

Design and implementation of an automated eye care system GUI

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ABSTRACT

Using a structured questionnaire sent to medical practitioners at Ibn Al-Haytham Eye Hospital, this study looks at user needs for a computerized Eye Care Management System (ECMS). The outcomes underline the requirement of automation in sophisticated image processing for disease identification, patient management, and appointment scheduling. Important needs found include easy user interfaces and safe data storage. These results led to the development of a prototype ECMS containing an interactive hospital interface with automatic Diabetic Macular Eedema (DME) identification.

This work shows how user-driven needs could direct the creation of sensible and quick eye care treatments. The information used in this study came from Ibn Al-Haytham Eye Hospital, therefore guaranteeing the practical relevance and legitimacy of the study. The created Python code was used for automated analysis and disease diagnosis to handle this actual data. The Eye Care Management System's user interface then was developed and put into use depending on the processed data and the needs found by means of the questionnaire.

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1. INTRODUCTION

Public health depends critically on eye care since millions of people world wide's quality of life is much affected by vision problems and blindness. If discovered early and properly handled, the main causes of vision loss—cataracts, diabetic macular oedema (DME), and glaucoma—often are curable or preventive, for patient administration, diagnosis, and record-keeping, many hospitals and clinics still rely on conventional eye care practices, meanwhile, which depend on manual procedures. Growing patient numbers, complicated diagnostic criteria, and the necessity of accurate, quick healthcare delivery call for more than these hand-crafted methods can provide [1].

Many facets of healthcare have been changed by the fast development of technology, including ophthalmology is no exception. Emerging as crucial tools to overcome the limits of manual systems is computerized eye care management systems (ECMS). Automating patient data management, appointment scheduling, and diagnostic procedures will help ECMS improve the accuracy and efficiency of eye care treatments [2]. Moreover, the combination of artificial intelligence methods and sophisticated picture processing helps to early identification of eye disorders, therefore guiding doctors in making quick and wise decisions [3].

Notwithstanding these technical developments, effective application of ECMS depends on a clear awareness of the needs and requirements of its users, including doctors, nurses, technicians, and administrative staff. Structured questionnaires and other quantitative research tools offer insightful analysis of the functional and non-functional needs required for a competent and user-friendly system [4].

Real-world data from Ibn Al-Haytham Eye Hospital was gathered for this work and analyzed using a custom-developed Python application for automated analysis and disease identification Designed and executed to meet the

down to earth requests of therapeutic experts,a client interface for the Eye Care Administration Framework was created based on the prepared information and the necessities found by means of the questionnaire.

The leftover portion of this paper is organized as takes after: Section II audits related works and existing frameworks; SectionIII portrays the strategy and questionnaire plan; Section IV presents the investigation of comes about; Section V addresses the found needs and framework design; Section VI closes with future bearings for system development.

2. METHOD

I. RELATED WORK

A few thinks about have investigated the improvement and execution of Eye Care Management Systems (ECMS) and electronic medical records (EMR) in ophthalmology to upgrade quiet care, workflow productivity, and symptomatic capabilities. Chosen related works are summarized underneath .

Bastawrous et al. (2016) [5] introduced a cloud-based eye care management system designed to enable remote access to patient data and diagnostic images, thereby supporting teleophthalmology services. Their study showed that the cloud system facilitated data sharing, enhanced collaboration among healthcare professionals, and improved access to eye care in underserved and remote regions.

Boland et al. (2018) [6] investigated the adoption of electronic health records in ophthalmology clinics and identified key barriers to implementing ophthalmology-specific EMR software. Their findings revealed that customized EMR systems led to improved data accessibility and patient safety, while also highlighting ongoing challenges such as interoperability and workflow integration.

Kermany et al. (2018) [7] developed a deep learning system capable of automatically detecting various eye diseases from retinal images. Their results demonstrated high diagnostic accuracy, emphasizing the potential of AI-based image analysis to support ophthalmologists in early detection and classification of conditions such as diabetic retinopathy and macular edema.

Ting et al. (2019) [8] provided a comprehensive review of the integration of advanced optical imaging techniques and artificial intelligence in ophthalmology. Their work discussed how these technologies, when incorporated into ECMS, have improved the speed and accuracy of disease detection and transformed patient management strategies in eye care.

Naemi et al. (2024) [9] designed and evaluated a web-based electronic health record system specifically for amblyopia patients at Farabi Hospital, Tehran.They used progressive user feedback, presenting paper prototypes to ophthalmologists, residents, and nurses to iteratively refine the interface. The final system scored over 90% “good” or “very good” in usability assessments, demonstrating high acceptance and satisfaction among clinical staff.

Table (1): Related Works

Ref. And year	Objectives
Bastawrous et al. (2016) [5]	To introduce a cloud-based eye care management system that enables remote access to patient data and diagnostic images. Facilitate teleophthalmology services, enhance collaboration among healthcare professionals, and improve access to eye care in underserved and remote regions.
Boland et al. (2018) [6]	To investigate the adoption of electronic health records in ophthalmology clinics and identify key barriers to implementing ophthalmology-specific EMR software. Improve data accessibility, patient safety, and address challenges such as interoperability and workflow integration.
Kermany et al. (2018) [7]	To develop a deep learning system for automatic detection of various eye diseases from retinal images. Achieve high diagnostic accuracy and support ophthalmologists in early detection and classification of diabetic retinopathy and macular edema.
Ting et al. (2019) [8]	To provide a comprehensive review of integrating advanced optical imaging techniques and artificial intelligence in ophthalmology. Discuss the impact of these technologies within ECMS to improve disease detection speed, accuracy, and patient management.
Naemi et al. (2024) [9]	To design and evaluate a web-based electronic health record system for amblyopia patients using iterative user feedback. Achieve high usability and satisfaction among ophthalmologists, residents, and nurses through user-centered interface design.

II. QUESTIONNAIRE AND SAMPLING

A organized questionnaire was made and sent among medical experts in numerous educate to absolutely characterize and survey user needs for the Eye Care Management System (ECMS). Designed to investigate a wide range of highlights and prerequisites, this think about concentrated on both functional and non-functional components germane to the arrangement of ECMS. A purposive testing approach was received to guarantee the incorporation of different points of view from key partners within the eye care division. The questionnaire was managed online and focused on four fundamental bunches: doctors, medical attendants, professionals, and authoritative staff. By locks in members with changing specializations and instructive foundations, the consider pointed to assemble comprehensive and agent criticism, subsequently improving the unwavering quality and legitimacy of the discoveries.

Sixty individuals in all replied the questionnaire.. The poll consisted in three main parts. The first part gathered demographic details like gender, degree of education, and present employment position. The second portion concentrated on the experiences and difficulties with current eye care practices among the participants. Covering elements including data security, user interface preferences, and the integration of sophisticated diagnostic tools, the last part sought to elicit comprehensive user needs for the suggested ECMS.

The questionnaire combined open-ended and multiple-choice questions to let for both qualitative insights and quantitative study. The outcomes clearly show the present needs and expectations of medical practitioners for the implementation of a suitable Eye Care Management System, as seen in the following figures and tables.

III. ANALYSES OF RESULTS

In this study, an exploratory, quantitative-based approach was employed to validate the functional and non-functional requirements of users for the Eye Care Management System (ECMS). Data collection was conducted through an online questionnaire designed and distributed using Google Forms. The responses were systematically analyzed to assess user interests, incorporate suggestions from both specialists and end-users, and align with insights drawn from the literature review.

