DEVELOPING OPD APPOINTMENT AND HOSPITAL INFORMATION SYSTEM: AVOIDING PHYSICAL APPOINTMENT AND PREDICTING THE SPECIALIST USING AI

Yasotha R[1], Srinivash G S[2], Allansam A[3] , Poornima A[4]

[1]*Information Science and Engineering, Bannari Amman Institute of Technology, Erode, Tamil Nadu.*

[2]*Information Science and Engineering, Bannari Amman Institute of Technology, Erode, Tamil Nadu.*

[3]*Information Science and Engineering, Bannari Amman Institute of Technology, Erode, Tamil Nadu*

[4]*Assistant Professor, Information Science and Engineering, Bannari Amman Institute of Technology, Erode, Tamil Nadu*

Abstract

OPD appointment and hospital administration system employs cutting-edge technology and approaches to improve patient care and hospital efficiency. It is developed using HTML, CSS and JavaScript for the front-end and Go Lang for the back-end and Mongo db for database. The Gemini AI API is integrated to forecast medical specializations required by patients, expediting the process of identifying the appropriate specialist. This AI-driven strategy examines patient symptoms, history, and preferences to improve appointment scheduling efficiency and shorten wait times. Consultations now include automated email communication, which aligns with telemedicine trends and improves patient-doctor relations. To meet the diverse demands and privileges of administrators, patients, and doctors, separate login portals are built. The technology intends to improve hospital operations and patient happiness by automating appointment scheduling and anticipating medical specialty, so decreasing administrative demands on hospital staff and making healthcare more accessible and individualized. Technological and operational feasibility are critical to the system's success, with meticulous planning and execution assuring smooth integration of Go and Java script. MongoDB's flexibility and performance make it ideal for managing vast amounts of unstructured data in healthcare settings.

Keywords- *Hospital interface, outpatient Department, great healthcare services, smart healthcare equipment, health care finder, disease specialist, Google maps Api integrator, Health Care service Provider, End User Interface, reducing, dashboard, insurance.*

I. INTRODUCTION

The healthcare business is undergoing a major transformation due to rising demand for accessible, efficient, and patient-centred services. This paper describes an innovative Outpatient Department (OPD) appointment and hospital administration system designed to bridge the gap between patients and healthcare professionals, providing prompt medical care while decreasing administrative overhead. The system uses cutting-edge technologies like Go for robust front-end interactions, Node.js for scalable back-end services, and MongoDB for flexible and efficient data management.

The Gemini AI API is a critical component of the system, using artificial intelligence to forecast medical specialization based on patients' symptoms, medical history, and other pertinent data. This predictive power guarantees that patients are paired with relevant specialists, greatly improving the healthcare delivery process. The system offers separate user interfaces for administrators, patients, and doctors, each adapted to their

respective needs and access levels. For patients, it makes it easier to discover the correct specialist and schedule an appointment, while healthcare practitioners and administrators can manage calendars, patient records, and communications, decreasing administrative work and allowing for more focus on patient care.

Automated communication systems enable virtual consultations via email, which aligns with the expanding trend of telemedicine. This feature makes healthcare services more accessible and assures continuity of care in an increasingly digital age.

II. EXISTING METHOD

A number of researchers have proposed various models for Opd appointment and hospital management system using various techniques. This part focuses on the work done in the same area.

Mohammad wazid .[1] Healthcare 5.0 is a system that can be deployed to provide various healthcare services. It does these services by utilising a new generation of information technologies, such as Internet of Things (IoT), Artificial Intelligence (AI), Big data analytics, blockchain and cloud computing.

Ragheb Ai-Nammari.[2] In this study, the relationship between the nine themes and the output (staff engagement) is analyzed by training three treebased ensemble algorithms: RF, GB, and ET. A prediction model was built to determine the relative importance of these factors by performing feature importance functions in each algorithm.

