

Medication Alert Mobile App

Rakesh Kumavat¹, Aparna Autade², Snehal Abuj³, Bhosale Palak⁴

¹ Professor, Dept. Cloud computing and big data & P.Dr.V.V.P. Institute of Technology and Engineering, Loni,

Maharashtra, India

^{2,3,4} Final year Diploma Student, Dept. Cloud computing and big data & P.Dr.V.V.P. Institute of Technology and Engineering, Loni, Maharashtra, India

Abstract - These days, therapy isn't as fundamental to comprehensive health care as self-care. When it comes to health-related therapy, pharmaceutical therapy is a powerful tool, particularly in the field of medication. Medication administration errors cause a variety of issues and annually cost billions of dollars. In order to help patients reduce the occurrence of medication errors, we created a local medication reminder software called "Medication Alert app" that is compatible with mobile phones. Methods: We divided our mixed-methods study into three distinct stages: 1) built an object-oriented model; 2) researched and compared existing mobile applications; 3) Created the first iteration of the "Medication alert" system. Appropriate medication administration, including timing and dosages, is the goal of this app, which features feature such as patient and pharmaceutical data recording, medication scheduling, progress reporting on medication administration, and appointment taking.

Key Words: SQL Lite Lite, Codename one, Google map, Medication Alert

1.INTRODUCTION

After they have been discharged from the hospital, it is essential to make certain that patients continue to take their prescribed medications as directed. Additionally, this will improve the quality of life of patients while simultaneously lowering the rates of hospitalization and mortality. One factor that contributes to medical errors is patients who do not follow the instructions given to them by their physicians. Inpatient admissions that are the result of pharmaceutical errors make up five percent of the total number of hospital admissions. It is estimated that the vast majority of patient errors are caused by misunderstandings of doctor orders and perplexity regarding the administration of medication. In outpatient care, there is a greater emphasis placed on improving the safety of

pharmacological therapy due to the extensive range of drugs that are available by prescription. Patients' failure to adhere to the recommendations of their physicians is the most significant problem facing the healthcare system. The failure of patients to take their prescriptions as directed accounts for between 33 and 69 percent of all hospitalizations and 23 percent of all nursing care visits in the United States. Approximately one hundred billion dollars is allocated to it by the health system. There are a number of factors that might influence this percentage, including the kind of condition, the interactions between medications, and the quality of the patient's non-adherence schedule. On average, pharmaceutical non-adherence in chronic diseases is approximately fifty percent. Intentional and accidental medication non-adherence can occur for a variety of reasons, such as: forgetting to take the medication (due to factors like amnesia or dizziness), administering the wrong dose, dealing with complicated medications (due to polypharmacy), not having enough information to correctly administer the medication, administering it at the wrong time, using the wrong tools for medication administration (like inhalation medications), not having enough self-confidence to manage the disease, not being aware of the disease condition, problems caused by re-consumption of inappropriate medication, and a lack of relationship between the patient and healthcare provider. It is possible for individuals to experience a variety of unfavorable results if they do not take their medication as directed. These include a decrease in the effectiveness of treatment, an increase in the utilization of healthcare resources, a decrease in quality of life, disability, and even death; a lack of disease control; and weak clinical outcomes such as the development of diseases that might have been avoided and the adverse effects of medicine. In light of this, patients are able to more effectively control the administration of their medications through the utilization of information technology solutions, which in turn lower the number of medication errors. Within communities that

