POLITEKNIK

SULTAN SALAHUDDIN ABDUL AZIZ SHAH

MIXER COCKTAIL

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JABATAN KEJURUTERAAN ELEKTRIK

SESI 1 2024/2025

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MARIA SOFIA BINTI ROSZAINI	**08DEP22F1093**

This report submitted to the Electrical Engineering Department in fulfillment of the requirement for a Diploma in Electrical Engineering (communication)

JABATAN KEJURUTERAAN ELEKTRIK

SESI 1 2024/2025

CONFIRMATION OF THE PROJECT

The project report titled "Mixer Cocktail" has been submitted, reviewed and verified as a fulfills the conditions and requirements of the Project Writing as stipulated

Checked by :
Supervisor's name : PUAN NOR ROFIZAH BINTI ABDUL MUTALIB

Supervisor's signature :
Date :

Verified by :
Project Coordinator name :
Signature of Coordinator :
Date :

"I acknowledge this work is my own work except the excerpts I have already explained to our source"

1. Signature :

Name : **MARIA SOFIA BINTI ROSZAINI**

Registration Number : **08DEP22F1093**

Date :

DECLARATION OF ORIGINALITY AND OWNERSHIP

TITLE : MIXER COCKTAIL

SESSION: SESI 1 2024/2025

1. I'm MARIA SOFIA BINTI ROSZAINI with the matric number 08DEP22F1093 is a final year student of **Diploma in Electrical Engineering, Department of Electrical, Politeknik Sultan Salahuddin Abdul Aziz Shah**, which is located at **Persiaran Usahawan, 40150 Shah Alam, Selangor**. (Hereinafter referred to as 'the Polytechnic').

2. I acknowledge that 'The Project above' and the intellectual property therein is the result of our original creation /creations without taking or impersonating any intellectual property from the other parties.

3. I agree to release the 'Project' intellectual property to 'The Polytechnics' to meet the requirements for awarding the **Diploma in Electronic Engineering (Communication)** to me.

Made and in truth that is recognized by;

a) **MARIA SOFIA BINTI ROSZAINI**
(Identification card No: - 041117100058)

. ....……
MARIA SOFIA BT ROSZAINI

In front of me, **PUAN NOR ROFIZAH BINTI ABDUL MUTALIB**
As a project supervisor, on the date:

.....……
NOR ROFIZAH BINTI ABDUL MUTALIB

ACKNOWLEDGEMENT

In this project, I have taken all the efforts needed. However, it would not have been possible without the kind support and help of many other individuals and organizations. I would like to extend my sincere thanks to all of them. I am highly indebted to my supervisor Puan Nor Rofizah Binti Abdul Mutalib for their guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in completing the project.

Moreover I also would like to convey my special thanks to the lecturer of Politeknik Shah Alam who helped us to learn in detail about the components that we frequently used for the project work such as Arduino and etc even though in the weekend with a special additional program.

Furthermore, I also would like to express my gratitude towards my parents for their kind co-operation and encouragement which help me in completion of this project. I would like to express my special gratitude and thanks to industry persons for giving me such attention and time.

My thanks and appreciations also go to my colleague in developing the project and people who have willingly helped me out with their abilities.

ABSTRACT

This final year project focuses on the design and development of an automated cocktail mixer system aimed at simplifying the preparation of cocktails by automatically measuring and mixing ingredients. Utilizing three pumps connected to separate ingredient containers, a mixer, and a user interface with buttons and an LCD screen, the system allows users to select a cocktail and have it prepared with minimal effort. The goal of the project is to reduce human error and streamline the cocktail mixing process. The literature review highlights the advancements in automated beverage preparation, which have significantly improved efficiency and consistency but often remain expensive and complex. This project addresses these challenges by incorporating a simple, affordable design with automated pumps and a mixer. The methodology involved calibrating the pumps to ensure precise measurements and integrating a microcontroller to regulate liquid flow based on user input. The results of the prototype testing demonstrated that the system could accurately dispense and mix ingredients to consistently reproduce cocktails with the same proportions and flavor. The user-friendly interface, supported by an LCD display, made the system easy to operate, even for individuals unfamiliar with cocktail preparation. In conclusion, the automated cocktail mixer successfully achieved its objective of creating a reliable and efficient system for preparing cocktails, making it a viable solution for both home use and small premises environments. This setup can be particularly useful in a shop or small premise where quick and consistent cocktail preparation is essential. By reducing the manual effort involved, this project aims to enhance the efficiency of cocktail preparation and improve the overall customer experience.

