all about "What do we want?" ...
- 2) Stage 2: Gathering Requirements & Analysis. ...
- 3) Stage 3: Design. ...
- 4) Stage 4: Coding or Implementation. ...
- 5) Stage 5: Testing. ...
- 6) Stage 6: Deployment. ...
- 7) Stage 7: Maintenance.

C. Login

Login methodology refers to the process by which users authenticate themselves and gain access to a computer system, application, or online service. It is a crucial aspect of security and user access control. The primary goal of login methodology is to verify the identity of the user and ensure that only authorized individuals can access a system or application. Here are the key components of a typical login methodology:

- 1) Username/ID
- 2) Password
- 3) Authentication Factors
- 4) User Authentication
- 5) Session Management

Login methodology is a critical aspect of any system or application, and its design and implementation should prioritize security while providing a convenient and user-friendly experience. Additionally, it should adhere to legal and regulatory requirements, such as data protection and privacy laws.

D. Automatic Form Filling

Automatic form filling is a process where software or tools automatically populate online forms with predefined or user-provided data, streamlining data entry and saving time for users. This methodology is commonly used in web browsers, password managers, and other software applications to simplify tasks like logging into websites, filling out registration forms, or completing online transactions. Automatic form filling can significantly enhance user convenience, especially when dealing with numerous online forms or repetitive data entry tasks. However, users should exercise caution when using such tools, particularly when storing sensitive information, and ensure that the software is secure and regularly updated.

E. Booking and Scheduling

Booking and scheduling methodologies refer to the processes and systems used to manage and coordinate appointments, reservations, and events. These methodologies are essential in various industries, including healthcare, hospitality, transportation, and professional services. Booking and scheduling methodologies aim to simplify the process of reserving services, resources, or appointments for both customers and service providers, while also maximizing efficiency and minimizing scheduling conflicts. The specific features and design may vary depending on the industry and the needs of the users.

F. Appointments

Appointments methodology refers to the systematic process of scheduling and managing appointments, whether for business meetings, medical consultations, client services, or any other planned interactions. This methodology involves various steps to ensure efficient, organized, and effective appointment management. An effective appointments methodology streamlines the scheduling process, minimizes errors, reduces scheduling conflicts, and enhances the overall customer experience. It is particularly important in service-oriented industries, healthcare, consulting, and any context where planned interactions need to be well-organized and efficiently managed.

G. Chatbots

Chatbots are software applications designed to simulate human conversation and provide automated responses to users' queries or requests. The methodology for chatbot development is an iterative process that may involve collaboration between developers, data scientists, UX/UI designers, and domain experts. The goal is to create a chatbot that effectively serves its intended purpose and provides a positive user experience. H. Virtual Assistant A virtual assistant in healthcare, often referred to as a healthcare chatbot or healthcare AI, is a computer program or application designed to assist healthcare professionals, patients, and other stakeholders in various healthcare-related tasks. These virtual assistants leverage artificial intelligence (AI) and natural language processing (NLP) to provide a wide range of services and support in the healthcare industry. It's important to note that the effectiveness of healthcare virtual assistants depends on their design, accuracy, and integration into existing healthcare systems. They can complement the work of healthcare professionals, improve patient engagement, and streamline administrative processes, but they are not a replacement for the expertise and personalized care provided by trained healthcare professionals.

IV. IMPLEMENTATION

The implementation of the Healthcare Virtual Assistant using generative AI has been successfully carried out, providing comprehensive functionalities across different panels – Admin, Doctor, and Patient. This section presents the outcomes achieved in each panel.

A. Admin Panel

- 1) *Admin Verification Page:* The Admin Verification Page ensures secure access to the admin panel, incorporating robust authentication mechanisms.
- 2) *Admin Profile Page:* Administrators can efficiently manage their profile information, including personal details and preferences.
- 3) *Doctor-Patient Management Page:* This feature facilitates seamless management of doctor and patient records, ensuring accurate and organized data storage.
- 4) *Admin Settings Page:* Administrators have access to settings where they can customize system configurations, such as notification preferences and access permissions.

B. Doctor Panel

- 1) *Doctor Verification Page:* Similar to the Admin Panel, the Doctor Verification Page implements stringent verification processes to authenticate doctors' access.
- 2) *Doctor Profile Page:* Doctors can conveniently update their profiles, including professional credentials, specialization, and availability.
- 3) *Patient Appointment Management Page:* This page enables doctors to efficiently manage patient appointments, including scheduling, rescheduling, and cancellations, streamlining the workflow.
- 4) *Doctor Settings Page:* Doctors have the flexibility to configure settings tailored to their preferences, such as notification preferences and appointment scheduling rules.