The first result of the questionnaire, as shown in Figure 1, presents the gender distribution of the participants. The analysis indicates that 63.9% of respondents were female, while 36.1% were male. This demographic diversity ensures that the collected requirements reflect a broad spectrum of perspectives within the healthcare sector, thereby enhancing the reliability and applicability of the system design.

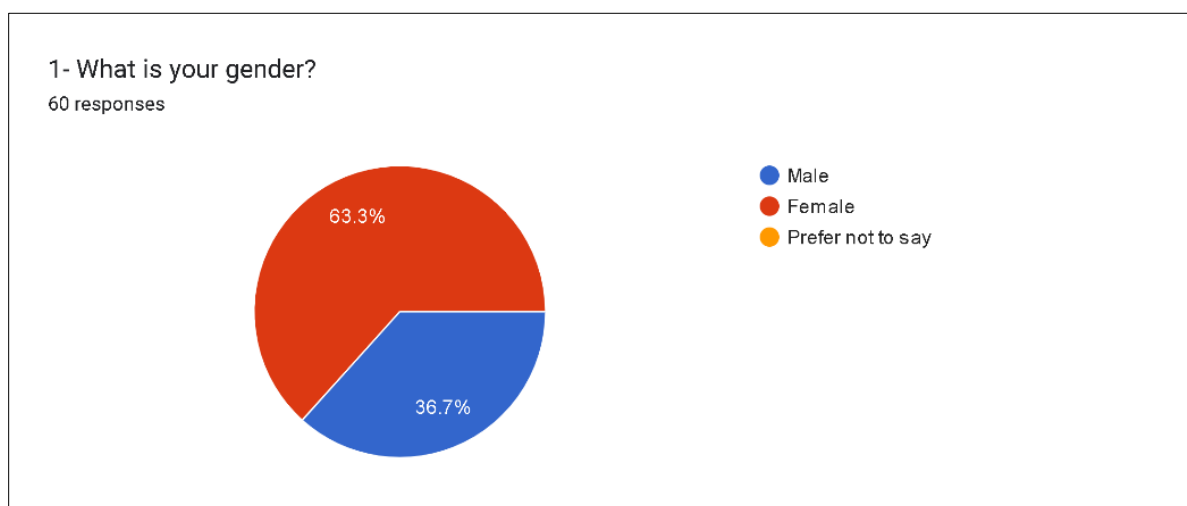


Figure 1. Gender distribution of questionnaire participants.

The second question in the questionnaire addressed the educational background of the participants. As illustrated in Figure 2, the majority of respondents held a vocational or technical diploma (39.3%), followed by those with a

bachelor's degree (29.5%), a master's degree (19.7%), and a high school diploma (8.2%). This distribution demonstrates a diverse range of educational qualifications among the participants, ensuring that the feedback collected for the Eye Care Management System encompasses insights from individuals with varying levels of expertise and professional training.

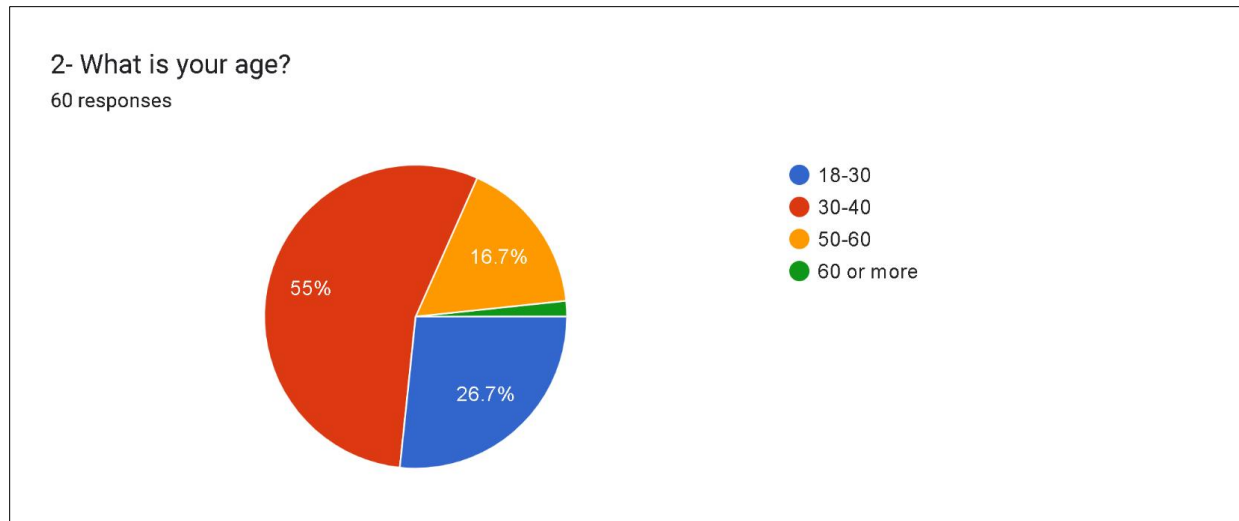


Figure 2. Distribution of participants by educational level in the ECMS questionnaire.

The third question in the questionnaire focused on the current job roles of the participants within the healthcare sector. As shown in Figure 3, the largest proportion of respondents were physicians (44.3%), followed by nurses (24.6%), technicians (21.3%), and administrative staff (9.8%). This distribution highlights that the majority of feedback was obtained from medical professionals directly involved in patient care and clinical operations, ensuring that the system requirements reflect the practical needs of end-users in eye care environments.

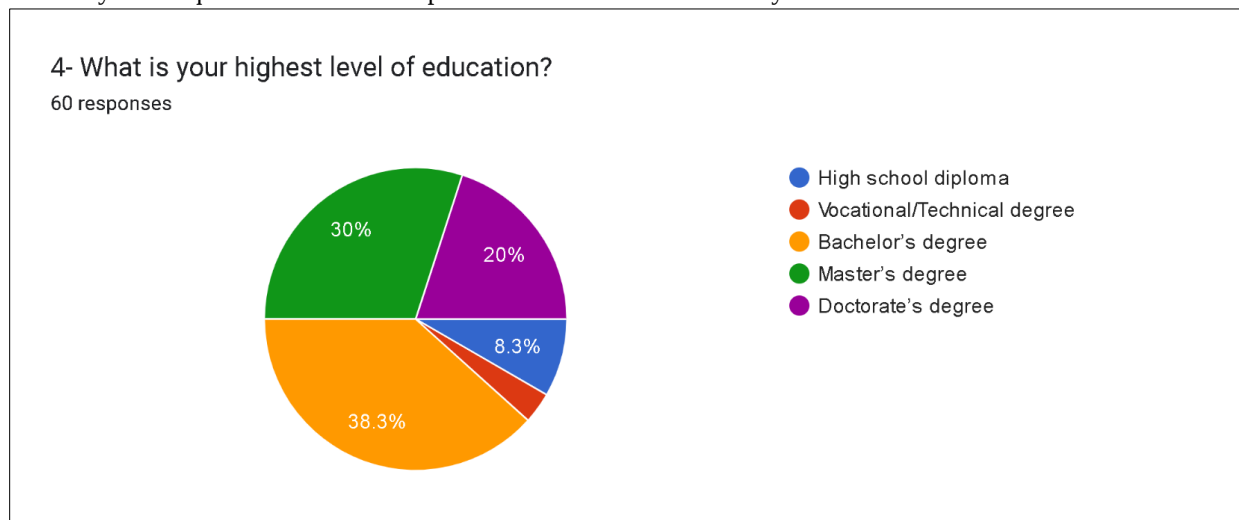


Figure 3. Distribution of participants by current job role in the ECMS questionnaire.

