Pharmacy Inventory Management & Drug Tracking System

Ayush Bansal, Ashutosh Kumar, Vishwadeepak Singh Baghela,
School of Computer Science and Engineering(SCSE), Galgotias University Delhi NCR, India

Ayush.bansal258@gmail.com, thesanu5889@gmail.com , vdsbaghela@gmail.com;

Abstract- Generally, electronic technology has been used to automate traditional systems. So, a variety of operating systems were shown in a variety of ways. These systems are similar to healthcare in that they provide services to both the company and its employees. Traditional data operations systems for drugstores, as an example, are limited in capacity, time-consuming, drug availability, managing the drug store, and the need for good staff based on the conditions of employment prospects. It is proposed in this paper that a sanitarium-pharmacy system be put in place to help alleviate the issues mentioned above. Two main corridor databases and Graphical Stoner Interface (GSI) frames have been proposed for the Iraqi sanitarium's drugstore data operation system. SQL Garçon was used to build a database containing information about drugstores that can be used by untrained users of the proposed system. Drugstore operations in a sanitarium are monitored and controlled by an offer system that monitors and controls all aspects of drug ordering and reporting.

Keywords- SQL Server, GSI, SSMS

I. INTRODUCTION

As technology has advanced, it has become increasingly important for computer systems to be managed in a more efficient manner [1]. Another issue that has arisen in the management of paper-based services is how to find employees who can meet the needs of a prospective employer without having to spend a lot of time going through bureaucracies and stores [2]. When it comes to document tracking, matching, or storing, a large portion of the time is spent by hand. In pharmacology, the focus is on chemical properties and research into the use, action, side effects of a drug, which is a subfield of biology. In the medical field, healthcare information technology is a promising strategy for reducing the number of drug errors. An electronic prescribing system (CPOE), barcode authentication, and CPOE are the most commonly used technologies [4].

Pharmaceutical management and storage are handled by pharmacy systems, which can be thought of as a computer programme. Manual systems with more efficient functions, such as stock management and control, drug labelling, and the like, are taking their place. Supporting hospital pharmacy processes by knowing the patient's medical history. Drug Control Program (DMS): Nurul Muhammed proposed a DMS in 2010 that expanded the stock management system. When an over-the-counter or expired medication is found, an alarm system will notify regulators.

In 2012, Carlisle George published a book titled Drug Withdrawal and Patient Monitoring and Control [1]. As the Internet of Things (IoT) continues to evolve, the authors in 2017 sought to identify the most critical Hospital Departments and the services they provide. The author published a study in 2018 that described the current state of hospital pharmacy operations in all aspects [8].

Based on an in-built website and GUI frames, the pharmacy management system was introduced in this project. A built-in website stores patient information about patients and medications, as well as information about inpatient and outpatient care. According to this plan, patient registration, inpatient and outpatient care and medication are the four main sections. Because there are two types of patients in a hospital, an inpatient and an outpatient, this is the reason. There are a variety of site actions and tables included in each of the above components, in addition to the GUI management framework.

II. THE PROPOSED SYSTEM

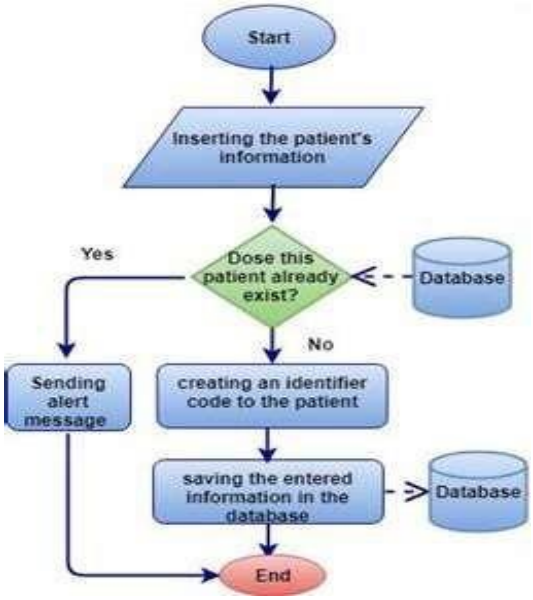
In this project, one of the objectives is to develop a hospital pharmacy's integrated data management system that can solve many common system issues. We have gained reliability, robust performance, and high capacity by connecting the system to the SQL Server website [9]. In addition, the program's GUI is designed in a simple and easy-to-understand manner, which eliminates the need for highly skilled users. Visual Studio C#,.NET framework 4.5, and SQL server are used to meet all assumptions.

