

# COMPREHENSIVE FRAMEWORK FOR THE DEVELOPMENT OF AN ONLINE HOSPITAL MANAGEMENT SYSTEM WITH PRIMARY MEDICATION SUGGESTION USING DJANGO

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**Abstract**—Taking doctor’s appointment offline or in physical mode has drawbacks such as being time-intensive, communication challenges and so on which could impact both patients and health care providers. To overcome this problem, we have come up with the solution called Online Hospital Management System using Django framework which would book the doctor’s appointment online. Our paper Hospital Management system included registration of patient’s, storing their details into the system and also booking their appointments with doctors. The patient would register in our software. After that, login is done with their usernames and check the availability of a doctor. The data is well protected and makes data processing very fast and the interface is user friendly. This application employs a robust authentication system to safeguard access, ensuring a secure and controlled environment for users to interact with its functionalities and resources. Administrator task includes managing doctor’s information, patient’s information and approving the appointments. The billing will be computerized by the admin and the patient can download their bill in online and It’s not essential of standing in the queue for longtime to get the bill and also can pay the bill in online. To enhance patient care our system incorporates medicine recommendation feature. when patient provides symptom names system suggests recommended medicines.

**Keywords:** Django framework, Hospital Management, Web Development.

Managing a sanatorium is a complicated job, it entails the control of various sports each day along with recording doctor’s and patient’s information, admission and discharges information of patients, scheduling appointments, generating billing and invoices, and other hospital-related management matters. Conventionally, these are processed separately and manually. Without medical institution control automation, the medical institution directors and body of workers will come upon problems in coping with medical institution subjects with a view to sluggish their service. The pre-current device of control hinders the medical institution to offer higher and best healthcare offerings to the stakeholders. The medical institution cannot absolutely optimize its operations to higher serve its purpose.

The user must go through a hospital and book an appointment. Time is lost because of this. Therefore, the usage of this application will make it easy to manipulate the whole lot process [2]. Therefore, the development team is designing this solution that provides support both patients and hospital workers using the motivation of this scenario, which was frequently performed in hospitals So, the stakeholders would like to have this system that makes hospitals work quickly and efficiently.

## I. INTRODUCTION

The project, “comprehensive framework for the development, implementation of a Hospital Management System in Django” is designed for clinic control automation. The machine will streamline and automate the procedure of engaging in the hospital’s day by day transactions from patients, physician appointments as much as producing payments of patients.

## II. LITERATURE REVIEW

In the initial phase, relevant studies were gathered from databases using specific keywords. Only research employing maturity models was considered, and those that failed to were excluded.

Current hospital management systems face two primary challenges: operational efficiency and wait times across various procedures, departments, and individuals [4]. Visual simulation offers a solution by allowing users to analyze current processes and implement necessary adjustments to enhance service levels and process efficiency. Consequently, a final sample of 41 studies was established. Among these, 82.93% are journal articles, 7.32% are doctoral dissertations, and 9.76% are master's theses.

1. **“Functional Description of Online Medical Management System Using Modern Technology” (2013):** This paper solely focuses on online appointment booking, lacking additional functionalities. We have adopted the design from this paper and enhanced it by incorporating billing and online payment options as additional functionalities.
2. **“Intelligent Hospital Management System (IHMS)” (2015):** We taken inspiration from this paper for the set of components to be included in our system. Additionally, we have introduced a new functionality for digitizing health records.
3. **“Design and Implementation of Hospital Management System” (2019):** The limitation of this paper is that it does not provide any alternatives if a particular medicine is unavailable in the hospital. To address this, we have added a functionality that suggests related medicines closely matching the prescribed medicine.

### III. PROPOSED SOLUTION

To address the requirement for automation in hospital management, the researchers suggested developing the Hospital Management System in Django [9]. This system will automate the management of numerous essential daily processes in the hospital. The software will enable hospital administrators and staff to digitally record doctor and patient information, patient admission and discharge records, appointment scheduling, generate invoices and bills, and other pertinent hospital management tasks [8]. This project encompasses the development of services specifically designed to streamline and seamlessly integrate the tasks of healthcare professionals, fostering enhanced communication channels between them and their patients [20].

