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Development of An Appointment and Patient Record Management System for Hearing Aid Center

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Abstract: This capstone project developed a web-based Appointment and Patient Record Management System for Kamatage Trading Hearing and Health Solution, a multi-branch audiological center. Using the Waterfall SDLC model, the system was built with Laravel (PHP), MySQL, and HTML/CSS/JavaScript, supported by tools like Gmail SMTP, DOMPDF, and Chart.js for notifications, reporting, and visualization. It provided role-based access for patients, staff, and administrators, offering centralized records, appointment scheduling, billing, reporting, and secure communication. Testing and user feedback confirmed improved accuracy, reduced waiting times, elimination of double bookings, and overall efficiency in clinic workflows.

Keywords: *Appointment, Patient Record, MySQL Waterfall SDLC, Web-Based, Laravel PHP Framework.*

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I. INTRODUCTION

Healthcare clinics often struggle with manual appointment scheduling and fragmented patient records, leading to inefficiencies and errors. This project aimed to design a centralized, secure, and efficient system to streamline workflows and improve service delivery for a multi-branch audiological center.

➢*Conceptual Framework*

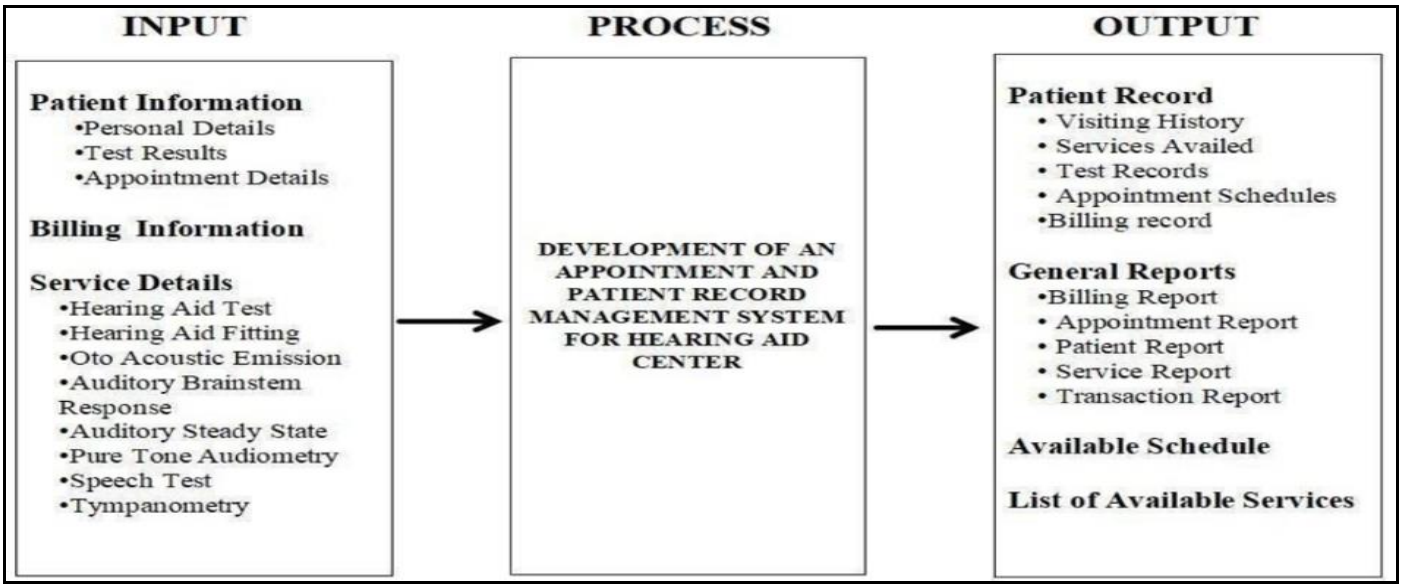

Fig 1 Conceptual Framework of the Study

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The objective of this study is to design and implement a web-based Appointment and Patient Record Management System for hearing aid centers that enhances efficiency, accuracy, and patient care. Specifically, the system aims to collect and organize essential patient information such as personal details, medical history, test results, and appointment schedules to build complete profiles. It seeks to streamline clinic operations by preventing double bookings, enabling secure communication between staff and patients, and simplifying record storage and retrieval. Furthermore, the system is intended to generate comprehensive reports on appointments, services, and patient visits to support administrative decision-making and resource planning. By integrating these functions, the study strives to reduce errors, improve organization, and deliver a more seamless and personalized healthcare experience for both patients and staff.

II. RELATED WORK

This chapter reviewed literature on appointment and patient record management systems, examining theories, concepts, and findings from both local and foreign studies to establish a foundation for system development. By analyzing existing solutions, it identified strengths, weaknesses, and gaps that justified the relevance of the current investigation. The methodology of the capstone project was then outlined, detailing the research design, data collection methods, tools used, and procedural steps. These approaches were carefully selected to ensure organized execution, accuracy of results, and alignment with the study's objectives. Prior studies highlighted common issues in clinics, such as reliance on manual processes, and demonstrated how digital systems could enhance workflow efficiency and data accuracy.

The project itself involved the development of a web-based Appointment and Patient Record Management System for a hearing aid center, designed to replace manual processes with a secure, digital platform. Built using the Laravel PHP framework and MySQL, with a responsive front-end in HTML, CSS, and Bootstrap, the system supported three user roles—patients, staff/audiologists, and administrators—with secure login via Laravel Breeze. Additional tools such as Laravel Excel, DOMPDF, and Chart.js enabled report generation and data visualization, while Mailgun facilitated email notifications. The system was tested locally using XAMPP and chosen technologies for their reliability, security, and strong community support. Despite its effectiveness, limitations such as dependency on internet access and third-party tool restrictions were noted, underscoring the importance of understanding key concepts like authentication, database management, APIs, and responsive design in ensuring system functionality.

III. METHODOLOGY/FRAMEWORK

The study adopted the traditional Waterfall methodology, a structured and sequential model ideal for projects with stable requirements. Each phase—Requirement Gathering and Analysis, System Design, Development, Testing and Evaluation, Deployment, and Maintenance—was completed before moving to the next, ensuring systematic workflow and comprehensive documentation. As noted by Zuriani Ab Ghani (2021), this approach supports efficiency and adaptability in health-related information systems. In this project, researchers first gathered and analyzed requirements, then designed the system's structure and functionality. The development phase followed, after which the system was tested and evaluated to resolve issues. Once validated, it was deployed for use, and finally placed under maintenance to monitor performance and apply necessary updates.