have limited access to medical resources, the World Health Organization (WHO) promotes the utilization of cutting-edge medical technology. Mobile health systems are a relatively new subject that has evolved in response to the growing availability of high-powered computing devices and applications. These systems offer a number of benefits, including user-friendliness, convenience, efficiency, and cost savings. There is a significant impact that smartphones have on the health outcomes of people living in developing countries. In order to improve the effectiveness and efficiency of health care procedures, smart phones provide the possibility of lowering costs while simultaneously improving the quality of the services provided. The technological capabilities of cellphones are being rapidly advanced by the healthcare system. Smartphones and personal digital assistants (PDAs) have a combined total of ten billion users across the globe. There is a mobile phone available to almost every person on the planet and in every individual community. The availability of clinical decision support systems and the ease with which they can be utilized are two factors that have contributed to their widespread adoption. There is a great deal of potential for the technology of cellphones to assist in improving the results of drug adherence within the healthcare system. This technology raises patients' consciousness, improves the efficacy of treatment, inspires patients to change their behavior, and boosts the participation of healthcare personnel. All of these benefits are achieved in the context of limited resources. The utilization of cellphones is an innovative approach that can be utilized to improve medication adherence and promote patient education. This duty can be fulfilled by developing and distributing specific mobile applications that are easily accessible to consumers and can be downloaded and utilized by them. Therefore, "Seeb," a mobile application that serves as a localized medication reminder, was developed in accordance with the opinions of specialists (such as pharmacists and health information technologists) in order to serve as a clinical decision support system that assists outpatients in making accurate decisions regarding the timing and dosage of their medication. For the purpose of preventing errors in the administration of medications, adverse effects, and the annual loss of billions of dollars in expenditures, this system has been developed.

[1] Qun Xie et al. constructed the needs of traditional Chinese medicine's global expansion in the "Internet + TCM" paradigm are perfectly met by the TCM mobile health platform. The platform's design and implementation may address the challenges of TCM's

communication and application throughout internationalization development; it's a fresh approach and an essential endeavor for TCM to expand globally. With the Internet as its foundation, TCM's influence will grow exponentially in the global community. This is particularly true when considering TCM's special benefits in the treatment and prevention of both chronic and non-chronic diseases. As a result, more and more people will become aware of TCM, and it will be easier for it to reach its aim of international development.

[2] Maria Elanne M. Rodrigues et al. aimed to Assess the initial encounter with health-related mobile apps developed for individuals with a diabetes diagnosis. Finding diabetes-related apps in the Google Play Store and looking through scholarly articles were the first steps of the investigation. Following this pilot study, researchers tested diabetic users to learn about their experiences with the technology and its pros and cons in relation to their everyday life, particularly with regard to monitoring and analyzing blood glucose levels. This research uncovered the most significant ways in which diabetes interferes with people's regular lives. Ten participants with diabetes type 1 and type 2 participated in the study remotely. For the participants, using the apps was a novel approach to making their everyday lives easier and faster. The evaluated apps were helpful to users and could supplement more conventional ways of monitoring and assessing blood glucose levels. The researchers intend to expand the number of participants in future evaluation tests and include additional current applications. In future studies, they intend to cover a broader range of ages not included in this one. The findings will also help shape a brand-new app that incorporates capabilities like gamification and sensor data usage that were missing from the previous apps we looked at.

[3] Keqiang Shi et al. proposed function structure diagram and database design of Figure 10: settings interface are introduced in this study, along with a design and implementation method for an elderly medicine support system that is based on the WeChat applet. The WeChat applet-based pharmaceutical support system for the elderly, describes each function module in detail, shows the interface for each function, and implements the system using the WeChat applet development tool.

An examination of earlier research that was deemed a Literature Survey is presented in the second part of this publication. Section 3 provides a comprehensive description of the proposed methodology, outlining the path of action. The experimental evaluation is covered in Part 4, possible modifications are discussed in Section 5,

and the essay concludes with a conclusion on the existing plan.

2. LITERATURE SURVEY

[4] Xiao Shao et al. studied invigorate the area of intelligent medication management systems with fresh ideas for future studies. Additional aspects of safety evaluation indicators, such as financial gain and patient happiness, can be investigated in future studies. The development of increasingly advanced machine learning models allows for the prediction and prevention of drug-related adverse events with greater accuracy.

