An Najah National University
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Mojito Maker Pro Machine

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Abstract

This paper presents a mojito machine that can be controlled by a mobile app or manually via the machine. The machine is designed to be used in the home or in the office. The application allows the person to choose the drink with the flavor he wants and asks him to confirm the order via a message that appears on the application screen. When the machine finishes executing the order, a notification is sent to the customer's phone. The machine is made of high-quality materials and is designed to be durable and easy to use. It is also environmentally friendly. The machine is a great way to enjoy a refreshing mojito at home or in the office.

The machine supports the automatic pouring of the cup using a dispenser cup and the pouring of ice and lemon using a container containing a scroll inside it that allows it to pour smoothly and automatically. We used a mechanism to crush the lemons smoothly and used special pumps with electric valves that control the pouring of syrup and soda. In the last stage, a cover is lowered to the cup automatically.

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Chapter 1

Introduction

Contents

We are on a journey to design an innovative machine for preparing summer mojitos, staying in tune with the rapid advancements in industries and innovations that captivate customer interest. In an era where production speed, without delays and minimal reliance on manual labor, alongside exceptional quality, are of paramount importance, our project aims to deliver a product that seamlessly integrates innovation, regulatory compliance, and environmental sustainability. We will now explore the stages we have processed and developed, leading to advanced levels of technological progress.

1.1 General background

Mojito is a summer drink made from various flavors of juice in addition to soda, lemon and ice are added to it. In this report we will show the design of our machine, which works automatically without human intervention. Our machine consists of two containers, one for ice and the other for lemon, and four tanks, one for soda and three others for three different flavors. we have a DC motor to control the conveyor belt, a DC motor for a car window to control the horizontal descent of the beater, a DC motor to control the descent of the cup cover, and we also have four pumps and four valves to control the descent of syrups and soda. We have three stepper motors, one to control the descent of the cup, the other to control the lemon scroll, and the last for ice.

1.2 Objectives

For our graduation project, our goal is to develop a simple, efficient and reliable machine to make a mojito that is superior to traditional methods. This machine will have the ability and potential to produce mojitos very quickly and with infinite precision without the need for human presence, making it a successful and beneficial investment for cafes and restaurants. By automating the process, employees can then do other tasks and accomplish the greatest amount of work, especially during peak times, which benefits overall efficiency. Our main goals are to improve our production while maintaining quality and reducing costs. We also seek to build a system that suits the diverse and different requirements of customers without the need for extensive and complex supervision. Our first priority is safety, so we provide good protection from dangerous tasks and ensure an easy-to-use interface. We also care about environmental friendliness and following public health and safety standards.

1.3 Significance or importance of your work.

By automating the mojito making process, the time required to prepare the drink can be significantly reduced compared to traditional methods. This enhances the operational efficiency of restaurants and cafes, allowing them to serve more customers in less time.

Reducing labor costs Since the machine prepares the mojito automatically, it reduces the need for specialized staff to prepare the drinks. This can reduce operational costs, especially in environments that require preparing a large number of drinks in a short time. Also, one of the major challenges in the beverage industry is maintaining the same level of quality every time the drink is prepared. The mojito machine ensures precise consistency in proportions and ingredients, resulting in a drink of consistent quality that satisfies customers. Reducing human error Relying on humans to prepare mojitos can lead to variations in quality due to human errors. Using the machine, these errors can be greatly reduced. Speed of service By reducing waiting time, the machine provides a faster experience for customers, increasing their satisfaction and encouraging them to return. This can be a major competitive advantage in the market. The machine design can also include mechanisms that reduce component waste, which contributes to conserving resources and reducing environmental impact. By using modern technologies such as the Peltier based cooling unit, the machine can be designed to be more energy efficient than traditional methods of cooling components. Availability of the feature of connecting with smart devices The machine can be designed to be able to connect to smartphones as we did or smart home systems, allowing users to control it remotely or prepare their favorite recipes with ease. Finally, the machine can be used in a variety of scenarios, from luxury homes to large events, which increases its flexibility and target market.

1.4 Organization of the report

Our report is carefully divided into main sections to guide you through the experience of making a mojito machine. Start with the introduction, background, and previous work for context, followed by the methodology that explains our approach.

Move on to the results and analysis for experimental results and interpretations. The discussion section puts the results into a broader context, while the conclusions and recommendations summarize the achievements and suggest future directions. The report concludes with references, acknowledging our sources.

Chapter 2

Constraints and Earlier Coursework

Contents

2.1 Constraints & Limitations

1- Budget: The parts used to complete this project require a high budget, and given the current poor economic conditions, we were suffering in this regard because the budget is limited.

2- The lack of time available to complete this project, as it was in the summer, meant that we only spent two months planning, designing and implementing the project. This made us stick to the work that was completed and made us overlook other matters that should have been implemented.

3- Our general lack of knowledge about the parts we used, as this was the first time we were installing and using these parts, made the process more difficult.

4- The process of designing and getting the 3D printed part's was a difficulty , because of lack of time.

5- Doing pretty much work on the Project , Report , and Demo on the final exams period was making a lot of pressure which makes us don't think with a lot of creativity and peace of mind.

6- Navigating the checkpoints was a major challenge, causing frequent delays in reaching the university, which affected our ability to complete the project on time.

7- As girls, we faced difficulties in using mechanical and carpentry tools, which forced us to seek help from other people to help us with these tasks.

8- The intensity of the war and tensions in the West Bank increased during the critical period of the project, which increased our anxiety and fear of not being able to complete the project as required.

9- Ice Maintenance Challenges: Maintaining the consistency of the ice was a major challenge. Although we used an ice box and a Peltier cooler, which provided some level of cold storage, it was not a professional solution. The lack of a more advanced cooling system impacted our ability to maintain the ice at the desired temperature consistently, which impacted the overall efficiency and performance of the project. This limitation highlighted the need for more advanced solutions in future iterations of the project.

2.2 Earlier Coursework

1. Electronics course: that provides instruction in various aspects of electronic systems and technologies.

2. Microcontrollers Course: We be able to deal with any controller and use it to control devices like motors and get information from sensors and how to deal with serial communication.