C. Patient Panel

- 1) *Patient Verification Page:* Ensuring the security of patient data, the Patient Verification Page authenticates patients before granting access to the panel.
- 2) *Patient Profile Page:* Patients can manage their profile information, including personal details, medical history, and insurance information.
- 3) *Appointment Booking Page:* This pivotal feature allows patients to schedule appointments with their preferred doctors at their convenience, enhancing accessibility to healthcare services.
- 4) *Patient Settings Page:* Patients can customize settings according to their preferences, such as communication preferences and appointment reminders.

Overall, the implementation of the Healthcare Virtual Assistant exhibits robust functionality across all panels, catering to the diverse needs of administrators, doctors, and patients, thereby enhancing the efficiency and accessibility of healthcare services.

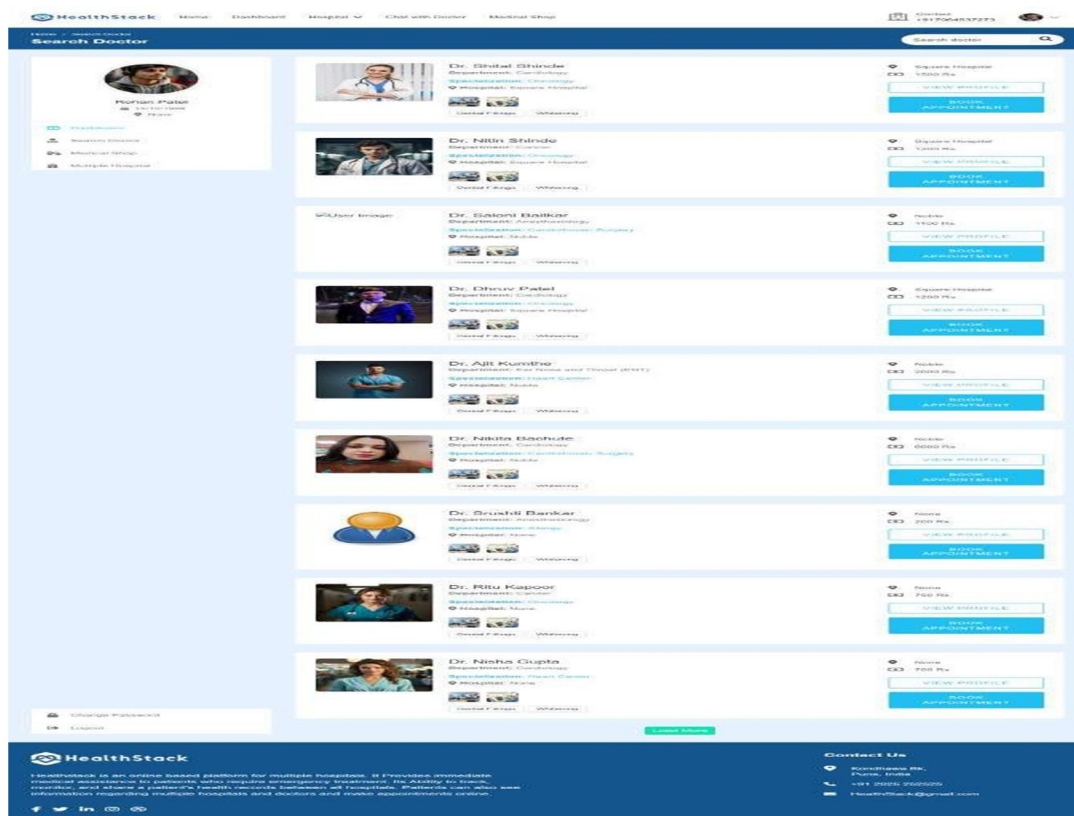
V. RESULTS


The Result section of the report for the healthcare virtual assistant project utilizing generative AI presents a comprehensive overview of the system's performance and its impact on user experience and healthcare outcomes. It outlines the efficacy of the virtual assistant in understanding and responding to user queries accurately, its ability to provide relevant medical information and assistance, and its overall usability and user satisfaction metrics. Additionally, this section may include data on the virtual assistant's efficiency in handling various types of inquiries, such as symptom analysis, medication information, appointment scheduling, and more. Furthermore, it may highlight any significant improvements achieved over previous iterations or benchmarks, along with insights gained from user feedback or testing. Overall, the Result section provides crucial insights into the project's success in leveraging generative AI for enhancing healthcare accessibility and efficiency through an innovative virtual assistant solution.