[5] Jinmei Shi et al. solved the problems of medication errors and forgotten doses among the elderly, we developed a smart drug aid device that can be remotely monitored and uses voice reminders to ensure proper medication administration. These pill boxes may communicate with caregivers and the Internet of Things to ensure that elders take their meds as prescribed and to provide this information in a timely manner. Benefits of modular design, robust stability, and easy maintenance are also present in the design. As a future companion to smart homes and pensions, we anticipate that smart medicine boxes will make people's lives easier.

[6] Hossein Poorcheraghi et al. proposed that study will help identify the best policies to implement in order to achieve the health care system's fundamental goal of preventing costs from rising and reducing the economic burden on individuals and communities. Policymakers can use this study's findings to improve the quality of life and welfare of older adults and society as a whole by increasing the elderly's familiarity with new technologies so that they can effectively manage their health conditions and improve medication adherence, which reduces adverse events (re-hospitalization being the most significant of these). People with chronic diseases have less control over their condition and are more likely to experience adverse outcomes when they use health mobile applications developed with their specific needs and abilities in mind.

[7] Nam V. Nguyen et al. applied methodology The software engineers working on this project have built the Smart Pill Box system to perfection, fulfilling all the functional criteria for individual use in different company functions. By reliably and efficiently handling the anticipated demand, the system proved to have strong security and performance at the individual level. The system's shortcomings in managing heavy traffic were apparent when the utilization levels were increased, like in hospital settings. Implementing Ngrok Edge cloud endpoints for load balancing and Redis caching for

performance optimization are two of the practical solutions that the team has suggested in response to these difficulties. To make sure the system can handle bigger and more demanding contexts reliably and scalably, these suggestions lay out a clear course for future upgrades.

[8] Christa E. Hartch et al. studied to discovered that patients with chronic illnesses who are medically underserved and seeking treatment at FQHCs can benefit from a medication adherence app. One possible mediator of the effect mechanism is self-efficacy (Bandura, 2004). Medication adherence applications might benefit from rethinking their social support features in light of the low adoption rate of such features. With the increasing number of smartphone owners and users in this demographic, FQHC clinical settings can greatly benefit from this easy-to-use technology that can help patients stick to their medication schedule. With over 30 million patients seen each year by community health centers (National Association of Community Health Centers, 2022), this medication adherence app has the potential to greatly improve the health of medically underserved individuals living with chronic illnesses in the United States.

[9] Hangxing Huang et al. summarized, Intelligently generating and sending medication reminders, the medication reminder system also detects drug interactions and adverse reactions, offers clinical pharmacy services in hospitals, monitors patients at bedside, and can be used for remote monitoring even when patients are not in the hospital.

[10] Jia Zhou et al. proposed this the first randomized controlled trial to examine the efficacy of a digital medication system that integrates a pill tracker with an app for patients living in the community who have SMD in terms of medication adherence. In addition to storing medications and providing voice reminders, the technology also notifies caregivers and healthcare staff in real-time using an integrated app. The protocol for assessing complicated interventions³⁴ was followed by the study. From a variety of stakeholders, we gathered feasibility assessments that included acceptance, recommendation likelihood, and overall satisfaction. Medication adherence was assessed using both objective data from digital medication monitors and patient-reported data. Both the intervention and the technique for implementing it were tested using a pragmatic approach. The study validated the intervention's viability by incorporating it into the preexisting responsibilities of healthcare professionals.

[11] Maha Slit et al. presented a multi-sensor network for forest monitoring that combines fiber Bragg