3. Microcontrollers Lab: which includes hands-on experience with Arduino and its functionalities, and topics like controlling stepper motor and dealing with analogs.

4. Critical thinking and scientific research: teaching students skills such as reading scientific publications and utilizing modern technologies like LaTeX to produce research papers.

5. Networks and Wireless: We used the esp32 Wi-Fi module to be able to control the Mojito machine using Wi-Fi.

Chapter 3

Literature Review

Mojito machines are automated devices that can dispense mojito quickly and accurately,without the need for human intervention. They have been developed in recent years to meet the growing demand for mojitos in businesses, such as restaurants, as well as in homes.

Using a mobile app to control the machine is also a new approach that makes the machine more user-friendly. The app allows the user to choose the type of mojito they want, and confirm the order, making it easy for the user to customize the mojito to their liking. This machine also supports the addition of lemon slices with the possibility of beating them in a smooth and soft way, which gives the drink a delicious taste, and also supports the falling of ice cubes, which makes the drink refreshing and cold in the summer.

The design of the device is modular, making it easy to customize and upgrade.

The device consists of a number of different components that can be easily replaced or upgraded. This makes the device future-proof and ensures that it can be adapted to meet the changing needs of users.

The device is capable of dispensing a variety of mojitos, including pure and mixed flavors. This makes it a versatile device that can be used in a variety of settings.

The machine is efficient and reliable, and is capable of dispensing mojitos quickly. This makes it a valuable addition to any business or home that serves mojitos. Overall, the mojito machine described in this paper is a new and innovative design that offers a number of advantages over traditional mojito machines. The mobile app and modular design make the machine more accurate, easy to use, and versatile. The machine is also efficient and reliable, making it a valuable addition to any business or home that serves mojitos.

Chapter 4

Methodology

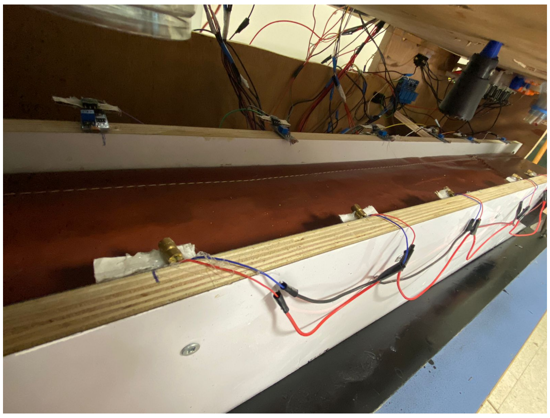
Contents

4.1 Introduction

This chapter outlines the methodology adopted for the design and implementation of the Mojito Maker Machine hardware project, with a specific emphasis on the design process, tools and technologies utilized and details of usage .

4.2 System Architecture

4.2.1 Conveyor Belt



(a) Conveyor Belt

Figure 4.1: Conveyor Belt Figure.

The flat belt conveyor, shown in Fig. (A), supports the cups as a structure for placing them and carries them forward in sequence onto the lemon, ice, beater and pump containers, and then onto the covering wheel, where the cups will be covered. The conveyor belt arrangement consists of a wooden frame, a motor, two pulleys and a belt. The frame has low friction with the leather belt. Therefore, only two pulleys on each side can facilitate the belt movement well.

4.2.2 covering Wheel

The cover wheel is a circular base made of wood, containing three circular holes of equal size. The rotation of the base is controlled by a DC motor, and the base can hold three covers. When the base is moved at a certain angle, the cover automatically descends onto the cup when the cup is in the correct position on the conveyor belt.

When the cover descends, it is covered directly without the need to use a tool to press it, in order to avoid liquids overflowing from inside the cup due to excessive pressure, especially since the cup is filled with liquids at this stage. In addition, the material from which the cover is made is weak plastic that cannot withstand great pressure.

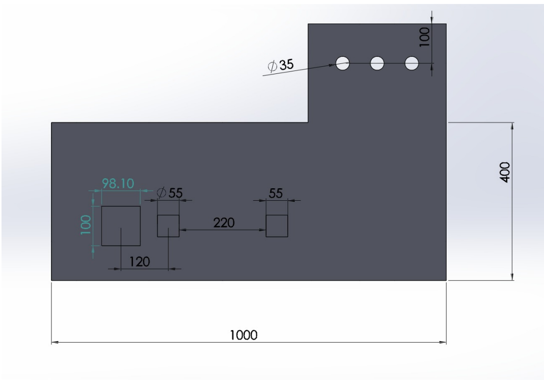
This stage is the last in the process of preparing the cup before it is delivered.

(a) Cover Wheel

Figure 4.2: Description of the Cover wheel.

4.2.3 Bottle Stand

It is the wood that is considered the surface of the project, i.e. the project model. We made 4 circular holes with a diameter equal to the diameter of the bottle neck so that we can stop the bottles on the model in an orderly manner and to facilitate the movement of the liquids inside them and their smooth and effective descent.



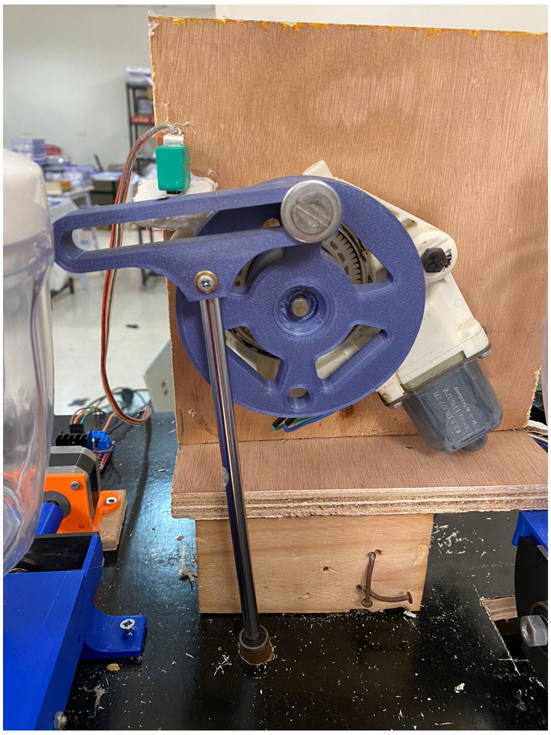
(a) Stand Design Before Implementation on The Ground.