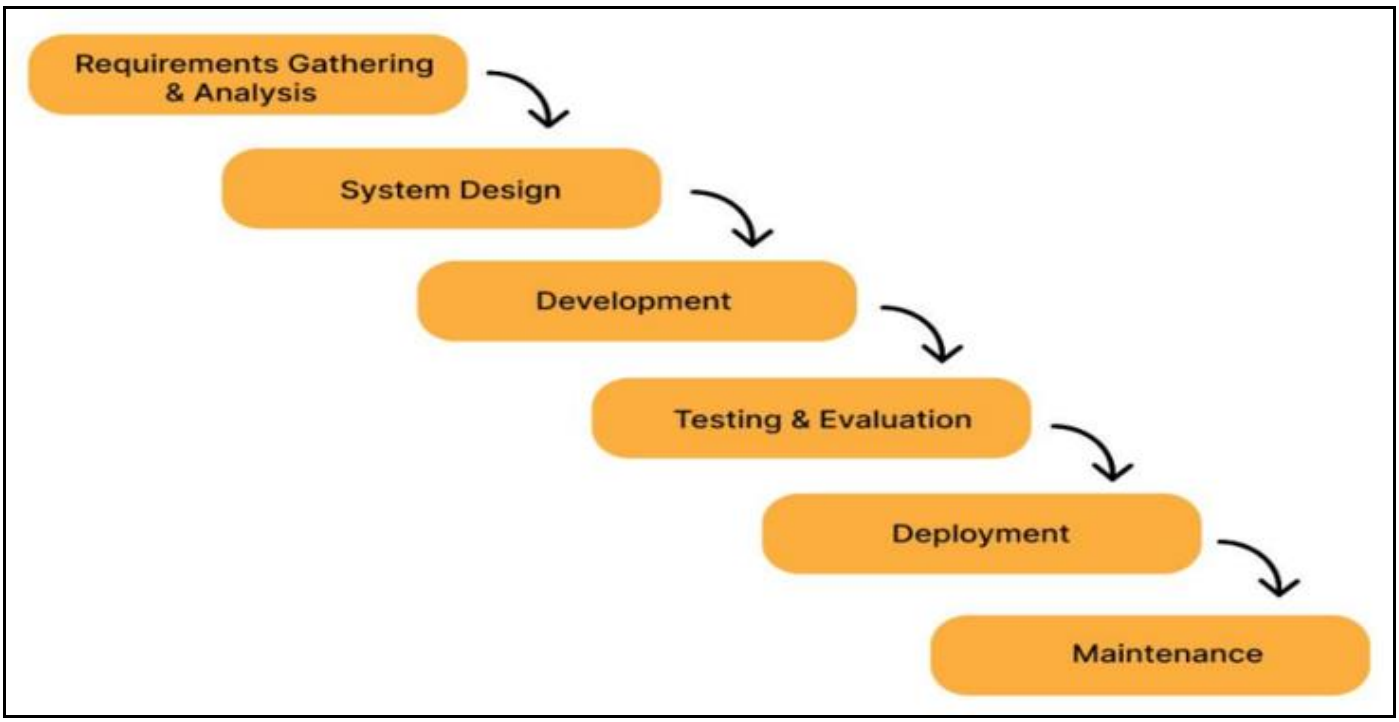

Fig 2 Waterfall Methodology Phase by Zuriani Ab Ghani June (2021)

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➢ *Requirements Gathering and Analysis*

The researcher gathered system requirements through interviews, observations, and questionnaires with the owner and staff to understand real challenges in appointment scheduling, patient record handling, and billing. This user-centered approach revealed operational difficulties and financial concerns such as payment management and delayed settlements, guiding the design of billing features to improve accuracy and transparency. The collected data was systematically analyzed to identify recurring issues, inefficiencies, and gaps, which were then translated into functional and non-functional requirements. These structured findings provided a solid foundation for system development, ensuring the platform streamlined appointments, enhanced patient record management, improved billing processes, and simplified daily tasks for patients, staff,and administrators.

➢ *Sytem Design*

In the design phase, the proponents established the system's overall structure using diagram models to visualize data flow and user interactions. Data Flow Diagrams defined boundaries and functions, while use case diagrams outlined tasks for patients, staff, and administrators. Figma was employed to create wireframes and interactive interfaces, supporting iterative design and usability testing, while phpMyAdmin was used to design the database through an Entity Relationship Diagram (ERD) that mapped relationships among system entities. These tools ensured organized data handling and user-centered design. The outputs included wireframes, ERDs, context diagrams, and use case diagrams, providing a comprehensive blueprint that guided implementation and ensured the system aligned with actual user needs.

➢ *Development*

In the development phase, the researchers translated the system design into a fully functional web-based Appointment and Patient Record Management System. Using Laravel as the core framework, supported by Laravel Breeze and Sanctum for secure authentication and role-based access, the team implemented structured routing, database handling, and user management. The front end was built with HTML, CSS, JavaScript, and Bootstrap to ensure responsiveness and usability across devices. Integrated tools such as MailGun for email notifications, Chart.js for analytics dashboards, and DOMPDF for report generation enhanced the system's functionality. MySQL served as the relational database, providing robust data organization and security for sensitive patient information. The outcome was a complete system that streamlined appointment scheduling, patient record management, billing, and reporting, significantly improving clinic efficiency and healthcare service delivery.

➢ *Testng and Evaluation*

In this phase, the researchers verified that all system components functioned as intended by conducting unit testing on core features such as login, appointment booking, report generation, and email notifications. Usability testing was also performed using the System Usability Scale (SUS) to gather user feedback on ease of use, navigation, and interface clarity. Responsiveness was tested across different devices to ensure consistent performance. The outcome was a detailed report confirming system stability, reliability, and user satisfaction, identifying minor issues for improvement, and validating that the system was ready for deployment in a real-world healthcare setting.

➢ *Deployment*

In the deployment phase, the researcher finalized the system by applying improvements based on usability feedback and ensuring all core features functioned smoothly. Stakeholders were provided with login credentials, a user guide, and a basic maintenance plan to support system handover. The system was hosted locally using XAMPP, which enabled controlled testing of database tables and server-side functions prior to release. The final output was a complete and operational Appointment and Patient Record Management System, equipped with administrator and user access, documentation, and a deployment acceptance form, ready for transition into everyday use

IV. RESULTS AND DISCUSSION

This chapter presents the outcomes of the system development process, linking the project's objectives with the actual outputs. It follows the phases of the Software Development Life Cycle (SDLC), beginning with requirement analysis to define the project scope, followed by system design using diagrams and database structures, and development into functional modules. The system was then tested and evaluated for accuracy, usability, and reliability before being deployed for real-world use. Interpretations of the results demonstrate how the system addressed identified problems, validated the project's objectives, and highlighted its significance in improving appointment scheduling, patient record management, and overall healthcare service delivery.

➢ *Research Design*

The research design outlined how the system was planned and structured based on requirements gathered from interviews and observations. Visual and technical models served as the foundation for development, ensuring the system addressed user needs. Several diagrams were created to organize and plan the system clearly: the Conceptual ERD showed the main entities and their relationships; the Logical and Physical ERDs detailed attributes, data types, and database structures; the Use Case Diagram defined user actions for patients, staff, and administrators; the Data Flow Diagram illustrated how data moved through system processes; and Lo-Fi wireframes presented the interface layout. Together, these models provided a comprehensive blueprint for building the Appointment and Patient Record Management System.