**Database-Driven-System:** The Hospital Management System is a database-driven platform that efficiently manages hospital operations and activities [14].

1. **Automated Management Processes:** The system simplifies complex processes, enabling hospital administrators and management to efficiently handle day-to-day transactions. **Records Management:** By converting hospital records into electronic format, the system ensures data security, accuracy, reliability, and fast retrieval [1].

2. **Report Generation:** The system automatically generates reports on the hospital's operations and transactions, providing valuable insights for decision-making.
3. **Medicine Recommendation:** Based on user-entered symptoms, the system recommends appropriate medications.
4. **UPI Payment Integration:** The system supports UPI payment, enabling patients to make secure and convenient payments.

The Hospital Management System in Django offers numerous benefits, including automated management processes, improved records management, report generation capabilities, and enhanced patient-doctor communication. It streamlines hospital operations, improves overall efficiency, and elevates the quality of healthcare services [16].

### IV. METHODOLOGY

#### Gemini AI: Personalized Medicine Recommendation System

Gemini AI is an innovative artificial intelligence (AI) system designed to revolutionize healthcare by providing personalized medicine recommendations based on patients' symptoms [4]. Developed by a team of leading AI researchers and medical experts, Gemini AI leverages cutting-edge machine learning algorithms and extensive medical knowledge to deliver accurate and tailored treatment suggestions [11].

#### Data Collection:

1. Gemini AI leverages a vast repository of medical information, which incorporates electronic health records (EHRs), clinical studies, medical literature, and patient feedback.
2. This comprehensive dataset allows the system to learn covering a vast variety of medical cases and effectively identify patterns and correlations between symptoms and treatments.

#### Machine Learning Algorithms:

1. Gemini AI employs a combination of supervised and unsupervised machine learning algorithms to analyze the collected medical data.
2. Supervised learning techniques, such as decision trees and random forests, enable the system to learn from labeled data (i.e., cases where the correct diagnosis and treatment are known).
3. Unsupervised learning algorithms, such as clustering and dimensionality reduction, help identify hidden patterns and relationships within the data.

#### Symptom Analysis:

1. Gemini AI utilizes natural language processing (NLP) and information retrieval techniques to extract meaningful insights from patients' descriptions of their symptoms.

2. The system employs advanced semantic analysis algorithms to understand the nuances and context of patients' expressions.
3. This enables Gemini AI to accurately capture the underlying medical conditions and generate precise treatment recommendations.

**Treatment Recommendation:**

1. Once the system has analyzed the patient's symptoms, it generates a list of potential treatment options based on its learned knowledge.
2. These recommendations are personalized to the patient's unique medical history, age, and other relevant factors.
3. Gemini AI takes into account the potential side effects, drug interactions, and overall efficacy of each treatment option, ensuring the most suitable recommendations.

**Recommendation Evaluation:**

1. The performance of Gemini AI is continuously evaluated using number encompassing metrics like accuracy, precision, recall, and F1 score.
2. The system's recommendations are compared against actual medical outcomes to ensure their effectiveness and reliability.
3. Ongoing evaluation helps improve the accuracy and robustness of the system's recommendations over time.

Gemini AI represents a significant advancement in personalized medicine by providing accurate and tailored treatment recommendations based on patients' symptoms. By leveraging machine learning algorithms, extensive medical knowledge, and advanced data analysis techniques, Gemini AI empowers healthcare professionals with valuable insights, enabling them to make more informed decisions and improve patient outcomes. The continuous evaluation and refinement of the system ensure its ongoing effectiveness and adaptability to evolving medical knowledge and practices. Gemini AI possesses the capacity to transform healthcare delivery, enhancing the quality of care and empowering patients to take an active role in their own health management.