(b) Stand Design After Implementation on The Ground.

Figure 4.3: Description Of The Bottle Stand.

4.2.4 3D Printed Dispenser Cup And Blend Gear Mechanisms

(a) Dispenser Cup



(b) Blend Gear

Figure 4.4: 3D Printed Dispenser Cup And Blend Gear Mechanisms.

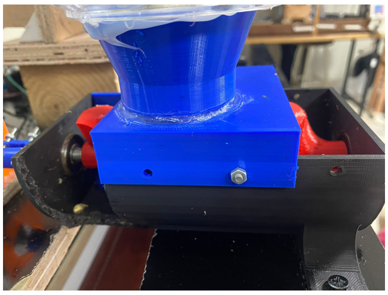
The 3D printed dispenser cup and blender are two essential components of our process. They are designed to be simple, cost effective and easy to use, making the process even simpler.

When the dispenser cup is moved by the stepper motor, it moves forward and separates the first cup from the rest of the cups above it through the triangular opening that helps in separating it and then returns to its normal position after the cup is lowered so that the rest of the cups remain fixed in place and arranged.

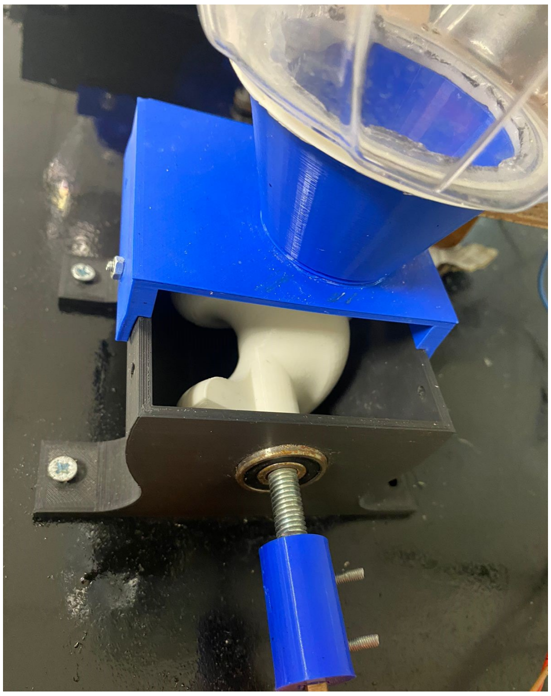
As for the blender, it moves by the DC motor of the car window and is connected to the gear, so the blender is connected to the gear that moves in a circular motion and when it moves, it gives the blender a vertical movement up and down

4.2.5 3D Printed Ice and Lemon Screw with Ice and Lemon Cone and Line Dispenser Housing

(a) Lemon Container And Screw



(b) Lemon Screw



(c) Ice Screw

Figure 4.5: 3D Printed Ice and Lemon Screw with Ice and Lemon Cone and Line Dispenser Housing.

We designed this screw for ice and lemon so that they work in the same way. The movement of the screw printed from the 3D printer is controlled by a stepper motor, so it moves in a spiral motion to smoothly drop the ice and lemon grains in a specific quantity and size suitable for the cup. We used this method because it suited the size of the ice and lemon used and it gave an attractive shape and an effective and smooth method.

4.3 Tools and Technologies

Our mojito production and making line project became a tangible reality thanks to the essential tools and technologies that were carefully adopted. These crucial resources, such as smart sensors and micro-motors, played a pivotal role in transforming innovative design ideas into a fully functional product. These technologies helped us achieve the perfect harmony between mechanical and electronic systems, which contributed to simplifying operations and ensuring optimal performance.

By leveraging advanced control software, we were able to develop a system that can be customized to meet different user needs and ensure high production efficiency. The integration of smart sensing technologies also allowed us to accurately monitor essential components such as fluid levels, which enhances the quality of the final product.

One of the innovations we adopted in our project was the use of a laser sensor in conjunction with an LDR (Light Dependent Resistor) sensor to sense the presence of the cup in its designated place. Once the cup reaches its designated location, the sensor sends a signal to the control system to accurately lower the components into the cup, ensuring an even and rapid distribution of materials without the need for manual intervention. This technology contributed to increasing production efficiency and avoiding any potential spills or errors.

In the following sections, we will detail the tools and technologies that formed the backbone of our project, such as programmable controllers (PLCs) and electric actuators, which helped ensure the accuracy of operations and reduce human error, as well as advanced cooling technologies that helped maintain a constant ice temperature for longer, enhancing the efficiency of the overall system.

Arduino Mega

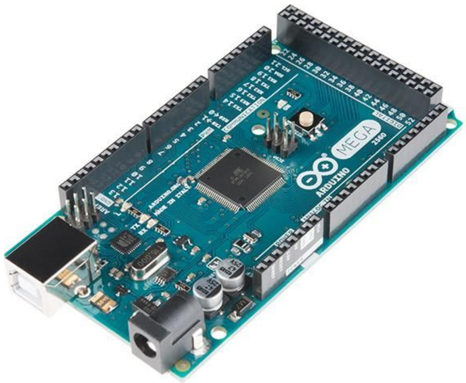


Figure 4.6: Arduino Mega.

Absolutely! At the core of our hardware project is the Arduino Mega, a microcontroller packed with 54 digital I/O pins, 16 analog inputs, and 256 KB of memory. These pins serve as the connectors for our Project components – buttons,motors, and Sensors.implementation Through the Arduino Inte- grated Development Environment (IDE), we craft intricate code,to make the accuracy and efficiency work at the highest level. The IDE also facilitates real-time Communication with the Arduino Mega, allowing us to upload and execute code seamlessly. This dynamic interaction between hardware and software forms the backbone of our project, where the Arduino Mega's adaptability and memory contribute to a responsive and intelligent experience, truly showcasing the fusion of technology.

