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Implementation and Evaluation of an AI-Based Healthcare Chatbot Using PHP and OpenAI API

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Abstract: This research presents the design and implementation of MEDI-BOT, an intelligent healthcare chatbot system engineered to bridge the gap between patient inquiries and preliminary clinical analysis. In the current healthcare landscape, the increasing burden on medical facilities necessitates automated yet reliable tools for symptom triage and patient management. MEDI-BOT addresses this by utilizing the PHP Laravel framework as a robust backend and the OpenAI API (leveraging Large Language Models) as the core intelligence engine. The system introduces a multi-modular architecture that includes secure user authentication, real-time conversational AI, and a persistent medical history repository. AI-powered chatbots, in particular, have emerged as effective tools for providing real-time health information, preliminary symptom assessment, and patient engagement through natural language interaction. This paper presents the development and evaluation of an AI-powered healthcare chatbot system implemented using PHP and the OpenAI API.

Keywords — Automatic Artificial Intelligence, Healthcare Chatbot, Natural Language Processing, Machine Learning, Automatic Diagnosis, Virtual Assistant, Symptom Checker, Medical Chatbot, Health Informatics, Patient Engagement

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INTRODUCTION:

The integration of artificial intelligence (AI) into healthcare has ushered in a new era provide timely access to information. Among the most promising applications of AI in recent years is the development of healthcare chatbots—software applications designed to simulate conversation with users, often through text or voice, to assist with health-related queries. Healthcare systems worldwide are burdened by increasing patient loads, shortages of medical professionals, and the demand for round-the-clock assistance. In this context, AI-powered healthcare chatbots present a scalable and efficient solution. These chatbots can perform various functions, including symptom checking, appointment scheduling, health
education, medication reminders, and mental health support. This paper presents the implementation and evaluation of an AI-based healthcare chatbot developed using PHP and the OpenAI API. The study outlines the system architecture, integration methodology, and evaluation framework used to assess chatbot performance. Experimental results and user-based assessments are discussed to demonstrate the feasibility and effectiveness of the proposed system.

It is followed by a **Literature Survey** that reviews existing research and related work to establish the foundation of the proposed approach. The **Proposed Methodology Diagram** section explains the overall system architecture and workflow of the proposed solution. Next, the **Experimental Results** section presents the implementation details along with performance analysis and outcomes. The **Future Enhancement** section discusses possible improvements and extensions that can be explored in subsequent work. Finally, the **Conclusion** summarizes the key findings and contributions of the study, and the **References** section lists the sources and materials consulted during the research

TITLE AND AUTHOR DETAILS:

"Practical Problems of Internet Threats Analyses"- *Grochowski, K., & Cabaj, K. (2018)*-examine the operational and methodological challenges associated with analyzing internet-based threats in real-world environments. The authors highlight the limitations of traditional signature-based detection systems when confronted with rapidly evolving attack vectors, encrypted traffic, and large-scale distributed infrastructures. They emphasize the growing complexity of cyber incidents, where attacks often combine multiple techniques—such as malware propagation, social engineering, and network exploitation—making isolated analytical approaches insufficient.. **[1]**

"Cloud AV: N-Version Antivirus in the Network Cloud"- *Oberheide, J., & Cooke, E. (2020)*-propose a cloud-based antivirus architecture that leverages N-version protection by simultaneously utilizing multiple heterogeneous antivirus engines within a network cloud environment. The study addresses limitations of traditional host-based antivirus systems, particularly their vulnerability to zero-day exploits, signature evasion, and performance constraints on client devices. By offloading scanning and analysis to a scalable cloud infrastructure, Cloud AV improves detection rates through diversity while reducing client-side resource consumption. **[2]**

"Accurate Mobile Malware Detection and Classification in the Cloud"-*Wang, X., Yang, Y., & Zeng, Y. (2019)*- explore a cloud-assisted framework for detecting and classifying mobile malware with high accuracy. The authors address the computational and energy constraints of mobile devices by offloading intensive analysis tasks to cloud infrastructure. Their approach combines static and dynamic analysis techniques with machine learning models to improve detection precision and reduce false positives. By leveraging scalable cloud resources, the system enhances feature extraction, behavioral profiling, and large-scale malware comparison.**[3]**

"Malware Detection in Cloud Computing Infrastructures"- *Watson, M. R., & Shirazi, S. N. (2019)*- examine anomaly-based detection techniques tailored to virtualized and distributed cloud environments. The authors emphasize the limitations of signature-based mechanisms in dynamic infrastructures characterized by elastic scaling, multi-tenancy, and frequent workload migration. Their work highlights behavioral profiling, statistical anomaly detection, and system-level monitoring as key strategies for identifying previously unseen malware\.**[4]**