The fourth question explored the type of healthcare institution in which the participants are employed. According to the results presented in Figure 4, most respondents work in government hospitals (47.5%), with others employed in private hospitals (19.7%), health centers (13.1%), and medical research institutions (9.8%). A smaller percentage indicated employment in other types of institutions or as medical students. This variety in institutional backgrounds

provides a comprehensive understanding of the operational contexts in which the Eye Care Management System will be implemented, thereby supporting the development of a system adaptable to different healthcare settings.

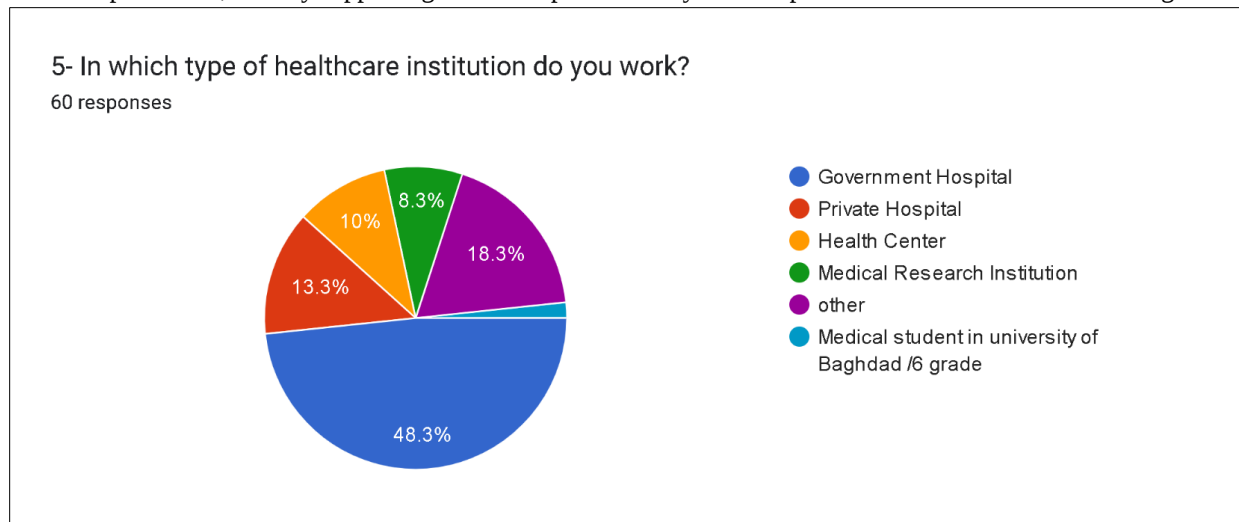


Figure 4. Distribution of participants by type of healthcare institution in the ECMS questionnaire.

The fifth question in the questionnaire examined the participants' years of experience in the medical field. As depicted in Figure 5, the majority of respondents reported having between 5 and 10 years of experience (37.7%), followed by those with less than 5 years (32.8%), 10 to 15 years (19.7%), and more than 15 years (9.8%). This distribution indicates that the sample includes both early-career and highly experienced professionals, which enriches the feedback and ensures that the Eye Care Management System addresses the needs of users with varying levels of expertise.

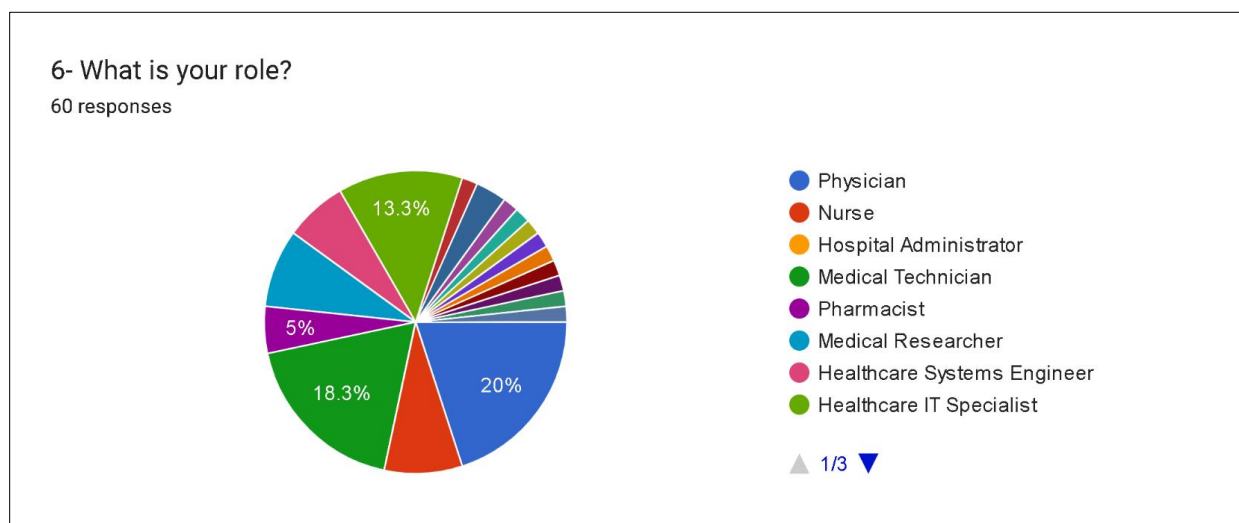


Figure 5. Distribution of participants by years of experience in the medical field.

The sixth question focused on the participants' familiarity with computerized management systems. As shown in Figure 6, a significant proportion of respondents indicated that they have previous experience using such systems (68.9%), while 31.1% reported no prior experience. This finding suggests that most users are already accustomed to digital solutions in healthcare, which may facilitate the adoption and effective utilization of the proposed Eye Care Management System.

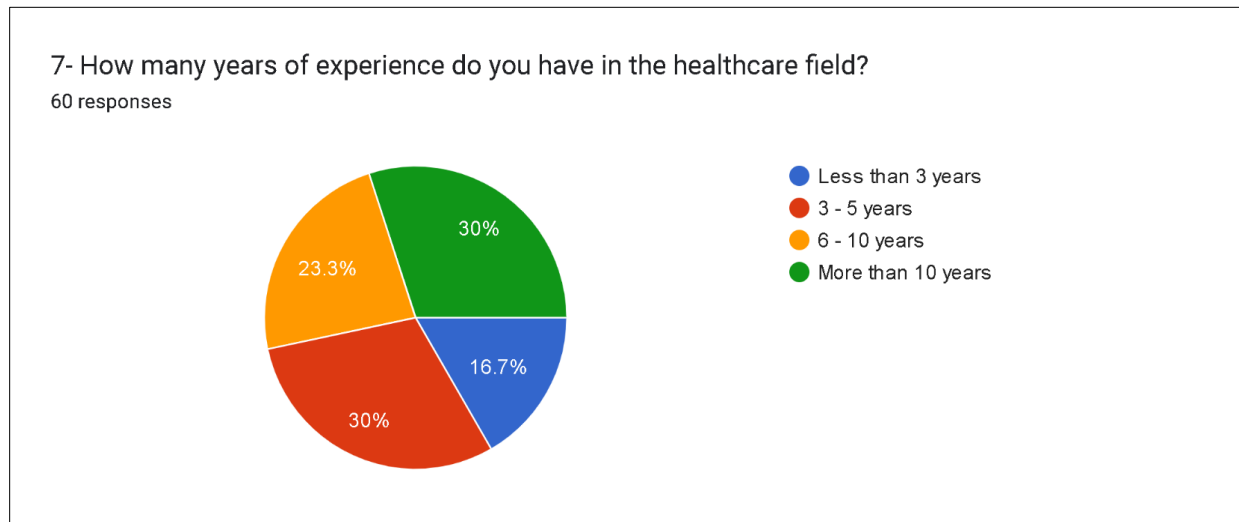


Figure 6. Distribution of participants by familiarity with computerized management systems.