NEMA 17 stepper motor 17HS4401

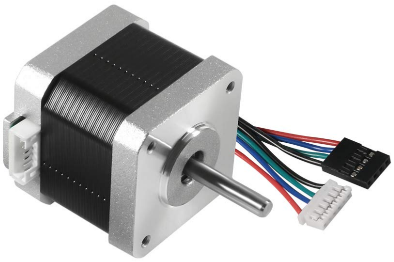


Figure 4.7: NEMA 17 stepper motor 17HS4401.

NEMA 17 stepper motor, such as the 17HS4401 model, is renowned for its precise control. It adheres to NEMA 17 standards with a 1.8-degree step angle (200 steps per 360-degree rotation). This motor boasts considerable holding torque—its static position maintenance force. It's widely used in precise positioning tasks like CNC machines, 3D printers, gimbals, and robotics.

Regarding its electrical needs, the 17HS4401 has specific current and voltage ratings for optimal performance. It adheres to NEMA 17 dimensions—42mm by 42mm faceplate, 5mm shaft. It comes in unipolar and bipolar coil setups, influencing wiring and control methods. Its popularity in maker and engineering communities stems from its versatile compatibility and integration ease.

Sensor Ultrasonic

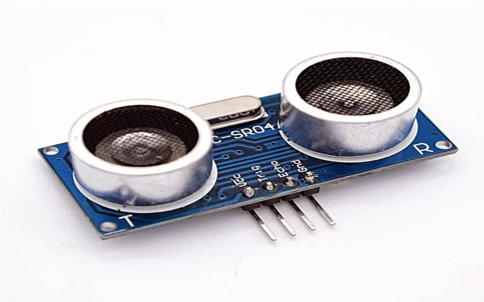


Figure 4.8: (Ultrasonic) sensor.

Ultrasonic sensors are versatile devices used to measure distances by emitting high-frequency sound waves and detecting their reflections. These sensors operate by sending out ultrasonic pulses, which bounce off an object and return to the sensor. By calculating the time it takes for the echoes to return, the sensor determines the distance between itself and the object. Ultrasonic sensors are commonly used in applications such as obstacle detection in robotics, level sensing in tanks, and parking assistance in vehicles. Their ability to provide accurate measurements regardless of light conditions makes them valuable for various automation and measurement tasks.

Sensor LDR

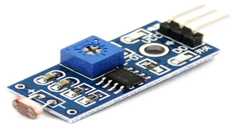


Figure 4.9: (LDR) sensor.

Light-dependent resistors (LDRs) are a versatile component that detects changes in light intensity and converts it to a varying electrical resistance. LDRs are commonly used in a wide range of applications and can sense the presence or absence of light, making them ideal for ambient light sensing, automated lighting controls, and light-sensitive devices. When exposed to light, the resistance of LDRs decreases, allowing more current to flow, while in the dark, their resistance increases dramatically. Depending on the specific application, LDRs can be used to detect light levels, trigger alarms, or activate devices based on ambient brightness. Their ability to respond to changes in light intensity makes them an integral part of many systems such as street lighting automation, solar energy devices, and electronic display systems.

Laser

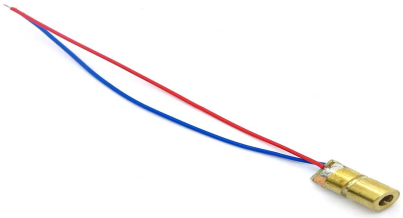


Figure 4.10: (Laser) .

A 5V laser is a simple and effective device used in many electronic applications. It generates a precise beam of light that can be directed at a light sensor known as an LDR (Light Dependent Resistor). When the laser beam is directed directly at the LDR, the sensor's resistance is at its lowest level as it receives light, allowing the electric current to pass through. However, when the beam is cut off or the light level changes, the LDR's resistance increases, causing a change in the circuit signal. This system is used in applications such as alarm systems, sensors, and robotics to detect motion or activate certain functions based on the interruption or continuation of the laser beam.

l298n motor driver

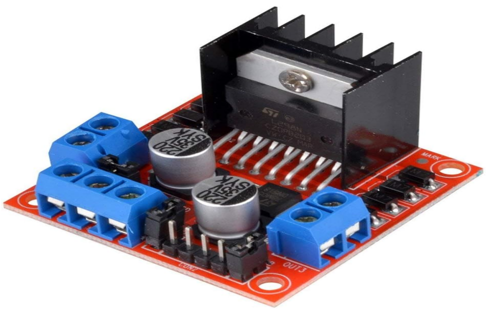


Figure 4.11: l298n motor driver.

The L298N motor driver module is a widely used dual H-bridge motor controller that enables the control of two DC motors or a single stepper motor. It is capable of driving motors with higher current and voltage requirements, making it suitable for various robotics and automation projects. The module offers both forward and reverse control for each motor and can handle peak currents, contributing to efficient motor operation. The L298N's compatibility with microcontrollers and ease of integration have made it a popular choice for driving motors in applications such as mobile robots, CNC machines, and remote-controlled vehicles.

LCD Display

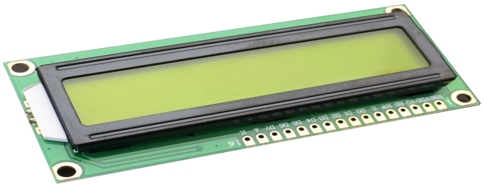


Figure 4.12: LCD Display.

An LCD (Liquid Crystal Display) is a flat-panel display technology that uses liquid crystals to modulate light and create images or text. LCD displays are commonly used in electronic devices such as televisions, computer monitors, smartphones, and digital clocks. They offer high-quality visual output with sharp images and a wide range of colors. LCDs consist of pixels that can be individually controlled to display different colors and patterns. They are energy-efficient and come in various sizes and resolutions, making them suitable for diverse applications including information displays, user interfaces, and visual output in electronic devices.