User Interface Design:


Below is the snapshot of the application: -

Doctor:





[Home](#)
[Dashboard](#)
[Hospitals](#)
[About Us](#)
[Chat with Patients](#)


[Contact](#)
+919252939594




[Home](#) / [My Patients](#)

My Patients



Ritu Kapoor
Oncology

- Dashboard
- Profile
- Appointment
- Patient ID
- Multiple Hospital
- My Patients
- Test Information
- Profile Settings
- Change Password
- Logout




Rohan Patel
ID: 9
None






Phone: 7084537273

Age: 26


Blood Group: O+





Healthstack is an online based platform for multiple hospitals. It Provides immediate medical assistance to patients who require emergency treatment. Its Ability to track, monitor, and share a patient's health records between all hospitals. Patients can also see information regarding multiple hospitals and doctors and make appointments online.









Contact Us


 Kondhawa Bk,
Pune, India

 +91 2025 252525

 HealthStack@gmail.com



[Home](#)
[Dashboard](#)
[Hospitals](#)
[About Us](#)
[Chat with Patients](#)


[Contact](#)
+919252939594



[Home](#) / [Profile Settings](#)


Profile Settings



Ritu Kapoor
Oncology

- Dashboard
- Profile
- Appointment
- Patient ID
- Multiple Hospital
- My Patients
- Test Information
- Profile Settings
- Change Password
- Logout

Basic Information



Upload Profile

Username *

Email *

Name *

Phone Number *

Gender *

Date of Birth *

NID *

Visiting Hour *

About Me

Biography

Pricing

Consultation Fee

Report Fee

Education

[Add Education](#)


Experience

[Add Experience](#)






[Change Password](#)

[Logout](#)


[Save Changes](#)





Healthstack is an online based platform for multiple hospitals. It Provides immediate medical assistance to patients who require emergency treatment. Its Ability to track, monitor, and share a patient's health records between all hospitals. Patients can also see information regarding multiple hospitals and doctors and make appointments online.