ABSTRAK

Projek tahun akhir ini memfokuskan pada reka bentuk dan pembangunan sistem pembancuh koktel automatik yang bertujuan untuk memudahkan penyediaan koktel dengan secara automatik mengukur dan mencampurkan bahan-bahan. Menggunakan tiga pam yang disambungkan ke bekas bahan yang berasingan, satu pembancuh, dan antara muka pengguna dengan butang dan skrin LCD, sistem ini membolehkan pengguna memilih koktel dan menyiapkannya dengan usaha yang minimum. Matlamat projek ini adalah untuk mengurangkan ralat manusia dan mempercepatkan proses bancuhan koktel. Kajian literatur menyoroti kemajuan dalam penyediaan minuman automatik, yang telah meningkatkan kecekapan dan konsistensi dengan ketara tetapi selalunya masih mahal dan kompleks. Projek ini menangani cabaran tersebut dengan menggabungkan reka bentuk yang mudah dan berpatutan dengan pam automatik dan pembancuh. Metodologi yang digunakan termasuk menentukur pam untuk memastikan ukuran yang tepat dan mengintegrasikan mikropengawal untuk mengawal aliran cecair berdasarkan input pengguna. Hasil ujian prototaip menunjukkan bahawa sistem ini dapat mengeluarkan dan mencampur bahan dengan tepat untuk menghasilkan koktel dengan nisbah dan rasa yang konsisten. Antara muka mesra pengguna, disokong oleh paparan LCD, menjadikan sistem ini mudah dioperasikan, walaupun untuk individu yang tidak biasa dengan penyediaan koktel. Kesimpulannya, pembancuh koktel automatik ini berjaya mencapai objektifnya untuk mencipta sistem yang boleh dipercayai dan cekap untuk menyediakan koktel, menjadikannya penyelesaian yang berpotensi untuk kegunaan rumah dan persekitaran premis kecil. Susunan ini amat berguna di kedai atau premis kecil di mana penyediaan koktel yang cepat dan konsisten adalah penting. Dengan mengurangkan usaha manual, projek ini bertujuan untuk meningkatkan kecekapan penyediaan koktel dan meningkatkan pengalaman pelanggan secara keseluruhan.

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CHAPTER 1
INTRODUCTION

1.1 Introduction

Fruit cocktail drink is a drink made from a mixture of fruit and fresh milk, often supplemented with condensed milk to add sweetness. This drink is a suitable choice for people who want to try a healthy and delicious drink. This drink is very suitable when the weather is hot or those who like outdoor activities, because cocktail drink is very refreshing.

In response to these challenges, this project aims to simplify the cocktail-making process by developing an automated cocktail mixer. The automated system is designed to measure and mix ingredients with minimal user intervention, helping cocktail makers provide consistent and high-quality drinks more efficiently. Using three pumps connected to individual ingredient containers, a mixer, and a user interface with buttons and an LCD display, the system allows users to select and create cocktails effortlessly. By automating the process, this project reduces preparation time, minimizes human error, and ensures consistency in every drink.

This project is particularly beneficial for small businesses or shops where quick and efficient service is essential. By incorporating an Arduino microcontroller to control the pumps and mixer, this system provides a straightforward, reliable solution for cocktail preparation, enhancing the customer experience and improving operational efficiency.

1.2 Background Research

Advancements in automation technology have significantly shaped the food and beverage industry, making processes faster and more efficient. The journey began with the development of simple vending machines in the early 20th century, which could dispense basic drinks like coffee and soda. These machines introduced automation to beverage services and marked the first step toward faster, more accessible drinks, although they were limited to dispensing pre-packaged beverages (Smith et al., 2005). Early systems focused on improving customer convenience by simplifying access to ready-to-drink options.