Keypad

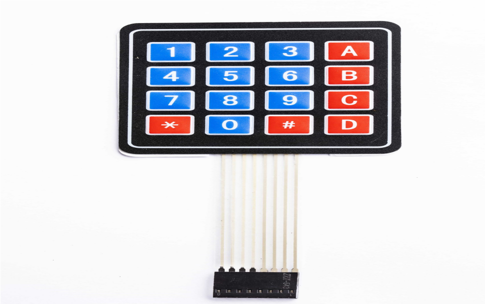


Figure 4.13: Keypad.

keypad, short for "keypad entry system" or "keypad input device," is a user interface component that consists of a set of buttons arranged in a grid or array. Each button typically represents a specific character, digit, or function. Keypads are commonly used for entering numerical data, text, or commands into electronic devices, security systems, and other applications. They can be found on devices like calculators, remote controls, security alarm panels, and ATM machines. Keypads provide a convenient and tactile way for users to input information, and they are often used in combination with other display technologies like LCDs to create user-friendly interfaces.

Power Supply

Figure 4.14: Power Supply.

A power supply is an essential electronic component that converts input voltage from a source, such as a wall outlet or a battery, into the required output voltage and current needed to operate various electronic devices. Power supplies provide the necessary energy to run everything from small gadgets to complex systems. They come in various forms, including AC-DC adapters for household devices, DC-DC converters for voltage regulation, and power distribution units (PDUs) for data centers. Power supplies ensure stable and reliable operation of electronics by delivering the appropriate and consistent electrical power for their functioning.

I2C module for lcd

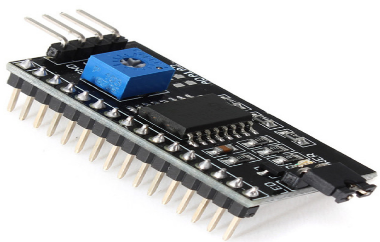


Figure 4.15: I2C module for lcd

An I2C module for LCD simplifies connecting and controlling an LCD screen using the I2C communication protocol. It reduces wiring by using fewer pins and is commonly used in projects with limited microcontroller pins. This module makes integrating LCDs into devices like IoT systems and robots easier and more efficient.

ESP32

Figure 4.16: ESP3

The ESP32 serves as a compact yet remarkable computer, adding an element of intelligence to your projects. With rapid processing and seamless Wi-Fi and Bluetooth connectivity, it stands as a versatile tool. Its pins allow you to integrate various components such as sensors and lights, while its robust memory effortlessly retains extensive data. By translating your instructions into action, the ESP32 transforms concepts into reality. Imagine crafting a plant watering system that communicates with your phone, autonomously nourishing plants when they require moisture. In essence, the ESP32 serves as an ingenious collaborator, amplifying your imaginative endeavors.

Single Channel Relay Module

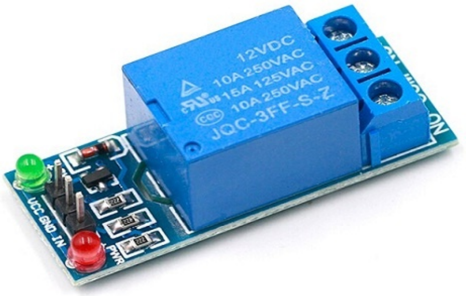


Figure 4.17: Relay

A single-channel relay is an electromechanical device used for switching or controlling electrical circuits. It typically consists of a coil, an armature, and a set of contacts. When an electrical current is applied to the coil, it generates a magnetic field, which attracts the armature and closes or opens the contacts. This action allows the single-channel relay to control the flow of electricity to a connected device or circuit. Single-channel relays are commonly used in a variety of applications, such as home automation, industrial control systems, and automotive electronics, to enable remote or automated control of electrical loads, such as lights, motors, or heaters. They are known for their simplicity, reliability, and versatility in providing an isolated switch for electrical circuits.

four channel relay module

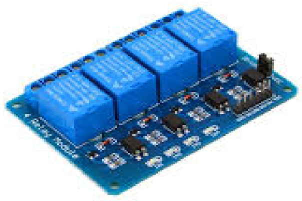


Figure 4.18: 4-Relay

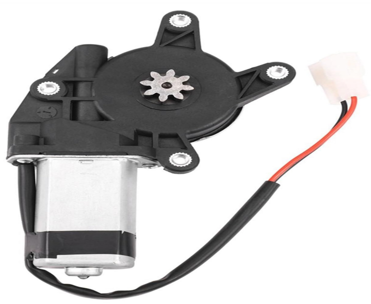
A four-channel relay is an electromechanical device designed to control multiple electrical circuits independently. Like a single-channel relay, it consists of a coil, armature, and contacts, but it includes four separate relays within a single module. Each channel operates independently, allowing the control of up to four different devices or circuits simultaneously. When an electrical current is applied to the coil of a specific channel, it generates a magnetic field, moving the armature and either opening or closing the corresponding contacts. Four-channel relays are widely used in more complex applications where multiple loads need to be controlled, such as in home automation, industrial machinery, and robotics. They enable automated or remote control of various electrical loads, including motors, lights, pumps, and heating systems, with a single control interface. The isolation provided by the relay ensures safety by keeping high-power circuits separate from low-power control systems. Known for their efficiency, reliability, and capacity to handle multiple tasks at once, four-channel relays are a versatile solution in modern electrical control systems.

Two channel relay module

Figure 4.19: 2-Relay

A two-channel relay is an electromechanical device that allows control of two independent electrical circuits. Similar to single and multi-channel relays, it consists of coils, armatures, and contacts, but it provides two separate relays within a single module. Each channel can control a different device or circuit, making it possible to switch or automate two electrical loads simultaneously. When an electrical current is applied to one of the relay's coils, a magnetic field is created, which moves the armature and opens or closes the corresponding contacts, controlling the flow of electricity to the connected load. Two-channel relays are commonly used in home automation, industrial systems, and other applications where control of multiple devices is required, such as lights, motors, or appliances. They offer the advantage of controlling two circuits with a single controller, providing simplicity and flexibility. Additionally, they help maintain electrical isolation between the control and load sides, enhancing safety and reliability in systems that manage low and high-power devices.