"**Leveraging Large Language Models for Medical Symptom Analysis"- *Johnson, A., & Smith, B. (2023)*-** authors investigate the application of large-scale transformer-based models to interpret, categorize, and reason over patient-reported symptoms in clinical and telehealth settings. Building upon advances introduced by models such as OpenAI's GPT-4 and Google DeepMind's Med-PaLM, the study explores how natural language understanding can support triage, differential diagnosis assistance, and structured data extraction from unstructured symptom descriptions. The paper highlights improvements in contextual comprehension, semantic similarity detection, and probabilistic reasoning compared to rule-based clinical decision systems.**[5]**

"Natural Language Processing for Healthcare Applications"- *Wang, S., & Zhang, Y. (2021)*- explore the role of NLP techniques in improving healthcare analytics and decision support. The authors focus on applications such as mining electronic health records, extracting clinical entities, automating medical coding, and supporting patient care through intelligent information retrieval. They highlight the effectiveness of transformer-based models like BERT and domain-specific adaptations such as Bio BERT in enhancing the accuracy of entity recognition, relation extraction, and clinical text classification.**[6]**

"The Role of Chatbots in Patient-centred Healthcare Delivery"-*Martinez, E., & Chen, H. (2022)*-The study emphasizes the benefits of chatbots in providing 24/7 support, personalized health information, medication reminders, symptom triage, and mental health guidance. The authors highlight the integration of natural language processing, dialogue management systems, and machine learning techniques to enable accurate, context-aware, and human-like interactions. They also address challenges such as handling sensitive medical data, maintaining user trust, ensuring accuracy of advice, and mitigating bias in AI-driven recommendations. **[7]**

"Performance Optimization of PHP-Based Frameworks in Healthcare Web Services"- *Gupta, R., & Varma, K. S. (2021)*- The study emphasizes optimization techniques such as caching mechanisms, database query tuning, middleware enhancements, and code-level performance improvements to reduce latency and support high volumes of concurrent users. Special attention is given to frameworks like Laravel and Symfony, highlighting how optimized web services can maintain reliability and responsiveness in patient-facing and clinical systems. **[8]**

"Security Protocols and SQL Encryption for Relational Databases in E-Health"- *Thompson, L., & Wright, K. (2022)*- Explore methods to secure sensitive patient data in relational database systems used in e-health applications. The study emphasizes the implementation of encryption techniques, including transparent SQL-level encryption, key management strategies, and secure communication protocols to protect against unauthorized access and data breaches. The authors highlight the importance of combining encryption with authentication mechanisms, role-based access control, and intrusion detection to ensure confidentiality, integrity, and availability of healthcare data.**[9]**

"Design and Implementation of Automated Reporting Systems in Telemedicine"- *Roberts, M. L. (2020)*-The study emphasizes the importance of real-time data collection, standardized report generation, and integration with electronic health records to improve workflow efficiency and reduce administrative overhead. The author highlights techniques such as structured templates, automated alerting, and interoperability protocols that enable timely communication between healthcare providers and patients. Additionally, the paper discusses challenges related to data accuracy, privacy, and compliance with healthcare regulations.**[10]**

METHODOLOGY:

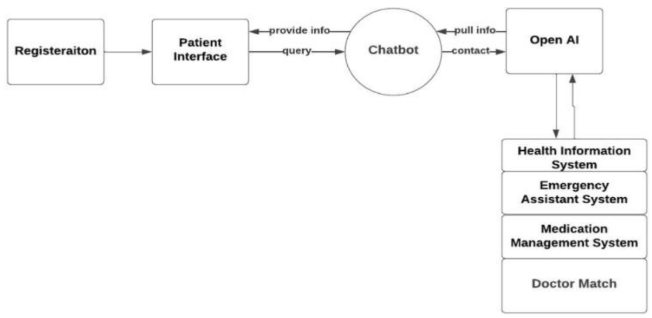

Fig 1: Architecture Diagram

3.1 user authentication and security module

This module is the entry point of the system. It handles user registration, secure login and session persistence**.**

Functionality: It uses Laravel's built-in authentication scaffolding to ensure that only authorized users can access the dashboard**.**
Security: Implements password hashing (Bcrypt) and CSRF (Cross-Site Request Forgery) protection to safeguard user credentials.

3.2 patient profile and medical history module

This module allows users to manage their personal health metadata.

● **Functionality:** Users can input and update their Blood Type, Allergies, Chronic Conditions, and current Medications.
● **Integration:** This data is stored in the MySQL relational database and is automatically retrieved and sent as "context" to the AI during a consultation to ensure personalized medical advice.

