

**AL-SAFWA**

**HIGH INSTITUTE OF ENGINEERING**

**Patient Management System**

**(Thoutha)**

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**ABSTRACT**

In Egypt, dental students are required to treat real patients as part of their academic projects, but finding suitable cases often proves difficult. Many students face financial and logistical challenges in locating patients with specific dental conditions, while at the same time, many patients struggle to afford high-quality dental care due to the high costs of treatment in private clinics. Currently, there is no organized or affordable system that connects both sides effectively, leading to wasted time, unnecessary expenses, and limited opportunities for hands-on learning.

The proposed project, *Thoutha*, introduces an integrated digital solution that bridges this gap by connecting dental students with patients in need of affordable treatment. The system consists of a mobile application and a website designed to facilitate this connection through a user-friendly interface. At its core, an AI-powered chatbot interacts with patients, collecting their symptoms and performing an initial examination using basic natural language processing techniques. Based on the provided information, the chatbot suggests potential dental cases and matches the patient with a student who requires a similar case for academic purposes. This ensures a smooth, automated matching process while minimizing human error and communication delays.

The development process involves the use of modern software engineering methodologies, including system analysis, database design, and user interface prototyping. The frontend will be developed using [kaza w kaza], while the backend will utilize [kaza w kaza]. Data will be securely stored in a relational database such as MySQL, and the chatbot functionality will be powered by an AI model built with Python and integrated using REST APIs. The platform will also include authentication, role-based access, and communication features between students and patients to ensure privacy and reliability.

Although the project is still under development, preliminary testing will focus on evaluating the chatbot’s accuracy in symptom interpretation and the matching system’s efficiency in connecting users. Upon completion, validation will be conducted through sample user testing among dental students and volunteer patients. The expected results include reducing the time and cost required for students to find patient cases while providing patients with access to affordable dental care. Future enhancements may include integrating professional dentist supervision and expanding the platform to support other medical fields.

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**CHAPTER (1)**

**INTRODUCTION**

* 1. **Introduction**

The field of dentistry in Egypt faces a significant challenge when it comes to practical education and clinical training. Dental students, during their academic journey, are required to complete several clinical cases to fulfill their graduation requirements. However, one of the most common difficulties they face is finding suitable patients who meet the specific conditions required for their projects. Many students spend considerable time searching for appropriate cases or end up paying large sums of money to secure patients. This issue not only adds financial and emotional stress to students but also hinders their educational progress and hands-on learning experience.

On the other hand, there exists another segment of the population—patients in need of dental care—who cannot afford the high costs of private dental clinics or specialized treatments. Despite the availability of dental hospitals and teaching clinics, accessibility, long waiting times, and lack of awareness often prevent these patients from receiving proper care. This situation creates a gap between two groups who could greatly benefit from each other: dental students in need of cases, and patients in need of affordable dental treatment.

To address this problem, the proposed project introduces a digital solution in the form of a **mobile application and website** that act as a bridge between dental students and patients. The system aims to connect students searching for specific clinical cases with patients experiencing relevant symptoms or conditions. Through the platform, patients can describe their dental issues and receive an initial automated assessment using an **AI-powered chatbot**. This chatbot performs a preliminary analysis based on the patient’s responses and medical descriptions, helping classify the case and suggest whether it matches a student’s requirements. Once a match is found, the system facilitates direct communication between the student and the patient under supervised conditions, ensuring both safety and privacy.

The proposed system not only simplifies the process of case finding for students but also creates opportunities for patients to receive free or low-cost dental care. By implementing this solution, the project aspires to improve the efficiency of dental education, reduce financial burdens on students, and make oral healthcare more accessible to those in need. Furthermore, the system leverages artificial intelligence to automate initial evaluations, enhancing the accuracy and speed of the matching process.

Ultimately, this project represents an innovative step toward integrating technology with medical education and social welfare. It demonstrates how modern tools such as AI chatbots, mobile applications, and database systems can collectively provide a sustainable, mutually beneficial solution for both dental students and patients in Egypt.