DC Gear Motor



(a) DC Car Window

(b) DC Belt Motor And cover wheel

A DC gear motor is a compact electric motor with an integrated gearbox, designed for specific applications requiring controlled speed and increased torque. The combination of a direct current (DC) motor and precision gears enables precise and efficient motion control in devices such as robotics, electronic locks, and small appliances. These motors are known for their compact size, reliability, and versatility, making them ideal for applications where space is limited and precise movement is essential.

DC Water Pump

Figure 4.21: DC Water Pump

A 12-volt water pump for projects is a compact and lightweight device designed to efficiently move water using a 12-volt DC power supply. Ideal for small-scale applications such as DIY irrigation systems or water circulation in projects, this pump is portable, easy to install, and offers reliable performance. Its durable construction ensures longevity, making it a cost-effective solution for hobbyists and DIY enthusiasts seeking a simple and versatile water pumping solution for their projects.

Dc Solenoid valve

Figure 4.22: Dc Solenoid valve

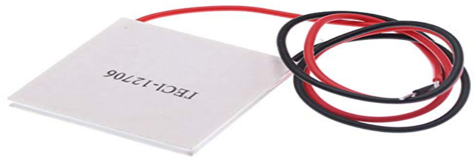
A 12-volt solenoid valve is a compact and efficient device designed to control the flow of liquids or gases using a 12-volt DC power supply. Ideal for small-scale applications such as automated irrigation systems, fluid control in DIY projects, or water management, this valve operates by using an electromagnetic coil to open or close the valve when powered. Its lightweight and portable design make it easy to integrate into various setups, providing precise control over fluid flow. Built for durability, the solenoid valve ensures long-lasting performance, making it a reliable and cost-effective solution for hobbyists, DIY enthusiasts, and engineers looking for a simple yet versatile fluid control mechanism.

limit switch

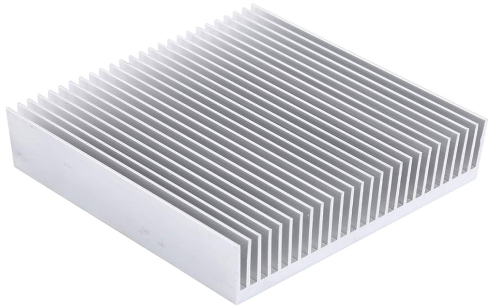
Figure 4.23: limit switch

A limit switch is an electromechanical device used to detect the presence or position of an object by making or breaking an electrical connection. When an object comes into contact with the switch actuator, it triggers the internal mechanism, opening or closing the circuit. Limit switches are commonly used in industrial applications to control machinery movement, detect the end of travel in mechanical systems, and ensure safety by preventing over-travel or collisions. They are known for their reliability and precision in automated systems.

Peltier cooler with heat sink fan



(a) Peltier cooler



(b) heat sink

(c) A Fan

The principle of a cooling piece with a heat sink and fan is based on transferring heat from hot components to the surrounding air efficiently. The cooling piece (usually made of a heat-conducting material such as aluminum or copper) absorbs heat from the device or component to be cooled, and this heat is then transferred to the heat sink, which increases the cooling surface area thanks to its finned design. The fan then provides airflow through the fins of the heat sink, helping to dissipate heat faster and achieve effective cooling of the components. This system helps to maintain a suitable temperature and prevents overheating to ensure optimal performance.

Ice Box

Figure 4.25: Ice Box

The principle of the ice box is to provide a thermally insulated environment to keep the ice cold for as long as possible. This is done by using insulating materials that prevent the transfer of heat from the outside to the inside, such as foam or insulating plastic, which reduces the exposure of the ice to the surrounding warm air. In the Mojito project, the ice box plays a vital role in keeping the ice in its solid state to ensure the quality of the drink and the continuity of production without the need for frequent re-cooling. This reduces the costs and time required to refill the ice, and ensures the provision of cold and high-quality drinks to customers.

Project Accessories

(a) Design Menu

(b) Menu With Keypad

(c) Label For Cups

(d) Cups

In this project, we wanted to add touches that give a beautiful and nice character and simple movements. We designed a special menu for the foods we have available with a number next to it that expresses the number of the food from the keypad. Once the customer chooses the number he wants, his order starts to be used. We also designed a special logo for the cups we use in our project that expresses the name of the project and its owners. Although they are simple touches, they gave a beautiful and distinctive character to the project.

Mobile Application

We used App Inventor to create a simple mobile application consisting of only two pages. The first page is the general page of the application, which includes the name of the application and a button to access the second page, which contains the menu that our walker can perform.

When you click on the menu button, the application goes to the second page, which is the menu page, which contains all types of drinks supported by the machine

Figure 4.27: Application home page

Figure 4.28: Second page of the application

The person chooses any drink he wants and clicks on it, and a message comes to him confirming the request, so that if he chooses yes, the machine receives this request and starts making the drink, and if he chooses no, the machine does not work.

