INTRODUCTION

The growth of digital technology has led to significant changes across various industries, but the health sector changes drastically toward innovation and modernization. As technology evolves, patient increasingly expect easier and more convenient access to the medical services, making traditional clinic management systems less effective in meeting their demands (Smith & Brown, 2020). This issue is particularly noticeable in dental clinics, where outdated practices such as manual appointment scheduling, unclear service information, and poor communication between clinics and patients often result in inefficient operations and reduced patient satisfaction (Johnson et al., 2019). For it will make sure that the needs of the patients will be satisfied and also that the clinic would be able to improve their operations. This work focuses on the design and implementation of an Integrated Clinic Management System with Smart Scheduling and Chatbot. A transformative solution intended for better operations at UMIPIG Dental Clinic. This clinic at the moment depends on appointment-based scheduling via the Facebook application and has restrictions on scalability, operational effectiveness, and engagement of its patients. a transformative solution intended for better operations at Umipig Dental Clinic. This clinic at the moment depends on appointment-based scheduling via the Facebook application and has restrictions on scalability, operational effectiveness, and engagement of its patients.

The proposed system will address these challenges by providing a comprehensive, web-based platform that integrates multiple advanced features to optimize both patient experience and clinic management. The system will enable automated scheduling, allowing patients to easily book, reschedule, or cancel appointments online. Smart scheduling algorithms will optimize appointment availability, minimizing downtime and reducing scheduling conflicts. Additionally, the Chatbot will enhance patient interaction by offering 24/7 support, answering common inquiries, providing reminders for appointments, and even collecting patient information before visits. The proposed system is therefore designed to offer a holistic web-based system that incorporates multiple innovative features to allow the clinic to easily deliver a seamless and accessible healthcare experience. This project focuses on developing an Integrated Clinic Management System with Smart

Scheduling and a Powered Chatbot to improve UMIPIG Dental Clinic's operations. Currently, the clinic relies on Facebook for appointment scheduling, which limits scalability, efficiency, and patient engagement. The new system will provide an easy-to-use online platform that allows patients to book, reschedule, or cancel appointments and ensures efficient clinic scheduling through smart algorithms. The Chatbot will be available 24/7 to assist with common questions, appointment reminders, and collecting patient information. A key feature is service transparency, offering patients real-time pricing for dental services and packages to help them make informed decisions. The system also ensures secure patient record management, allowing both patients and healthcare providers easy access to lab results and medical histories. Additionally, data analysis tools will provide doctors with detailed performance and patient trend reports, available on a weekly, monthly, quarterly, and yearly basis.

This research aligns with the ongoing digital transformation in healthcare, where the integration of artificial intelligence (AI) and advanced technologies plays a crucial role in improving clinic management. The proposed system for UMIPIG Dental Clinic will not only improve operational efficiency but also set a new standard for patient engagement and satisfaction. By offering a user-friendly website, the clinic will be able to provide more personalized and efficient care. In the broader context of computer science, this research highlights the potential for transforming healthcare management. It explores the opportunities presented by web-based systems and AI-driven solutions to streamline clinic operations, enhance patient experience, and support decision-making. This paper demonstrates how technology can play a pivotal role in the evolution of healthcare, offering insights into how technology and digital tools can reshape the way clinics manage appointments, patient records, and data analysis.

Background of the problem

Through the experience with UMIPIG Dental Clinic, Dra. Aurea Ramos Umipig, DMD would be exposed to the challenges associated with patients not showing up or reporting late for appointments. Such scenarios cause a lag in the smooth running of the flow of activities in the clinic and result in wastage of many resources and inefficient schedules that affect the service provision to patients and proper management of the clinic. Another problem they face is that patients cannot find the clinic.

The attendance rates and punctuality are expected to rise with smart scheduling systems and automated reminders. This would enable clinics to be effective and efficient in the running of their operations as patients would have a higher satisfaction grade due to the tendency of appointments to become more predictable and orderly. Unexpected cancellations are due to financial constraints as patients cancel their appointments. This deranges the clinic schedule and wastes resources. Overbooking or double-booking is another cause of stress to staff members and negative outcomes for patients, especially walk-ins, resulting in dissatisfaction or loss of trust in healthcare services.

Such inefficiencies also take place in appointment management systems, and a huge demand for solutions that manage to offer scheduling stability exists coupled with an improvement of customer and staff satisfaction. Making health care facilities more operationally efficient is a giant step and involves closing the gaps as mentioned above.

Overview of the Current State of Technology

The current client management process of Umipig Dental Clinic has relied on manual and basic digital tools for some years, resulting in inefficiency and failure to meet patients' needs. Appointment scheduling primarily occurs through the clinic's Facebook page or walk-in and often leads to delays, as there is a need for manual communication and coordination. Clients often struggle with accessing actual information related to service availability, pricing, and appointment confirmations because all that is delivered is on demand, and a manual system manages all these. Clients as well as staff find it a hassle without a central platform where to access them easily and save time.

This makes manual or limited digital systems even worse in terms of patient records and clinic operations, further aggravating inefficiencies. Often, this set-up makes retrieving, analyzing, and reporting data cumbersome and limits the clinic from taking informed decisions based on trends of patient cases or the operational performance. In addition, the failure to develop a virtual triage or automated system in assessing patients has left cases of emergencies waiting for patients to walk into the health facility, thereby straining resources and lowering general patient satisfaction.

Even though digital technologies are revolutionizing the delivery of services in most sectors, from healthcare to education, and others, the current strategy of this clinic has not yet effectively tapped into the power of those changes. Solutions such as social media have been good to an extent but could not scale or be very efficient enough to match the growing demand for accessibility and service quality in modern healthcare. The proponents seek to fill these gaps by developing and implementing an integrated clinic management system that will provide online appointment booking, real-time service pricing transparency, and a chatbot for streamlined interactions. This system will improve operational efficiency and accessibility, solving long-standing problems that manual methods and basic digital tools have been unable to solve.

Objectives of the study

General Objectives:

The goal of the study is to enhance scheduling efficiency by developing and implementing a web-based Integrated Clinic Management System with Smart-Scheduling and a Chatbot for Umipig Dental Clinic. The system will utilize a chatbot scheduling feature that automatically allocates time slots, reduces conflicts, accommodates last-minute changes, and manages patient inquiries and appointment bookings. By automating these processes, the system aims to save time, improve patient interaction, and ensure smoother clinic operations. This will not only streamline the appointment process but also enhance the overall experience for both patients and clinic staff.

