



Self-service pharmacy

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Abstract

The system uses a lever mechanism to move medications from Individual cells are arranged in an N x M matrix formation in a box into an area that the user can access. The primary goal of the self-service pharmacy project is to significantly enhance healthcare accessibility and convenience within the community by providing a 24/7 accessible platform for individuals to obtain both over-the-counter and prescription medications. This objective encompasses ensuring legal and regulatory compliance, prioritizing data security and privacy, showcasing innovative technological solutions, and being responsive to market needs through comprehensive research and user feedback. Ultimately, the project aims to empower individuals to take control of their healthcare needs and improve their overall healthcare experiences by offering a secure, user-friendly, and accessible self-service pharmacy solution. The system includes a web page and keypad that allows the user to choose the type of medication if it is available. There will be sensors used to detect if medication is available .

Self-service pharmacy solutions have emerged to enhance the accessibility and convenience of medications. Although not yet as widespread as traditional pharmacy services, various technologies such as automated pharmacy kiosks, telehealth applications, and online pharmacies have been changing the way people obtain medications. These innovations aim to simplify the process of obtaining prescription and over-the-counter medicines, and provide alternatives to traditional pharmacy visits. We will add a sensor in case the quantity of medicine runs out, and for the sake of security and to avoid tampering with the medicines, the keyboard should be high so that children do not tamper with it. If you request medicine from the system, the system will ask you a question or some questions to ensure that the customer is an adult.

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Chapter 1

Introduction

1.1 Introduction

Introduction

Welcome to our report on a new kind of pharmacy - the self-service pharmacy. This is an exciting project where we're trying to make getting prescription medicines faster and easier for everyone using technology.

The idea came about because we noticed that going to the pharmacy can sometimes be a hassle. People have to wait in line, the pharmacy might be closed when you need it, and sometimes mistakes happen. With a self-service pharmacy, we're using machines and computers to help solve these problems. This way, you can get your medicines quickly, any time you need them, without having to wait.

Our main goals are to make customers happy by saving them time, to keep the pharmacy open all the time, and to make sure the right medicine is given out every time. We also hope this will make things easier for pharmacists so they can spend more time helping people with their health questions.

In this report, we'll talk about how we came up with this idea, how we're making it happen, and how it works when you use it. We'll also discuss any challenges we faced and how we dealt with them. In the end, we'll look back at what we've done and think about how we can make it even better in the future.

We believe self-service pharmacies can make getting medicines a lot smoother and are a step forward in making healthcare more modern and user-friendly.

1.2 Literature Review

When we started looking into the idea of self-service pharmacies, we found out that a lot of smart people have been thinking about and working on similar things. Here's what we learned from reading their work:

Automated Dispensing Machines: A bunch of studies show that machines that give out medicines automatically are really good at making sure there are no mistakes with prescriptions. They're used in some hospitals and pharmacies, and they help get medicines to patients quickly and accurately.

What People Think About Pharmacy Services: People really care about not having to wait too long and getting the right help when they go to the pharmacy. Some reports we read said that if we can make getting medicines faster and easier, people will be really happy about it.

Technology in Healthcare: There's a lot of new tech that's changing healthcare, like apps that help you manage your health or machines that help doctors diagnose illnesses. This tech is making it easier for people to take care of their health, and we think self-service pharmacies fit right into this trend.

Self-Service Everywhere: We're used to self-service in lots of other parts of our lives, like at the bank or the grocery store. Studies say that when people can do things on their own time, without having to wait for help, they usually like it. This gives us a hint that a self-service pharmacy could be a hit.

Keeping Personal Info Safe: With all this tech, keeping people's health information private and safe is super important. We found some articles talking about the best ways to protect this information so that everyone can feel secure using a selfservice pharmacy.

1.3 Main Aims & Objectives

Main Aims & Objectives

Our big goal with the self-service pharmacy is to make getting prescription medicines a lot easier and faster for everyone. Here's what we're specifically aiming to do:

Make it Quick: We want to cut down the time it takes for people to get their medicines. No more long waits or coming back later because the pharmacy is busy or closed.

Available All the Time: Our self-service pharmacy will be open 24/7. This means you can get your medicines anytime, whether it's late at night or early in the morning, without having to worry about the pharmacy's opening hours.