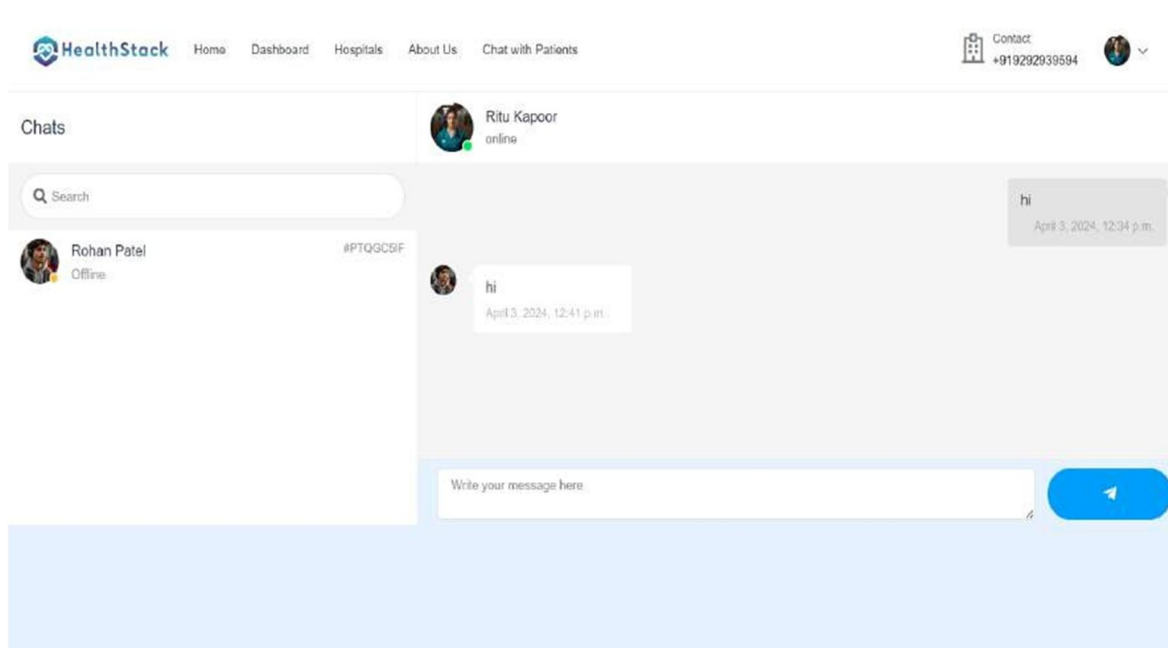






Contact Us

 Kondhawa Bk,
Pune, India

 +91 2025 252525

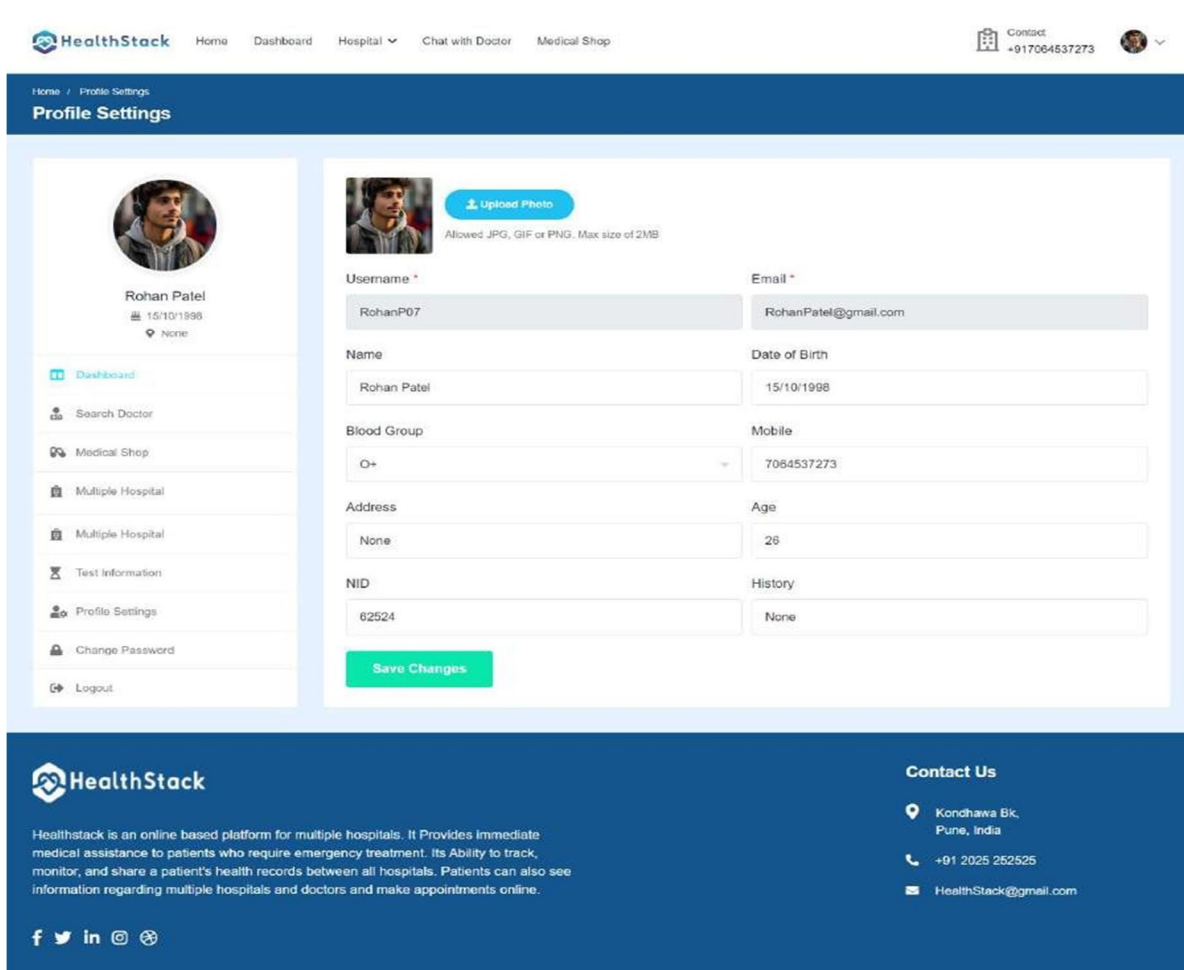
 HealthStack@gmail.com




The screenshot shows the HealthStack chat interface. At the top, there's a navigation bar with links: Home, Dashboard, Hospitals, About Us, and Chat with Patients. On the right, there's a contact information section showing a phone number +919292939594 and a profile picture. The main chat area displays a conversation with Ritu Kapoor, who is online. A search bar is visible on the left. The chat history shows a message from Ritu Kapoor saying "hi" on April 3, 2024, at 12:34 p.m. Below the chat area, there's a text input field labeled "Write your message here" and a blue send button.


Patient:


Patient:



The screenshot shows the HealthStack patient profile settings page. The navigation bar includes links: Home, Dashboard, Hospital, Chat with Doctor, and Medical Shop. The page title is "Profile Settings". On the left, there's a sidebar menu with options: Dashboard, Search Doctor, Medical Shop, Multiple Hospital, Test Information, Profile Settings (selected), Change Password, and Logout. The main content area displays the patient's profile information for Rohan Patel, including a profile picture, username (RohanP07), email (RohanPatel@gmail.com), name, date of birth (15/10/1998), blood group (O+), mobile number (7064537273), address (None), age (26), NID (62524), and history (None). There's an "Upload Photo" button and a "Save Changes" button. The footer section contains the HealthStack logo, a description of the platform, contact information (Kondhawa Bk, Pune, India; +91 2025 252525; HealthStack@gmail.com), and social media links.