Specific Objectives:

Design and develop the web Based for Umipig Dental Clinic:

The goal is to create a robust framework for integrating Chatbot functionalities, such as scheduling optimization and chatbot services, into the clinic management system. Thorough testing of the system's web-based platform will be conducted to ensure its stability, reliability, and compatibility with the clinic's existing hardware and software. Inefficient scenarios, such as scheduling conflicts and delays, can disrupt the smooth flow of clinic activities, leading to wasted resources and ineffective schedules. These issues not only hinder service provision to patients but also affect the overall management of the clinic.

Implement Smart Scheduling Features:

The goal is to implement a web-based scheduling tool that efficiently manages patient appointments by optimizing time slots, reducing conflicts, and accommodating last-minute changes. The system will automatically organize appointment time slots to make the best use of the clinic’s schedule. It will allow patients to book appointments online and receive instant confirmation based on the available slots. The experience at Umipig Dental Clinic would also address the challenges associated with patients not showing up or arriving late for appointments.

Integrate a Powered Chatbot:

To design and implement an intelligent chatbot capable of handling patient inquiries, appointment bookings, and basic consultation guidance, ensuring 24/7 assistance for patients. Answering Patient Questions, the chatbot will provide quick and accurate responses to frequently asked questions, such as information about clinic hours, services offered, and general health tips. Appointment Scheduling It will make it easier for patients to book or reschedule appointments by connecting to the clinic's scheduling system. 24/7 Availability The chatbot will always be active, ensuring that patients can access help even outside regular working hours.

Scope and Limitations:

Scope of the System

- **Patient Booking and Access Systems:**

  Online scheduling can be said to improve the accessibility of dental care for patients by discussing how it could do better in improvement on benefits realized for patients' scheduling, rescheduling, or cancellation of appointments using a web-based interface.

- **Pricing Transparency**

  This paper relates to the suitability of transparent pricing for all dental procedures. That is, how candid up-front pricing impacts on decisions by patients and thus, in turn, treatment-acceptance rates.

- **Patient Engagement**

  The research investigates how ongoing communication through the web-based system, such as reminders and educational content, enhances patient engagement and adherence to treatment plans.

- **Integration with Medical History and Records**

  The system will integrate with electronic health records (EHR) or patient management systems to securely store and access patient information, including medical histories, dental records, laboratory results, and treatment progress. Doctors and clinic staff will have easy access to patient data, enabling more efficient diagnosis and treatment planning. By centralizing patient records, the system will help ensure that relevant health data is available when needed, reducing errors and improving overall care quality.

- **Real-Time Data Analytics for Clinic Performance**

  The system will provide valuable data analysis tools for clinic management, generating reports on patient flow, treatment patterns, and clinic performance. Doctors and clinic administrators will be able to track the number of consultations, cancellations, treatments performed, and patient satisfaction levels. This data will help the clinic improve operations, identify trends, optimize resource allocation, and make informed decisions for continuous improvement.

- **Patient Feedback and Satisfaction Surveys**

  To improve patient care and the overall clinic experience, the system will include tools for collecting patient feedback after appointments or treatments. These surveys will ask patients to rate their experiences and provide insights into areas for improvement. By regularly gathering feedback, the clinic can assess patient satisfaction, identify potential problems, and make necessary adjustments to enhance the quality of care.

- **Chatbot Assistance**

  The chatbot will assist with frequently asked questions, appointment reminders, and collecting basic patient information. Available 24/7, the chatbot will enhance patient interaction by providing immediate responses, reducing the load on clinic staff and ensuring that patients get the assistance they need at any time of day. This will improve operational efficiency and patient satisfaction by providing quick answers to common queries.

Limitation of the Study

- **Limited Patient Engagement with Technology**

  Although the system is designed to increase patient engagement through reminders and educational content, some patients may be resistant to using the platform or may prefer traditional methods of communication, such as phone calls or face-to-face interactions. Additionally, some patients may not find the educational materials provided in the system as engaging or helpful. This limitation can reduce the effectiveness of the system in driving patient adherence to treatment plans and improving overall patient satisfaction.

- **Internet Connectivity Issues**

  While the system aims to offer online services, patients in areas with unstable or low-speed internet may face difficulties in accessing the platform. Slow or unreliable internet connections could lead to frustration for users trying to schedule appointments, access information, or interact with the chatbot. This could limit the system’s effectiveness in reaching a broad demographic of patients.

- **Chatbot Capabilities and Limitations**

  The chatbot will assist patients with very simple queries such as scheduling an appointment, frequently asked questions, and other simple information, but it has limited scope and cannot address the complexities of medical inquiries or give individualized care recommendations. Though it will ease some tasks, it will not replace human staff in the more complex or sensitive matters related to patients. The chatbot cannot fully understand all the queries or be able to deliver the degree of service needed for most complex issues.

- **System Downtime or Technical Issues**

  Like any technology, the system has a weakness for technical issues, such as server shutdown, software bugs, or malfunction that may cause downtime in clinic activities or prevent patients from accessing the system. The system is designed to have minimal downtimes; however, some maintenance issues might still influence its performance. The research does not discuss fully the management of these events or potential impacts on clinic activities during the downtimes.

Review of related literature/studies/systems

FOREIGN

The Impact of AI-Powered Systems on Healthcare Service Delivery. Baker, D. (2022)

Automated appointment reminder systems are essential for improving healthcare efficiency by reducing missed appointments. A study on a nationwide text message reminder program in Chile, as highlighted in the article "How Scheduling Systems with Automated Appointment Reminders Improve Health Clinic Efficiency," demonstrated the impact of these systems. While the reminders didn't affect the number of visits for chronic disease patients, they led to a 5% increase in visits from other patients in the first year and a 7.4% increase in the second year. The benefits were particularly evident in clinics serving younger and chronic patient populations.

This research reflects a broader trend in healthcare, where digital solutions like automated reminders are being adopted to boost operational efficiency. These systems help clinics manage their schedules more effectively, minimize wasted resources, and improve patient care by facilitating timely cancellations and rescheduling.

Integrating automated appointment reminder systems not only reduces missed appointments but also optimizes scheduling processes. This approach enhances patient care while contributing to the overall operational efficiency of healthcare clinics.