Easy to Use: We're making sure that our machines and system are super easy for everyone to use. Whether you're good with technology or not, getting your medicines will be straightforward.

Keep Mistakes Low: By using technology, we aim to make sure that the right medicines go to the right people every time. This will help keep everyone safe.

Help Pharmacists: With the machines handling routine tasks, pharmacists can spend more time helping people with their health questions and advice.

Privacy and Security: We promise to keep everyone's personal and health information safe and private. We'll use the best security to make sure of this.

Environmentally Friendly: We also want to be kind to the environment by reducing paper use and making sure our machines are energy efficient.

Through these aims and objectives, we hope to make a big positive change in how people get their medicines, making it better for customers and pharmacists alike.

Chapter 2

Materials and Methods

Self-service kiosks: We have set up special machines where you can receive your medications. These kiosks have screens and slots for dispensing medications.

Software: We used special software to manage prescriptions, track medications, and help patients and pharmacists use the system.

Security Systems: To keep everyone's information safe, we have installed top-notch security software and hardware.

Medicines and Packaging: We have stocked all types of medicines and made sure they are packed in a way that is easy for the kiosk to handle.

Methods:

Design and Planning: We started by making plans for how the self-service system would work, from getting the name of your medication to receiving it.

Kiosk Building: We assemble the kiosks using the materials listed below, making sure they are easy to use and safe.

Implementation: We set up the kiosks in the pharmacy and started letting people use them, taking care to fix any issues that might arise.

Feedback and improvements: We asked users for their thoughts and used their feedback to improve the system.