grating (FBG) sensors with unmanned aerial vehicle (UAV)-mounted diffraction spectroscopy. The design provides a supplementary view of tree physiology not possible with either ground-based or remote sensing alone by integrating canopy-level reflectance with in-stem strain and temperature proxies. By combining data from UAVs and FBGs, more precise and earlier georeferenced stress maps are created, which in turn allow for more targeted management activities like precise irrigation, insect treatment, and selective thinning prior to the appearance of apparent symptoms. Embedded FBG arrays guarantee continual, passive, multiplexed sensing at the tree level, and UAV platforms offer fast, on-demand coverage over diverse terrain. The simulation results—which account for both atmospheric and diurnal variability—verify that the pipeline meets all of the demanding requirements for accuracy and reliability. We use on-board event markers (e.g., shutter/gimbal flashes) to anchor timelines, periodic beaconing for clock co-training, and GNSS-disciplined clocks with 1 PPS tagging when available to synchronize the moving UAV spectrometer with the stationary FBG interrogators, which is a major practical bottleneck. It is possible to achieve an inter-stream skew of ≤ 0.5 -1 s by using drift estimation and cross-correlation to re-align streams post hoc during connection outages or GNSS-denied regions, after packets have been buffered. Uncertain timestamps cause inflated per stream variances, which the fusion layer takes into account by downweighting misaligned samples in its estimator. Handling climatic fluctuation and canopy occlusion are additional requirements for robust deployment beyond synchronization.

[12] SUGI CHOI et al. proposed enhancing the performance of wildfire detection by strengthening the Mask-RCNN model with the Swin Transformer as its backbone network. Traditional wildfire detection systems frequently failed to distinguish between fire and non-fire occurrences; this model overcame this problem by including non-fire categories including clouds, mist, and chimney smoke. The findings proved that the Swin Transformer was far better at identifying fires and non-fires alike.

[13] Giacomo Albamonte et al. To identified the best model for forest/non-forest classification, a battery of ML tests were run. In this testing and evaluation process, we used both classic ML methods and DL approaches. In terms of performance, the FPN model that took vegetation indices into account performed the best, with an IoU of 89.36%. A bespoke ontology called SORSOntology was created to systematically arrange entities and interactions across several domains, which

significantly enhanced the capabilities of the framework. With SORSOntology, a single knowledge base that is built by merging and expanding current ontologies, semantically structured information may be accessed seamlessly. By utilizing SPARQL queries, reasoning, and competency questions (CQs) that mirror important analytical tasks, the ontology was validated through task-based evaluation.

[14] Shakti Kundu et al. proposed that environmental sustainability efforts can benefit from the LangChain Agent-enabled YOLOv8 model's ability to identify abnormalities associated with deforestation in forest settings. Deforestation signs such as tree stumps, trunks, machinery, and human presence can be effectively identified using this approach, which combines the autonomous decision-making capability of LangChain Agent with the robust object identification framework of the YOLOv8 model. Because of its excellent backdrop detection capability, the algorithm can effectively manage vast swaths of wooded land. However, further improvement is required to offer consistent identification under diverse environmental conditions, as the model fails to recognize smaller, less distinctive objects. Throughout many epochs, the model's training results showed promising tendencies toward reducing significant loss measures as train/box_loss, train/cls_loss, and train/df_loss decreased consistently.

[15] Cristian Vidal-Silva et al. introduced brand new, comprehensive Chilean wildfire dataset built from official CONAF ground-reported records spanning 1985–2024. The dataset also allows for analysis that are unique to climate zones. To compare wildfire patterns worldwide with those in Mediterranean-type climates, one can look at towns in Chile's Mediterranean zone. This paves the way for the possibility of transnational policy assessment and comparative modeling in areas that are prone to fires. This dataset is perfect for sophisticated fire modeling and risk assessment studies because it has been through extensive data cleaning, validation, and standardization procedures to ensure its completeness and trustworthiness.

3. METHODOLOGY



Fig 1: Overview Diagram

The purpose of the Medications App is to facilitate better doctor-patient communication and service delivery. You can schedule appointments, keep tabs on prescriptions, and access your medical history with the help of its two user roles, Doctor and Patient. Doctors and patients can communicate more easily with this app. Two separate user roles are available: Both the doctor and the patient have unique roles to play.

Step1: Doctor Registration: As a preliminary step, interested medical professionals must create an account within the app. In order to complete this extensive registration process, you will need to provide certain details such as your full name, mobile phone number, medical registration number, medical specialties, full address, and exact location utilizing the built-in Google Maps functionalities. Patients can find the doctor's office with ease thanks to this location data. The doctor will be able to access the application's functionalities once they have successfully registered. Doctors can access their profiles, patient lists, service histories, and notifications on the dashboard.