AI-Driven Solutions for Healthcare Management. Chen, Y., & Wang, X. (2021)

The article "Mitigating the Adverse Effects of Uncertainty in Appointment Systems" explores how appointment scheduling systems can address challenges arising from patient preferences and varying needs. The study introduces a stochastic overbooking model that maximizes profit by balancing accepted requests with costs incurred by patient wait times and physician overtime. The research also emphasizes the use of a myopic scheduling policy, where the decision to accommodate more requests depends on patient preferences rather than their type.

The conclusion underscores the importance of developing appointment systems that improve resource allocation and performance by integrating patient choice in

scheduling. These findings offer valuable insights into optimizing appointment management in outpatient clinics, enhancing both efficiency and patient satisfaction.

The Role of Web-Based Systems in Healthcare Transformation. Doe, J. (2021)

Scheduling systems have transformed healthcare management by improving efficiency and patient care. In the study "Smart Healthcare Appointment Management System using Artificial Intelligence" (2021), the integration of AI into scheduling systems was shown to reduce patient waiting times, optimize resource allocation, and enhance service delivery. The research highlights how machine learning algorithms can predict appointment durations, minimize overlaps, and adjust schedules in real-time to accommodate unexpected changes.

The study also underscores the importance of user-friendly interfaces and intelligent features that ensure smooth interactions for both patients and staff. These systems not only boost clinic productivity but also make appointment scheduling more accessible and efficient for patients.

AI-driven appointment systems play a critical role in improving healthcare operations by reducing waiting times and enhancing resource management. By utilizing artificial intelligence, these systems deliver scheduling accuracy, ensure flexibility, and contribute to providing high-quality, patient-centered healthcare services.

Digital Healthcare Management and Patient Engagement. Smith, A. (2020)

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Emerging Trends In AI-Integrated Healthcare Systems., Khan, R. (2020)

Online appointment systems have become a cornerstone of efficient healthcare delivery. According to the study "Developing an Online Appointment System for Healthcare Services" (2020), these systems enhance clinic operations by reducing patient waiting times, minimizing manual scheduling errors, and improving overall patient satisfaction. The research emphasizes the integration of real-time updates and user-friendly interfaces, enabling both patients and healthcare providers to manage appointments seamlessly.

The study also highlights how online systems address common challenges, such as overbooking and no-shows, through features like automated reminders and instant rescheduling. This contributes to better resource allocation and streamlines workflows.

Online appointment systems significantly improve healthcare service delivery by optimizing scheduling, reducing inefficiencies, and enhancing the patient experience. By leveraging digital tools, healthcare providers can achieve higher operational efficiency and deliver more accessible, patient-centered care.

LOCAL

Innovative AI-Driven Healthcare Models., Lee, S. (2023)

AI-powered scheduling systems have become vital for optimizing healthcare operations and improving patient satisfaction. According to the study “The Development of an Online-Based Appointment Scheduling System for Healthcare Services” (2023), the implementation of online scheduling systems streamlines patient appointment processes, reduces waiting times, and improves service efficiency. The research highlights that

integrating AI and real-time data capabilities ensures accuracy in scheduling and resource allocation.

The study also emphasizes the importance of user-friendly interfaces and system accessibility, which enhance the overall patient experience. By automating scheduling tasks, healthcare providers can minimize manual errors, improve operational workflows, and deliver better patient-centered care.

The adoption of AI-driven online scheduling systems significantly improves healthcare efficiency and patient satisfaction. By automating appointment processes and utilizing real-time data, these systems optimize resource allocation and streamline clinic operations, ensuring a more responsive and effective healthcare service.

AI-Powered Health Management Systems in Clinics., Garcia, M. (2023)

Online-based management systems are essential for improving efficiency and coordination in educational settings. According to the study “Development of a

Web-Based Classroom Scheduling System for Universities” (2023), these systems automate the process of assigning classrooms, managing timetables, and resolving conflicts. The research highlights how integrating real-time updates and user-friendly interfaces ensures accuracy and accessibility for administrators, faculty, and students.

The study also emphasizes the importance of centralized data management, which reduces manual errors, enhances transparency, and streamlines operations. Such systems significantly improve resource allocation and ensure the effective use of classrooms and facilities.

Web-based classroom scheduling systems enhance operational efficiency in educational institutions by automating the scheduling process, minimizing conflicts, and optimizing resource management. These systems provide real-time accessibility and accuracy, contributing to a more organized and efficient academic environment.

Teleconsultation System for Rural Health Units (RHUs) For Metro Vigan, Philippines., Paculan, E., R. (2020)

Teleconsultation systems are essential for improving healthcare accessibility, particularly in rural areas. According to the study "Teleconsultation System for Rural Health Units (RHUs) for Metro Vigan, Philippines" (2020), the development of teleconsultation platforms bridges the gap between patients and healthcare providers by enabling remote consultations. These systems improve access to medical services, reduce travel time for patients, and optimize resource usage for healthcare units.

The study highlights that teleconsultation systems utilize real-time communication tools, ensuring timely medical advice and follow-ups. This approach addresses the challenges of geographical barriers, limited resources, and patient outreach in rural healthcare settings.

Teleconsultation systems play a vital role in improving healthcare delivery by providing remote access to medical services. These systems enhance efficiency, reduce patient burdens, and ensure that healthcare units deliver timely and accessible care, particularly in underserved rural communities.

Web-Based Maternity Record System with Appointment and Billing For A Lying-in Clinic in Laguna. Legrama, M., J. (2022)

Web-based systems are essential in improving both clinic operations and patient care. In the study "Web-Based Maternity Record System with Appointment and Billing for a Lying-In Clinic in Laguna" (2024), the integration of digital record management, appointment scheduling, and billing systems was shown to enhance operational efficiency. These systems streamline processes by offering real-time access to patient records, automating appointment bookings, and accurately handling billing transactions.

The research points out how web-based platforms address manual inefficiencies, reduce scheduling conflicts, and ensure that patient records are well-organized. Additionally, the automated billing system reduces errors and ensures smooth financial management, contributing to overall productivity in the clinic.

By implementing web-based maternity record systems, clinic management can be optimized through the automation of patient records, scheduling, and billing. These systems improve efficiency, reduce errors, and ultimately enhance the quality of care provided, especially in maternity-focused healthcare services.