- *Lofi Design*

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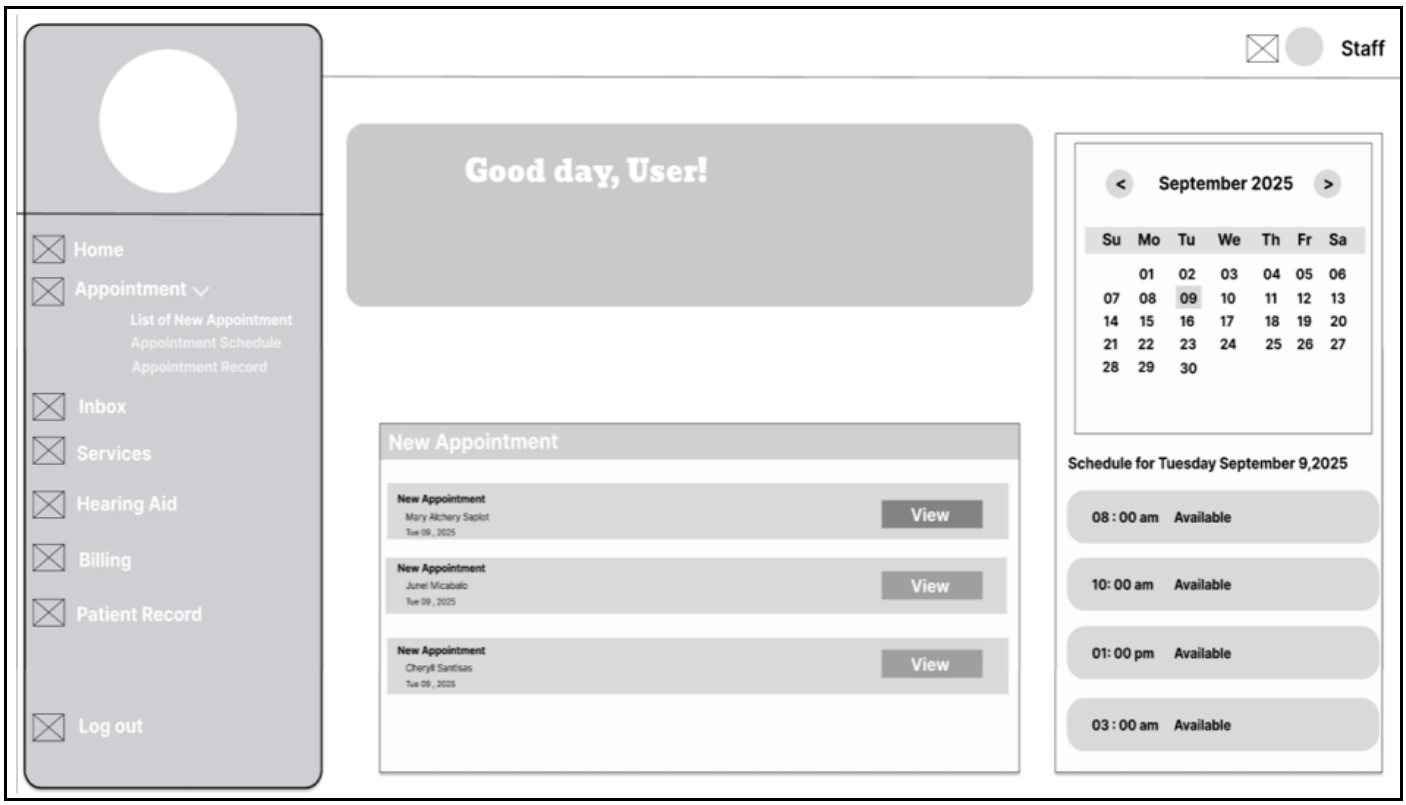

Fig 3 LO-FI Wireframe of Staff Dashboard Page

This Lo-Fi interface illustrates the Staff Dashboard page, which provides the staff with an overview of new appointments and daily schedules. The layout includes a fixed sidebar with menu options such as Home, Appointment, Services, Hearing Aid, Patient Record, Billing, and Log out for easy navigation. A greeting message appears at the top of the page, while the center section displays newly submitted appointments with quick view buttons to confirm the request appoinment. On the right side, a calendar and a list of available time slots are shown to help staff monitor and manage appointment schedules efficiently.

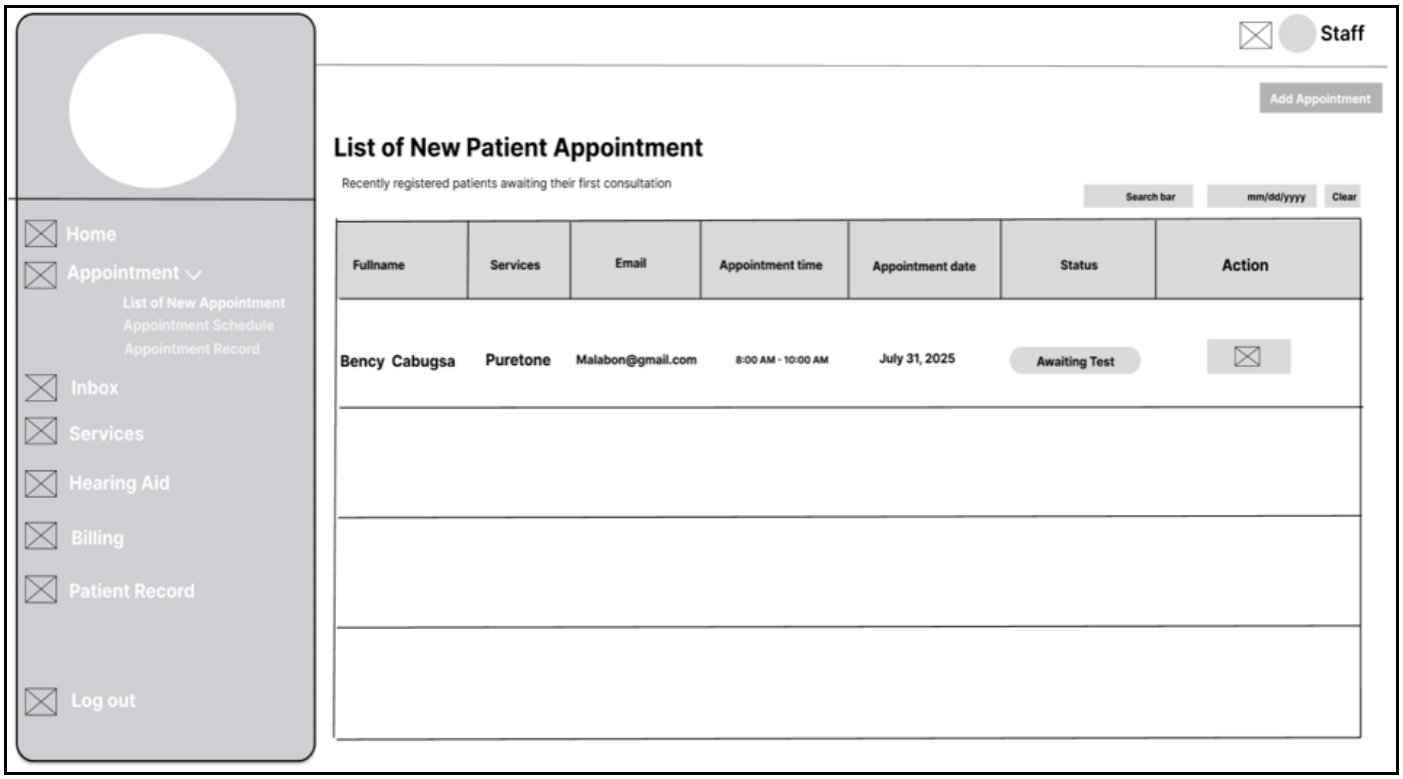

Fig 4 LO-FI Wireframe of Staff List of New Patient Appointments Page

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This Lo-Fi interface represents the List of New Patient Appointments page, where staff can view patients who recently booked their ==first consultation. A sidebar on the left provides navigation options such as Home, Appointment, Services, Hearing Aid, Patient Record, Billing, and Log out. The main section displays a table showing each patient's name, service type, email, appointment time, appointment date, and current status. A search bar and date filter are available for easier tracking, and an action button lets the staff open or manage the appointment. An 'Add Appointment' button on the top right allows staff to manually create a new appointment when needed.