In another question, participants were asked, “How important is it to implement an integrated Eye Care Management System in your institution?” As shown in Figure 7, 62.3% of respondents considered it very important, 27.9% rated it as important, and 9.8% were neutral. These results indicate a strong consensus among healthcare professionals regarding the necessity of adopting a comprehensive and integrated management system to enhance the quality and efficiency of eye care services.

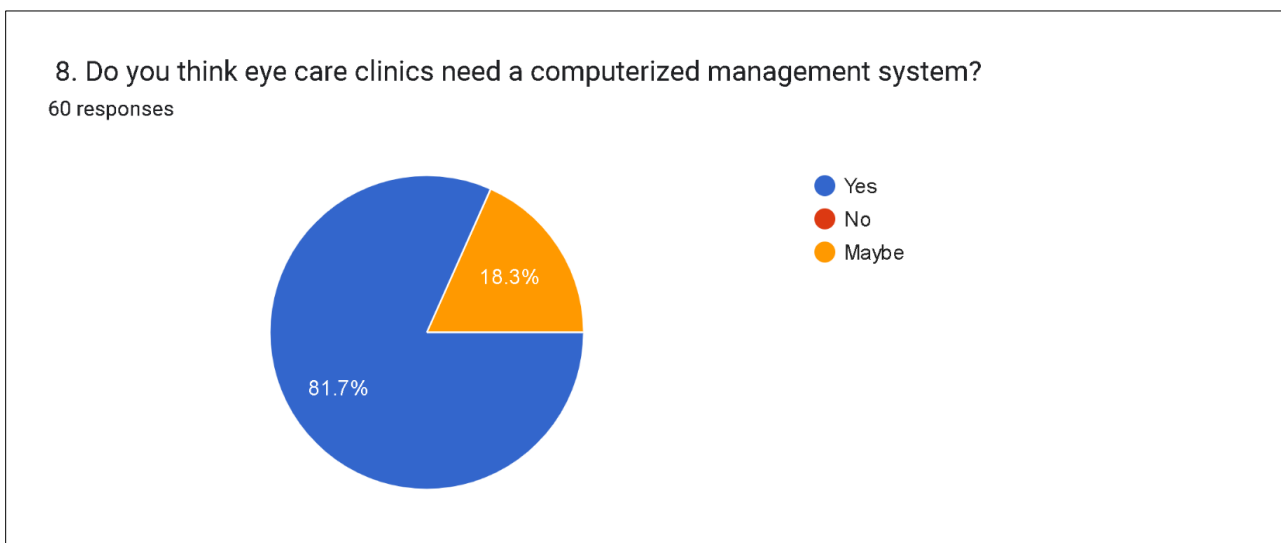


Figure 7. Participants’ opinions on the importance of implementing an integrated Eye Care Management System.

One of the key aspects assessed in the questionnaire was the functional requirements of the Eye Care Management System (ECMS). Participants were asked to indicate how frequently they utilize specific system functionalities in their daily work. Understanding the frequency of use for these core features provides valuable insights into which functions are most critical for end-users and helps prioritize system enhancements and training efforts.

The questionnaire included a question regarding the frequency of using the Eye Care Management System (ECMS) among healthcare professionals. As illustrated in Figure 8, the majority of respondents reported using the system on a daily basis (40%), followed by weekly usage (30%), monthly usage (15%), rarely (10%), and never (5%). This

distribution indicates a high level of engagement with the ECMS in daily clinical practice, reflecting the system's importance and integration into routine healthcare workflows. The presence of users who connected with the system less habitually too highlights the require for a user-friendly interface and comprehensive preparing to guarantee viable utilization over all staff categories.

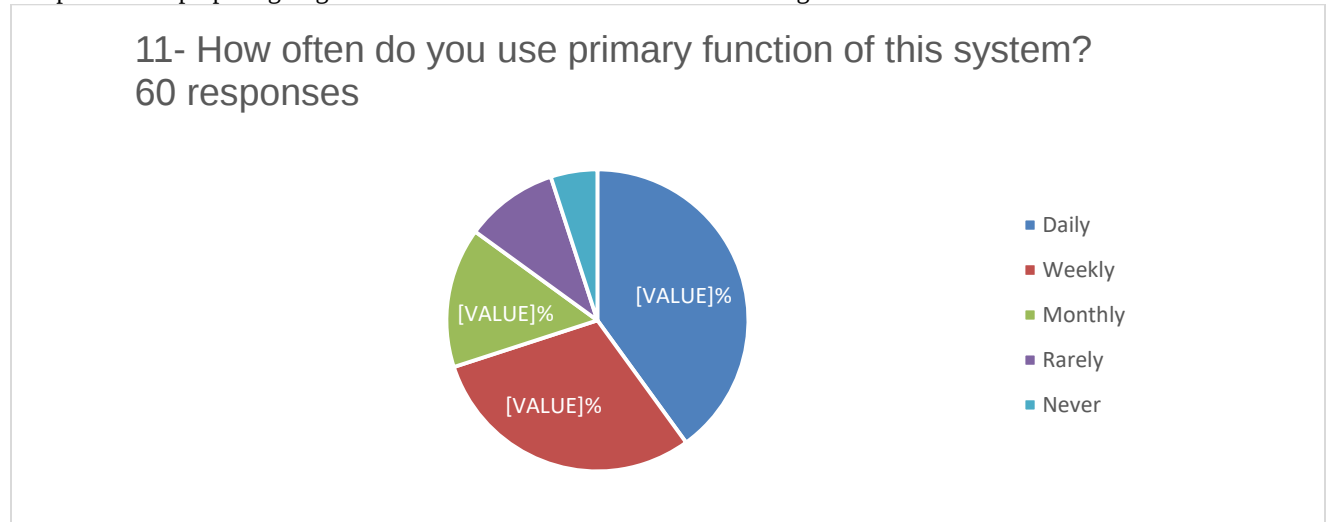


Figure 8. Frequency of ECMS usage among healthcare professionals.

Figure 9 illustrates the participants' responses regarding their ability to generate the necessary reports using the Eye Care Management System (ECMS). According to the data, 25% of users indicated that the system allows them to generate all the reports they need, while 13.3% confirmed it provides most of the required reports. Additionally, 21.7% mentioned they could generate some of the reports, whereas 5% reported being unable to generate the needed reports, and another 5% stated they have not tried to generate reports at all. Furthermore, 20% responded simply with "Yes", and 11.7% responded with "No".

This distribution highlights the diversity of user experiences with the report generation feature within ECMS. While a fair portion of users are able to generate the reports they need, others experience partial or no access, and some have not utilized the feature. This underlines the importance of enhancing system usability and training, ensuring that all users can fully benefit from its reporting capabilities.

11- Does the system allow you to generate the reports you need?
60 responses



Figure 9: Report Generation Capability – User Feedback

Figure 10 presents user satisfaction levels concerning the search functionality within the ECMS. The chart reveals that 25.8% of users are satisfied and 17.7% are very satisfied, indicating that nearly half the users find the search system effective. Conversely, 19.3% and 16.1% of users reported being dissatisfied and very dissatisfied, respectively. The remaining 21.0% expressed a neutral stance.