AI Advancements in Clinical Data Management. Taylor, J. (2023)

The article "An Implementation and Evaluation of Web-Based Appointment System for the Mindanao State University – Main Campus" discusses how a web-based appointment system improved client waiting time at the Office of the University President, Mindanao State University, especially during the pandemic. The system was evaluated using the System Usability Scale and the Technology Acceptance Model, which revealed a high level of user satisfaction at 90.2%. The implementation of the system helped streamline the appointment scheduling process, contributing to better time management and reducing delays in administrative tasks.

The conclusion emphasizes that the web-based system enhances appointment scheduling convenience for both clients and employees, leading to more efficient operations and improved user satisfaction.

METHODOLOGY

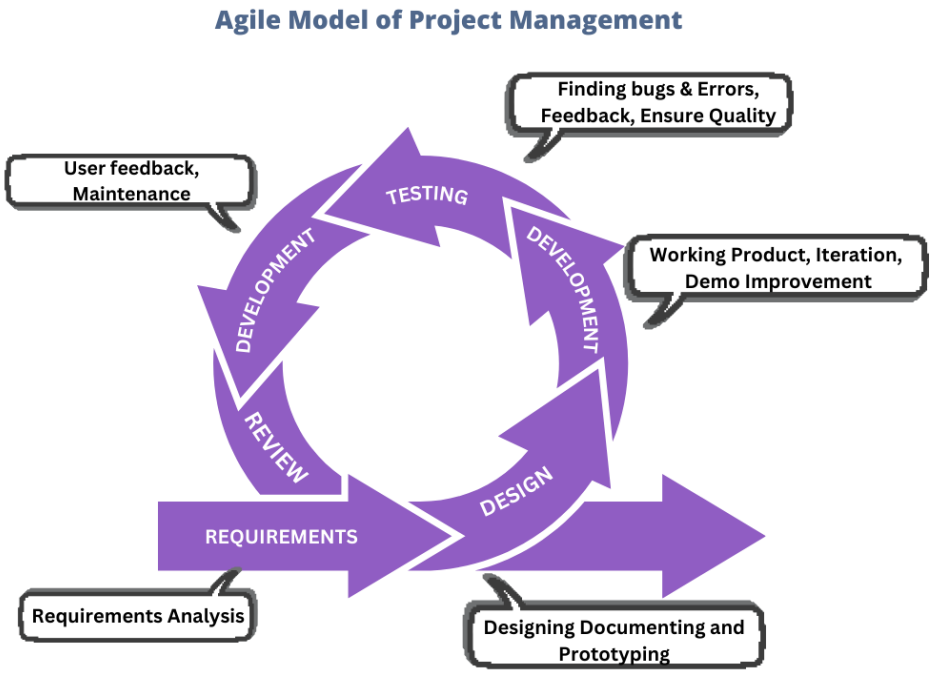

Figure 1 – Sprint Agile Model

Requirements:

In this phase, we interviewed the clinic's doctors to understand and specify clearly the needs and challenges in relation to appointment scheduling, clinic operations, and patient records to define project objectives.

Design:

This includes the preparation of prototypes and documentation that would guide the development process. During this phase, prototypes and documentation were created to guide the development process of the system. This phase focuses on building prioritized features, such as online appointment booking, chatbot for basic inquiries, and doctor profiles, in incremental sprints.

Development:

The proposed system will be developed in iterations, with each sprint that will deliver a working product that includes essential features. A demo was conducted to showcase the product to clinic staff and doctors. Feedback from the demo will be used to identify areas for improvement, refine system features, and ensure that the product will be aligned with user needs.

Testing:

In this phase, a system demo was presented to clinic staff and doctors to gather detailed feedback, identify bugs, and make improvements, such as system performance, usability, and functionality.

Development:

Once the system is developed and deployed, user feedback will be gathered to identify any issues or areas for improvement. This feedback will help improve the system to meet the clinic's needs. Regular updates and maintenance will ensure the system remains functional, reliable, and adaptable to future requirements. This phase will focus on addressing user-reported issues, improving performance, and ensuring long-term usability.

Agile Model

The Agile model's process starts with Requirements Analysis phase, where the project's goals and needs are identified. This is crucial to ensure that the product will evolve through consistent and incremental improvements. After that, it proceeds to the Design phase, the team will start visualizing potential solutions and create prototypes to represent how the final product might look or work. The next phase is Development, this is where the core of the work will take place. In here, the team will focus on writing the code, building features, and making designs into a functioning product. The development process will be carried out in small, manageable iterations or sprints, which will result in regular releases of the product. After Development, it enters the Testing phase in which the team will check the product for bugs, errors, and functionality issues. This phase is critical for ensuring the product will work as intended and will comply with the requirements established earlier. The last phase is Development, in here, the team will evaluate the product's quality and completeness. Any issues found in the testing phase

will be addressed, and improvements will be made to ensure the product is up to standard. It also includes getting feedback from users and stakeholders, which plays a crucial role in improving the product.

No table of contents entries found.**thesis:**

The studies reviewed highlight the transformative impact of web-based and AI-powered systems on healthcare management, directly supporting the development of a web-based dental clinic management system. These systems have been shown to optimize scheduling, improve operational efficiency, and enhance patient care, which are central goals of the proposed thesis. The research provides a strong foundation for understanding how similar technologies can address real-world challenges and inform the system's features.

One key connection is the role of automated scheduling and reminders in improving appointment efficiency. Studies by Baker (2022) and Chen & Wang (2021) demonstrate how AI tools can reduce no-shows, optimize appointment slots, and adjust schedules dynamically, aligning with the system's real-time scheduling and automated notification features. Additionally, research by Doe (2021) and Lee (2023) emphasizes the importance of user-friendly interfaces and real-time updates, reinforcing the need for an intuitive platform design to improve patient satisfaction and accessibility.

The relevance of these studies extends to the automation and integration of clinic operations. Research by Legrama (2023) and Garcia (2023) highlights how AI systems reduce manual errors, improve resource allocation, and integrate essential functions such as billing and record management, which aligns with the thesis's aim to automate these processes. Furthermore, Paculan (2020) underscores the importance of accessibility through teleconsultation systems, a feature addressed through online access and an AI-powered chatbot in the proposed system. Overall, these studies validate the practicality and relevance of the proposed system, ensuring it meets the demands of modern clinic management and delivers high-quality, patient-centered care.