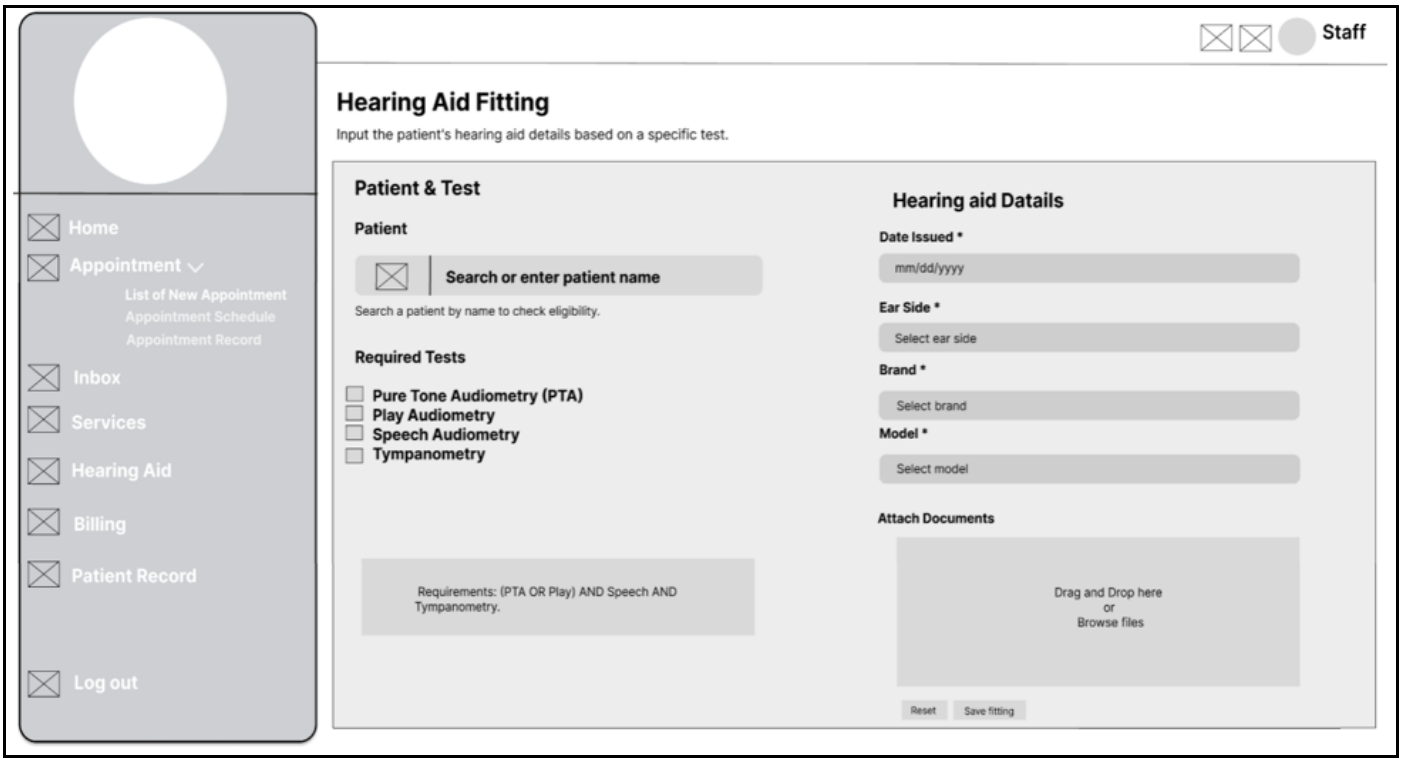

Fig 5 LO-FI Wireframe of Staff Hearing Aid Fitting Page

This LO-FI interface Hearing Aid Fitting page, where staff can input and manage a patient's hearing aid information based on their completed tests. The main section is divided into two parts the Patient & Test panel and the Hearing Aid Details panel. In the Patient & Test section, staff can search for a patient by entering their name, and check the required tests such as Pure Tone Audiometry (PTA), Play Audiometry, Speech Audiometry, and Tympanometry. A requirement note is displayed below to guide the staff. On the right side, the Hearing Aid Details section includes fields for the date issued, ear side, brand, and model. There is also an upload area where staff can drag and drop documents or browse files related to the fitting. At the bottom of the form, Reset and Save buttons allow staff to clear the fields or finalize the hearing aid fitting entry.

Fig 6 LO-FI Wireframe of Staff Messaging Page

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This Lo-Fi interface illustrates a Messaging interface within the system, where users can communicate with staff. On the left side, there is a menu with options like Appointment, Appointment Record, Message, and Log out. In the middle, there is a chat section displaying recent conversations with staff members from Davao, Cdo, and Butuan. To the right, there is a panel labeled "Message Staff" where users can type and send new messages.