In the 1970s and 1980s, further progress in microprocessor technology enabled more advanced beverage dispensers, especially in fast-food and public spaces. Automated coffee machines became popular, combining ingredients in precise proportions to enhance consistency (Jones et al., 1983). This period also saw the creation of automated espresso machines, allowing users to make complex drinks like cappuccinos and lattes with a single push of a button. Such advancements simplified operations and helped establish the foundation for beverage automation in both commercial and personal settings.

More recently, developments in sensor technology have made it possible to automate complex processes like cocktail mixing. High-end systems capable of preparing custom cocktails by accurately measuring and mixing ingredients are now used in high-end events (International Federation of Robotics, 2015). However, many of these machines remain costly, complex, and suited only for large operations. This project aims to fill the gap by creating an affordable automated cocktail mixer that uses basic components like Arduino and calibrated pumps. This design provides small businesses and home users with a simple, cost-effective solution for consistent, high-quality cocktail preparation.

1.3 Problem Statement

Nowadays, making many of cocktails takes time The use of a can opener for cocktail mixing makes the implementation process slow. In order to prevent users from faltering and taking a long time to make a cocktail, this project can simplify and lighten the users' work as much as possible. This project can also be used for the work of users in producing cocktail drinks in a shop or small premises.

1.4 Research Objectives

- To develop a system to mix ingredient of cocktail easily.
- To design the production of cocktail in an easier way.

1.5 Scope of research

- This project is focusing for use in shops or small premises.
- This project is focusing aims to simplify and expedite the process for users.

1.6 Project Significant

This project marks a significant advancement in the realm of cocktail preparation within compact establishments. This project is significant as it offers a cost-effective, automated solution for cocktail preparation, benefiting small businesses and personal use. By using an Arduino microcontroller, it simplifies the cocktail-making process, making it faster and more reliable while minimizing human error. The system's design, featuring pumps controlled by relays and a user-friendly LCD screen, provides real-time updates, making operation easy for anyone, even without technical skills. This project allows small establishments to deliver consistent, high-quality cocktails quickly, improving customer satisfaction and operational efficiency without the need for expensive machinery. Furthermore, the reduction in manual labor enhances operational efficiency and cost-effectiveness, while the modernized approach positions the establishment as an innovative player in the industry.

1.7 Chapter Summary

This section focusing on the main studies of my project such as the introduction, background research, problem statement, project objective, scope project and also the project significance. In the end of this section, I have a better understanding about my project.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

From the previous study, there are a few research that has been done related to the mixer cocktail. Most of the studies are focused on the system that used to mix the cocktail once it is to be done. However, most of the study are still in prototype phase because people nowadays are being used to the manual preparation of fruit cocktail but they are not focus to the way the work can be done much easier.

2.2 Automated Cocktail Mixer

In response to the time-consuming nature of cocktail preparation in small premises, this project presents a streamlined solution. By integrating an Arduino microcontroller, pumps, relays, and a mixer, the system automates the entire process. Once activated, each pump dispenses precise amounts of ingredients, while the mixer seamlessly combines them. This setup reduces manual effort, ensuring quick and consistent cocktail preparation every time. Ideal for busy environments, this project enhances efficiency and improves the overall customer experience.

2.2.1 Previous Research

There are few of studies which have been done by the previous researcher related to the robotic arm as shown in Table below.

NO	TITLE/AUTHOR	OBJECTIVE	METHOD	RESULT
1	**- Development of an Automated Drink Dispenser Using Arduino** - J. R. Smith, T. A. Brown (Journal of Automation, 2019)	- To design an efficient, user-friendly drink dispenser for consistent liquid measurements. - To automate drink preparation to reduce human errors.	The system uses an Arduino microcontroller connected to pumps, an LCD, and user input buttons. Each pump is programmed to dispense a set amount of liquid based on the chosen drink.	The automated drink dispenser successfully measured and dispensed liquids accurately, achieving consistent proportions and reducing manual errors. The LCD provided real-time updates for users.
2	- **Automated Beverage Mixing Machine Using Microcontrollers** - K. L. Thomas, S. P. Martinez (International Conference on Embedded Systems, 2020)	- To automate beverage mixing using microcontrollers and minimize preparation time in high-demand environments.	Utilized a microcontroller to control multiple pumps and a mixer. Each pump dispensed a specific ingredient, followed by the activation of the mixer to blend ingredients. Systems programmed to prepare common recipes based on user input.	The machine achieved faster beverage preparation with consistent ingredient ratios. It proved effective in busy environments by significantly reducing wait times and maintaining flavor consistency.
3	**Design of a Portable Automatic Drink Mixer for Small Businesses** - M. A. Lee, J. K. Wong (Small Business Technology Journal, 2021)	- To create a compact, affordable, and portable drink mixer suitable for small businesses. - To improve the speed and accuracy of drink preparation.	Designed a small-scale drink mixer with an Arduino board, pumps, and a digital display. Allowed users to select drink recipes, and the pumps would automatically dispense the ingredients.	The portable drink mixer effectively streamlined drink preparation, enhancing efficiency for small businesses. Users reported ease of operation and reliable performance in daily operations.