Hardware

Laptop:

Edition	Windows 11 Pro
Version	23H2
Installed on	27/03/2024
OS build	22631.4602
Experience	Windows Feature Experience Pack 1000.22700.1055.0
Processor	11th Gen Intel(R) Core (TM) i5-1145G7 @ 2.60GHz 1.50 GHz
Installed RAM	16.0 GB (15.7 GB usable)
Device ID	360D473F-26BD-4D6B-A256-175D451DE05C
Product ID	00330-81610-41103-AA902
System type	64-bit operating system, x64-based processor

IOS:

Edition iOS 15 (Upgradeable to iOS 17)

Version 15.0 (Out of the Box)

Installed on September 24, 2021

Build Number 19A346

Processor A15 Bionic Chip, 6-Core CPU, 5-Core GPU, 16-Core Neural Engine

Installed RAM 6.0 GB

Device ID Unique to Each Device (Cannot be Displayed)

Storage Options 128 GB, 256 GB, 512 GB, 1 TB

System type 64-bit Architecture

Display 6.7-inch Super Retina XDR OLED, 2778 x 1284 pixels, 120Hz ProMotion

Camera System Triple 12 MP (Wide, Ultra-Wide, Telephoto) + LiDAR Scanner

Battery 4352 mAh, MagSafe Wireless Charging Support

Product ID Unique to Each Model (Cannot be Displayed)

Connectivity 5G, Wi-Fi 6, Bluetooth 5.0, U1 Ultra-Wideband Chip

Android:

Android 4.4.2 KitKat (Upgradeable to Android 6.0.1 Marshmallow)

Version: TouchWiz UI Installed on:

Varies by purchase date Build Number: Varies by region and carrier

Processor: Qualcomm Snapdragon 801, Quad-core 2.5 GHz Krait 400

Installed RAM: 2 GB

Device ID: Unique to each device

Product ID: Unique to each model

System Type: 32-bit operating system, ARM-based processor

Display: 5.1-inch Super AMOLED, 1920 x 1080 pixels

Storage Options: 16 GB or 32 GB, expandable via microSD up to 128 GB

Rear Camera: 16 MP, f/2.2 aperture, phase detection autofocuses, LED flash

Front Camera: 2 MP, f/2.4 aperture

Battery: 2800 mAh, user-replaceable

Connectivity: 4G LTE, Wi-Fi 802.11 a/b/g/n/ac, Bluetooth 4.0, USB 3.0

Software

To develop an efficient and effective web-based system for Cua Dental Clinic, choosing the software tools is essential to ensure functionality, scalability, and user-friendliness of the system remains flawless. Each tool was chosen for its capability to meet the needs of our project, and each plays a role in managing different aspects of the system, from coding and design to data storage and processing. Below are the primary software tools that will be utilized to bring the planned system to life:

- *MongoDB* is a NoSQL database that stores data in a flexible format, it is cloud-compatible, which is easier to integrate with other online systems. This will be utilized to store and manage the records of patients, clinic reports, billing information, as well as appointment schedules. MongoDB makes sure your database is flexible, scalable, and accessible online for handling increasing data as the clinic's operations grow.

- *VSCode* is a lightweight but powerful code editor with lots of extension support for different programming languages. This will be utilized in our project as it develops and manages both the frontend and backend code of the system. It has features like *debugging*, *version control integration* since our project involves team collaborations, *integrated terminal*, to allow our team to execute commands, scripts, and interact with tools like MondoDB directly within the VSCode.
- Node.js is a versatile and powerful runtime environment that empowers developers to use JavaScript beyond its traditional role as a client-side scripting language. Built on Google Chrome's V8 JavaScript engine, which is renowned for its speed and efficiency, Node.js allows developers to extend the capabilities of JavaScript to the server-side, enabling the creation of a wide range of applications such as web servers, networked applications, command-line tools, and more. This innovation makes it possible to build complete, full-stack applications using a single programming language, significantly streamlining the development process.

Calendar of Activities

The Gantt Chart is a graphical depiction to visually represent a project plan and the duration periods of each activity. In the month of August, the group of researchers has been made. On the 2nd week of September, the group choose a topic and title as well the client who will benefit from the project. On the 1st day of October, they submitted their thesis abstract. And starting to gather information's to create the whole research documents.

On the month of October, the group started to develop their documentation from Chapter 1 to Chapter 3. They also had their adviser consultation to ensure that the documents are properly created by gathering more data information's that are related to the research topic.

On the month of December, the group finalize their documents for their defense.