[Home](#)
[Dashboard](#)
[Hospital](#)
[Chat with Doctor](#)
[Medical Shop](#)


 Contact
 +917084537273



[Home](#) / [Patient Dashboard](#)


Patient Dashboard




Rohan Patel
15/10/1998
None






- Dashboard
- Search Doctor
- Medical Shop
- Multiple Hospital
- Test Information
- Profile Settings
- Change Password
- Logout

[Appointments](#)
[Prescriptions](#)
[Medical Records](#)
[Billing](#)




Prescription ID	Doctor Name	Doctor	Action
18	Ritu Kapoor	 Dr. Ritu Kapoor Cancer - Square Hospital	View





Healthstack is an online based platform for multiple hospitals. It Provides immediate medical assistance to patients who require emergency treatment. Its Ability to track, monitor, and share a patient's health records between all hospitals. Patients can also see information regarding multiple hospitals and doctors and make appointments online.








Contact Us

 Kondhawa Bk,
 Pune, India
 +91 2025 252525
 HealthStack@gmail.com



[Home](#)
[Dashboard](#)
[Hospital](#)
[Chat with Doctor](#)
[Medical Shop](#)


 Contact
 +917084537273



[Home](#) / [Patient Dashboard](#)


Patient Dashboard




Rohan Patel
15/10/1998
None






- Dashboard
- Search Doctor
- Medical Shop
- Multiple Hospital
- Test Information
- Profile Settings
- Change Password
- Logout

[Appointments](#)
[Prescriptions](#)
[Medical Records](#)
[Billing](#)




Doctor	Appt Date	Type	Amount	Status	Payment Status	Action
 Ritu Kapoor Cancer - Square Hospital	April 3, 2024 1:01 pm	report	300 Rs	Confirm	Pending	Pay Now



Healthstack is an online based platform for multiple hospitals. It Provides immediate medical assistance to patients who require emergency treatment. Its Ability to track, monitor, and share a patient's health records between all hospitals. Patients can also see information regarding multiple hospitals and doctors and make appointments online.