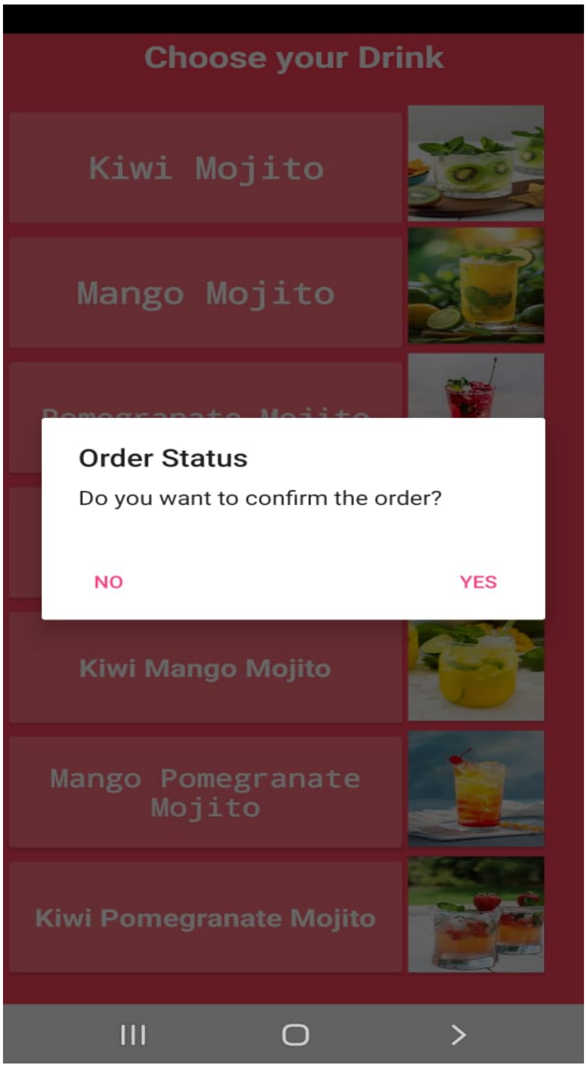


Figure 4.29: Confirm order

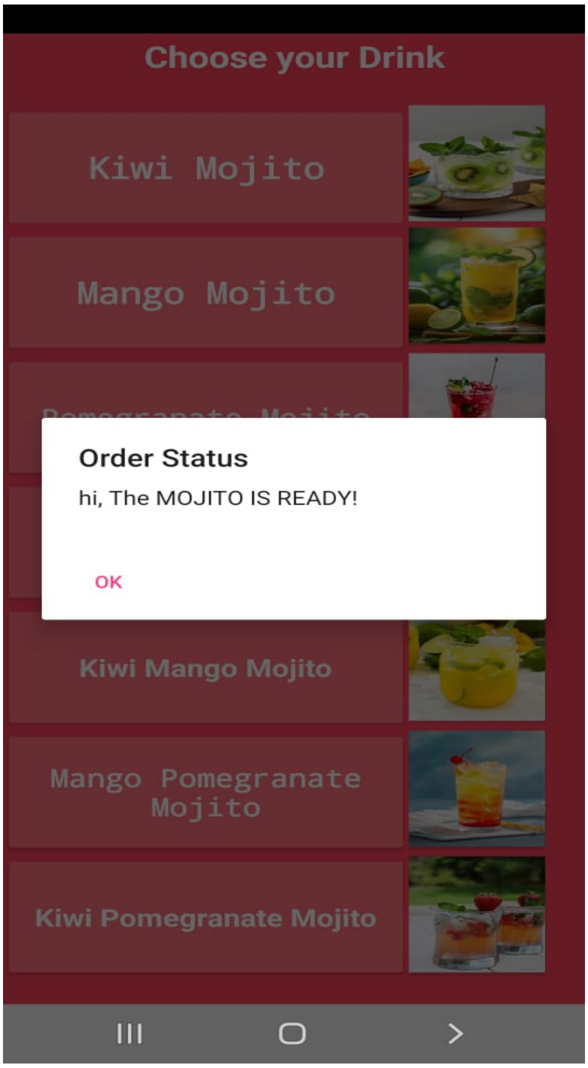


Figure 4.30: Notification

When the machine finishes making the drink and reaches the final stage and the reception center at the end of the conveyor belt, the machine sends a notification to the application stating that the drink is ready