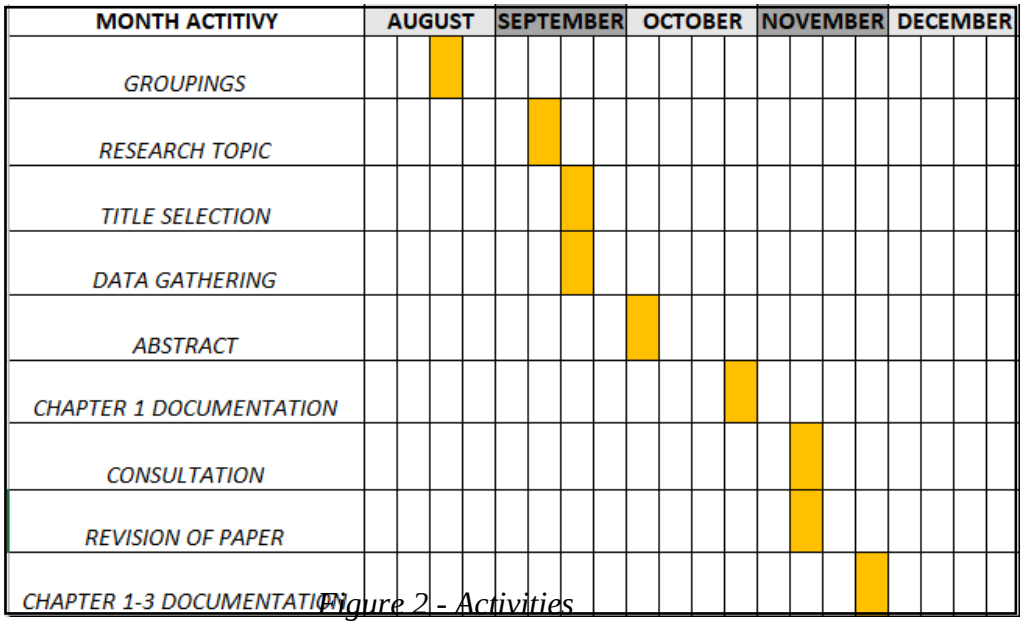

Figure 2 - Activities

Activities	Purposes/Objectives	Timeframe	Persons Involved
Brainstorming and Researching	1. Generate ideas 2. Choose three potential titles	Weeks 1-4	All Members
Topic and Title Proposal	1. Present topic proposals and gather feedback from the adviser 2. Further brainstorming 3. Conduct surveys for data	Weeks 5-8	All Members
Abstract Revision Chapter 1: Introduction	1. Revise the abstract 2. Draft the introduction and problem background 3. Outline the problem, methodology, and hardware/software 4. Define the objectives and prepare the calendar of activities	Weeks 9-12	All Members
Chapter 2: Methodology and Hardware/Software	1. Addressed alongside Chapter I activities		
Chapter 1: Scope and Limitation Budgetary Estimate	1. Establish scope, limitations, and budget 2. Review related studies and references 3. Update Chapters 1 and 2 4. Prepare thesis proposal	Weeks 13-16	All Members

Figure 3 - Activities

Budgetary Estimate

Quantity	Specifics	Approximate Cost
1	1 Ream Short Bond Paper	P170
3	Ink Set	P428
2	Gas	P900
25	Short Folder	P120
1	Domain	P1,299
TOTAL		P2,917

Table 1 – Table of Budget

Human Resources

Curriculum Vitae of

Kyla Denice O. Santos

10 Prime rose st. Greenland Exec Village, Cainta Rizal
006kylasantos@gmail.com
+63 935 412 2101

EDUCATIONAL BACKGROUND

Level	Inclusive Dates	Name of school/ Institution
Tertiary	2021-Present	STI College Ortigas-Cainta
Vocational/Technical	2018-2020	Taytay Senior High School Stand Alone
High School	2013-2017	Scholastica De San Alfonso, Inc.

PROFESSIONAL OR VOLUNTEER EXPERIENCE

Inclusive Dates	Nature of Experience/ Job Title	Name and Address of Company or Organization
2020-2021	Former Business Owner of Clothing Store	Denice Apparel
2019	OJT at National Bookstore Sta Lucia	National Bookstore Sta.Lucia
2022	Coffee Barista	Suvi Coffee Shop
2023-Present	Coffee Shop Owner	Wake Up Coffee

AFFILIATIONS

Inclusive Dates	Name of Organization	Position
2016-2017	Student Council	4th Year Representative
2021-2022	Alpha	Budget Analyst
2023-2024	Alpha	Vice President of Operation

SKILLS

Goal oriented: I do specific manageable targets, but I also set deadlines and create a plan to reac

Communication: Handles sensitive issues with sensitivity, calm, and negotiations; communicat people at all levels

Computers and Administration: Proficiencies include Microsoft Office (Word, Excel, Access, QuickBooks, Internet search, and applications.

Curriculum Vitae of

Kristian Anthony R. Espinase

Kristian Anthony R. Espinase
Himalayas Road, Montevista Heights, Taytay Rizal
kristianespinase01@gmail.com
09764191080

EDUCATIONAL BACKGROUND

Level	Inclusive Dates	Name of school/ Institution
Tertiary	2021-Present	STI College Ortigas-Cainta
Vocational/Technical	2019-2021	San Beda University
High School	2015-2019	Montessori Integrated School

PROFESSIONAL OR VOLUNTEER EXPERIENCE

Inclusive Dates	Nature of Experience/ Job Title	Name and Address of Company or Organization
2021-2022	Front desk staff	Porking Zone Food Hub

SKILLS

Willingness to learn and adapt to new technologies.
Proficient In Using Visual Studio Code
Basic programming knowledge
Open to feedback and dedicated to personal growth.

Curriculum Vitae of

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EDUCATIONAL BACKGROUND

Level	Inclusive Dates	Name of school/ Institution
Tertiary	2022-Present	STI College Ortigas-Cainta
Vocational/Technical	2020-2022	Escuela De.STO ROSARIO
High School	2016-2020	Eusebio High School

PROFESSIONAL OR VOLUNTEER EXPERIENCE

Inclusive Dates	Nature of Experience/ Job Title	Name and Address of Company or Organization
2021-2023	Customer service	New wave Tailoring

SKILLS

- Multi-Tasking
- Fast Learning
- CSS Programming
- Phyton

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EDUCATIONAL BACKGROUND

Level	Inclusive Dates	Name of school/ Institution
Tertiary	2022-Present	STI College Ortigas-Cainta
Vocational/Technical	2019-2021	Arellano University
High School	20164-2018	Manggahan High School

PROFESSIONAL OR VOLUNTEER EXPERIENCE

Inclusive Dates	Nature of Experience/ Job Title	Name and Address of Company or Organization
2020-2024	Piercer Artist	Mangbubutas ng luzon

SKILLS

- Ability to learn new skills
- Can work under pressure
- Good communicator
- Fast Learner
- Computer Literate

ADVISER'S ACCEPTANCE FORM

NAME OF PROPONENTS: **John Nicholas Onix L. Eugenio**
Kristian R. Espinase
Kyla Denice O. Santos
Hennesy U. Villa

APPROVED RESEARCH TITLE: **The Implementation of an Integrated Clinic Management System, with Smart Scheduling and Chatbot**

AREA OF STUDY: **Computer Science**

CONFORME:

Rozelyn May Bernardo
Thesis

APPROVED BY:

Salvador Jr. T. Gascon **Date:** December 2024
Thesis Coordinator

NOTED BY:

Richard Santos

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TRANSCIPT OF RECORD

INTERVIEWER: So, doc, ano pong pangalan niyo?

CLIENT: Aurea Ramos Umipig.

INTERVIEWER: Yung clinic niyo po ba, anong oras po nag bubukas?

CLIENT: I will open at 9 o'clock to 5pm, Monday to Saturday. Except kung meron akong seminar or anything, we post na sarado kami. By appointment kami usually, pero we accept walk ins.

INTERVIEWER: Sa facebook po kayo nagpapa appointment?

CLIENT: Yes, sa facebook tsaka dyan, sa number sa calling card.

INTERVIEWER: San po ba kayo mag active po?

CLIENT: Sa lahat, nag memessage sila sa fb.

INTERVIEWER: Sa email po ba?

CLIENT: No, fb at tsaka sa phone.

INTERVIEWER: Sa assistant po, ilan po assistant niyo?