Doctors can keep their registration information up-to-date and manageable in the Manage Profile area. This involves updating their address, phone number, and any other pertinent data. This keeps the doctor's profile up-to-date and correct.

Newly registered patients who have sought consultations or appointments can be seen in detail by doctors using the Patient List feature. Name, contact info, medical history (if supplied), and appointment request reason are all included in this list of patients' specific information. By doing so, doctors may swiftly determine which patients require more urgent attention and schedule appointments appropriately.

The Service History section provides clinicians with a comprehensive record of all previous patient appointments and visits. All pertinent information from prior appointments, including dates, times, diagnoses, and treatments, should be included in this history. Better patient care and the ability to monitor therapy efficacy over time are both made possible by such meticulous record-keeping. Updates on new patient registrations, appointment requests, and other significant app changes are communicated to clinicians through the Notifications area.

Step 2: Patient Registration: Patients are also need to register with their doctors and provide extensive personal information in order to obtain an account. Their whole name, cell phone number, residence, DOB, and medical history are all part of this. Patients can use the app to find doctors and schedule appointments after they've registered and logged in. By using filters such as specialty, geography, and more, patients may narrow their search for doctors to those that best meet their individual needs. Patients can begin the process of scheduling an appointment with a doctor after they find one they like. This includes giving a short account of their symptoms, like a runny nose, cough, or fever. Before the consultation, the doctor can better comprehend the patient's situation with this preliminary information. After the patient submits their appointment request, the system verifies the booking and gives them the doctor's contact information, including their address and location, which are taken from their registration record.

Step 3: Appointment and Prescription Management: In the event that the doctor receives a new appointment request, the application will notify them. The doctor writes a unique prescription taking into account the patient's symptoms as well as their medical history, if any. The prescription comes with specific directions for how often to take the medication, how much to take, and when to take it (before or after meals). The patient receives their prescription via the application when it is electronically transmitted.

The patient can then use the app to set up medication schedule reminders. The patient is reminded to take their prescription as prescribed by the system, which generates timely warnings. To make sure patients take their prescription as prescribed, these alerts are customized to the exact timing instructions given by the doctor. Patients are more likely to take their medications as prescribed with the help of this integrated medication

reminder system, which improves their health. Efficient healthcare delivery is made possible by the application's simplification of doctor-patient communication and data interchange.

The Medications App unifies doctor-patient communication, prescription delivery, and medication reminders into one seamless digital healthcare system. By facilitating better adherence and efficient medical support, this not only improves the quality of care but also guarantees that patients receive treatment promptly, leading to better health outcomes.

4. RESULTS AND DISCUSSIONS

The proposed method makes use of the Java programming language and the NetBeans integrated development environment (IDE) to construct a reliable Medication Alert Mobile App. Windows, an Intel Core i5 CPU, 8 GB of RAM, and 500 GB of internal capacity are the features of the developer laptop. When it comes to managing databases, SQL Lite is in charge. Over a wide range of operating situations, the effectiveness of the suggested method has been evaluated comprehensively. What follows is a description of the findings from the experiment.

Scalability Analysis of Database Transactions

Estimating the scalability of data processing is done using the proposed approach for Medication Alert. The deployment of the Medication Alert Mobile App, which requires three separate logins and stores other organization-related data on the platform, is the subject of intense research. The density of the documented and exhibited database transactions is displayed in Table 1.