4	**- An Automated Cocktail Mixing System Using Arduino** - N. R. Patel, L. S. Anand (International Journal of Robotics and Automation, 2021)	- To design an automated cocktail mixer capable of preparing complex cocktails with minimal human intervention. - To enhance consistency and reduce human error in cocktail preparation.	The system used an Arduino microcontroller to control multiple pumps and a stirring mechanism. A touchscreen interface allowed users to select from various recipes, with each recipe dictating specific amounts for each ingredient.	The Smart Bartender successfully prepared cocktails with high accuracy, achieving consistency in taste and ingredient ratios. Users found the system reliable and intuitive, especially beneficial in busy bar environments.
5	- **Automated Drink Dispensing Machine with Ingredient Tracking** - R. Chen, P. Li (Automation in Food and Beverage Industry Conference, 2022)	- To develop a drink dispensing machine that can automatically track ingredient levels and alert users when refills are needed. - To ensure smooth operation by preventing ingredient shortages during drink preparation	The machine included an Arduino to control pumps and an LCD display. Sensors tracked ingredient levels in real time and notified users via the display when a refill was required. The Arduino managed the sequence of dispensing based on the drink selected.	The drink dispensing machine was effective in managing ingredient levels and automating drink preparation. It provided real-time updates, improving inventory management and ensuring smooth, uninterrupted service in high-demand scenarios.

2.4 Chapter Summary

This section focusing on two different sections, the first is about a few investigate on the project title which helped me to get in detail the basic of my project.

CHAPTER 3
RESEARCH METODHOLOGHY

3.1 Introduction

To make this project a fully functional, fully secure equipment, a highly comprehensive plan is being implemented. To ensure that the project is finished on schedule, a step-by-step process is followed. This include gathering information on the primary cocktail preparation, designing the mechanical component, and testing and verifying the circuit design.

3.2 Project design and overview

As mention in previous chapter, the project design is using the Arduino as the main controller. The Arduino Uno plays the main role in the early asthmatic detection project. The design of the controller circuit using Arduino is realize using Arduino Software and then add the coding for the schematic which should be connected to the Arduino by using the USB cable and the laptop. Overall, the design of my project is a wearable design.

3.3 Control System

The control system for the automated fruit cocktail mixer in this project utilizes an Arduino microcontroller, LCD display, relay modules, pumps and mixer to deliver a fully automated mixing process. The Arduino acts as the central control unit, managing inputs from the user and coordinating the timing and activation of each pump and mixer. The system allows for real-time feedback through the LCD display, notifying users of each step in the preparation process, such as when ingredients are being dispensed or mixed. This setup ensures efficiency in cocktail preparation, guarantees consistent proportions for each drink, and minimizes the need for manual intervention, making it an ideal solution for small premises looking to enhance productivity and customer satisfaction.

3.3.1 Microcontroller

The microcontroller in this automated fruit cocktail mixer project, specifically an Arduino, serves as the central processing unit that controls the entire operation. It processes inputs from the user interface and sends signals to activate the pumps and mixer in the correct sequence. The Arduino is programmed to handle timing and precise measurements for each ingredient, ensuring consistent proportions and reliable functionality. By managing all components, from the relays that power each pump to the mixer activation, the microcontroller enables a seamless, automated process for preparing fruit cocktails, reducing human error and enhancing efficiency in cocktail preparation.