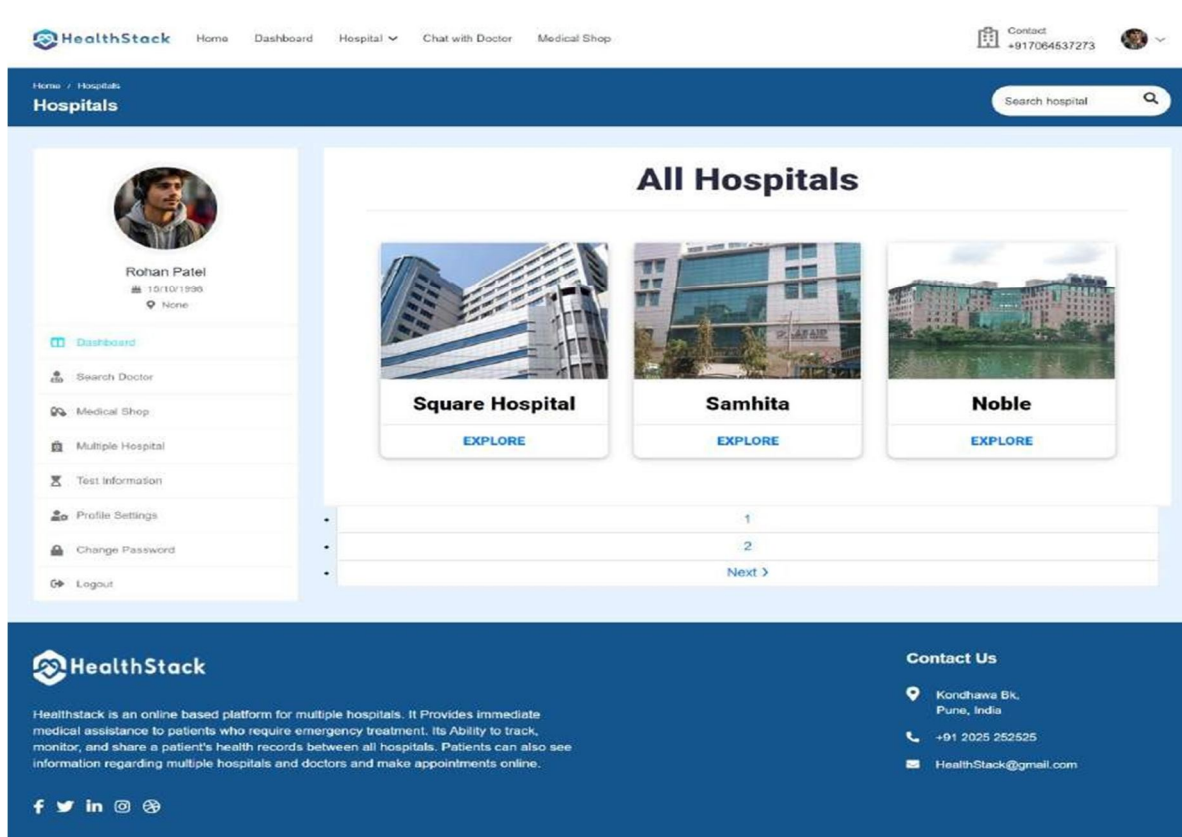
Contact Us

 Kondhawa Bk,
 Pune, India
 +91 2025 252525
 HealthStack@gmail.com

© IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

3569

Hospital:



HealthStack Home Dashboard Hospital Chat with Doctor Medical Shop

Contact +917064537273

Home / Hospitals

Hospitals Search hospital

All Hospitals

Square Hospital EXPLORE

Samhita EXPLORE

Noble EXPLORE

1

2

Next >

HealthStack

Healthstack is an online based platform for multiple hospitals. It Provides immediate medical assistance to patients who require emergency treatment. Its Ability to track, monitor, and share a patient's health records between all hospitals. Patients can also see information regarding multiple hospitals and doctors and make appointments online.