Alessandro Giuseppi.[3] This paper presents a FL consensus-based paradigm called FedLCon, originating on the ground of results from discrete-time average consensus theory, that is used to decentralize two FL algorithms - FedAvg and AdaFed. Decentralizing existing FL algorithms thought a solution such as FedLCon enables the application of FL over federations with sparse communications graphs, further enhancing its privacy-related features. The paper presented the results attained by the tested algorithms on several scenarios for a COVID-19 detection task.

Muhammad Nazakat.[4] Appropriate public health action comes from data driven decision support systems. While a sophisticated health information exchange framework may be costly in developing countries, the health care delivery system in place may provide a promising infrastructure that spans all parts of a region. Therefore, while digital and non-digital data is constantly being generated from a variety of sources including public and private health sectors, the health care delivery systems remain the primary and most fundamental source for data on population health status.

Omar Maki.[5] A cross-sectional analysis study has been carried out, with qualitative and quantitative phases. The first phase entails a thorough review of the literature on innovative health-care technologies and facility management practices. This includes searching academic papers for critical, innovative healthcare ideas and determining FM necessary measures after the COVID-19 pandemic. The second phase of this research constituted a semi-structured interview with healthcare and facility management professionals, to attain more knowledge about the gathered technological ideas and facility management methods. The causal loop diagram (CLD) has been designed in this study using VENSIM software to conceptually model dynamic systems holistically, illustrating how variables interact. (i.e., Adoption and usage of technology, Efficiency of Resources Usage, Waiting time, Availability of Healthcare Facilities, Patient Satisfaction, etc.).

Ola posi.[6] created an information system that allows students to schedule appointments with university doctors remotely, cutting wait times at the university health center. The system was planned and implemented using the UML language and diagrams. The system enabled patients to arrange appointments, nurses to match patients with doctors, doctors to report medical data, and patients to reschedule appointments.

Abid Haleem.[7] Telemedicine has grown in popularity among patients who are unable to visit their doctor because to high travel costs and the Covid-19 epidemic. This technology minimizes hospitalizations, saves time and money, and improves healthcare workflows. It enables medical professionals to diagnose and treat patients in remote locations, enhances follow-ups, and optimizes patient outcomes. However, it should be used in conjunction with physical consultations rather than as a replacement for them. The article examines the key capabilities, characteristics, and barriers to telemedicine adoption in healthcare.

Yang Zhao.[8] This study investigates older persons' digital capacity in healthcare information technologies (HIT). It creates a theoretical model based on a qualitative inductive investigation with 33 people, including Chinese patients and their families. The approach proposes two techniques for encouraging older persons to use HIT. The study adds to the literature on digital capacity and has practical consequences for governments and the commercial sector.

Aleksandar Milenkovic.[9] The purpose of this paper is to decrease the transmission of COVID-19 by enhancing social separation through the use of the existing Medical Information System (MIS). The MIS MEDIS.NET, which is used in the largest health institution in the Balkans, was modified and expanded, leading in the creation of four new modules and a smart triage questionnaire. The revised MIS drastically reduced social contacts, longer appointments, and viral exposure while maintaining a central registration for COVID-19.

Muhammet Usak.[10] The Internet of Things (IoT) has evolved into a distributed system capable of meeting daily demands while also supporting low-cost health services. This has resulted in greater interest in integrating IoT with healthcare. However, there is a need for a deeper knowledge of IoT-based health care systems. This study provides a literature overview of IoT-based health care services from 2018 and evaluates their disadvantages, benefits, and challenges. The findings will help practitioners and academics by generating visions for future research fields. The Internet of Things could help governments improve health-care services and business interactions.

Xu et al. [12] presented a data model to record and use the IoT data. They designed and developed a resource-based Ubiquitous Data accessing method to collect and publish IoT data globally to so that it can be accessed anywhere, anytime. They also present an emergency medical service based on IoT and how to collect and use the IoT data on different platforms.

III. PROPOSED METHODOLOGY

The opd appointment and hospital information system, which avoids paper documents and tracks medical records, aims to create a user-centric platform for quickly discovering and engaging with healthcare services. It serves both customers seeking medical services and healthcare practitioners or managers who manage hospital information. The system consists of various essential components and capabilities.