S. No	No. of Database Transactions	Time Taken (in Seconds)
1	256	0.48
2	541	0.95
3	801	1.62
4	965	1.88
5	1299	2.05

Table 1: Medication Alert Transaction Time Estimation Table

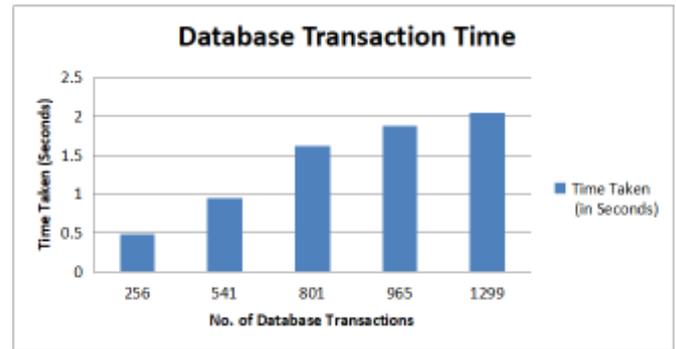


Figure 2: Medication Alert Transactions

Next, the data in the tables is used to create the graph in Figure 2. The connection between the many actions and the time needed to finish them on the SQL Lite Database may be seen clearly in the visual representation. To guarantee efficient data storage and management for the organization, this study's findings enhance understanding of the technology and usage of the SQL Lite Database. Database operations are executed at a rate that is clearly disproportionate to the time needed to finish them. This verifies the proper utilization of the SQL Lite storage mechanism. The data contributed to a better understanding of the Medication Alert Mobile App enhanced durability.

3. CONCLUSIONS

The development of mobile applications for health services, particularly self-care, can achieve the intended community effect because of the tremendous increase in the use of smart phones and mobile applications in recent years. Even if there are a lot of medicine reminder apps out there, nothing beats a native software made with the input of experts in the area. In addition to serving as a gentle reminder to take medications at the prescribed times, the "Medication alert app" also provides analysis of the patient's medication administration and, where appropriate, displays an image of the medication along with instructions on how to take it. By include these features in the medication reminder app, people are less likely to make mistakes when taking their medications and are more likely to take them as prescribed. With its user-friendly interfaces, data processing, accurate formula calculations and appropriate responses, display of medication pictures and descriptions, and suitable reminders of medication administration, the "Medication Alert app" can undeniably play a significant role in improving patient health. As a result, we propose that doctors raise patients' knowledge of the need of medication reminders and provide them with mobile apps that can help them remember to take their medications as

prescribed and reduce the likelihood of medication mistakes.

In the future, the Medication Alert App can be enhanced by integrating artificial intelligence to provide personalized medication schedules based on patient health conditions and adherence patterns. Connectivity with wearable devices and IoT-enabled health sensors can allow real-time monitoring of vital signs and medication effects. The application can be extended to support direct integration with electronic health records (EHR) and hospital management systems for seamless doctor-patient communication. Cloud-based analytics can be used to track long-term adherence trends and generate health insights for clinicians. Additionally, multilingual support and voice-based reminders can improve accessibility and usability for elderly and differently abled users.