A proposed plan to handle as much pharmacy work as possible in the hospital. Both a built-in SQL server and a GUI design made with C# are included. GUI frames control the proposed system's functions, while the website serves as an information repository. The proposed system's homepage is depicted in Figure (3). Verification can be achieved with limited access through the proposed system. Figure 2 depicts the main algorithm of the presented system, as depicted in the diagram. In subsection (3) below, the actual data transfer status of all proposed system components is described in great detail.

II. THE PROPOSED SYSTEM

In this project, one of the objectives is to develop a hospital pharmacy's integrated data management system that can solve many common system issues. We have gained reliability, robust performance, and high capacity by connecting the system to the SQL Server website [9]. In addition, the program's GUI is designed in a simple and easy-to-understand manner, which eliminates the need for highly skilled users. Visual Studio C#,.NET framework 4.5, and SQL server are used to meet all assumptions.

A proposed plan to handle as much pharmacy work as possible in the hospital. Both a built-in SQL server and a GUI design made with C# are included. GUI frames control the proposed system's functions, while the website serves as an information repository. The proposed system's homepage is depicted in Figure (3). Verification can be achieved with limited access through the proposed system. Figure 2 depicts the main algorithm of the presented system, as



depicted in the diagram. In subsection (3) below, the actual data transfer status of all proposed system components is described in great detail.

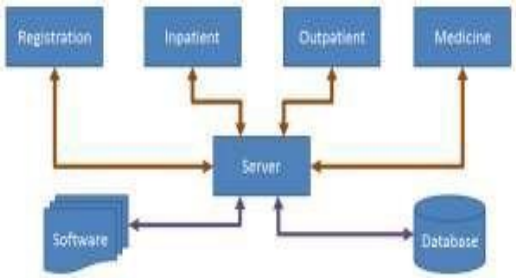


Fig: Block diagram of the system's main algorithm.

III. THE PROPOSAL ALGORITHM

The proposed algorithm is divided into four parts, each of which is described in detail below: enrollment, inpatient, outpatient, and medication. Figure (3) depicts the flowchart of the main algorithm proposed.

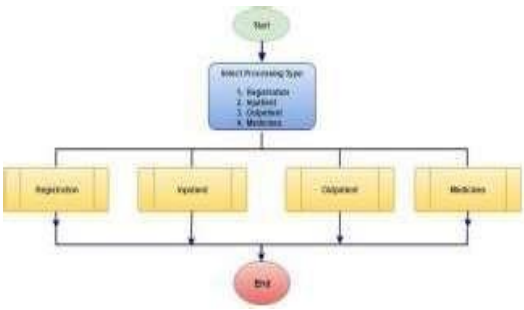


Fig: Flowchart of the system's main algorithm.

A. Registration: In order to access this section of our platform you must have been granted access by logging in with your authenticated account credentials. As part of the system, you can search for an existing patient and register a new patient. Figure shows the registration component's flowchart algorithm (4). It's now safe to say that all of the important data has been recorded. In doing so, we are able to accomplish many of our goals. Some of these will retain the patient's medical history even if the patient's condition worsens (example: inpatient or outpatient). Those patients who have already been registered from the search results are the only ones we can help. During this process, the medical histories and personal information of the patients are shown and reviewed. Only authorised users with their ownaccounts can get into this part of the system.