- **Technological Framework:**

  The system leverages Go for serving and managing front-end content, enabling dynamic web page rendering and efficient handling of user interactions. Node.js is utilized for back-end development, facilitating asynchronous operations and efficient data processing to manage complex workflows and real-time data exchanges. MongoDB, a NoSQL database, is chosen for its flexibility and scalability, perfectly suited for storing and querying the heterogeneous and voluminous data inherent in healthcare settings, including patient records, appointment schedules, and medical histories.

- **AI Integration for Enhanced Patient Care**

  The incorporation of the Gemini AI API marks a pivotal innovation, enabling the system to intelligently predict the medical specialization required by patients based on their symptoms, medical history, and other relevant data. AI-driven methodology significantly streamlines the appointment scheduling process, ensuring patients are quickly and accurately matched with the appropriate specialists, thereby improving the efficiency of healthcare delivery and patient outcomes.

- **Features for User Experience and Accessibility:**

  Automated communications, including the dispatch of meet links via email for consultations, are seamlessly integrated, aligning with the growing demand for telemedicine solutions. This feature ensures a smooth transition from appointment scheduling to consultation, enhancing the convenience and accessibility of healthcare services for patients.Distinct login portals are designed for administrators, patients, and doctors, each tailored to meet the unique needs and access levels of these user groups, ensuring a personalized and secure user experience.

- **Operational Efficiency and Patient Satisfaction:**

  By automating crucial operations like as appointment scheduling and predicting required medical specializations, the technology not only reduces administrative stress on hospital staff, but also makes healthcare services more accessible and individualized for patients.
  The strategic use of technology aims to improve hospital operations, shorten wait times, and increase overall patient happiness, resulting in a more efficient and patient-centered healthcare ecosystem.

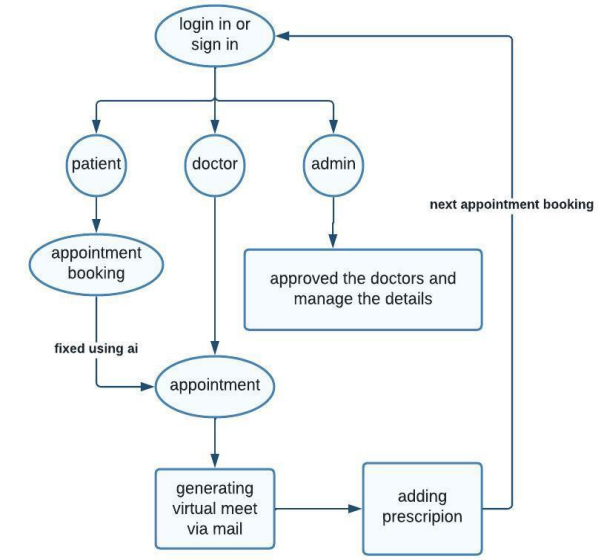

Figure 1. system design

The OPD appointment and hospital management system marks a significant step forward in the integration of technology in healthcare. The Gemini API, which uses Go, Node.js, MongoDB, and AI, claims to revolutionize healthcare appointment management and administration. Its emphasis on operational efficiency, improved patient care, and seamless integration of telemedicine components distinguishes it as a future-ready solution capable of meeting the increasing needs of the healthcare business. The effective adoption of this system involves careful planning, execution, and continuing review to ensure that it fulfills its promise of altering healthcare experiences for both patients and providers.

IV. RESULT

The Outpatient Department (OPD) appointment and hospital administration system has revolutionized healthcare management by integrating cutting-edge technology. Utilizing Go for the frontend, Node.js for the backend, MongoDB for data storage, and the Gemini AI API for predictive analysis, the system has improved patient care and hospital efficiency.

Fig 6.1. Main Page

The AI-driven approach to predicting medical specialization has significantly streamlined the appointment booking process, reducing wait times and improving patient routing within healthcare facilities. This feature optimizes healthcare resource utilization and ensures timely and focused care.

