

**AL-SAFWA**

**HIGH INSTITUTE OF ENGINEERING**

**Teeth Management System**

**(Thoutha)**

**Submitted by**

**Zyad Saad Abdelfattah**

**Joseph George Wahba**

**Zyad Gamal Saeed**

**Muhammed Ashraf Tawfik**

**Abdelhalim Ramadan Abdelhalim**

**Menna-Allah Ahmed Amin**

**Zeyad Mohamed Yahia**

**Under Supervision of**

**Dr/ Mahmoud Ouf**

**2025/2026**

**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.

**Table of Content**

|  |  |
| --- | --- |
| **LIST of FIGURES**………………....…………….…………………....………... | III |
| **LIST of TABLES**………………....…………………………………....………... | IV |
| **LIST of ABBRIVATIONS**………………………………………....………... | IIV |

|  |  |  |  |
| --- | --- | --- | --- |
| **CHAPTER 1: INTRODUCTION** | | | |
| 1.1 Introduction…………………………………………………………………………… | | |  |
| 1.2 Problem statement….………………………………………………………………… | | |  |
| 1.3 The Proposed solution ……...………………………………………………………… | | |  |
| 1.4 Project Outline ……...…………………………………………………………………. | | |  |
| **CHAPTER 2: PROJECT DESIGN & IMPLEMENTATION** | | | |
| 2.1 Introduction…………………………………………………………………………….. | | |  |
| 2.2 THE PROPOSED SYSTEM …….…………………………………………………... | | |  |
|  | | 2.2.1 System Fabrication…………………..…………………………......................... |  |
|  | | 2.2.2 Printed Circuit Board (PCB) Design……………………………………………. |  |
|  | | 2.2.3 Hardware Components…..…………………………………………………..…. |  |
|  | | 2.2.4 Block Diagram ……………….…………………………………………….….. |  |
|  | | 2.2.5 Flowchart ……………….……………………………………………………... |  |
| **CHAPTER 3 : AI & MOBILE APPLICATION** | | | |
| PART I: Artificial Intelligent Model ……………………………………………………. | | |  |
| 3.1 Data Collection ……………………………………………………………………….. | | |  |
| 3.2 Data Description …..……………………….………………………………………….. | | |  |
| 3.3 Data preparation ……….………………………………………………………………. | | |  |
|  | | 3.3.1 Exploratory data analysis(EDA), learning about the data you’re working with |  |
|  | | 3.3.2 Data preprocessing, preparing your data to be modeled |  |
| 3.4 Train model ………….…………..…………………………………………………….. | | |  |
|  | 3.4.1 Machine Learning Algorithms Explained ……………………………………… | |  |
|  | 3.4.1.1 Logistic Regression …………………..………………………………… | |  |
|  | 3.4.1.2 K-Nearest Neighbors …………………..………..……………………... | |  |
| 3.5 Analysis/Evaluation ………………………….…….……………………………… | | |  |
|  | 3.5.1 Evaluation metrics……….…………………………………….……………… | |  |
| PART II: MOBILE APPLICATION …………………………….………….………….. | | |  |
| 3.6 User Interface of LifeSign Software…………………………….………….………….. | | |  |
| 3.7 Typography…………………………….………….…………..…………………… | | |  |
| 3.8 Flow Chart…………………………….………….…………..…………………….. | | |  |
| 3.9 Final User Interface (UI)…………………………….………….………………….. | | |  |
| 3.10 Flow Chart for converting UI to React ……………….………….………………… | | |  |
| 3.11 Building a custom UI with React Native ………….………….……………………… | | |  |
| 3.12: Final app ………….………….…………..…………………………………………. | | |  |
|  |  | |  |
| **CHAPTER 4: Results & Discussion** | | | |
| 4.1 THE PROPOSED SYSTEM ARCHITECTURE …….……………………… | | |  |
| 4.2 SYSTEM PROGRAMMING AND RUNNING …….……………………… | | |  |
| 4.3 FLOWCHART OF OUR SYSTEM. …….………………………………….. | | |  |
| 4.4 Results and Discussion …….……………………… | | |  |
| **CHAPTER 5: Conclusions and Future Work** | | | |
| 5.1 Conclusions………………………………....………………………………....……… | | |  |
| 5.2 Future work………………………………....………………………………....………. | | |  |
| **References**………………………………....………………………………....………... | | |  |

**LIST OF FIGURES**

Figure 1-1: Page settings............................................................