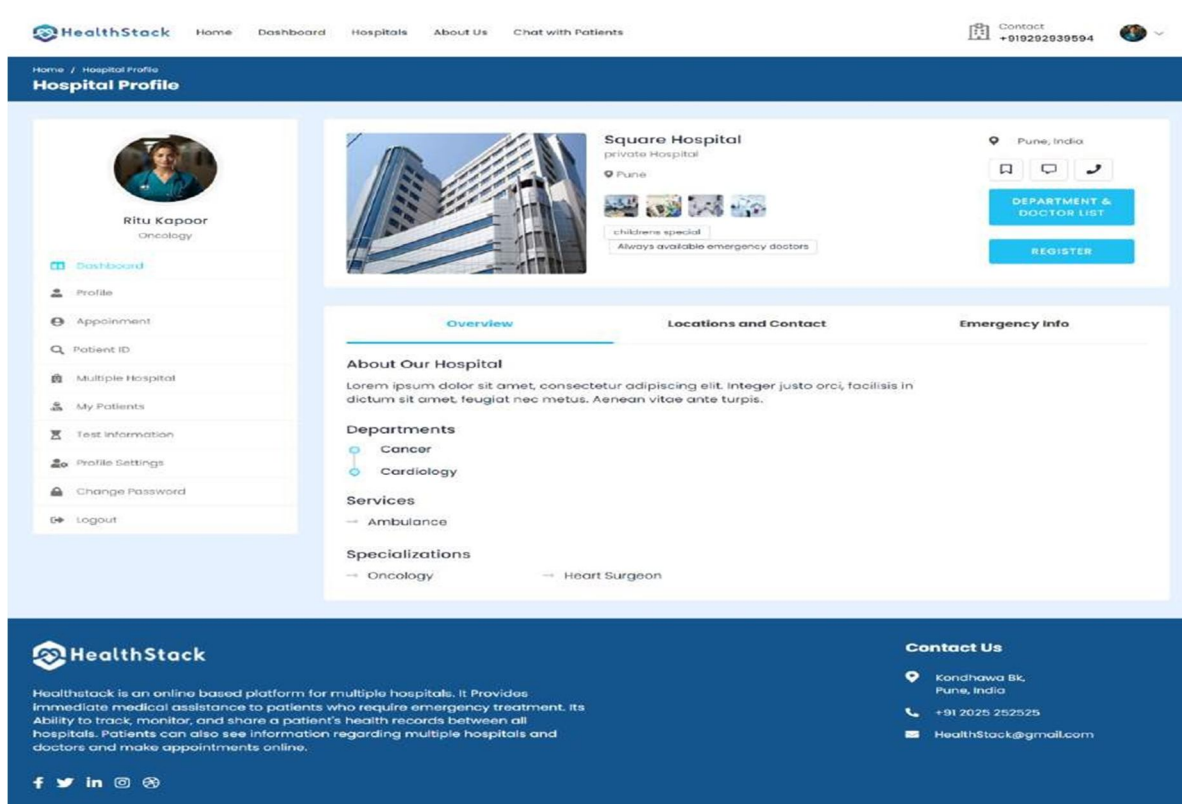
f t in @

Contact Us

Kondhwa Bk.
Pune, India

+91 2025 252525

HealthStack@gmail.com



HealthStack Home Dashboard Hospitals About Us Chat with Patients

Contact +91202039594

Home / Hospital Profile

Hospital Profile

Ritu Kapoor
Oncology

Square Hospital
private Hospital
Pune

Pune, India

DEPARTMENT & DOCTOR LIST

REGISTER

Overview Locations and Contact Emergency Info

About Our Hospital

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Integer justo orci, facilisis in dictum sit amet, feugiat nec metus. Aenean vitae ante turpis.

Departments

- Cancer
- Cardiology

Services

- Ambulance

Specializations

- Oncology
- Heart Surgeon

HealthStack

Healthstack is an online based platform for multiple hospitals. It Provides immediate medical assistance to patients who require emergency treatment. Its Ability to track, monitor, and share a patient's health records between all hospitals. Patients can also see information regarding multiple hospitals and doctors and make appointments online.


f t in @


Contact Us


Kondhwa Bk.
Pune, India

+91 2025 252525


HealthStack@gmail.com


[Home](#)
[Dashboard](#)
[Hospitals](#)
[About Us](#)
[Chat with Patients](#)


[Contact](#)
+919292939594



[Home](#) / [Hospital Doctor Register](#)
Hospital Doctor Register



Ritu Kapoor
Oncology

- Dashboard
- Profile
- Appointment
- Patient ID
- Multiple Hospital
- My Patients
- Test Information
- Profile Settings
- Change Password
- Logout

Hospital Registration

Choose Department

☐ Cancer
☐ Cardiology


Choose Specialization

☐ Oncology
☐ Heart Surgeon






Drop Certificate

Drop file here or click to upload




Submit





Healthstack is an online based platform for multiple hospitals. It Provides immediate medical assistance to patients who require emergency treatment. Its Ability to track, monitor, and share a patient's health records between all hospitals. Patients can also see information regarding multiple hospitals and doctors and make appointments online.








Contact Us


-  Kondhawa Bk, Pune, India
-  +91 2025 252525
-  HealthStack@gmail.com


[Home](#)
[Dashboard](#)
[Hospitals](#)
[About Us](#)
[Chat with Patients](#)


[Contact](#)
+919292939594




[Home](#) / [Hospital Departments](#)
Hospital Departments



Ritu Kapoor
Oncology


- Dashboard
- Profile
- Appointment
- Patient ID
- Multiple Hospital
- My Patients
- Test Information
- Profile Settings
- Change Password
- Logout

All Departments




Cancer

[Explore](#)








Cardiology




[Explore](#)




Healthstack is an online based platform for multiple hospitals. It Provides immediate medical assistance to patients who require emergency treatment. Its Ability to track, monitor, and share a patient's health records between all hospitals. Patients can also see information regarding multiple hospitals and doctors and make appointments online.








Contact Us

-  Kondhawa Bk, Pune, India
-  +91 2025 252525
-  HealthStack@gmail.com

Admin:


[Home](#)
[Doctor Dashboard](#)
[About Us](#)
[Hospital](#)


[Contact](#)
+91 2025 252525


[LOGOUT](#)

[Home](#) / [About Us](#)

About Us

About Us


Healthstack is an internet platform that supports numerous hospitals. It offers urgent medical aid to those in need of emergency care, its capability of tracking, monitoring, and sharing a patient's health records across all hospitals. Patients can also view information about various hospitals and providers and schedule appointments online.





Healthstack is an online based platform for multiple hospitals. It Provides immediate medical assistance to patients who require emergency treatment. Its Ability to track, monitor, and share a patient's health records between all hospitals. Patients can also see information regarding multiple hospitals and doctors and make appointments online.


[f](#)
[t](#)
[in](#)
[ig](#)
[whatsapp](#)

Contact Us

 Kondhwa Bk,
Pune, India

 +91 2025 252525

 HealthStack@gmail.com





[Menu](#)


[Dashboard](#)
[Hospitals](#)
[Doctors](#)
[Lab Worker](#)
[Pharmacist](#)
[Profile](#)


Welcome Admin!