CLIENT: Meron akong dental tech, but assistant ko pero hindi na, bale kami nalang tatlo. Bale isa sa reception tsaka may isa pa akong dental tech na nag aassist din.

INTERVIEWER: Ilang years na po yung clinic?

CLIENT: Ito? Ito mag t three years pero actually i established in Philippines in 2007. I started doon then nalipat ako sa Karangalan nung pinaalis, then dito. So ito is going to 3 years na.

INTERVIEWER: Doc, ilan years na po kayong dentist?

CLIENT: Since 1986.

INTERVIEWER: Ilan patient po kayo per day?

CLIENT: Depende, most of the time may sampu. Usually, kung halimbawang ilan lang kasi we have procedures, long procedures like cosmetics. So, by booking, alam ko na kung ilang oras naka allot ang isang pasyente.

INTERVIEWER: Meron po bang case na parang natatagalan po kayo sa isang patient po? Kunwari po sa pag bunot po, minsan po diba inaabot po siya mga 1 hour, mga ganun po.

CLIENT: Depende, pero usually di naman ako inaabot ng isang oras unless mag s-surgery ako. If I do surgery, I dont book after niya. I allot 3-4 hours matapos ng maaga, okay lang. Kasi ayaw ko ng may nag hihintay sakin pag nag s-surgery.

INTERVIEWER: Kasi po yung nainterview po namin na isang clinic, ganun din po appointment din po kaso ano po, pag may patient po siya ng ganto, parang sumobra po siya sa oras, ang kinalalabasan po yung patient po na next po nun is nag hihintay po.

CLIENT: Very seldom naman sakin yung ganung pangyayari. Wag lang kung surgery nga kasi it will take time. DI ko naman pwede sabihin na I can do the surgery in an hour. So alam ko na, it's okay na lumabis ako ng allot na time kesa mag hintay ang pasyente. Usually walk ins, they wait. Naghihintay naman sila kasi gusto nilang makita ako. Kasi dalawa ang dental chair ko. So, while I'm doing another patient at the first room, like let's say extraction. Syempre mag a-anesthesia ako, hindi ko naman pwede bunutan na hindi pa anesthetized. So, I can squeeze kung check-up, or kung adjustment ng braces, pwede ko gawin sa other room. While waiting for the anesthesia to work, nakakapag trabaho ako sa kabila.

INTERVIEWER: Doc tanong ko lang, ano po yung pinaka problema niyo po sa patient?

CLIENT: Sa bayad, pero di naman kami masyado nakaka encounter ng ganun. Hindi naman problema yung discount diba? Kasi nasa pag uusap naman yun. Kasi depende sa budget, let's say gusto nila ng fixed bridge or crowns, I offer them the budgetable ones. Kaya naman nila yung price na ganito.

INTERVIEWER: Mag tatanong po muna kayo kung magkano yung budget?

CLIENT: Hindi, I will offer and show them the differences na okay naman na let's say na this is the pang artista, Zirconia, like yung kay Vice Ganda, Zeinab Harake. Budget mo ba is ganto, kung kaya mo to, I will suggest. Kunwari yung sa harap, mas prefer ko kung kaya mo na Zirconia and Emax because it looks like natural. I am the one suggesting tapos sila naman yung hihirit sakin na "Doc pwede bang ganto nalang, pwede bang maka discount pa? Kasi hanggang dito lang ang budget ko.".

INTERVIEWER: Tumatanggap din po ng mga Philhealth?

CLIENT: No, kasi mahirap sa HMO, ang dami mong pasyente and mostly naman mga HMO na napupunta samin, they have to wait. Tulad nung isang araw na, HMO siya, limang araw na

namamaga ngipin niya. So pumupunta na sila sa akin. They are willing to pay instead of waiting the HMO for insurance.

INTERVIEWER: Doc sa website po, malalagay na po kasi doon ang mga price lists po eh.

CLIENT: No, we don't usually say na ang price list is ganito ha? Ang price kasi tulad ng dentures, we cannot say na ganto kasi we have to explain it personally. Ang dentures, maraming klase yan. Like porcelain crowns and bridges, may mga klase kasi niyan eh. Yung mga normal lang ng procedures pwede mo ilagay dyan like pasta, cleaning, check-up.

CLIENT: So pumunta ka personally we'll discuss about it kung okay sayo, edi okay. If not, punta ka sa another clinic. Yung iba nag s-scout ng presyo, I do not give prices fixed pag dating sa messenger. Pero yung mga bunot, it ranges 800-1000.

INTERVIEWER: San po kayo nag aral doc?

CLIENT: way back 1980's pa sa De Ocampo. Naging dentist ako ng PUP for 5 years, sa mismong PUP. Nalilipat lipat ako sa branch or sa main, after non natanggap ako sa Saudi as a Dentist 1991 GP ako don. General Practioner.

INTERVIEWER: What services po kaya yung sa tingin niyo nasasatisfied po yung patient niyo?

CLIENT: halos lahat naman satisfied sila, wala naman kami pasyente na nag reklamo, sa awa ng dyos, yung hindi ako binayaran meron.

INTERVIEWER: Nag aaccept po ba kayo ng appointment for Sunday:

CLIENT: Close kami ng Sunday kasi family day, except meron akong aalis na patients or emergency. Like lilipad kaya kailangan isuot yung mga ngipin nila. Madami din kasi kami balik bayan, kaya kung kailangan talaga, mag oopen kami ng Sunday, flexible kasi ako hindi ako kagaya ng ibang dentist na strict, kasi nga galing ako sa ibang bansa din.

INTERVIEWER: May alam po ba kayo about sa mga AI? Like chatbot

CLIENT: oo meron naman

INTERVIEWER: Pano niyo po nahahandle yung mga biglaang cancelation?

CLIENT: Actually, nangyare na sakin yon madaming beses, ang problem don may kaibigan silang dentist, tapos naki usap sila sa akin, na ako ang tumingin sa anak kasi ayaw ng anak niya don. Yung importante kasi I booked for 1hr – 2hrs tapos walang sabi na hindi kami dadating, ang dami

ko pasyente na nireched at nacancel. Ayon lang naman, sayang yung slot, holidy at Sunday pa naman.

INTERVIEWER: Anong araw po yung madaming pasyente?