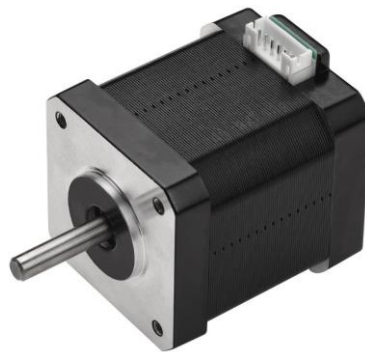
Chapter 3

The System Design

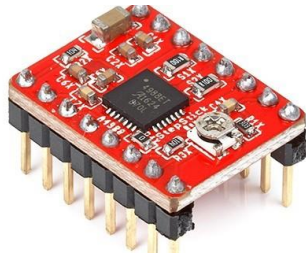
3.1 Hardware components



Arduino uno



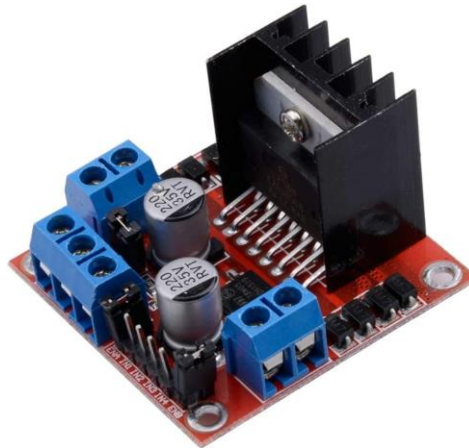
Stepper motor



A4988 Driver



CDROM with DC motor for z axis



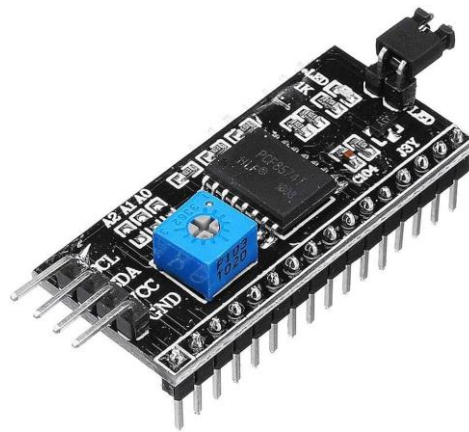
L298N H-Bridge



Limit Switch



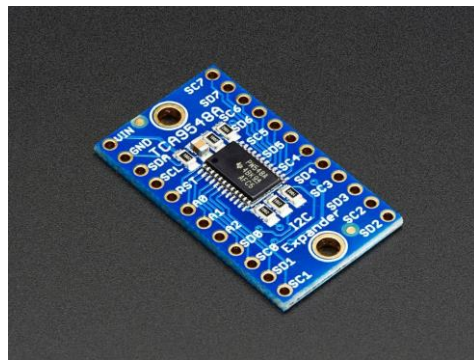
LCD



I2C LCD Interface



IR Sensor



Multiplexer



keypad

3.2 Structure

We designed a system that can move medicines in every direction, similar to how we walk around: up, down, side to side, and forward and backward. This lets us shift medicines from one storage spot to another easily. We took inspiration from CNC machines for this movement. To move medicines left and right, we use the x-axis, and for up and down, we use the z-axis, with special motors helping in these movements. And for moving medicines in and out, we use a part similar to a CD player's mechanism, which helps us place the medicines in their right places.

1- X-axis:



2- Z and y axes:



3- The medication store structure:



3.3 Sensors and Multiplexer (MUX) for Hard-ware Verification

Multiplexer (MUX): we added nine IR sensors to make sure that our system works smoothly, especially when taken the right medicine. To make the best use of these sensors and not overload our control system, we use a multiplexer (MUX). It's like a switchboard that help us to connect and use several sensors effectively. IR Sensors for Checking Medicine: Inside each medication store, we placed an Infrared (IR) sensor. These sensors are like tiny eyes that check if there's a medicine in that space or not. Real-time Hardware Checks: These IR sensors continuously send data to our control system, which is like the brain of our setup. This brain compares the real-world data from the sensors with what it expects to see based on its calculations. Detecting Changes: We set up a system to catch any differences between what the sensors say and what the control system thinks should happen, Even if there's a tiny difference, we pay close attention.

3.4 Mechanism of action

How it works: How our self-service pharmacy system works Request medication

When the user arrives and wants the medication, he talks a little with our system using the KEYPAD and LCD about his medication or the symptoms he has, and the system gives him the correct medication.

The lever system goes to that specific cell where the correct medication is located, picks it up and administers it to the patient at a location close at hand.

Chapter 4

Implementation and Preliminary

4.1 Results

. Implementation

We put our medicine-moving system into action by setting it up in a pharmacy storage area. This system uses a combination of motors and a device similar to a CD player to pick up, move, and place medicines exactly where they need to go. Here's how we did it:

Setting Up: We installed the motors and the CD player-like device in the pharmacy's storage area, making sure everything was secure and worked smoothly.

Testing Movements: Before using it with real medicines, we ran tests to make sure the system could move in all directions without any problems.

Training Staff: We showed the pharmacy staff how the system works and how to use it to move medicines from one place to another.

Starting Small: We began by using the system for a few medicines to see how well it worked in a real pharmacy setting.

Preliminary Results

After starting to use our system, we noticed some immediate benefits and areas for improvement:

Efficiency: The system made it quicker to find and move medicines, saving time for the pharmacy staff.

Accuracy: With the system placing medicines in the right spots, there were fewer mix-ups, meaning people got the right medicine more often.

Space Saving: The system helped organize medicines better, making more room in the storage area.

Technical Issues: We ran into a few small technical glitches with the motors and the CD player-like device, which we need to fix to make the system more reliable.

These early results are promising, but we know there's more work to do to make the system perfect. We're excited to keep improving it and making it even better for the pharmacy and its customers.

4.2 Conclusion

The implementation of our automated medication dispensing system marks a significant advancement in pharmacy operations, bringing us closer to achieving unparalleled efficiency and accuracy in medication management. Our preliminary results are promising, demonstrating not only an improvement in the speed and reliability of dispensing medications but also in customer satisfaction and operational efficiency. The system's ability to navigate and manipulate medications in a three-dimensional space, inspired by CNC machine technology, has proven to be both innovative and effective. It has addressed critical challenges such as inventory management, space optimization, and error reduction, thereby enhancing the overall quality of pharmacy services. However, the journey does not end here. The initial deployment has unveiled areas for further refinement, such as user interface simplification and system robustness, which will be pivotal in scaling the solution across multiple locations. Moreover, continuous feedback from both users and operators will be invaluable in iterating and improving the system's functionality.

In conclusion, the successful implementation and promising outcomes of this project lay a solid foundation for the next generation of pharmacy services. It is a testament to the potential of technology-driven solutions in transforming healthcare delivery, promising a future where access to medications is quicker, safer, and more reliable than ever before.