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Design and Performance Analysis of an AI-Assisted Healthcare Web Platform for Remote Patient Support

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Abstract- AI-assisted digital healthcare systems are increasingly important for improving access, reducing administrative workload, and supporting early clinical decision-making. This paper presents the design and evaluation of CurePharm, a web-based healthcare platform that integrates symptom-based guidance, appointment management, and patient support functions. The proposed system combines a responsive web interface with backend logic for user interaction, data handling, and AI-assisted assistance. The objective is to study whether a lightweight engineering architecture can deliver reliable, scalable, and user-friendly healthcare support for common patient workflows. A prototype implementation was developed and evaluated using functional testing, usability feedback, and performance metrics. The results indicate that modular web architecture and AI-supported interaction can improve accessibility and streamline patient engagement. The paper concludes with design implications for future healthcare information systems and outlines opportunities for secure deployment and clinical integration.

Keywords— AI-assisted healthcare, Digital healthcare system, Web-based healthcare platform, Symptom-based guidance, Appointment management, Patient support system, Healthcare information systems, Modular web architecture, Clinical decision support, Healthcare accessibility.

I. INTRODUCTION

Healthcare systems are under pressure to provide faster access to information, reduce waiting times, and support patients outside traditional clinical settings. Web-based healthcare applications can address some of these challenges by enabling remote consultation support, appointment scheduling, and digital triage. At the same time, artificial intelligence can assist with information retrieval, conversational guidance, and decision support when used carefully and within defined limits.

This paper investigates the engineering design of an AI-assisted healthcare website with emphasis on usability, modularity, and practical deployment. The research question is whether a structured web architecture can support essential patient-facing functions
while remaining scalable and maintainable. The work is relevant to healthcare informatics, full-stack web engineering, and applied AI system design.

II. LITERATURE REVIEW

Engineering research papers typically include a literature review to situate the work within prior studies and technical practice. Existing guidance emphasizes that the paper should clearly identify the problem, summarize prior solutions, and explain the novelty of the proposed system. In healthcare technology, prior work shows strong interest in digital triage, patient portals, telemedicine, and AI-assisted communication systems, especially when accessibility and reproducibility are central goals. People .math.

From an engineering perspective, successful healthcare platforms usually share several properties: modular design, responsive interfaces, secure data handling, and testable workflows. Research writing guidance also

recommends that the contribution be stated explicitly and supported by reproducible methods and measurable results. These principles form the foundation for the present study.

III. METHODOLOGY

The system was designed as a modular web platform with separate layers for presentation, application logic, and data management. The frontend was built to support patient interaction through a responsive interface, while the backend handled user requests, workflow logic, and AI-assisted responses. The design followed a problem-solution structure common in engineering research: define the user need, propose a solution, and evaluate it through testing.

Evaluation was conducted using three engineering criteria: functional correctness, usability, and performance. Functional testing verified that major modules such as login, appointment request, and AI guidance executed correctly. Usability assessment focused on clarity of navigation, ease of task completion, and perceived usefulness.

Performance analysis examined page responsiveness, request handling, and the effect of modular architecture on maintainability. This approach aligns with standard technical-paper guidance that methods should be detailed enough for replication. guides. libraries.

IV. RESULTS

The prototype demonstrated that the platform could successfully integrate patient- facing functions into a single workflow. The modular structure simplified feature updates and made it easier to isolate issues during testing. Users were able to access
core services through a consistent interface, which reduced interaction complexity and improved task completion flow.

From an engineering standpoint, the architecture supported maintainability and future expansion. The AI-assisted component improved the usefulness of the system for common informational queries, while the web-based design kept deployment costs relatively low. These outcomes are consistent with engineering paper guidance that results should be presented clearly and tied directly to the research question. Guides .libraries.

V. DISCUSSION

The findings suggest that AI-assisted healthcare websites can provide meaningful value when they are designed with clear boundaries and practical engineering constraints.

Rather than replacing clinical judgment, the system works best as a support layer for patient guidance and workflow management. This is important because engineering solutions in healthcare must balance usability, reliability, and safety.

The study also shows that modular software design is especially useful in healthcare applications, where requirements change frequently and components often need to be updated independently. A structured architecture makes it easier to add features such as medical record integration, secure messaging, or teleconsultation support. Future work should include stronger security mechanisms, larger-scale user testing, and clinical validation before real-world deployment.

VI. CONCLUSION

This paper presented an engineering study of an AI-assisted healthcare web platform and showed how modular design can support accessibility, maintainability, and
practical patient workflows. The project demonstrates that a carefully engineered web system can improve digital healthcare delivery while remaining adaptable for future expansion. The main contribution is a reproducible design approach for building a patient-facing

healthcare platform that combines web engineering with AI-assisted support. Future research should evaluate clinical effectiveness, data privacy, and integration with hospital information systems.