**V. SYSTEM FEATURES**

The system consists of three main modules: patient, doctor, and admin. The patient module allows patients to register, sign in, book appointments, view their medical history, and pay their bills. The doctor module allows doctors to register, sign in, view their patients' medical history, and treat patients. The admin module allows admins to register, sign in, approve or reject doctors' and patients' registrations, and generate reports [5].

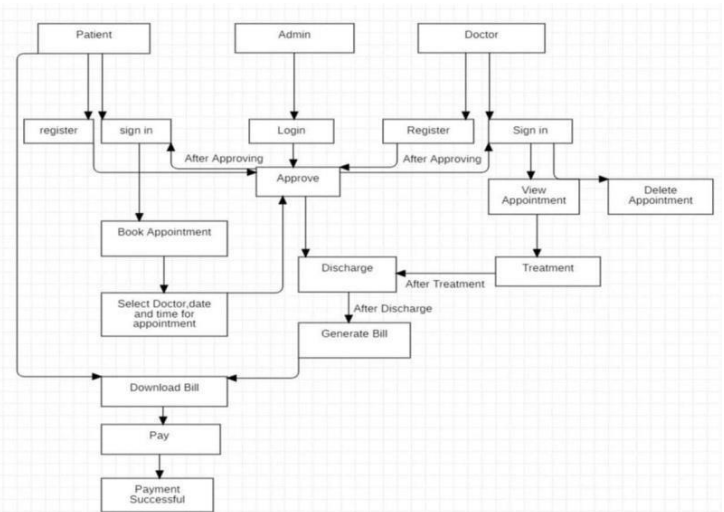


Fig.1 flow diagram of HMS

**Patient module:**

- The patient registration process involves the patient registering with the hospital or clinic. This can be done online. The patient will need to provide their name, address, contact information, and insurance information. They may also be asked to provide a medical history. Once the patient is registered, they will be given a patient ID number [19].
- The patient can then sign in to their account using their patient ID number and password. They will be able to view their medical records, make appointments, and communicate with their doctor.
- To select a doctor, the patient can search for a doctor by specialty, location, or insurance. They can also read reviews of doctors from other patients. Once the patient has selected a doctor, they can make an appointment.
- The patient will need to provide their insurance information when they make an appointment. The doctor's office will verify the patient's insurance coverage and will collect any applicable copayments or deductibles.
- The patient will be seen by the doctor at their scheduled appointment time. The doctor will examine the patient. The doctor may also order tests or prescribe medication.
- After the appointment, the patient will be able to view their medical records and communicate with their doctor through their patient account [18].

- They will also be able to download their medical bills and make payments online.
- When the patient is ready to be discharged from the hospital or clinic, they will need to speak to their doctor. The doctor will give the patient instructions on how to care for themselves at home. The patient will also be given a discharge summary, which will include information about their diagnosis, treatment, and medications.

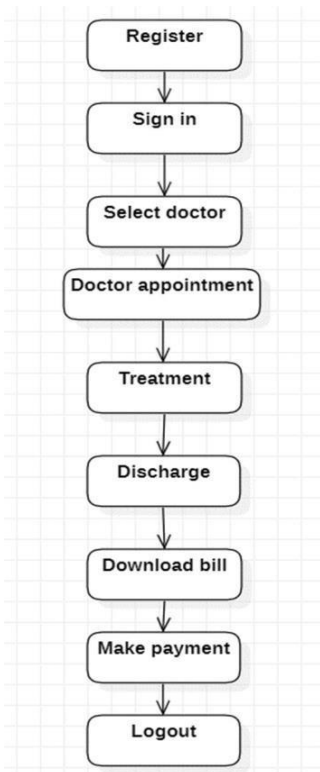


Fig.2 flow diagram of patient module

**Doctor module:**

- The first step in the doctor's engagement with the platform involves the registration process. During this phase, the doctor submits essential details, encompassing personal information, qualifications, and contact particulars. In addition, the doctor is prompted to establish a unique username and password, essential components for securing their account. This registration procedure is pivotal, serving as the gateway to the platform's suite of services. Upon successful completion, the doctor gains the privilege to proceed to the subsequent steps.
- With the registration formalities concluded, the doctor seamlessly transitions to the sign-in phase.
- Armed with the designated username and password, the doctor gains access to the platform's interface. The sign-in process is a straightforward yet crucial step, leading the doctor to a personalized dashboard. This dashboard acts as a centralized center for handling different elements of their professional activities within the platform.