These results reflect a diverse range of user experiences and underscore the need to further refine the search functionality. Improvements could focus on enhancing speed, accuracy, and user-friendliness to better support clinical tasks and data retrieval operations.

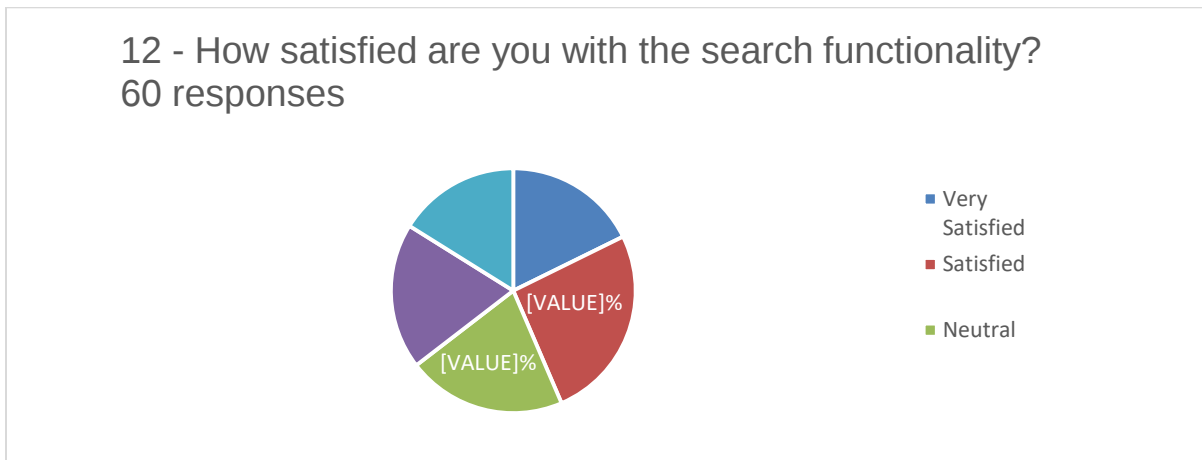


Figure 10. Satisfaction with Search Functionality in ECMS

"This may indicate that while the system is functional, additional customization or training may be necessary to convert neutral responses into positive experiences."

Figure 11 displays user preferences for the platform through which they access the Eye Care Management System (ECMS). According to the survey results:

- 65% of respondents prefer to access the system using both computer and mobile devices.
- 23.3% prefer using a computer only.
- 11.7% prefer accessing the system via mobile devices exclusively.

These findings highlight the growing importance of cross-platform compatibility in healthcare IT systems. The high percentage of users who favor both platforms emphasizes the need for a responsive design that functions equally well on desktops and mobile devices. This would enhance accessibility and ensure that medical staff can interact with the system effectively, regardless of location or device.

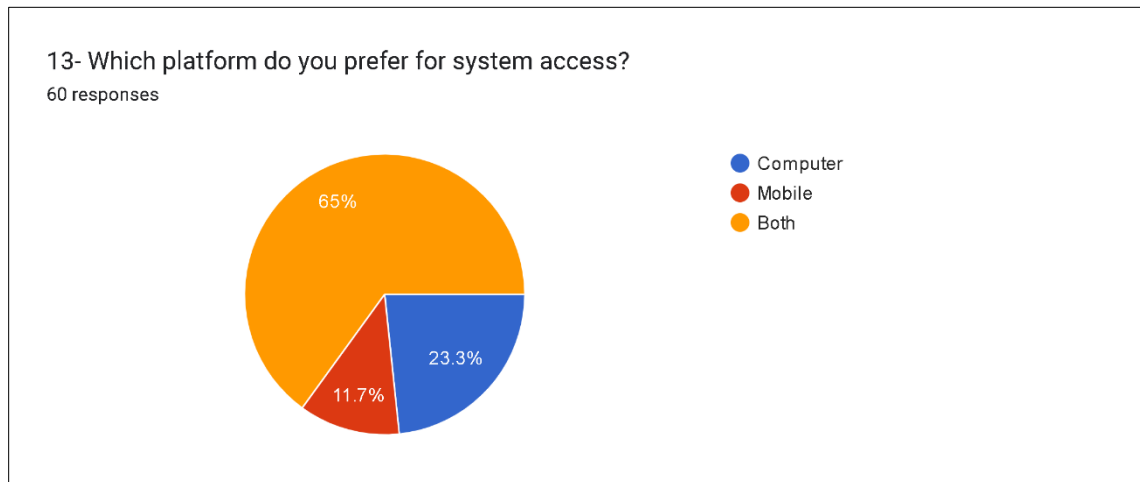


Figure 11. Preferred Platform for System Access

"The high demand for both desktop and mobile access directly influenced the adoption of a responsive UI framework during system development."

Figure 12 highlights the respondents' views regarding the importance of data security and patient privacy within the Eye Care Management System (ECMS). The majority of participants—70%—identified data protection and privacy as very important, while 25% rated it as important. Only a small minority (5%) considered it not important.

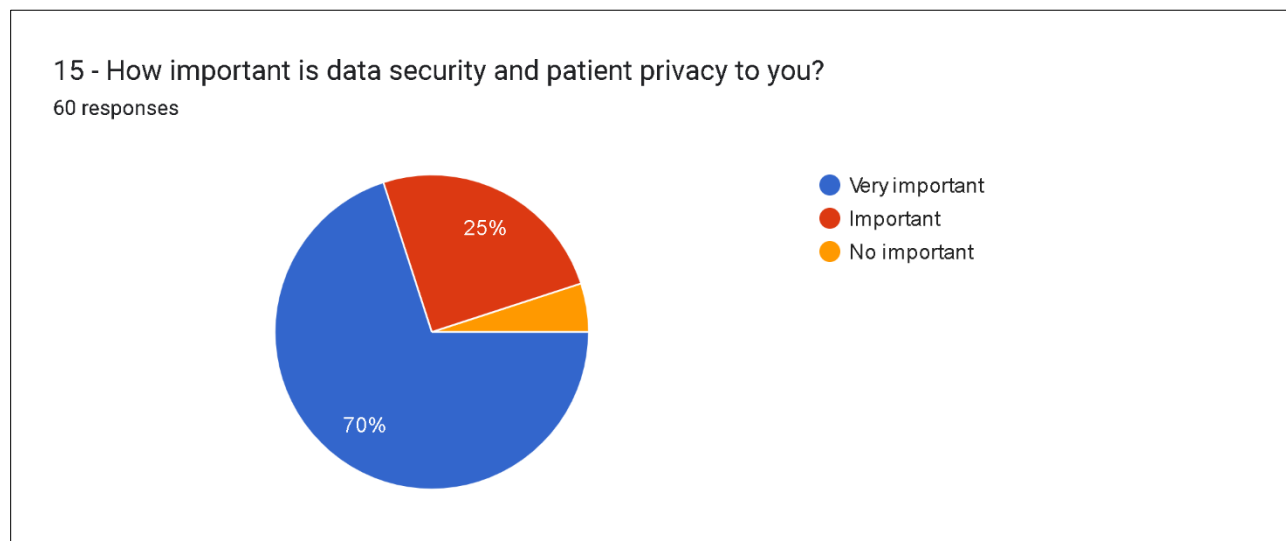


Figure 12. Perceived Importance of Data Security and Patient Privacy

During the survey, participants were asked to evaluate the speed and performance of the Eye Care Management System (ECMS), along with identifying potential barriers to optimal usage. As shown in Figure 13:

- 31.7% rated the system's performance as Excellent, and another 31.7% rated it as Good, indicating that the majority of users found the system to be generally efficient.
- However, a small number of respondents reported Poor (3.3%) or Very Poor (1.7%) performance.
- In terms of challenges, 21.7% cited High Cost as a concern, followed by 18.3% highlighting the Need for Staff Training.
- Other noted limitations included Poor Infrastructure (13.3%) and Resistance to Change (3.3%).