3.3.2 Programmable logic control (PLC)

In this automated fruit cocktail mixer project, a Programmable Logic Controller (PLC) could be used as an alternative to the Arduino microcontroller to manage the control processes more robustly and reliably, especially in an industrial or commercial setting. A PLC is designed to handle complex automation tasks and is highly durable, capable of withstanding extended operations in demanding environments. The PLC would take input signals from user commands or sensors, interpret the instructions, and control the pumps, mixer, and any additional components needed for cocktail preparation.

3.3.3 Arduino

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board -- you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program.

3.4 Block diagram of the project

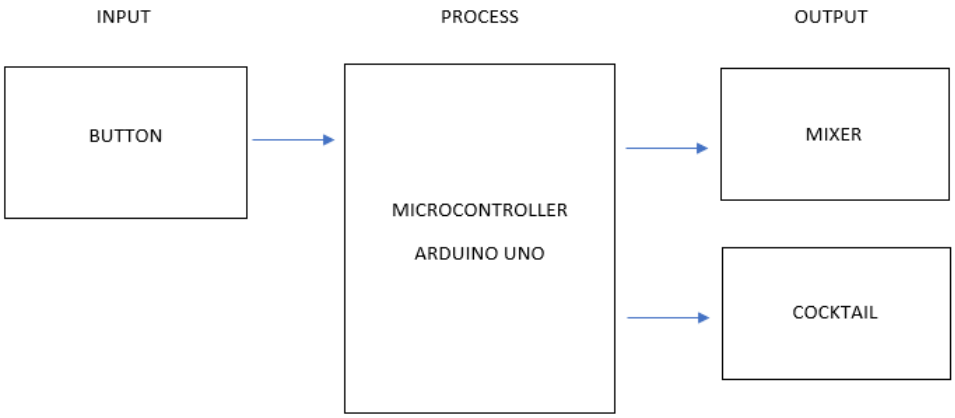

Figure 1.1 Block diagram

3.5.1 Project hardware

The hardware components of the automated fruit cocktail mixer are essential for its efficient operation and user-friendly design. At its core, an Arduino microcontroller serves as the brain, controlling all inputs and outputs to manage the cocktail preparation process. A LCD display provides real-time feedback, showing the user each stage of the drink-making process, including ingredient selection and mixing updates. Relay modules act as electronic switches, allowing the Arduino to control high-power devices like pumps and the mixer without directly powering them. Each of the three pumps dispenses a different ingredient, while the mixer ensures the ingredients are thoroughly blended before serving. Tubing and connectors create leak-free pathways for each ingredient to flow through the system, and a reliable power supply provides the necessary voltage for all components. Together, these hardware elements enable an automated, precise, and consistent cocktail-making experience, ideal for small premises and businesses looking to streamline operations.

3.5.2 Schemetic circuit

Figure 3. 2 shows the overall circuit diagram of this project. This complete schematic drawing is created by using the proteus software which is very easy to explore. All the components that I used below is completely labeled in the diagram.