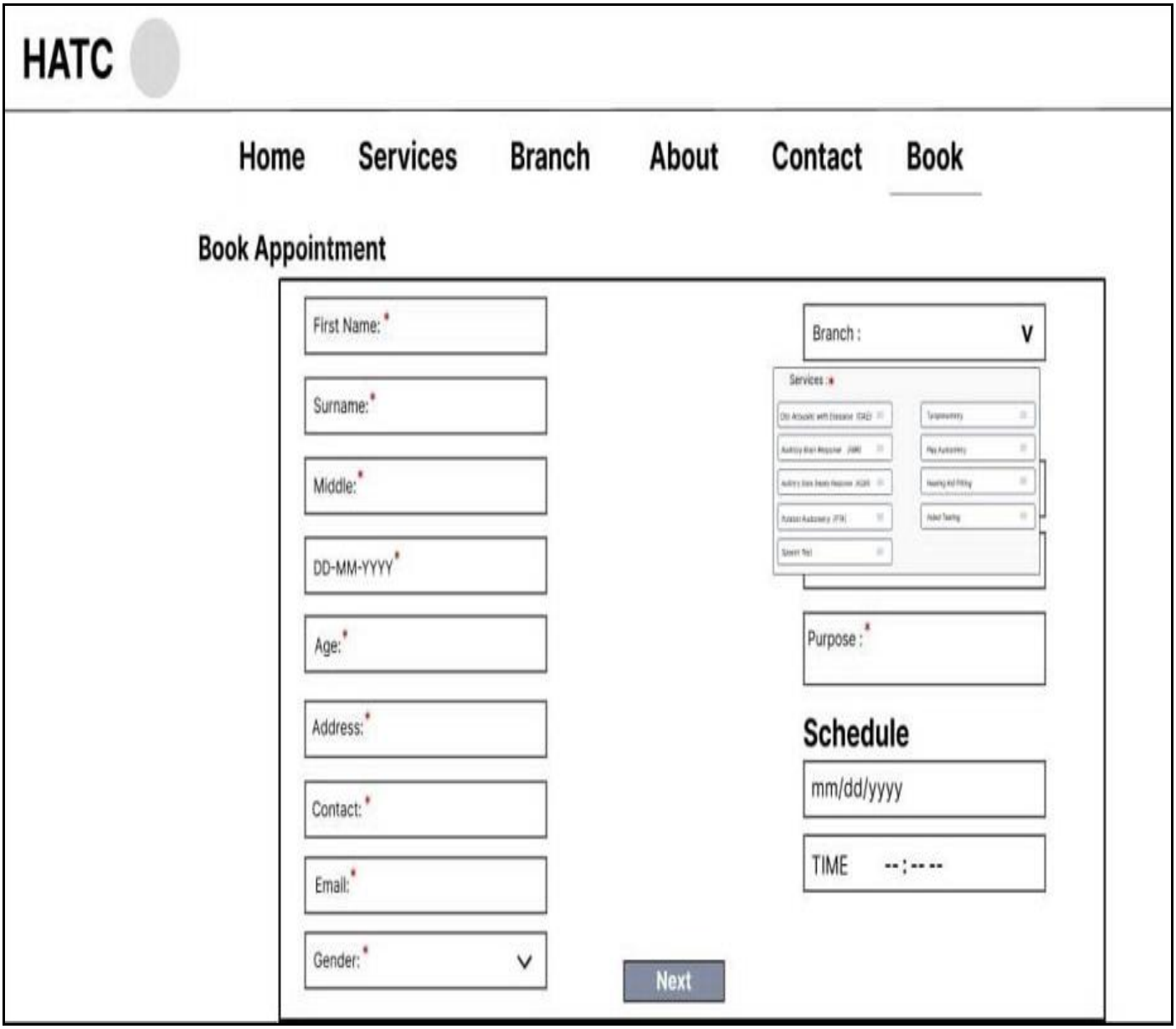

Fig 7 LO-FI Wireframe of Book Appointment Page

This LOFI wireframe shows the Book Appointment page where patients can fill out their personal details and appointment information. On the left side of the form, the patient enters basic information such as name, birthday, age, address, contact number, email, and gender. On the right side, they select a branch, choose the service they need, write their purpose. At the bottom, the patient picks their preferred date and time for the appointment. A “Next” button is provided to continue the booking process. The layout is clear and organized to help users easily complete their appointment request.

➢ *Developmet*

In developing the system, the researchers selected tools and technologies suited to the Hearing Aid Center’s needs. Laravel was used as the core framework for managing patient records, appointments, tests, and billing due to its reliability and security. For email notifications, Hostinger’s built-in email API replaced Mailgun to ensure dependable delivery of appointment confirmations. To enhance accessibility, Bootstrap was applied to create a responsive layout, allowing patients to book appointments seamlessly across computers and mobile devices without requiring a separate application.

- *Hifi Design*

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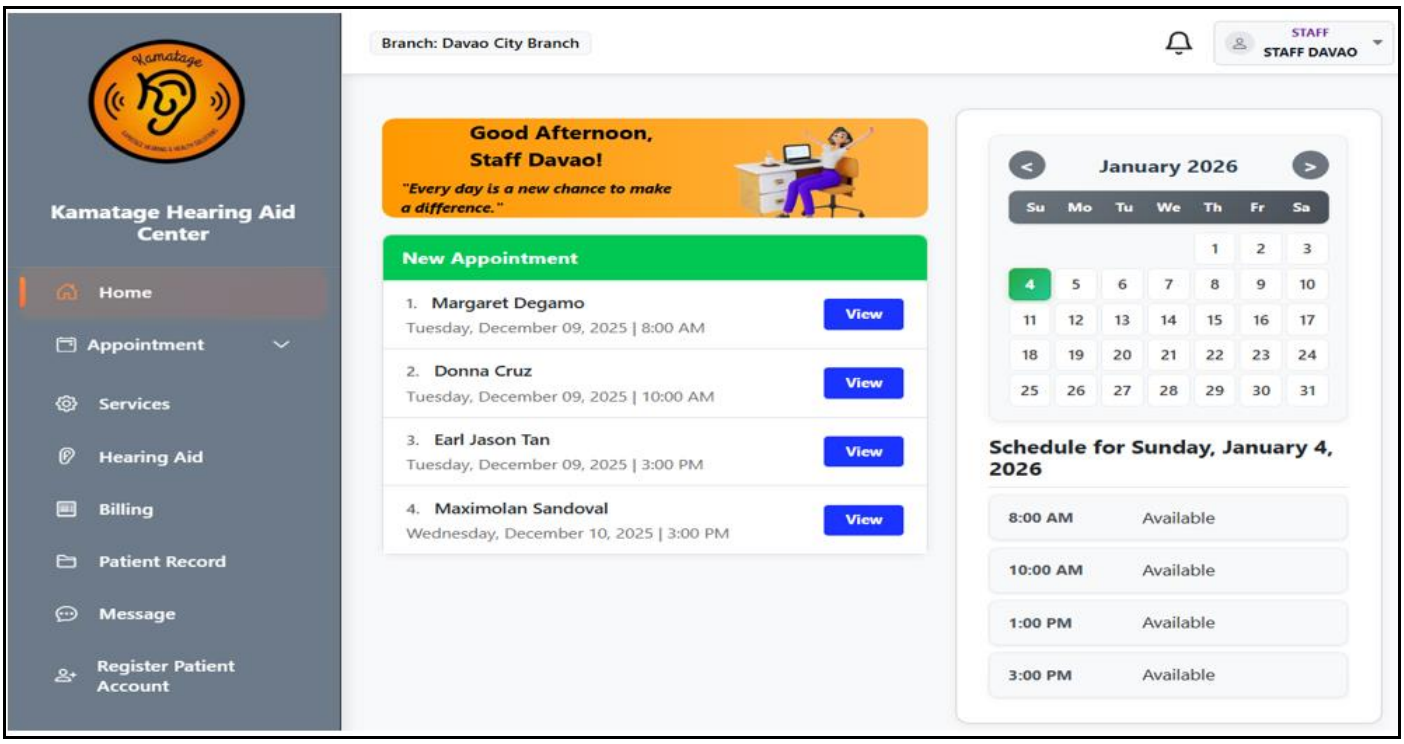

Fig 8 High Fidelity Web Interface for Staff Dashboard

This high-fidelity home dashboard display a polished interface for staff at the Kamatage Hearing Aid Center, featuring a dark sidebar on the left with the clinic logo and clearly labeled navigation options such as Home, Appointment, Services, Hearing Aid, Billing, Patient Record, Message, Register Patient Account, and Log Out, each paired with clean icons and highlighted when selected. The top section displays the current branch and staff profile with notification indicators. In the main area, a colorful welcome banner greets the staff with an illustration and motivational message, followed by a bright green "New Appointment" card showing the patient's name, date, and time, along with a blue "View" button. On the right side, a modern calendar highlights the selected day in green and shows the available appointment times in simple rounded cards.