B. Inpatient Patient: This unit focuses on patients who are currently in the hospital. Pharmacists are responsible for dispensing and demonstrating patient discharge in this situation. There's an algorithm shown in Figure (5). Although this section is available to anyone, it is restricted to those who are authorised to do so. Patient data from patients who are not in a hospital has now been integrated into this part of the system.

Fig: Flowchart of the algorithm for theregistration process.

C. External Patient: Although this section is available to anyone, it is restricted to those who are authorised to do so. Patient data from patients who are not in a hospital has now been integrated into this part of the system. As a flowchart of the registration process.contrary to the people they are used to seeing. The flowchart algorithm for an external patient component is shown in Figure (6).

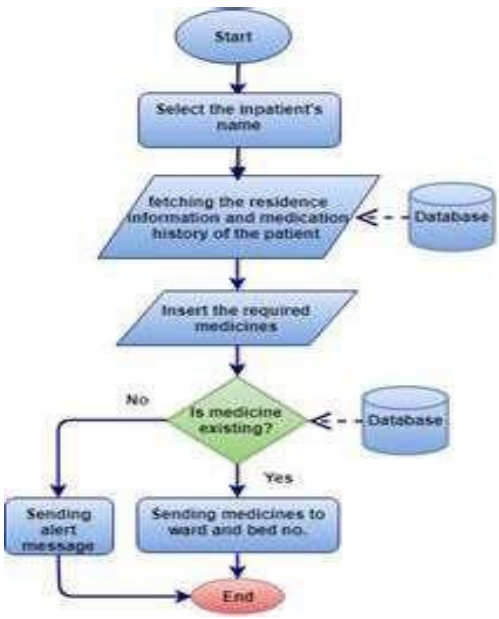


Fig: Algorithm Flow Chart: Inpatient Algorithm.

D. Medications: Medications stored or stored in the system are primarily the focus of this section of the proposed system. If a user has access to this section of the programme, he or she can add a new medication, review one already in place, and verify the dosage. A tree component's flow chart algorithm is shown in Figure (7).

IV. BUILT DATABASE

SQL Server Management Studio (SSMS), a programme that provides an integrated environment for managing all components of a SQL server, is used to construct the system website. SSMS is a management tool that is easy to use and manage [10,11]. Six tables make up this database. The "GeneralInfo" section contains 30 columns of information about patients who have received or will receive medication. as shown in Figure 1 some tables are linked to the original (8). "PatState," "Gender," "Inpatients," "MerState," and "Medicines" are all included in this set of tables.

Due to screen size limitations, the "GeneralInfo" table may not display all of its columns in the figure. The following are examples of dining room tables:

PatState: There are two indicators in this table, 1 and 2. Indicators 1 and 2 refer to inpatients and outpatients, respectively.

There are two indicators in this table for gender: 1 and 2. when indices 1 and 2 are associated with the "male" and "female" genders respectively.

As depicted in Figure 1, the table for inpatients has three columns: (8). The person who was hospitalised has the first one. The ward number and the bed number are listed in the second and final columns.

All patients who have been or will be given medication have their marital status represented in this table. We'll start with items 1 and 2. Indicators 1 and 2 are related to singles and married people, respectively.

Medications: All of the medications in the pharmacy are listed in this table.

Figure illustrates the relationship between these tables and the first (8).

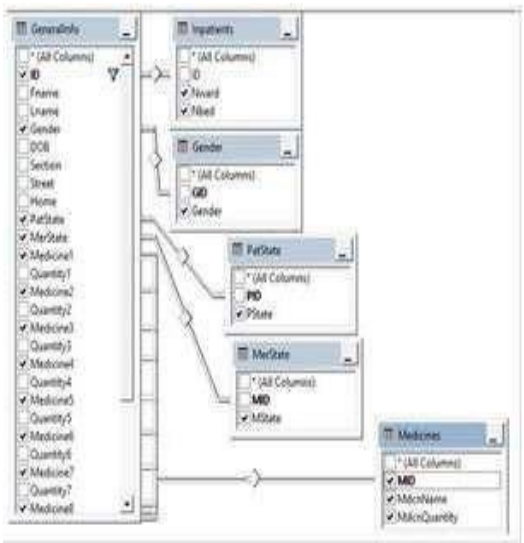


Fig: The proposed system's database table is shown.