**1.2 Problem Statement**

Dental students in Egypt face ongoing challenges in finding suitable patients for their graduation projects or clinical training. Most dental schools require students to complete a specific number of cases for various conditions such as tooth decay, gum diseases, or orthodontic problems. However, due to limited institutional resources and patient availability, students often struggle to locate appropriate cases. This leads many of them to spend extensive time searching manually or even paying intermediaries to find patients, which creates unnecessary financial and ethical complications.

Simultaneously, many individuals across Egypt suffer from dental problems but are unable to afford treatment at private clinics. The cost of dental care is often beyond the reach of low-income families, and while government or university hospitals exist, they are often overcrowded and have long waiting lists. The disconnect between students seeking learning opportunities and patients in need of affordable care highlights a critical inefficiency in the current system.

There is currently **no centralized digital platform** that connects these two groups efficiently, safely, and transparently. The absence of such a system not only slows down student’s academic progress but also deprives many patients of the opportunity to receive care. Therefore, there is a clear need for an intelligent, accessible, and user-friendly system that bridges this gap in a way that benefits both sides.

*THOUTHA* aims to directly address this problem by creating an intelligent, secure platform that automates the connection between dental students and patients, eliminating intermediaries and making the process transparent and efficient

**1.3 The Proposed Solution**

The proposed solution is a comprehensive **Dental Case Connection System**, developed as both a **mobile application and a web platform**, designed to connect dental students with patients who require dental care. The system will function as an intermediary that allows patients to report their symptoms and for dental students to specify the type of cases they are looking for.

An **AI-powered chatbot** will serve as the initial point of interaction for patients. By analyzing patient input, the chatbot will perform a preliminary assessment, categorize the case, and determine its urgency or type (for example: cavities, gum disease, or root canal requirement). Based on this analysis, the system will automatically match the patient with a student who requires that specific case type for their training or project.

The system’s interface will be designed for simplicity and ease of use. Patients will be able to register, describe their issues, and communicate securely with students, while students can search, filter, and accept cases relevant to their studies. Additionally, all interactions and matches will be monitored through a secure administrative dashboard to ensure ethical use and privacy compliance.

This solution provides mutual benefits:

* **For students**, it saves time and effort in finding cases, ensuring smoother progress in their studies.
* **For patients**, it opens access to affordable or free dental care delivered by trained students under supervision.
* **For institutions**, it offers a scalable system that supports practical learning and promotes social responsibility among students.

Through this integration of artificial intelligence, mobile application design, and healthcare accessibility, the project aims to revolutionize the process of dental case management in Egypt, ensuring efficiency, transparency, and inclusivity for all parties involved.

**1.4 Project Outline**

This project documentation is organized into five chapters, each addressing a specific aspect of the research, design, and development process of the proposed Dental Case Connection System.

**Chapter 1** provides an introduction to the project, including the background of the problem, its significance, and the motivation behind developing the system. It discusses the gap between dental students and patients in Egypt, presents the proposed solution, and outlines the main objectives of the project.

**Chapter 2** focuses on the system design and implementation. It presents the architectural structure of the proposed system, the diagrams that describe the data and process flow, and the technologies used in the implementation. This chapter also introduces the functional modules of the system, explaining how each contributes to achieving the project’s goals.

**Chapter 3** covers the development of the Artificial Intelligence model and the mobile application. The first part explains the data collection, preparation, model training, and evaluation methods used for the AI chatbot that performs preliminary case assessments. The second part discusses the design and development of the mobile application, including user interface design, flowcharts, and the integration of the AI model within the app environment.

**Chapter 4** presents the system results and analysis. It discusses how the system performs under different conditions, evaluates its accuracy and usability, and provides a discussion of the findings. Any limitations encountered during development and testing are also outlined.

**Chapter 5** concludes the report by summarizing the main achievements of the project and highlighting potential future improvements. It provides recommendations for scaling the system, integrating additional AI features, and improving accessibility to further support dental education and patient care in Egypt.

Through this structured approach, the documentation aims to provide a clear understanding of the system’s objectives, design methodologies, implementation process, and potential impact on the dental education and healthcare ecosystem.