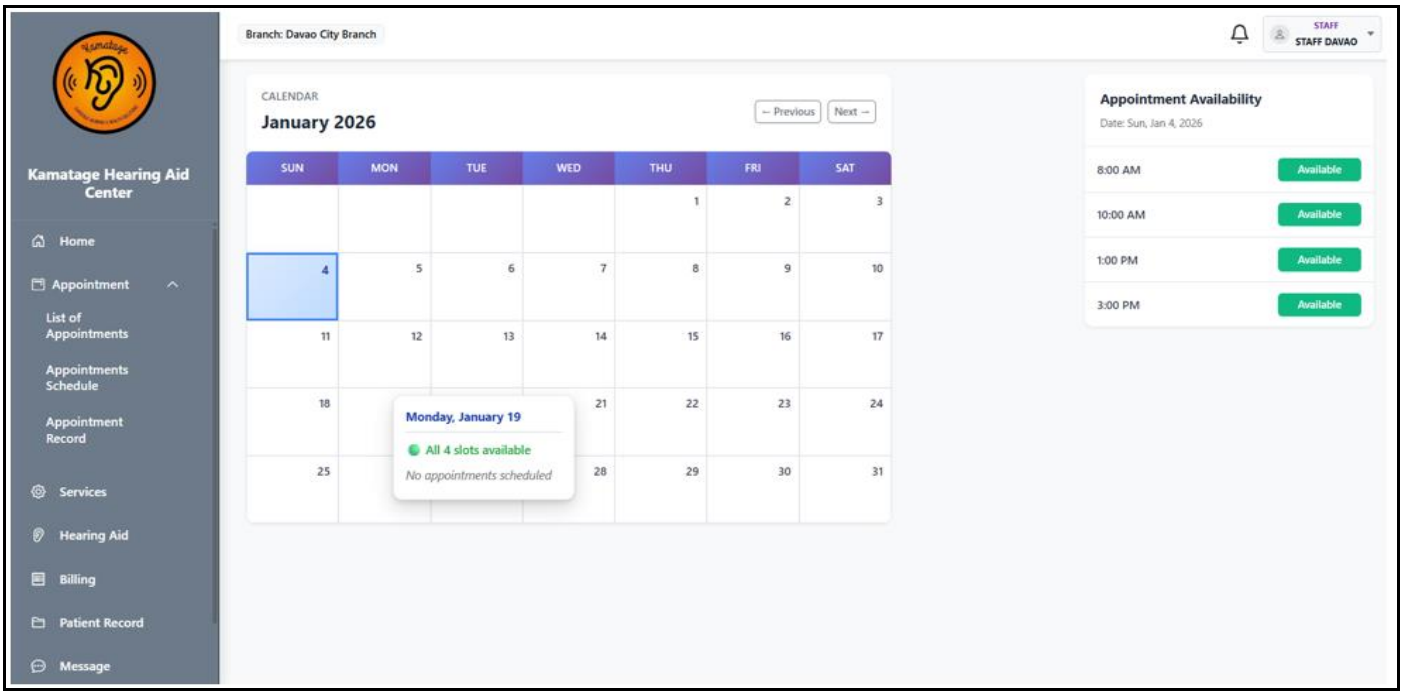

Fig 9 High Fidelity Web Interface for List of Appointment Schedule Page

This high-fidelity "Appointment Schedule" screen for the staff at the Kamatage Hearing Aid Center, CDO Branch, for December 2025. The main view is a calendar where Friday, December 5th is highlighted in red, indicating it is

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Fully Booked (4 of 4 slots), with a list detailing the four scheduled patients: Junel A Micabalo at 8:00 AM, Maribeth P Saldua at 10:00 AM, Gelo Vivar at 1:00 PM, and Julito Jude L Estoso at 3:00 PM. The system, accessed via a local IP address, clearly allows staff like Emily S. Suitado to navigate the calendar, view daily appointment details, and manage the clinic's schedule.

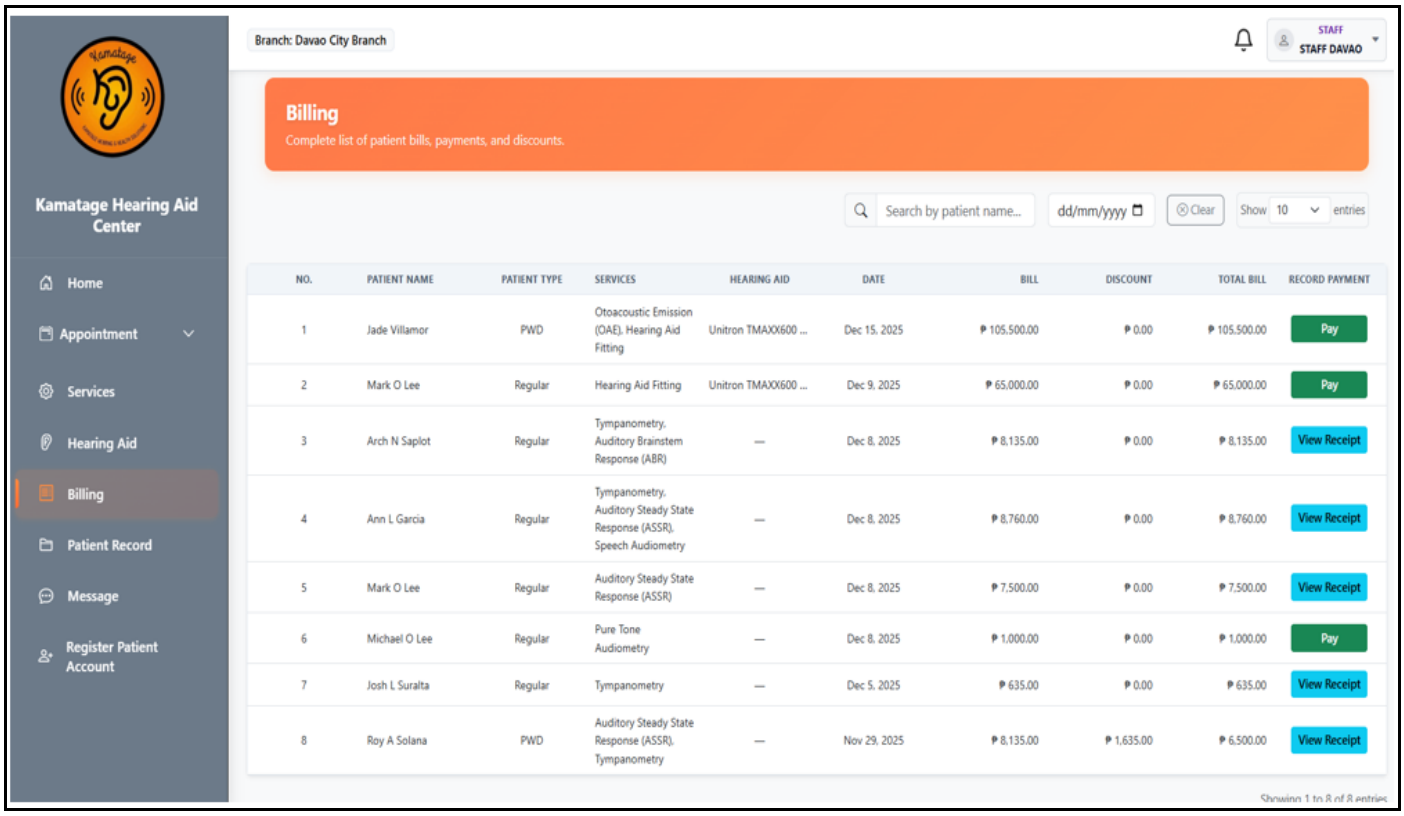

Fig 10 High Fidelity Web Interface for Billing Page

This high-fidelity "Billing" section of the Kamatage Hearing Aid Center's staff dashboard, showing a clear, organized list of patient charges at the CDO Branch. It tracks each patient's name, type like Senior or PWD, the services they received such as Otoacoustic Emission or Hearing Aid Fitting, any hearing aid model used, and the billing details including original bill, discounts applied, and final total. Staff can search by patient name or date, adjust how many entries are shown, and take action either viewing a receipt for completed payments or clicking "Pay" to process outstanding bills. It's designed to make managing finances simple and transparent for both staff and patients.