Figure 1-2: Paragraph settings. ..................................................

Figure 1-3: Setting caption numbering to include chapter number.

Figure 1-4: Using Cross-reference. ............................................

**LIST OF TABLES**

Table 1-1: List of headings and their formatting. .......................

**CHAPTER (1)**

**INTRODUCTION**

* 1. **Introduction**

It’s 8:00 a.m. in a dental college in Cairo. Zeyad, a fifth-year dental student, scrolls endlessly through his phone, searching for a patient who fits the exact case he needs for his graduation project a patient with a specific dental condition that rarely shows up. Every call he makes leads to the same answer: *“Sorry, I can’t help”* or a price he simply can’t afford. At the same time, somewhere across the city, Fatma, a mother of three, hesitates to visit a dentist because she knows even a single filling will cost her more than she can manage this month. Two people, two problems yet both could be the solution to each other’s struggle.

This is where the idea of **Thoutha** began. The project was born from observing this gap between dental students and patients in Egypt a gap filled with frustration, wasted time, and unnecessary costs. Students need specific patient cases to complete their academic requirements, while thousands of patients need affordable dental care. Yet, no existing platform connects them in a structured, trusted, and cost-free way. Some students end up paying intermediaries to find patients, and many patients delay treatments because of financial constraints. The need for a fair, efficient, and digital bridge became undeniable.

**Thoutha** aims to build that bridge. The system consists of a mobile application and a website that act as a meeting point between dental students and patients in need of treatment. Patients can describe what they feel through an **AI-powered chatbot**, which performs an initial examination by analyzing their symptoms and suggesting possible dental issues. Based on this quick assessment the system matches the patient with a student currently seeking a similar case for their practical project. This not only helps students fulfill their academic requirements faster but also provides patients with quality care at a minimal or even no cost.

Beyond its functional value, this project carries a strong **social and educational mission**. It promotes equal access to dental care, practical experience for students, and the responsible use of artificial intelligence in the healthcare field. By merging technology with social good, *Thoutha* turns a common educational obstacle into an opportunity for community impact. In the chapters that follow we will discuss the motivation behind the project, the system’s structure and design, the tools used in its development, and the methodologies followed to transform this concept into a working solution that benefits both students and patients alike.

**1.2 Problem Statement**

Dental education in Egypt requires students to complete practical case studies on real patients as part of their academic evaluation. However, there is no centralized or standardized system to help students find these cases efficiently. As a result, students often rely on informal methods such as social media groups or personal networks, which are unreliable, time-consuming, and sometimes costly. Many students end up paying intermediaries or spending excessive time searching for patients who match the specific conditions required for their coursework.

On the other hand, a significant portion of the population struggles to access dental care due to high treatment costs in private clinics. Although public hospitals offer lower-cost services, they are frequently overcrowded and limited in available specialists. Consequently, a large number of potential patients who could benefit from student-provided treatment remain disconnected from these educational opportunities.

The current situation reveals a clear gap: dental students need patients to fulfill their academic requirements, and patients need affordable care, yet **no digital infrastructure exists to connect them efficiently, safely, and at scale**. Existing healthcare platforms in Egypt, such as appointment booking websites, are designed for licensed practitioners, not students. This lack of a structured link leads to wasted resources, slower student progress, and continued inaccessibility of affordable dental care for many patients.

*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 system, **Thoutha**, is a web and mobile application designed to connect dental students with patients in need of affordable dental care. The system integrates an **AI-powered chatbot** capable of conducting an initial virtual examination by analyzing the patient’s symptoms and suggesting possible dental conditions. Once the chatbot gathers sufficient information, the system automatically matches the patient with a student seeking a similar case for academic work.

The platform includes secure user authentication, a database to store patient and student profiles, and a matching algorithm that considers case type, location, and urgency. By automating the search and communication process, Thoutha eliminates the need for intermediaries, reduces time and financial costs, and increases opportunities for both learning and treatment.