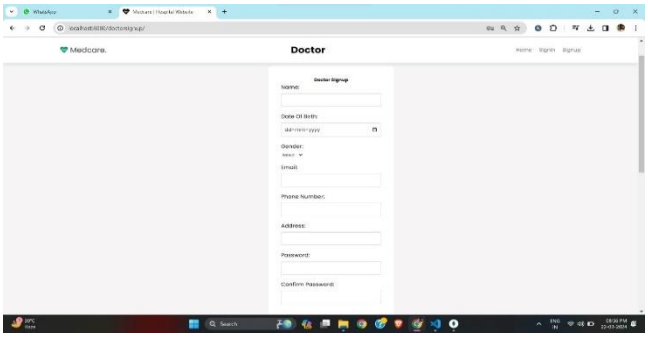

Fig 6.2. Doctor Sign up page

Patients have reported a marked improvement in their experience with the new system, with ease of booking appointments, immediate confirmation, and virtual consultations via email. The system also empowers patients by making healthcare more accessible and convenient.

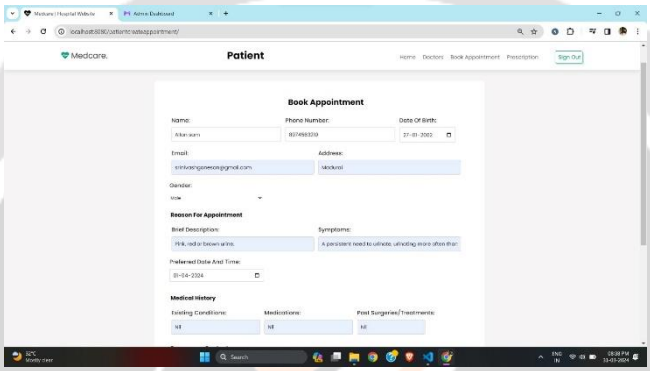

Fig 6.3. Appointment booking form

For healthcare providers and administrators, the system has reduced administrative load, allowing medical staff to focus on patient care rather than paperwork or scheduling conflicts. The digital dashboard provides a comprehensive view of appointments, patient histories, and other critical information, facilitating better planning and resource allocation. Automated communication tools have streamlined patient interactions, reducing no-shows and improving scheduling efficiency.

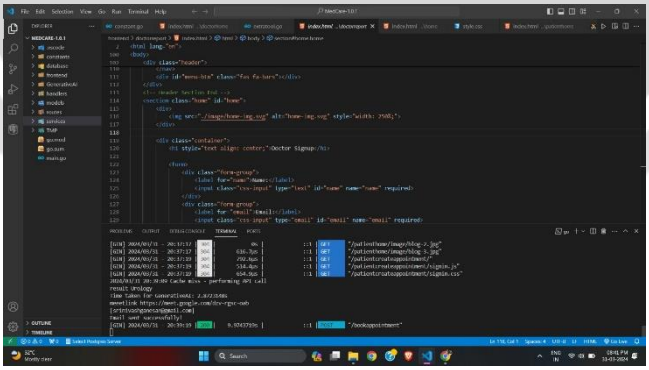

Fig 6.4. Doctor prediction

V. CONCLUSION

The Outpatient Department (OPD) appointment and hospital administration system has revolutionized healthcare management by integrating advanced technology. Utilizing Go for frontend, Node.js for backend, MongoDB for data storage, and Gemini AI API for predictive analysis, the system has improved patient care and hospital efficiency. The AI-driven approach to medical specialization has streamlined appointment booking, reducing wait times and improving patient routing. Patients have reported improved experiences with the system, including ease of booking appointments, immediate confirmation, and virtual consultations. Providers and administrators have reduced administrative load, allowing medical staff to focus on patient care.

The system also enhances data management and security, adhering to strict healthcare compliance standards. As the system evolves, it promises to refine and improve healthcare services, leading to a healthier, more accessible, and efficient system.

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