- Post-sign-in, the doctor's focus shifts towards managing their appointments. The platform provides a comprehensive overview of scheduled appointments, allowing the doctor to efficiently organize their upcoming commitments. This feature streamlines the process of preparing for patient interactions, ensuring that the doctor is well-informed and adequately equipped for each appointment.
- A pivotal aspect of the doctor's role on the platform involves the management of appointments. The doctor is empowered to either approve or delete appointments based on their availability and other factors. This level of control ensures that the doctor can optimize their schedule, providing flexibility and accommodating unforeseen circumstances. Additionally, the doctor can seamlessly transition from appointment management to the actual treatment phase, fostering a streamlined and efficient workflow on the platform. Following the completion of appointments and treatments, the doctor concludes their session by logging out, thereby ensuring the security of their account and patient information.

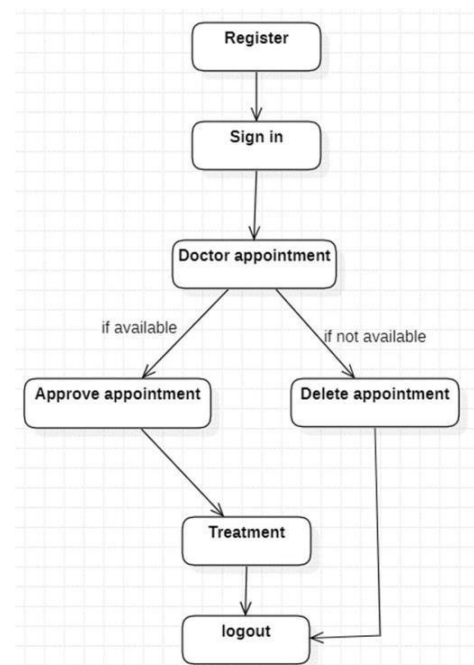


Fig.3 flow diagram of doctor module

**Admin module:**

- Upon successfully signing into the hospital management system, the administrator is empowered with the authority to oversee and manage various aspects of the healthcare facility. The first critical task in the admin module involves reviewing and deciding on pending registrations for both doctors and patients. The administrator, through a systematic approval or rejection process, ensures that the healthcare providers and patients within the system are valid and authorized to access the hospital's services. This initial step establishes a secure and controlled environment within the system.
- Moving forward, the admin module extends its functionality to the approval or rejection of doctor appointments. This phase is crucial in optimizing the hospital's scheduling and resource allocation. If a doctor's appointment is approved, it signifies that the scheduled consultation or procedure is authorized and can proceed as planned. On the other hand, rejections prompt a reevaluation or rescheduling of the appointment. This meticulous management of appointments contributes to the efficiency and smooth operation of the hospital, ensuring that both medical staff and patients are on the same page regarding scheduled activities.
- Moreover, the flowchart highlights an essential administrative capability - the ability to discharge patients. Once a doctor's appointment is approved, and the patient's medical needs are addressed, the administrator can initiate the discharge process. This involves generating a bill for the patient's stay in the hospital, encapsulating various incurred charges. The seamless integration of appointment approval and patient discharge ensures a streamlined and organized healthcare service delivery, reinforcing the effectiveness of the hospital management system. Finally, the administrator has the option to log out of the system, concluding their session securely. This multifaceted admin module enhances the overall functionality and control within the hospital management system, contributing to efficient healthcare administration.