These insights suggest that while the core performance of the ECMS is largely satisfactory to end users, its widespread adoption and optimal utilization may be hindered by institutional and infrastructural barriers. Addressing these aspects—particularly by reducing costs and offering user training—can enhance the overall system effectiveness and user satisfaction.

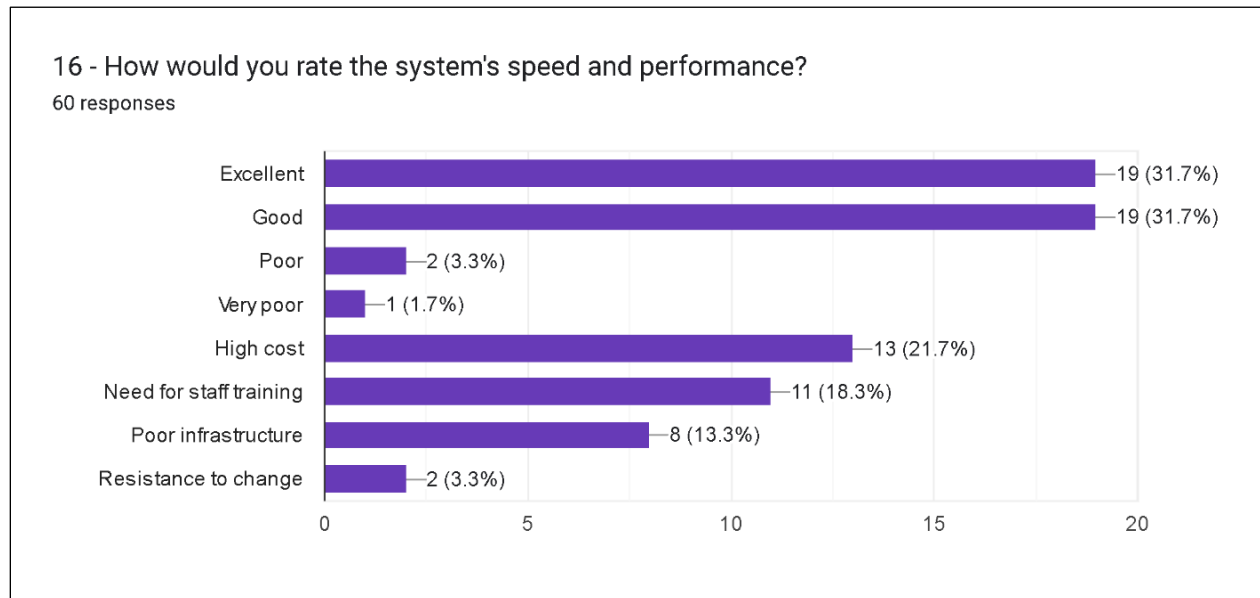


Figure 13. User Evaluation of System Speed and Performance

Figure 14 presents the responses of 41 participants regarding their satisfaction with the user interface (UI) of the Eye Care Management System (ECMS). The results show a mixed but generally positive perception:

- 46.3% of respondents expressed a Neutral opinion.
- 29.3% were Satisfied, and 19.5% reported being Very Satisfied with the interface.
- Only 4.9% of participants expressed dissatisfaction, while no respondents selected "Very Dissatisfied".

These results suggest that while a notable portion of users are pleased with the interface, nearly half remain neutral—possibly due to limited interaction or unfamiliarity. The low dissatisfaction rate indicates that major usability issues are unlikely, but the system could benefit from further enhancements in visual design, responsiveness, or customization features to convert neutral users into satisfied ones.

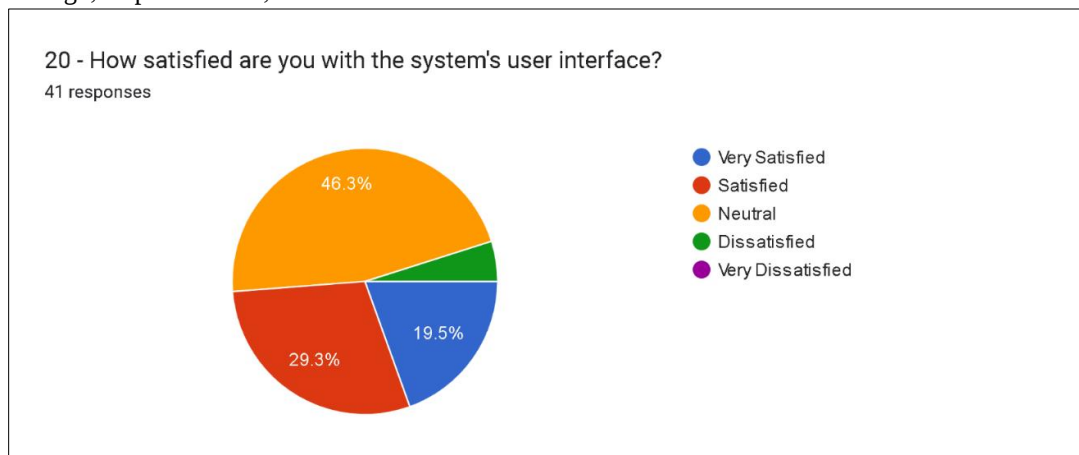


Figure 14. Satisfaction with the System's User Interface

3. RESULTS AND DISCUSSION

A. Demographic Distribution

Essential for building a strong and inclusive Eye Care Management System (ECMS), the demographic data collected from the 60 healthcare professionals who answered the questionnaire expose a well-distributed and varied sample. Male participants accounted for 36.1%; female participants for 63.9% of the sample. This captures the gender patterns usually seen in ophthalmology's clinical and supporting jobs.

39.3% of participants had vocational or technical diplomas; 29.5% had bachelor's degrees; 19.7% had master's degrees; and 8.2% had only high school diplomas. This range guarantees that the acquired needs will satisfy experts with academic background as well as hands-on practitioners.

From a role-based viewpoint, 44.3% of responders were physicians, 24.6% were nurses, 21.3% were technicians, and 9.8% were administrative staff. The prevalence of clinical personnel in the sample reinforces the system's focus on clinical usability and the enhancement of diagnostic workflows.

Institutional backgrounds comprised government hospitals (47.5%), private hospitals (19.7%), health centres (13.1%), and medical research institutes (9.8%). A balanced distribution of experience levels, ranging from less than 5 years (32.8%) to more than 15 years (9.8%), guarantees that the feedback encompasses both novice and expert perspectives.

Table 2 abridges how statistic differing qualities straightforwardly affected the system's plan standards. This incorporates the execution of a rearranged and responsive client interface, secluded dashboards for distinctive parts, and multi-level availability custom fitted to changing degrees of specialized proficiency.