- *Code Snippet/Backend Layer*

```
1.  public function login(Request $request, $role = null)
2.  {
3.    // Backend validation for email
4.    $request->validate([
5.        'email' => [ 'required',
6.        'email',
7.        'not_regex:/[<>;=\'\,]/', // Forbid < > ; = ' ,
8.     ],
9.     'password' => [
10.    'required',
11.    'min:8',
12.    'regex:/[A-Z]/', // at least one uppercase
13.    'regex:/[a-z]/', // at least one lowercase
14.    'regex:/[0-9]/', // at least one number
15.    'regex:/[^A-Za-z0-9]/', // at least one special character
16.    ],
17. ], [
18.    'email.email' => 'Email must be a valid email address.',
19.    'email.not_regex' => "Email must not contain special characters like <, >, ;, =, ',
20. or ,.",
21.    'password.min' => 'Password must be at least 8 characters.',
22.    'password.regex' => 'Password must include 1 uppercase, 1 lowercase, 1
23. number, and 1 special character (e.g., Test@123).',
24.  ]);
25.
26.  $credentials = $request->only('email','password');
```
Fig 11 Code Snippet for Admin and Staff Login

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This code snippet handles the login process for both admin and staff users. It begins by validating the email and password to ensure they follow the required format and security rules. The email must be valid and free from special characters, while the password must be at least eight characters long and contain uppercase, lowercase, numeric, and special characters. Once validated, the system checks the provided credentials against the database to verify the user's identity. This ensures that only authorized admin and staff can access the system securely.

```php
public function login(Request $req)
    {
        $credentials = $req->only('email','password');


        $authCredentials = [
            'user_email' => $credentials['email'],
            'password' => $credentials['password'],
        ];

        $remember = (bool) $req->boolean('remember');
        if (Auth::guard('patient')->attempt($authCredentials, $remember)) {
            if (Auth::guard('patient')->user()->role === 'patient') {
                $req->session()->regenerate();

                $redirect = route('patient.appointment');
                if ($req->expectsJson()) {
                    return response()->json(['ok' => true, 'message' => 'Successfully logged in', 'redirect' => $redirect]);
                }
                return redirect()->to($redirect);

```

Fig 12 Code Snippet for Patient Login

This code snippet defines the Show Login Function that manages the login view and redirection for patients. It first checks if a patient is already authenticated using the Auth::guard('patient'). If the authenticated user has the role of patient, they are automatically redirected to the appointment booking page. Otherwise, the function displays the patient login view for authentication.

```php
public function adminIndex()
{
    if (!Auth::check() || Auth::user()->role !== 'admin') {
        return redirect()->route('login');
    }


    $q = Appointment::whereIn('status', ['confirmed', 'completed'])
        ->whereHas('tests', function($query) {
            $query->whereNotNull('test_result')
                  ->where('test_result', '!=', '');
        });

    $appointments = $q->with(['patient','serviceRef','branchRef','tests'])
        ->orderByDesc('confirmed_at')
        ->paginate(10);

    return view('admin.admin-appointment-record', compact('appointments'));
}
```

Fig 13 Code Snippet for Admin Appointment Record

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The code snippet allowed admin to viewa list of confirmed and completed appointments in the system.It checks if the log-in user is an admin before accessing the page. This function retrieves appointment data along with the related patient,service, and branch details then display's them in the admin's appointment record page in descending order by confirmation date,

```
1.  public function generateStaffPdf(Request $request, $id)
2.   {
3.      if (!Auth::check() || Auth::user()->role !== 'staff') {
4.         abort(403, 'Unauthorized access');
5.      }
6.
7.      return $this->generatePdf($request, $id);
8.   }
9.
10.  /*
11.   * * Generate PDF for patient record (Admin)
12.   */
13.   public function generateAdminPdf(Request $request, $id)
14.  {
15.       if (!Auth::check() || Auth::user()->role !== 'admin'){
16.           abort(403, 'Unauthorized access');
17.       }
18.
19.       return $this->generatePdf($request, $id);
20.  }
```

Fig 14 Code Snippet for Generating PDF

This code snippet allows both admin and staff users to generate a PDF file of a patient record. It first checks the user's role to ensure that only authorized personnel can access the function. If the user is not logged in or does not have the correct role, the system denies access with an unauthorized message. Once verified, it calls the generatePdf function to create and display the patient's record in a PDF format. This helps staff and admin easily produce printable copies of important medical or appointment data.

Table 1 Functional Test Case Admin Login

Test Case ID	Scenario Title	Scenario Description	Test Objectives	Pre-Conditions	Test Steps	Test Data	Expected Results	Actual Results	Pass/Fail Criteria	Remarks
SCN-FUNC-001	Admin Login	Admin logs in using correct username and password.	Ensure valid admin credentials allow successful login.	Admin account exists..	Go to the login page.	Username: junelmicabalo19@gmail.com	System logs in and displays: "You have successfully logged in."	Message displayed successfully.	System accepts valid credentials and shows confirmation message.	Passed
					Enter correct username and password.	Password: Junelmicabalo@29				
					Click "Login."					

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Table 1 presents the results of functional testing conducted for the admin login feature of the system titled Development of an Appointment and Patient Record Management System for Hearing Aid Center. It includes the test case ID, which serves as the unique identifier for the scenario being tested. The scenario title indicates the focus of the test, while the scenario description briefly explains the action being validated—in this case, verifying that an admin can log in using correct credentials. The test objectives define the purpose of the test, which is to ensure that valid admin credentials result in successful login. Pre-conditions specify that the admin account must already exist before the test is performed.

Table 2 Functional Test Case Admin Login (Invalid)

Test Case ID	Scenario Title	Scenario Description	Test Objectives	Pre-Conditions	Test Steps	Test Data	Expected Results	Actual Results	Pass/Fail Criteria	Remarks
SCN-FUNC-002	Admin Login (Invalid)	Admin attempts login using wrong username or password.	Ensure system prevents login with invalid credentials.. .	Admin account exists.	Open admin login page.	Username: junelmicabalo19@gmail.com	System displays: "Password must be at least 8 characters and include 1 uppercase, 1 lowercase, 1 number, and 1 special character (e.g.,Test @123)"	Message appeared. .	System must show error message when login attempt fails.	Passed
					Enter incorrect username or password.	Password: wrongpass				
					Click "Login."					

Table 2 presents the results of functional testing conducted for the admin login feature using invalid credentials. This column provides insights into how the system responds when incorrect login information is entered. The test case ID uses the unique identifier SCN-FUNC-002 to reference this specific scenario. The scenario title indicates that the test focuses on invalid login attempts, while the scenario description explains that the admin tries to access the system using a wrong username or password. The test objectives confirm that the system must prevent access when invalid credentials are used.