CLIENT: Saturday, kasi puno talaga kaya you need to book ahead of Saturday, tsaka nag aauto book ako kasi nag cocosmetic ako, kailangan niya bumalik after 3 days, naka book na agad yon. Kailangan may booking talaga kasi hindi naman kami pasta at bunot lang. pag cosmetic kami, may mga time na yan kung kelan sila babalik mga after 3 days, usually ang time naman pag weekdays, may time na mahina pero okay naman kami.

INTERVIEWER: May mga scenario po ba na lumilipat yung mga pasyente sainyo galing sa ibang doctor?

CLIENT: actually, madami kami transferee, kaso unethical naman kung naka brace na sila sa iba tapos kukunin ko, so yung iba I asked them na bumalik muna don sa dating doctor niya, pero hindi ako yung mahigpit sa pag lipat sakin pag galing ka province, wala ako hinihingi na record or anything, kasi kailangan tulungan ko din naman yung pasyente dba, pano kung hindi na pala siya pwede. Lagi akong earn and help, may help ako lagi. Meron ako na tinutulungan ko sila. Hindi ako strict, basta flexible ako, nasa low profile lang ako, Madali ako kausap.

INTERVIEWER: Doc sa website naman po ano po yung mga gusto niyo ipalagay?

CLIENT: Gusto ko ilagay niyo yung experience ko, yung mga achievements ko, na 30 ano na ako, lahat lahat gusto ko nandon.

INTERVIEWER: Mga ilan taon po kayo nag aral doc?

CLIENT: mga 10 years din, pero habang nag papractice ka you need to have specialization. Kasi pag nag general dentist kana, talo ka. Pasta ka lang, mga ganon.

INTERVIEWER: Ano po yung mga gusto niyo ipalagay sa website para hindi na po kayo mahirapan?

CLIENT: Kasi si mama yung nag aasikaso ng mga schedule eh, siguro yung pwede siya mag update ng schedule don, para makita ng mga clients yung mga available time and date para sila yung mag pick kung ano oras at araw, ayon yung isa sa gusto namin na nandon. Tsaka paki lagay din na nag aaccept kami ng mga international patients, pero paki lagay na sa Philippines kami naka

base, kasi minsan may nag eemail na nirefer kami akala nila sa Australia kami naka base. Kaya mas okay kung website tapos naka lagay na sa Philippines kami.

INTERVIEWER:lahat po ba yan na sa page nyo?

CLIENT: hindi kami na p-post. basta ang mahalag kung ano kami, mga services na nag ooral surgery, TMD.

INTERVIEWER: meron po kasi kaming features na doctor profiles po.

CLIENT: oo ilalagay mo na. i worked in arcobar ibibigay ko sa inyo yung details pwede nyong picturan yung certificates ko. dentist in arcobar in Saudi aribia. tapos nag aral ako nung 2008 1 year for orthodontist with PMD tapos 2011 i study oral surgery and oral implant. 1 day for oral surgery and 1 day for oral implant so 2 days in a week we close the clinic kasi nag aaral ko non whole day.

INTERVIEWER: bukod po sa scheduling ano pa po kaya yung gusto nyo ipadagdag

CLIENT: yung na mention nyo na AI chatbot, kasi merong mga questions na common na lang. mas Maganda yun AI chatbot na lang ang mag hhandle. kasi minsan may mga patients kami na may nag tatanong paulit paulit nalang andon na yung sagot eh. hindi lang nakikita or nababasa. kaya kailangan ko pa replyan ng mano mano.

INTERVIEWER: About naman po sa patients records ng patients pano niyo po ito na-mamanage?

CLIENT: Meron po kami patient files, manual po siya gamitin, and also meron din ako another patients file para seperate na lang at ca-copy ko na lang sa kabilang file para mas seperate yung history ng patients record para mas madali ko siya mahanap at yung mga history details nila sa clinic.

INTERVIEWER: At about naman po sa patients record kayo lang naman po makakapag access nito, at mas convinient po siya gamitin kasi po mag sesearch na lang po kayo sa chatbot para hindi na po kayo mahirapan mag hanap ng mga gusto niyo po hanapin, tulad po ng patients record, etc.

CLIENT: Ah okay mas maganda, pwede yan sa clinic, kasi seperately ayaw ko madalas dalin yung laptop, medyo hussle pa.

INTERVIEWER: My time po ba na may kapalitan kayo sir jyro, if ever na wala po kayo dito sa clinic, kasi po ask ko din po sana si doc kung prefer siya sa authentication methods.

CLIENT: ahh Authentication method, okayy sure para possible na secured na din.

INTERVIEWER: About naman po sa records, tulad po ng data analysis, prefered po ba kayo na input natin yan sa website?

CLIENT: Okay actually.

INTERVIEWER: About naman po sa mga patients na nag fafollow up check-up? pano niyo po sila na memesage if ever na marami po yung nag fafollow up?

CLIENT: Based of our experience hindi na namin sila na memessage kasi sila na mismo yung nag papa schedule sa kanila kung gusto ba nila mag pa check-up or any service, Let say example si patients may adjustment siya for next 2 weeks, siya na talaga mismo nag aaddvance booking, usually ganun.

INTERVIEWER: May hindi na po ba bumabalik na patients dito doc base on your experience po?

CLIENT: Wala naman, wala naman kami na experience dito, kasi they like our clinic, hindi naman sila nawawala, siguro pag hindi lang sila nakakapunta baka busy lang pero nireremind naman kami ng patients for that situation, pero yung hindi babalik wala pa naman kami na experience na ganun, pero kung hindi na mag papatuloy, nasa probinsya na.

INTERVIEWER: About naman po sa confirmation reminders, mag sesend po ng notifications sa mga patients, for example po kung kelan ba siya babalik sa clinic or mag papa adjust.

CLIENT: pwede, oo pwede naman kasi si chat box naman ang mag mamanage yan.

INTERVIEWER: Pano niyo po na nonotify yung patients, kunyare po breaktime ni doc let say na may nag walk in pero naka break si doc, pano niyo po na hahandle yung ganyan situation?

CLIENT: I dont have break time, flexible ako kasi priority ko yang patients, kahit na kumakain ako, Im stop eating pag may patients walk-in.

INTERVIEWER: Suggest lang po namin, okay lang po yung front page ng website lalagay po namin dun yung mga achievement ni doc lahat ng mga naging achievement niya at yung mga certificate niya at i-input din po namin yung email and address, contact number etc.

CLIENT: Okayy sure mas maganda kung iinput niyo yan sa website.