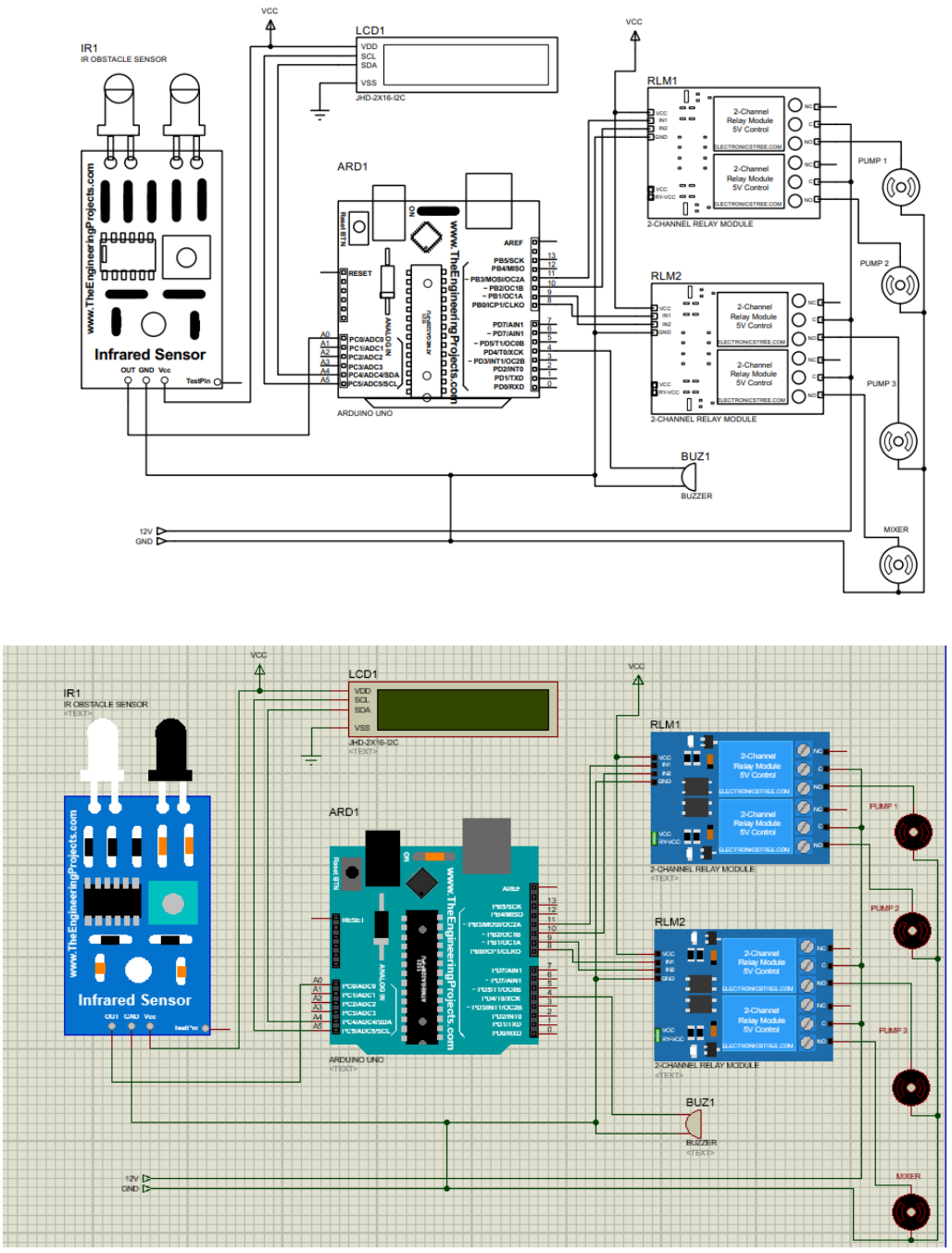

Figure 2.1 Schematic Diagram

3.5.3 Description of main component

The automated fruit cocktail mixer system comprises several key components that work together to simplify cocktail preparation. At the heart of the system is an Arduino UNO, which acts as the main control unit, managing the entire. The Arduino then activates the channel relay modules, which act as electronic switches, enabling it to control high-power devices such as the pumps and mixer. Each pump is connected to a specific relay, allowing precise dispensing of different ingredients based on the chosen recipe. Once the ingredients are dispensed, the mixer blends them to ensure a uniform taste and texture. The LCD display provides real-time feedback on the process, showing different cocktails in made. All components are housed in a sturdy frame with an intuitive user interface, making the system reliable and easy to operate, perfect for fast and consistent cocktail preparation.

3.5.4 Circuit operation

The circuit operation of the Mixer Cocktail project is designed for efficiency and precision. The system is centered around an Arduino microcontroller, which coordinates the activities of all connected components. The Arduino then controls the relay modules, which act as switches to manage the operation of the three pumps and the mixer. Each pump is connected to a relay, allowing the Arduino to control the dispensing of specific ingredients sequentially according to the selected recipe. As each ingredient is dispensed, the LCD display provides real-time updates on the process, keeping the user informed. When all ingredients are added, the Arduino activates the relay connected to the mixer, ensuring the ingredients are thoroughly combined. The Arduino's programmed logic ensures that each step is executed in the correct sequence, minimizing human intervention and maximizing efficiency in cocktail preparation. This streamlined circuit operation allows for quick, consistent, and automated cocktail mixing, ideal for busy environments.