Table 3 Functional Test Case Staff Login

Test Case ID	Scenario Title	Scenario Description	Test Objectives	Pre-Conditions	Test Steps	Test Data	Expected Results	Actual Results	Pass/Fail Criteria	Remarks
SCN-FUNC-005	Staff Login	Staff logs in using correct username and password.	Ensure staff can log in successfully with valid credentials	Staff account is active.	Open login page.	Username: cdostaff@gmail.com	System shows: "You have successfully logged in" and redirects to staff dashboard.	Message appeared and staff logged in.	System accepts valid login and shows success message.	Passed
					Enter staff username and password.	Password: cdostaff@123				
					Click "Login."					

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Table 3 presents the results of functional testing conducted for the staff login feature using valid credentials. This column provides insights into how the system handles login attempts and whether it performs as expected. The test case ID SCN- FUNC-005 uniquely identifies the scenario being tested. The scenario title specifies that the feature under test is staff login, and the scenario description explains that the staff member logs in using the correct username and password. The test objectives confirm that the system should allow staff to log in successfully with valid credentials.

- *System Uabiliry Scale (SUS) Result*

Table 4 Final SUS Score Computation

System Usability Scale (SUS) Questionnaire								
		P1	P2	P3	P4	P5	P6	TOTAL
1	I think that I would like to use this system frequently.	4	4	4	3	3	4	
2	I found the system unnecessarily complex	3	2	1	0	1	1	
3	I thought the system was easy to use.	3	4	3	4	4	4	
4	I think that I would need the support of a technical person to be able to use this system.	2	2	1	4	2	0	
5	I found the various functions in this system were well integrated	4	4	4	4	4	4	
6	I thought there was too much inconsistency in this system.	3	3	3	2	3	4	
7	I would imagine that most people would learn to use this system very quickly.	3	3	4	3	3	3	
8	I found the system very cumbersome to use.	4	2	3	2	3	4	
9	I felt very confident using the system.	3	3	3	4	4	3	
10	I needed to learn a lot of things before I could get going with this system.	4	3	3	2	4	4	
TOTAL		33	30	29	28	31	31	
TOTAL		82.5	75	72.5	70	77.5	77.5	455

The system achieved an average SUS score of 75.8, placing it in the “good to excellent” usability range. This indicates that most participants found the system easy to use and effective for its purpose. Staff and patient participants successfully completed tasks, with varying levels of confidence: the staff member managed well with minor confusion, patients generally showed positive or neutral reactions, and only the senior participant required more guidance due to unfamiliarity with digital tasks. Overall, users reported comfort and satisfaction, confirming that the system is user-friendly, reliable, and suitable for different types of users.

V. CONLUSION

The project achieved its main objectives by delivering a secure, centralized, web-based healthcare management system. Patients can easily book, reschedule, or cancel appointments, while staff are provided with tools to manage and monitor these efficiently. The system also ensures accurate recording, updating, and retrieval of patient

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information and test results. Administrators benefit from centralized control across branches, enabling them to oversee staff accounts, monitor appointments, and generate essential reports for decision-making. The high System Usability Scale (SUS) score confirms that the system is user-friendly and accessible across devices, proving its readiness for full operational deployment and addressing inefficiencies of paper-based or fragmented digital systems.

Users, developers, and stakeholders all gain valuable insights from the project. For users, the system simplifies healthcare tasks, making scheduling and record retrieval faster and more accurate. Developers see how structured design methodology can successfully translate complex requirements into a functional, high-usability product. Stakeholders gain confidence in managing patient records and appointments with reliability and ease. The only noted limitations were related to device and network performance, such as lagging or slow connections, which may affect future implementation environments but do not diminish the overall success of the system.

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REFERENCES

[1]. \Abdulkadir, A., Aiyedun, T. A., Shoretire, K., Danladi, A., & Others. (2024). Paper-based medical records: The challenges and lessons learned from studying obstetrics and gynaecological post-operation records in a Nigerian hospital. *TAF Preventive Medicine Bulletin, 9*(5), 427–432.

[2]. Akingbade, O. L., & Onwuasoanya, N. C. (2022). A web-based online doctor's appointment and medical database management system. *IRE Journals, 6*(5), 18–22

[3]. Amusa, A., Akinnukawe, O., Balogun, I. O., Iribhogbe, C. K., Mensah, Y., Bamidele, O., & Adelowo, J. (2024). Development of a web-based medical appointment booking system. *International Journal of Scientific Research and Engineering Development, 7*(2), 1112–1118

[4]. Bagheri, F., Behnam, F., Galavi, Z., & Ahmadian, L. (2022). The use of various appointment systems among patients visiting academic outpatient centers in Kerman and the evaluation of patients' perspective and satisfaction. *BMC Health Services Research, 22*(1), Article 1344

[5]. Gumabay, M. V., & Corpuz, C. B. (2021). Web-based medical information with inventory system of LGU Jones Health Services Unit Jones, Isabela. *International Journal of Science and Advanced Information Technology, 10*(2), 8–15.

[6]. Karunathilake, G. K. B. V., Wijesinghe, G. A. T. T., Samarakoon, H. M. W. T. C. B., Ovitigala, A. U., De Silva, D. I., & Samarasekara, H. M. P. P. K. H. (2022). An integrated management system for a medical center. *International Journal of Engineering and Management Research, 12*(5), 180–188

[7]. Mani, V., Manickam, P., Alotaibi, Y., Alghamdi, S., & Khalaf, O. I. (2021). Hyperledger Healthchain: Patient-centric IPFS-based storage of health records. *Electronics, 10*(23), 3003.

[8]. Olipas, C. N. P., Viloria, J. P., Mateo, S. M., Maria, S. A. P. S., Bisnar, E. A., & Vallecera, M. L. M. (2022). MediCord: A web-based health record management system. *Journal of Healthcare Treatment Development, 25*, 35–5.

[9]. Paré, G., Raymond, L., Castonguay, A., Grenier Ouimet, A., & Trudel, M.-C. (2021). Assimilation of medical appointment scheduling systems and their impact on the accessibility of primary care: Mixed methods study. *JMIR Medical Informatics, 9*(11), e30485

[10]. Pavliv, I., & Pasichnyk, V. (2023). Data security requirements of the medical information system. *ResearchGate*.

[11]. Precious, M. A. (2021). Design and implementation of hospital appointment management system. *Caleb University*

[12]. Reguyal, J. M. T., Agno, A. M. S., Martinez, M. C., Castro, J. T., Cariazo, B. V. C., Olipas, C. N. P., & Alegado, R. T. (2023). Ob-Gyn clinic online scheduling system. *Formosa Journal of Computer and Information Science, 2*(1), 25–36.

[13]. Yarima, K. I., Lawan, A. A., Umar, I. A., Uba, H. U., & Haruna, Y. (2024). Development and implementation of a new patient appointment scheduling system at ADUSTECH Wudil: An evaluation of user satisfaction and system impact. *Journal of Computational Innovation and Analytics, 3*(2), 27–56.

[14]. Simeon, I. F., & Nlerum, P. (2024). Design and development of a medical appointment and evaluation management model. *SSRN*

[15]. Sutton, F. N. (2024). *An exploration of mHealth applications usage among older adults: A mixed methods study* (Doctoral dissertation, University of Central Florida).