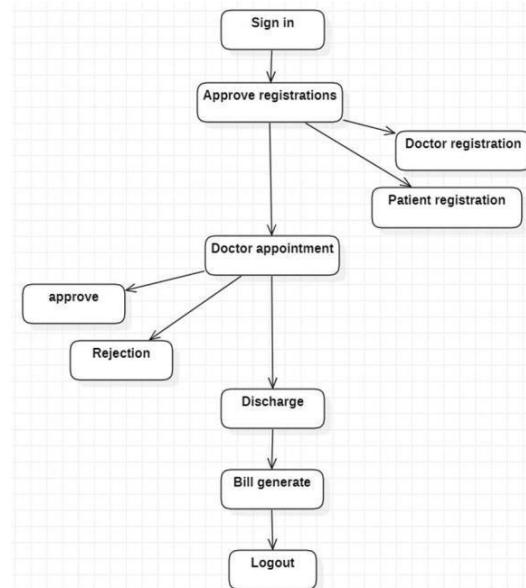


Fig.4 flow diagram of admin module

In the hospital management system, the integrated functionalities cater to the distinct roles of doctors, administrators, and patients. Doctors have the capability to register, sign in, and access their appointment schedules, where they can efficiently approve or delete appointments and provide necessary treatments to patients. Administrators, however, are outfitted with comprehensive control, enabling them to sign in, approve registrations for both doctors and patients, register new healthcare professionals, manage appointment approvals, discharge patients, and generate bills. Meanwhile, patients can seamlessly register, sign in, and choose their preferred doctor. Patients have the ease provided by viewing their appointments, receiving treatments, and making payments through this cohesive system, fostering a well-organized and patient-centric healthcare environment.

**VI. FUTURE WORK**

**Increase Domains of Doctor:**

- Expand the scope of services provided by doctors on the platform.
- Offer a wider range of specialties, including general practitioners, specialists, and sub-specialists.
- Enable telemedicine appointments for individuals who are unable to visit a clinic in person.

**Payment of Card and Online Transaction Integration:**

- Integrate multiple a range of payment selections, including credit cards, debit cards, net banking, and UPI (Unified Payments Interface).
- Make the payment process secure and seamless for both doctors and patients.



- Offer discounts and promotional offers to encourage digital payments.

**Give the Diet of Patient Based on Disease:**

- Develop a feature that allows doctors to prescribe personalized diets to patients based on their medical history, disease conditions, and dietary preferences.
- Include a database of dietitians and nutritionists who can provide personalized diet plans and advice to patients.
- Educate patients about the importance of diet and nutrition in managing their health.

**Integration of Pharmacy:**

- Integrate a pharmacy feature that allows patients to purchase medications prescribed by doctors on the platform.
- Partner with reputable pharmacies to ensure the availability of a wide range of medications.
- Offer home delivery of medications for added convenience and accessibility [10].

VII. CONCLUSION

The Hospital Management System (HMS) plays a central role in optimizing healthcare operations and elevating patient care standards. By centralizing patient data, the HMS enables quicker and more accurate diagnoses, ensuring timely treatments and an overall improvement in patient care. Online appointment booking, reduced wait times, secure communication channels, and easy access to medical records contribute to enhanced patient satisfaction. Additionally, the integrated HMS automates administrative processes, allowing healthcare professionals to focus on patient care and optimizing operational efficiency. It streamlines billing, insurance claims, inventory management, and facilitates resource allocation, leading to cost-effectiveness. The system's ability to collect and analyze extensive data supports data-driven decision-making, identifying trends and informing strategic planning. Ensuring regulatory compliance and data security, the HMS upholds patient privacy and legal requirements, making it a cornerstone for modern healthcare delivery. Embracing digital transformation, hospitals can leverage comprehensive HMSs to empower professionals, improve outcomes, and thrive in the competitive healthcare landscape.

VIII. REFERENCES

[1] Edmund, L. K. S., Ramaiah, S. K., and Gulla, S. P. (2009). DESIDOC Journal of Library and Information Technology, 29(6), 3–12. Electronic health record management systems: A review. DOI: 10.14429/dijit.29.273.