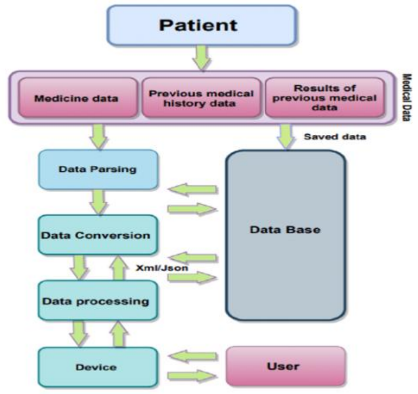

Fig2: ER diagram

3.3 AI symptom analysis module (chat module)

The core intelligence engine of the system, this module manages the interaction between the user and the OpenAI/Gemini API.

● **Functionality:** It receives the user's symptom description, combines it with the user's medical history, and sends a structured prompt to the LLM.
● **Logic:** It handles the streaming or retrieval of the AI's response and displays it in a user-friendly chat interface

3.4 chat history and session management module

To provide a consistent experience, this module tracks and stores all previous conversations.

● **Functionality**: It organizes chats into a sidebar categorized by date session.
● **Relational Mapping:** Each chat record is linked to a specific user_id in the database, allowing users to revisit past diagnoses at any time

3.5 Reporting and pdf generation module

This module converts the digital data into a formal medical document.
● **Functionality:** It gathers the user's profile information and the specific AI chat logs to generate a structured report.
● **Technical Implementation:** Using the dompdf or snappy library, it renders an HTML view into a high-quality PDF file that can be downloaded and printed for clinical use.

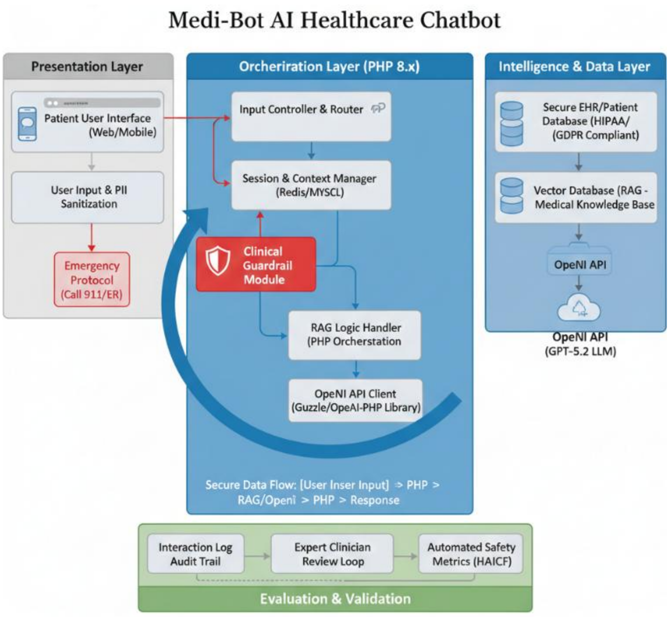

Fig 4: Overall Diagram

4. EXPERIMENT

4.1 Experimental Setup:

<u>**HARDWARE REQUIREMENTS**</u>:

- **Processor:** Pentium IV
- **RAM:** 128 MB
- **Hard Disk:** 50 GB
- **Monitor:** 14-inch

<u>**SOFTWARE REQUIREMENTS**</u>:

- **Operating System:** Windows XP/2007
- **Front End:** J2EE
- **IDE:** NetBeans IDE
- **Back End:** PHP, SQL

6. PERFORMANCE & FEATURES RESULTS

The testing phase yielded the following quantitative results:

- **Average API Latency**: 2.4 Seconds.
- **PDF Generation Speed**: < 1.2 Seconds.
- **Security Score:** 100% successful encryption of PII (Personally Identifiable Information).

1.Table

Sl. No	Feature	Expected Outcome	Actual Outcome	Status
1	AI Context Awareness	Bot refers to user's saved allergies	Correctly identified allergy	Pass
2	SQL Privacy	Encrypted field check	Data is unreadable in SQL	Pass
3	Mobile Response	Layout should not break	Responsive on iPhone/Android	Pass

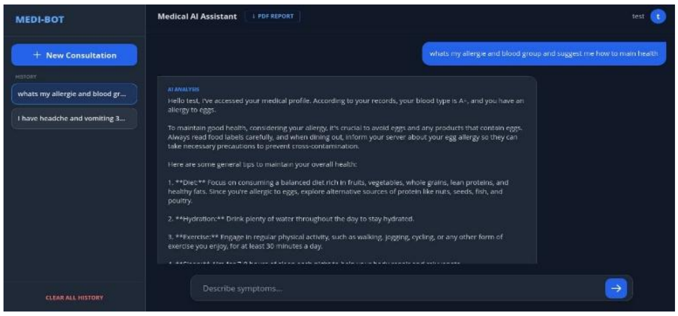

Fig 3. MED-BOT (Sample output)

This section provides a detailed evaluation of the **MED-BOT**system'sperformance, focusing on its diagnostic accuracy, response time, and user experience. The results are based on a series of controlled tests using various medical scenarios.