V. DESIGNED GUI

As a result, Microsoft SQL Server (MSSQL) is more easily integrated into the Visual Studio environment, allowing for the necessary connections [12]. [10, 11]. FIGUR E 1: The proposed program's homepage includes four main buttons related to patient registration and retrieval of information; in patient management; out patient management; and archive management. .

"Search" and "New Patient" buttons will appear when a user clicks on the "Register" button, as shown in Figure 1. (9). There will be two fields that ask for the patient's full name when they click "Search." User demonstrations can be performed using the first and corresponding surnames of all patients in the database, as shown in Figures (10) and (11).

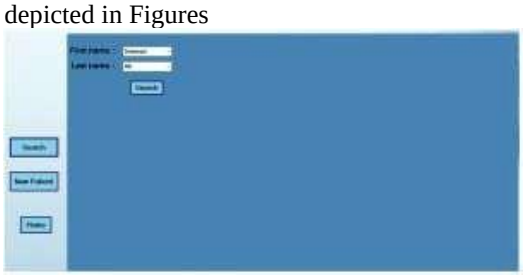
In addition, when the user clicks the "Update" button on the open form, this information is updated.

When a user clicks on the "New Patient" button, the general information fields shown in Figure (12) will appear, allowing the user to create a new patient.

When a user clicks the "Inpatient Patients" button, a new form will appear as shown in Figure (13) that enables the user to add or update the medication and dosage of the selected patient who is currently in the hospital. In this section, you can also print out the medicines that have been extracted.

Adding or updating medications and dosages for an outpatient patient can be done by selecting "outpatient patients" from the "inpatient patients" drop-down menu. In this section, you can also print out the medicines that have been extracted. A portion of the outpatient population is depicted in Figure 14.

Upon clicking on the "Medicines" button, a new form will appear as shown in Figure (15) New medicines can be added to the site, searches for and updates can be made on the site and orders can be placed. Resulting in trees as depicted in Figures



VI. PROPOSED SYSTEM RESULTS

New inpatient and outpatient records, as well as discharge and rehabilitation work, were used to test the proposed system's ability to register new patients. We created a new record for two outpatients and outpatients in order to

evaluate the induction process. It is shown in Figures 19 and 20 how to place a new inpatient patient and how to register a new inpatient, respectively. During operations, we include the process of creating 110 fake patient profiles in order to evaluate the proposed system's performance. With any given warning, registration is done with the utmost accuracy and flexibility.

Additionally, the search and review process is examined. We're looking for a patient record in Figure (19) based on the search type of the inpatient component (20). Users can make changes to their outpatient and inpatient profiles during the review process.

The result of this extraction is shown in Figures (23 and 24) of the above records, respectively. Because of this, the release of records is depicted in Figures 25 and 26.

TABLE 1: PROCESSING TIME CONSUMING TABLE

SEARCHING PROCESS	AVERAGE TIME CONSUMING
FOR 110 RECORDS	534 MS
FOR 1000 RECORDS	741 MS
FOR 1000000 RECORDS	2901 MS
FOR 10000000 RECORDS	12097 MS
* MS = MILLISECOND	

The pharmaceutical industry has also tested drug administration. As depicted in Figures (27), (28), and (29), we insert a new tree, review the existing one, and check the prices of the trees.

Profiles of randomised and outpatient patients are registered in the built-in table table during the evaluation of the expansion of the programme website. Table 1 shows the total amount of time spent and the record number associated with it. This system has been rated to handle a large number of records, based on the results obtained. A username and password are also used to ensure a high level of security when downloading data from the SQL server and verifying the system's accuracy.