3.6 Project software

To create the proposed arrangement, a convenient mixer cocktail. Based on my studies, the main application that have been used for this system is an Arduino Ide application. The system of project will be functioned completely once the Arduino board is successfully uploaded with a complete coding by using the application stated above. The Mixer Cocktail project also uses Proteus for circuit simulation to ensure efficient operation before building the actual hardware. By using Proteus, we can ensure that the system operates reliably, reducing errors and improving the overall efficiency of the cocktail-making process before physical implementation.

3.7 Prototype Development

The prototype development of the automated fruit cocktail mixer project involves several essential steps to bring the design concept to life. First, the necessary hardware components are gathered, including the Arduino microcontroller, LCD display, relay modules, pumps, and mixer. These components are assembled according to the designed circuit layout, with each part connected to the Arduino for seamless operation. The Arduino is programmed to control the pumps and mixer based on the IR sensor's input, ensuring that the system initiates the cocktail-making process when a cup is detected.

Once assembled, the prototype undergoes initial testing to verify that all components work together effectively. Each pump is tested for accurate and consistent dispensing of ingredients, and the mixer is evaluated to ensure thorough blending. Iterative testing and debugging are conducted, with adjustments made to the code and hardware setup as needed to improve functionality, reliability, and efficiency. The LCD display is also configured to provide real-time feedback during operation, giving the user clear updates on the cocktail preparation process. This prototype serves as a proof of concept, showcasing the practicality of the design and setting a foundation for further refinement and potential application in small business or home environments.

3.8 Sustainability Element in The Design Concept

The sustainability element in the design concept of the Mixer Cocktail project focuses on efficiency, energy conservation, and minimizing waste. The system is designed to use precise and efficient movements, reducing unnecessary energy consumption. The use of an Arduino microcontroller allows for low-power operation, ensuring the system consumes minimal electricity. Additionally, the automated process reduces human error and waste, as the precise measurements and consistent mixing ensure that ingredients are used optimally without excess.

Materials selected for the mixer and other components are chosen for their durability and recyclability, reducing the need for frequent replacements and lowering the environmental impact. By automating the cocktail-making process, the system also minimizes the need for disposable items like single-use stirrers. Overall, the design prioritizes long-term sustainability through efficient operation, durable materials, and waste reduction, aligning with eco-friendly practices and contributing to a more sustainable future in beverage preparation.

3.9 Chapter summary

This section has the full focus on block diagram, circuit design, prototype development, and Arduino app configuration. Each and every step of this process has provided me with the best opportunity to gain a better understanding and a good flow on how to design and construct a mixer cocktail.

CHAPTER 4
PROJECT MANAGEMENT AND COSTING

4.1 Introduction

The project management and costing for mixer cocktail involve strategic planning, coordination, and financial oversight to develop and implement an effective system for preparing fruit cocktail. This comprehensive approach encompasses defining project objectives, establishing timelines, allocating resources, and managing risks to ensure successful project execution. Key tasks include identifying stakeholders, assembling multidisciplinary teams, and delineating roles and responsibilities to facilitate collaboration and accountability. Additionally, cost estimation, budgeting, and financial forecasting are integral to optimizing resource allocation and ensuring project sustainability. By integrating project management principles with cost-effective strategies, the project aims to simplify and expedite the process for users

CONCLUSION

The automated cocktail mixer project demonstrates the potential of using microcontroller-based systems to streamline drink preparation in small businesses and high-demand environments. By employing an Arduino microcontroller, relay modules, pumps, an LCD display, and a mixer, the system can dispense precise ingredient quantities, blend them effectively, and provide real-time feedback to the user. This automation reduces manual labor, enhances accuracy, and ensures consistency in each prepared drink, which improves both operational efficiency and customer satisfaction. Throughout the development process, the design and assembly of the hardware components, combined with programmed controls, allow for smooth and reliable operation. The prototype validates the effectiveness of this approach, delivering an intuitive, efficient, and consistent solution for drink preparation. This project serves as a foundation for further advancements, such as refining ingredient tracking or adding customized drink options, making it a practical innovation for streamlining beverage service in small premises.