Table 2. Summary of Questionnaire Results and Design Implications

Category	Key Findings	Implications / Suggestions
System Usage Frequency	40% use daily; 30% weekly	Ensure seamless integration with clinical routines
Platform Preference	65% prefer both desktop and mobile	Maintain responsive design across platforms
Report Generation Capability	Only 27.3% can generate all needed reports	Enhance reporting tools and user training
Search Function Satisfaction	43.5% satisfied or very satisfied; 35.4% dissatisfied	Improve search speed and accuracy
Performance and Speed	63.4% rated as Excellent or Good	Address infrastructure and training issues
Data Security Importance	70% rated data security as very important	Maintain strict access control and encryption
UI Satisfaction	48.8% satisfied or very satisfied; 46.3% neutral	Enhance UI customization and visual design

B-System Interface Design and User Experience Evaluation

The Eye Care Management System (ECMS) incorporates a secluded and user-focused web interface custom fitted to suit numerous client parts, counting as directors, doctors, and patients. The interface was made with PHP, HTML,CSS, and JavaScript, ensuring cross-platform availability and usefulness.

Key Interface Components:

- Login Page: Secure verification door with role-based get to control, permitting custom fitted get to for each client gather.

- Administrator Dashboard: Empowers staff administration, report era, and framework checking through an natural and centralized interface.
- Doctor Dashboard: Provides clinicians with direct access to patient records, diagnostic imaging, and automated disease detection results, improving decision-making efficiency.
- Patient Dashboard: Allows patients to register, book appointments, and access their medical history, promoting engagement and transparency.

Figures 15–19 illustrate the interface components and workflow.