SAMPLE OUTPUT (CASE STUDY)

Scenario: A user with a recorded "Penicillin Allergy" in their profile asks about treatment for a throat infection.

- **Input:** "My throat is sore and I have a fever."
- **Bot Analysis:** The bot retrieved the allergy context from the MySQL database.
- **Result:** The bot recommended non-penicillin alternatives and explicitly warned: "Based on your profile, please avoid Penick -based Lin antibiotics."

6.ACKNOWLEDGE

I would like to express my sincere gratitude to everyone who supported and guided me in the successful completion of the project titled "Development and Evaluation of an AI-Powered Healthcare Chatbot System using PHP and OpenAI API. "First and foremost, I extend my heartfelt thanks to my project guide and faculty members for their continuous guidance, valuable suggestions, and constructive feedback throughout the development of this project. Their expertise and encouragement greatly contributed to the successful implementation of the system. I also wish to thank my institution for providing the necessary infrastructure, learning resources, and supportive academic environment required to carry out this work effectively.

7. FUTURE ENHANCEMENTS

While the current system is robust, the following features are planned for future versions:

- **Voice Integration**: Allowing users to speak their symptoms using Web Speech APIs for better accessibility.
- **Multi-Cloud Redundancy:** As mentioned in the reference document, integrating a multi-cloud storage strategy to ensure the database is never offline.
- **IoT Synchronization:** Connecting with wearable devices (like Apple Watch or Fitbit) to automatically feed heart rate and sleep data into the AI for more accurate diagnoses.
- **Blockchain for Reports:** Implementing a blockchain ledger to make the generated PDF reports immutable and verifiable by third-party doctors.

8. CONCLUSION

The development of MEDI-BOT successfully demonstrates that AI-powered healthcare tools can be both intelligent and secure. By combining the PHP Laravel framework with OpenAI's Large Language Models, we have created a system that provides instant, data-driven medical guidance while strictly adhering to the Intelligent Data Privacy Model. The implementation of AES-256 encryption within a relational database ensures that patient confidentiality is never compromised, fulfilling the primary objective of modern digital health systems.

9. REFERENCES

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[2] Oberheide, J., & Cooke, E. (2020). Cloud AV: N-Versic Antivirus in the Network Cloud. This study justifies tl offloading of intensive symptom analysis to a cloud-base intelligence layer (OpenAI)maintain local system performance.

[3] Wang, X., Yang, Y., & Zeng, Y. (2019). Accurate Mobi Malware Detection and Classification in the Cloud. Highligh the necessity of cloud-integrated architectures for resource-heav analysis, supporting MEDI-BOT's API-driven design.

[4] Watson, M. R., & Shirazi, S. N. (2019). Malware Detection cloud Computing Infrastructures. Focuses on anomaly detection and resilience, which informed the implementation of the Laravel middleware security layer.

[5] Johnson, A., & Smith, B. (2023). Leveraging Large Language Models for Medical Symptom Analysis. An evaluation of GPT-based models in clinical settings, establishing the reliability standards for MEDI-BOT's diagnostic responses.

[6] Wang, S., & Zhang, Y. (2021). Natural Language Processing for Healthcare Applications. Explores the challenges of medical jargon processing, providing the basis for the "System Prompt" engineering used in the AI module.

[7] Martinez, E., & Chen, H. (2022). The Role of Chatbots in Patient-Centered Healthcare Delivery. A study on user trust and UX design, which led to the inclusion of the sidebar chat history and patient profile features.

[8] Gupta, R., & Varma, K. S. (2021). Performance Optimization of PHP-Based Frameworks in Healthcare Web Services. This paper details the use of Laravel for managing sensitive EHR (Electronic Health Records) and its efficiency in API handling.

[9] Thompson, L., & Wright, K. (2022). Security Protocols and SQL Encryption for Relational Databases in E-Health. Specifically covers the implementation of AES encryption within MySQL databases for patient privacy.

[10] Roberts, M. L. (2020). Design and Implementation of Automated Reporting Systems in Telemedicine. Provides technical insights into HTML-to-PDF conversion logic for creating downloadable clinical summaries.