[2] Abraham and Joyce A. C. (2016). Designing a web-based hospital management system for MOUAU clinic.

International Journal of Trend in Research and Development, 2(6), 2394-9333.

[3] Demirel (2017). Hospital Management information systems in health sector and development in Turkey. Journal of Current Researches on Health Sector.

[4] Henry Lieberman, "Intelligent Agent Software for Medicine," and Cindy Mason, Health Techno Inform Research, vol. 80, pp. 99-109, 2002.

[5] R. G. Misal, "Advanced hospital management system," Int J Res Appl Sci Eng Technol, vol. 10, no. November 6, 2022, domain number: 10.22214/ijraset.2022.43686.

[6] P. K. Yadav and R. Kumar, "Online Hospital Management System," SSRN Electronic Journal, 2022, doi: 10.2139/ssrn.4104606.

[7] Nishanthan, S. Mativatana, "Hospital Management Systems," International Journal of Engineering and Management Research, vol. 12, no. May 5, 2022, doi: 10.31033/ijemr.12.5.17.

[8] F. A. Alzahrani, "Estimating security risk of healthcare web applications: a design perspective," Computers, Materials and Continua, vol. 67, no. 1, 2021, doi: 10.32604/cmc.2021.014007.

[9] M. V. Gawande, P. Pisey, A. A. Shinde, P. Ghagre, and K. Bhusari, "Hospital Management System in DJANGO," International Journal of Research in Engineering and Science (IJRES) ISSN, vol. 10, no. 06, 2022.

[10] P. Balaraman and K. Kosalram, "E –Hospital Management & Hospital Information Systems – Changing Trends," International Journal of Information Engineering and Electronic Business, vol. 5, no. 1, 2013, doi: 10.5815/ijieeb.2013.01.06.

[11] A. MacGregor John-Otumu, "Framework for Developing and Implementing an Automated Hospital Management System on an Intranet," NIGERIAN ANNALS OF NATURAL SCIENCES, vol. 13, no. 2, 2018.

[12] M.Y. Maryati, J.P. Ray and K.S. Lampros, "Towards a Framework for Health Information Systems Evaluation," 39th Hawaii International Conference on System Sciences, 2006.

[13] Mina Parveen, Sana Shaikh, Akansha Andey, Shreya Rajgire, Abdul Razzaque, HOSPITAL MANAGEMENT SYSTEM, International Research Journal of Modernization in Engineering Technology and Science, 2023, doi: 10.56726/irjmets37037.

[14] Zarei, S. Karimi, S. Mahfoozpour, and S. Marzban, "Assessing hospital quality management systems: evidence from Iran," Int J Health Care Qual Assur, vol. 32, no. 1, 2019, doi: 10.1108/IJHCQA-11-2017-0208.

[15] S. U. Jan, M. Ishaq, and A. Aziz, "Hospital Management System," SSRN Electronic Journal, 2023, doi: 10.2139/ssrn.4350730.

- [16] Y. Komalasari, "Factors Affecting the Utilization of Hospital Management Information System in PKU Muhammadiyah Bantul General Hospital," *Insights in Public Health Journal*, vol. 1, no. 2, 2021, doi: 10.20884/1.iphj.2020.1.2.3778.
- [17] "An Investigation Study of Hospital Management Information System," *IJARCCCE*, vol. 6, no. 1, 2017, doi: 10.17148/ijarcce.2017.6184.
- [18] "Internet Hospital Management System," *Iraqi Journal of Computer, Communication, Control and Systems Engineering*, 2018, doi: 10.33103/uot.ijccce.18.1.2.
- [19] A. Alzahrani, "Estimating security risk of healthcare web applications: a design perspective," *Computers, Materials and Continua*, vol. 67, no. 1, 2021, doi: 10.32604/cmc.2021.014007.
- [20] D.S.O.O.E. C. M., "Interconnected Hospital Management System," *International Journal of Scientific Research (IJSR)*, vol. 7, no. February 2, 2018.