Dashboard






 12
Total Doctors

 9
Total Patients

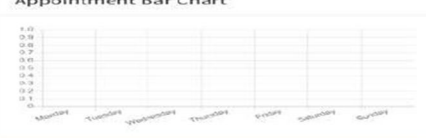
 5
Total Hospital

 2
Total Lab Worker














Hospital List

Hospital Name	Address	Email	Pho
 Square Hospital	Pune	square@gmail.com	149
 Samhita	Pune	labaid@gmail.com	1756
 Noble	Pune	united@gmail.com	274
 Sasoon Hospital	Pune	anwarshan@gmail.com	121
 Apollo	Pune	ibrahim@gmail.com	121










Appointment Bar Chart





Doctors List

Doctor Name	Department	Speciality	Hospital
 Shital Shinde			
 Nitin Shinde	None		
 User  Soni Balkar	None		
 Dhruv Patel	None		
 Ajit Kumbhe	None		
 Nikita Beshute	None		
 Anurag C	None		
 Aishwarya Autkar	None		
 Srushti Bankar	None		
 Shradha Kachare	None		
 Riti Kapoor	None		
 Nisha Gupta	None		



Patients List

Patient Name	Phone	Email
 Mrunal Shewale	128374613	munal@gmail.com
 Saurabh Bankar	175463231	saurabh@gmail.com
 Atharva Bhosale	171561610	atharva@gmail.com
 Kunal Hole	3435466789	kunal@gmail.com
 Dhanashree Kakade	3124235432	dhanashree@gmail.com
 Ayush Agarwal	4134343478	ayush@gmail.com
 Satoni Balkar	9421102973	Satoni5018_2@gmail.com
 Smita Patil	8226372831	Smitapatil06@gmail.com
 Rohan Patel	7664537273	RohanPatel@gmail.com

Pharmacist List

Pharmacist Name	Email	Phone Number
 rupali	rupali@gmail.com	None
 vedant	vedant@gmail.com	None

Lab-Worker List

Lab-Worker Name	Phone	Email
 Shailesh Choudhary	9876543211	shailesh@gmail.com
 Rahul Jadhav	9754321678	rahul@gmail.com

VI. CONCLUSION

The results showed that the proposed website was able to improve the quality of service for patients. Patients are facilitated to register online through a website, get medical history records quickly, and get services that are fast and measurable. Doctors and nurses get the patient's medical record information quickly through a web-based application. Doctors conduct patient assessments and collect data through an online system, and the results can be read by all medical teams through an integrated system. This is very efficient because it reduces the error rate. Through the proposed website, the hospital is facilitated to serve patients quickly which has an impact on patient satisfaction. Hospital management has a perfect database, making it easier for decision making and cost efficiency

REFERENCES

- [1] "Generative Adversarial Networks for Medical Image Synthesis and Analysis", 2018
- [2] "Text Generation and Representation in Healthcare: A Systematic Review", 2020
- [3] "Electronic Health Record Systems: The Vehicle for Achieving Effective and Quality Healthcare", 2015
- [4] Healthcare Process Optimization through Business Process Management, 2013
- [5] "Review on: Virtual Assistant and Patient Monitoring System by using AI & Data Science", 2019
- [6] APJII. Retrieved from <https://apjii.or.id/survei2018s/kirimlink>. 2018
- [7] M.B. Romney, and P.J. Steinbart, Sistem Informasi Akuntansi (Accounting Information Systems) (Vol. 13). Jakarta: Salemba Empat. 2015.
- [8] J. W. Satzinger, R. B. Jackson, and S.D. Burd. System Analysis and Design in A Changing World . Cengage Learning. 2012.
- [9] D. Bourgeois, J. Smith, S. Wang, and J. Mortati, Information Systems for Business and Beyond. 2019.
- [10] S.P. Bhavnani, J. Narula, and P.P. Sengupta, Mobile technology and the digitization of healthcare. European Heart Journal, 1428–1438. 2016.
- [11] J.S. Jeong, O. Han, and Y.Y. A. You, Design Characteristics of Smart Healthcare System as the IoT Application. Indian Journal of Science and Technology, 37. 2016.
- [12] B. Chen, A. Baur, M. Stepniak, and J. Wang, Finding the future of care provision: the role of smart hospitals. 2019.
- [13] M.M. Mahmoud, J.J. Rodrigues, S.H. Ahmed, S.C. Syah, J. Al- Muhtadi, V. Korotaev, and V.H. Albuquerque, Enabling Technologies on Cloud of Things for Smart Healthcare. IEEE, 2169- 3536..2018.
- [14] Undang - Undang Republik Indonesia nomor 36 tahun 2009. Jakarta. 2009.
- [15] Kementerian Kesehatan Republik Indonesia. Data dan Informasi Profil Kesehatan Indonesia 2018. Jakarta. 2018.



10.22214/IJRASET



45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24*7 Support on Whatsapp)