Figure 15. Error! No text of specified style in document. Login Page

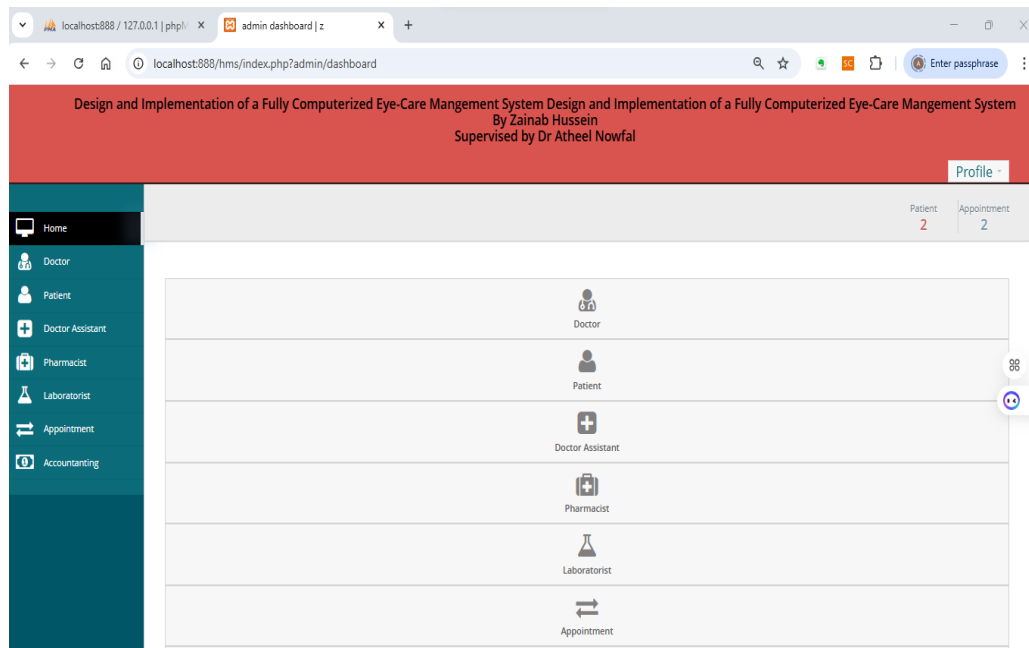


Figure 16. Admin Dashboard Interface

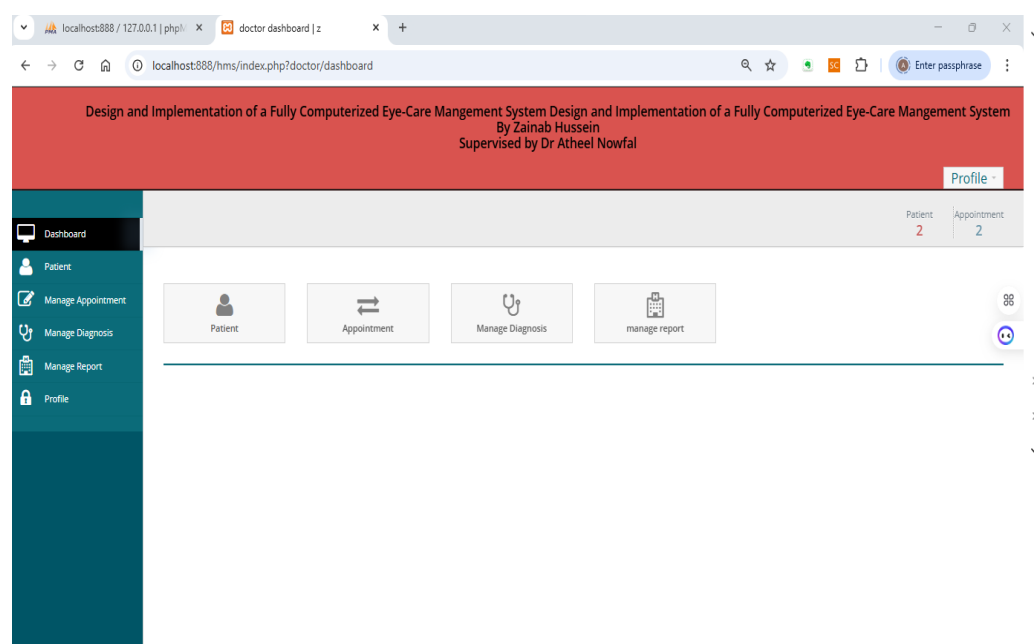


Figure 17. Doctor Dashboard Interface 1

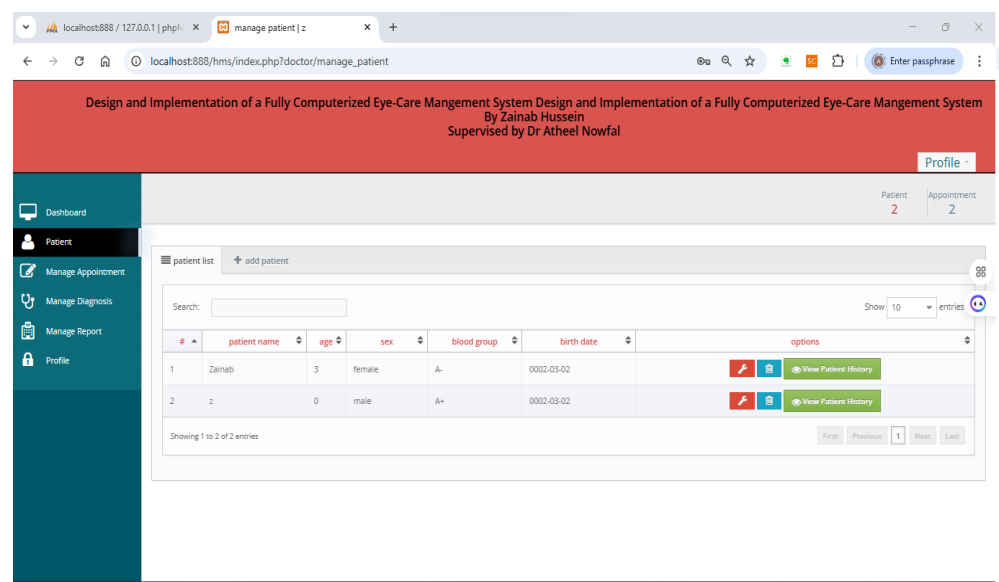


Figure 18. Doctor Dashboard Interface 2

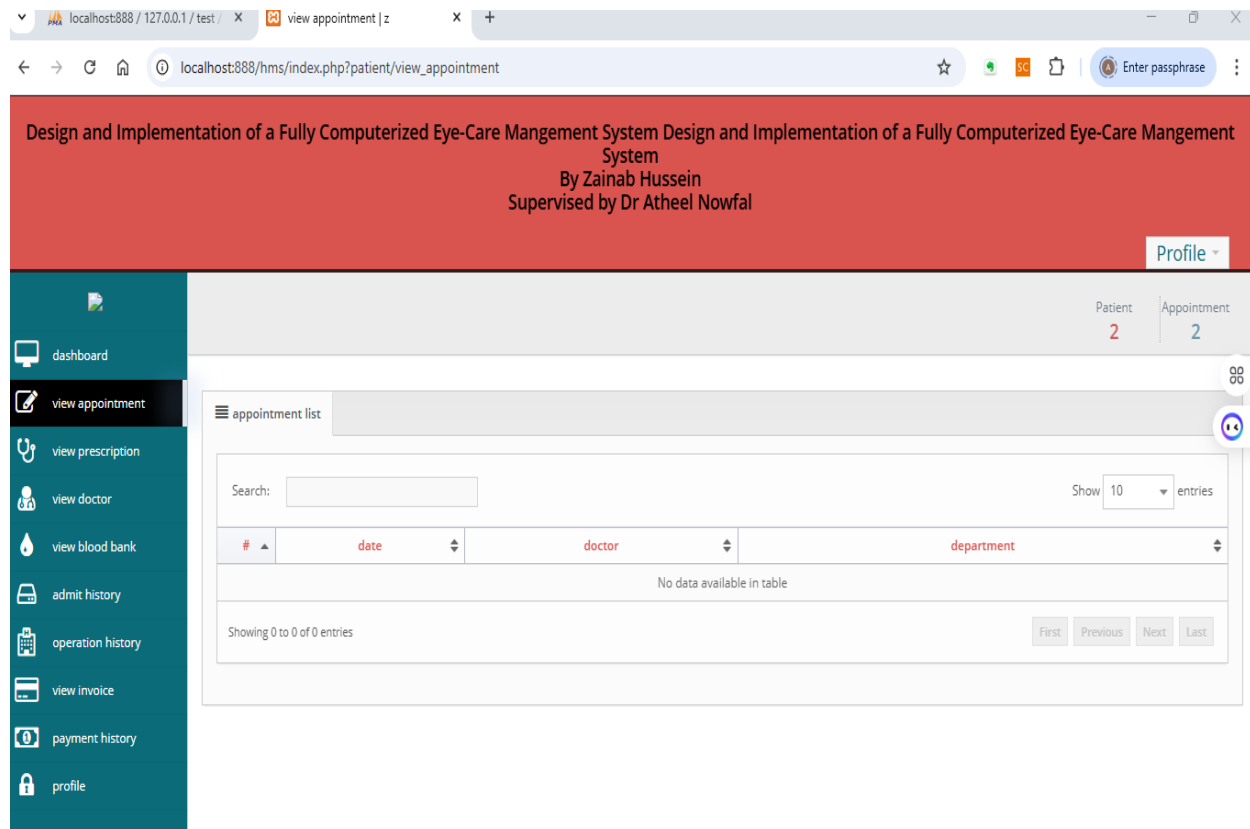


Figure 19. Patient Dashboard Interface

Usability Evaluation:

A board of five subject matter specialists from Ibn Al-Haytham Eye Hospital assessed the system's UI. Their input underscored the clarity of the format, the ease of route, and the consolidation of programmed symptomatic reports. The appraisal gotten an normal score of 9.5 out of 10, implying extraordinary convenience and client fulfillment. The integration of user-friendly interface plan and solid backend capabilities sets up the ECMS as an compelling choice for advanced change in ophthalmic healthcare associations.

The examination of questionnaire comes about shown that user satisfaction with the ECMS is unpredictably connected to interface ease of use, framework responsiveness, and information security. In spite of the fact that the basic functionalities were emphatically recognized, viewpoints like upgraded detailing and productivity enhancement require extra center. These bits of knowledge were pivotal in creating a user-centred plan and will direct ensuing improvement stages, enveloping multi-device integration and improved preparing modules.

4. CONCLUSION

The assessment of the Fully Computerized Eye-Care Clinic Management System (ECHMS) affirmed that specialized execution alone isn't adequate for selection; or maybe, client engagement and fulfillment are similarly crucial.

This consider extraordinarily illustrates how organized input from 60 restorative experts, counting doctors and specialists, was interpreted into concrete interface plan and system usefulness changes. Key user requirements such as stage responsiveness, security, and clarity of report generation were specifically incorporated into the ultimate framework. For occasion, over 70% of respondents emphasized

the significance of information security, while more than 48% expressed satisfaction with the interface design. These insights led to the integration of robust authentication mechanisms, modular dashboards, and simplified workflows.

The system not only fulfills core operational needs but also contributes to reducing administrative overhead, enhancing diagnostic accuracy, and supporting better patient outcomes. By addressing real-world constraints and clinical expectations, this work sets a foundation for scalable, user-informed digital transformation in ophthalmology.

Future directions will include the integration of telemedicine features, support for multi-disease detection, and dynamic analytics dashboards for patient monitoring.

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REFERENCES

- [1] W. H. Organization, *INSPIRE handbook: Action for implementing the seven strategies for ending violence against children*. World Health Organization, 2019.
- [2] J. Wenn, "Hospital information systems: a nursing viewpoint: a thesis presented in partial fulfilment of the requirements for the degree of Master of Arts in Nursing Studies at Massey University," Massey University, 1983.
- [3] P. Alexopoulos, C. Madu, G. Wollstein, and J. S. Schuman, "The development and clinical application of innovative optical ophthalmic imaging techniques," *Frontiers in medicine*, vol. 9, p. 891369, 2022.
- [4] H. A. Ali, N. Goga, C. V. Marian, and L. A. Ali, "An investigation of mind-controlled prosthetic arm intelligent system," in *The International Scientific Conference eLearning and Software for Education*, 2020, vol. 2: "Carol I" National Defence University, pp. 17-26.
- [5] A. Bastawrous *et al.*, "Clinical validation of a smartphone-based adapter for optic disc imaging in Kenya," *JAMA ophthalmology*, vol. 134, no. 2, pp. 151-158, 2016.
- [6] M. C. Lim *et al.*, "Adoption of electronic health records and perceptions of financial and clinical outcomes among ophthalmologists in the United States," *JAMA ophthalmology*, vol. 136, no. 2, pp. 164-170, 2018.
- [7] D. S. Kermany *et al.*, "Identifying medical diagnoses and treatable diseases by image-based deep learning," *cell*, vol. 172, no. 5, pp. 1122-1131. e9, 2018.
- [8] D. S. W. Ting *et al.*, "Artificial intelligence and deep learning in ophthalmology," *British Journal of Ophthalmology*, vol. 103, no. 2, pp. 167-175, 2019.
- [9] R. Naemi, M. Akbarian, M. Ebrahimi, L. Shahmoradi, B. Masoomian, and S. Rezayi, "Design and evaluation of a web-based electronic health record for amblyopia," *Frontiers in Medicine*, vol. 11, p. 1322821, 2024.

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