VII. CONCLUSION

An hospital pharmacy implemented a data management system. The hospital's drug delivery cycle is controlled and regulated by the delivery system. A SQL server and Visual Studio (C.) are used to create a website and a GUI.

Many benefits were presented by way of the website, such as reducing data usage, reducing review errors, increasing consistency and enhancing data integrity and access for users through host and interactive languages and better data security.

GUI frames, on the other hand, are designed to work with the system by allowing the user to interact with the system through graphic icons. As a result, even non-technical users can take charge of the system

Many research models were used to evaluate the system presented in this paper. These included patient registration, prescribing medication, and making requests for medication at the warehouse. For minor errors and more effective actions, this study's results were superior to those of the system under investigation.

We can conclude from the above that The system works well within the hospital:

- ✓ The e-pharmacy programme can be used more effectively if a user interface and website are designed.
- ✓ The system under investigation reduces human effort, errors, and physical costssystem .'s
- ✓ E-pharmacy improves accuracy, efficiency and speed of operation compared to the traditional hands-on method.
- ✓ On a working computer network, the system is required to function (LAN).
- ✓ The programme requires users to pass practical training courses before they can work on it.

Action is generally required to improve the system under investigation.

- It is possible to upgrade the e-pharmacy system to the next proposed work in the future.
- Real-world testing of the system in a hospital pharmacy
- Connecting pharmacies in different hospitals to each other and then to warehouses is one of the main goals. This is done in order to take advantage of the scarcity of other types of medications in the area's pharmacies.
- Expand the current system to include pharmacies that specialise in treating chronic conditions.

REFERENCES

[1] George, C. (2012). Hospital Pharmacy Management. *Management Science of Health*.

[2] Wheeler, J. S., Ngo, T., Cecil, J., & Borja-Hart, N. (2017). Exploring employer job requirements: An analysis of pharmacy job announcements. *Journal of the American Pharmacists Association*, *57*(6), 723-728.

[3] Goundrey-Smith, S. (2013). Pharmacy Management Systems. In *Information Technology in Pharmacy* (pp. 151-173). Springer, London.

[4] Ciampa, M., & Revels, M. (2012). *Introduction to healthcare information technology*. Cengage Learning.

[5] Gimbar, R. P., & Jarrett, J. B. (2017). Unique approaches to a medication history in an immigrant population: A case report. *Journal of the American Pharmacists Association*, *57*(6), 739.

[6] Muhammad, N. A. (2010). *Drug Management System (DMS)* (Doctoral dissertation, UMP).

[7] Spyropoulos, B. (2017). Incorporating the Internet of Things in the Modern Hospital: Attempting a “Taxonomy” of Pertinent Equipment and Services. *American Journal of Management Science and Engineering*, *2*(6), 160-169.

[8] Ratsimbazafimahefa, H. R., Sadeghipour, F., Trouiller, P., Pannatier, A., & Allenet, B. (2018, May). Description and analysis of hospital pharmacies in Madagascar. In *Annales pharmaceutiques francaises* (Vol. 76, No. 3, pp. 218-227). Elsevier Masson.

[9] Croock, M. S., Khudhur, S. D., & Taqi, A. K. (2016). Edge detection and features extraction for dental X-ray. *Engineering and Technology Journal*, *34*(13 Part (A) Engineering).

[10] Alwan, N. (2013). Developing a database system for the laboratory tests. *Eng. & Tech. Journal*, *31*(18), 52-67.

[11] Jackson, M., Crouch, S., & Baxter, R. (2011). Software evaluation: criteria-based assessment. *Software Sustainability Institute*, *1*.

[12] "SQL_Serv_Man_Studio", http://www.boosla.com .[Online; accessed on 19th Jan., 2019].

[13] Khudhur, S. (2018). HOSPITAL PHARMACY MANAGEMENT SYSTEM. *Iraqi Journal for Computers and Informatics*, *44*(2), 27-34.