REFERENCES

- [1] Xie, Q., & Song, B. (2022). Internationalization of TCM and Mobile Health Application under the Mode of "Internet + TCM". In BIC 2022: Proceedings of the 2022 2nd International Conference on Bioinformatics and Intelligent Computing (pp. 92–97). Association for Computing Machinery. <https://doi.org/10.1145/3523286.3524523>.
- [2] M. E. M. Rodrigues et al., "Medication time? A User Experience Evaluation of Mobile Applications targeting People with Diabetes," in WebMedia '22: Proceedings of the Brazilian Symposium on Multimedia and the Web, Curitiba, Brazil, Nov. 7–11, 2022, pp. 258–266. doi: 10.1145/3539637.3558045.
- [3] K. Shi, B. Li, and P. Jiang, "Design and Implementation of an Elderly Medication Assistance System Based on WeChat Mini Program," in PCCNT '23: Proceedings of the 2023 International Conference on Power, Communication, Computing and Networking Technologies, Wuhan, China, Sept. 24–25, 2023, pp. 1–5 [Online]. doi: 10.1145/3630138.3630553.
- [4] X. Shao and D. Lv, "Research on Drug Safety Assessment of Intelligent Drug Management System Based on Computer Technology," in ICEITSA '23: Proceedings of the 3rd International Conference on Electronic Information Technology and Smart Agriculture, Sanya, China, Dec. 8–10, 2023, pp. 627–631. doi: 10.1145/3641343.3641430.
- [5] J. Shi, Z. Lei, J. Cai, and M. Xu, "An intelligent medication aid system developed by Arduino," in EITCE '23: Proceedings of the 2023 7th International Conference on Electronic Information Technology and Computer Engineering, Xiamen, China, Oct. 20–22, 2023, pp. 1109–1113. doi: 10.1145/3650400.3650604.
- [6] H. Poorcheraghi, R. Negarandeh, S. Pashaeypoor, and J. Jafari, "Effect of using a mobile drug management application on medication adherence and hospital readmission among elderly patients with polypharmacy: a randomized controlled trial," BMC Health Serv. Res., vol. 23, no. 1, p. 1192, Nov. 2023. doi: 10.1186/s12913-023-10177-4.
- [7] N. V. Nguyen, T. H. Tran, and H. V. Dang, "Smart Pill Box: An IoT-Integrated Application for Monitoring Patient Medication Usage at Home," in CCIOT '24: Proceedings of the 2024 9th International Conference on Cloud Computing and Internet of Things, Hanoi, Vietnam, Nov. 1–3, 2024, pp. 19–24. doi: 10.1145/3704304.3704308.
- [8] C. E. Hartch, M. S. Dietrich, B. J. Lancaster, D. P. Stollendorf, and S. A. Mulvaney, "Effects of a medication adherence app among medically underserved adults with chronic illness: a randomized controlled trial," J. Behav. Med., vol. 47, no. 3, pp. 389–404, Jun. 2024. doi: 10.1007/s10865-023-00446-2.
- [9] H. Huang et al., "Construction and application of medication reminder system: intelligent generation of universal medication schedule," BioData Min., vol. 17, no. 1, p. 23, Aug. 2024. doi: 10.1186/s13040-024-00376-y.
- [10] J. Zhou et al., "Randomized clinical trial of a digital medication system to enhance adherence in patients with severe mental disorders," npj Digit. Med., vol. 8, no. 1, Art. no. 333, Jan. 2025. doi: 10.1038/s41746-025-01748-2.
- [11] G. Mohammadi Mogharab, R. Khajouei, N. Norouzkhani, Z. Esmaeili, F. Z. Bagheri, and M. R. Mazaheri Habibi, "Expert evaluation of mobile health apps for breast cancer management: a feature-based analysis using the Mobile Application Rating Scale (MARS)," BMC Health Serv. Res., vol. 25, no. 1, Art. no. 692, 2025. doi: 10.1186/s12913-025-12838-y.
- [12] S. Gamal, A. M. A. Elseasi, N. A. Sabry, and S. F. Farid, "Impact of pharmacist led mobile application on medication adherence and efficacy in chronic kidney disease," npj Digit. Med., vol. 8, no. 1, Art. no. 310, Jan. 2025. doi: 10.1038/s41746-025-01742-8.
- [13] Y. Zhang and Y. Chen, "The Role of Machine Learning in Reducing Healthcare Costs: The Impact of Medication Adherence and Preventive Care on Hospitalization Expenses," in GAITDI '25: Proceedings of the International Conference on Implementing Generative AI into Telecommunication and Digital

Innovation 2025, Beijing, China, July 18–20, 2025, pp. 1–6. doi: 10.1145/3771792.3774397.

[14] A. Selcuk, S. Soydan, V. Atmis, A. Yalcin, A. Bozkir, and M. Varli, "Development of content for a mobile application aimed to increase medication adherence among older adults," *BMC Geriatr.*, vol. 25, Art. no. 327, 2025. doi: 10.1186/s12877-025-05994-7.

[15] O. Alharbi, "Designing an OCR-Based Medication Support System with Drug-Drug Interaction Alerts for Elderly," *IEEE Access*, vol. 4, 2026, Art. no. 3651478. doi: 10.1109/ACCESS.2026.3651478.