4.4 3D printer links

cup.stl

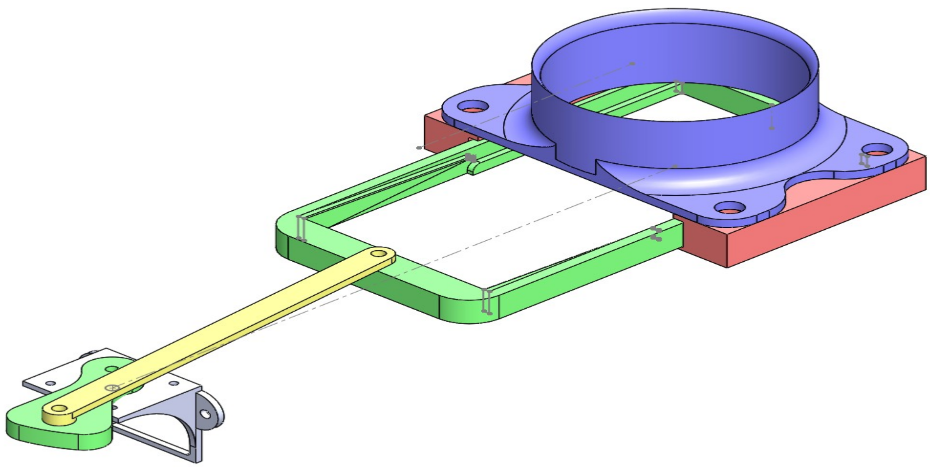


Figure 4.31: Cup Dispenser

lemon.stl

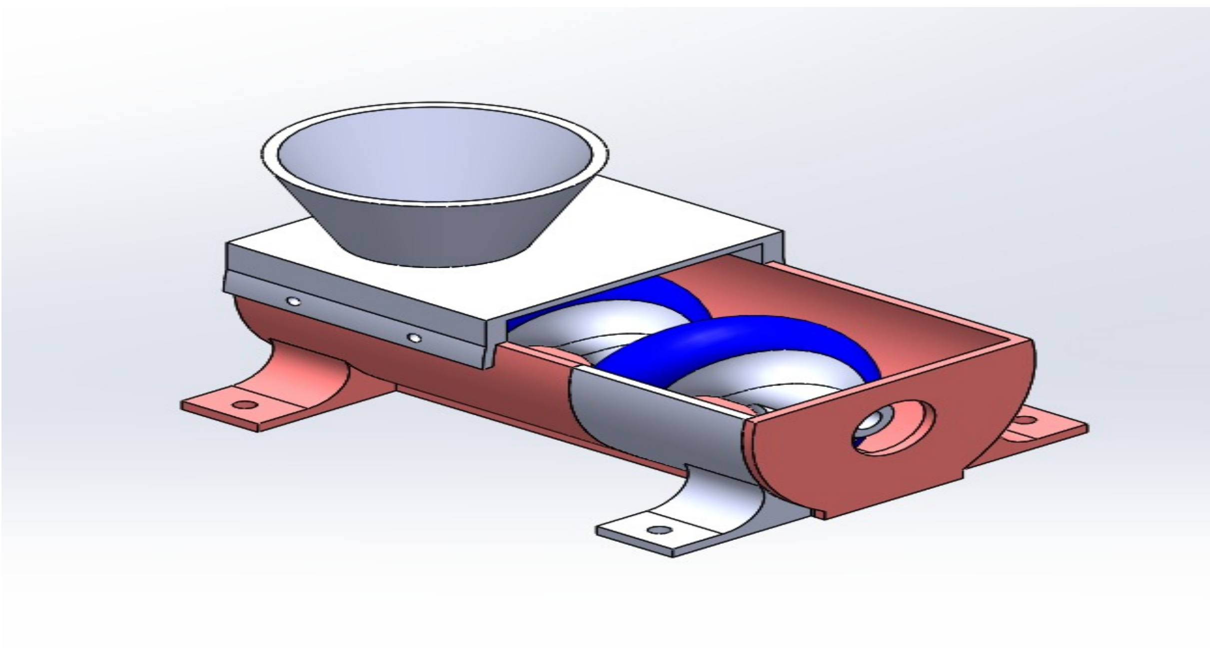


Figure 4.32: Full Lemon Cut Design

ice.stl

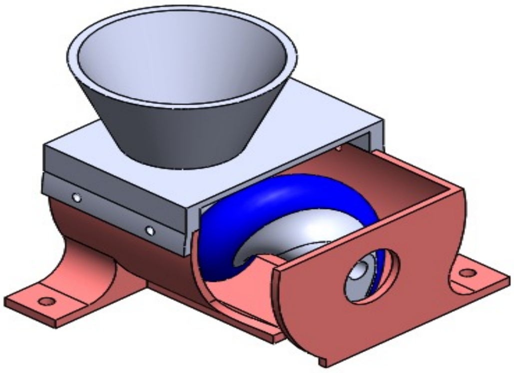


Figure 4.33: Full Ice Cut Design

blender.stl

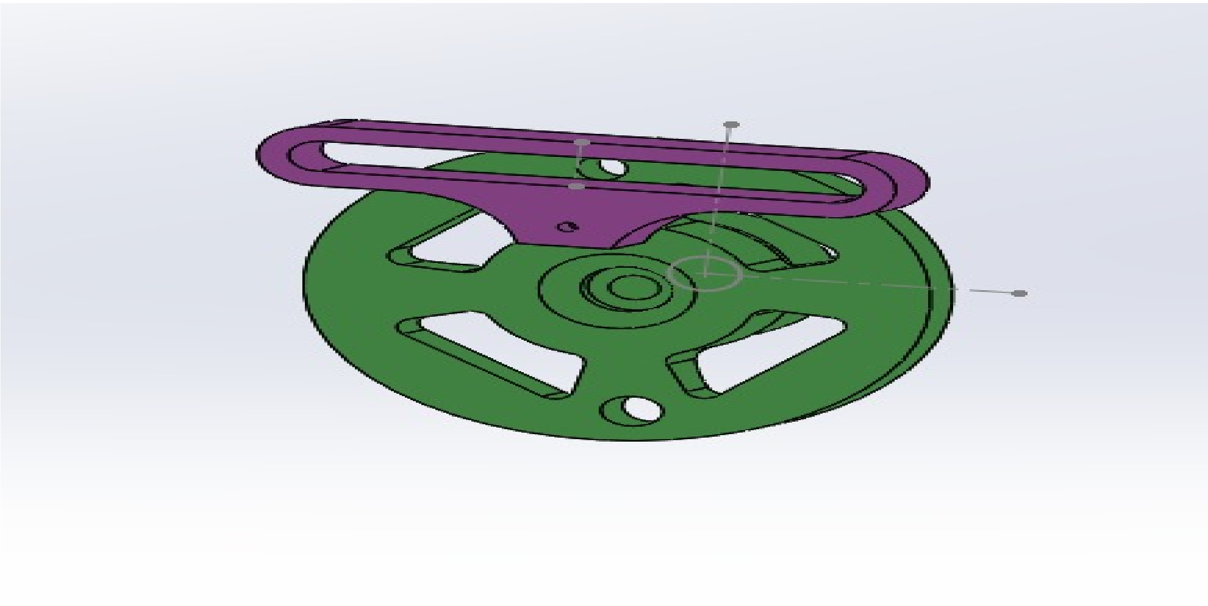


Figure 4.34: Blender gear mechanics

4.5 What did we use in this project and why?

1. Design a mojito making machine without human intervention
2. Use 5 LDR sensors with 5 lasers to detect the location of the cup
3. We used ultrasonic to check the levels of things.
4. Use a DC motor to move the conveyor belt.
5. Use a stepper motor to control the screw mechanism that regulates the descent of lemons.
6. Use a car window motor to lower and raise the racket that functions as a lemon masher.
7. Use limit switches to control the stop of the blender and return it to the original point
8. Use a stepper motor with a screw piece that drops lemons and ice
9. Use a Peltier piece with a fan to distribute cold air to the ice
10. Use an ice box to keep the ice for as long as possible
11. Use pumps to draw syrups and soda
12. Use a solenoid valve connected to the pump to control stopping and opening the liquids
13. Use a DC motor to lower the lid onto the cup.
14. Provide a keyboard and menu on the project model to allow for the selection of desired options.
15. Control the machine using a microcontroller.
16. using a esp.
17. Test the machine to ensure it operates as designed.

4.6 All Parts And full Project Assembled

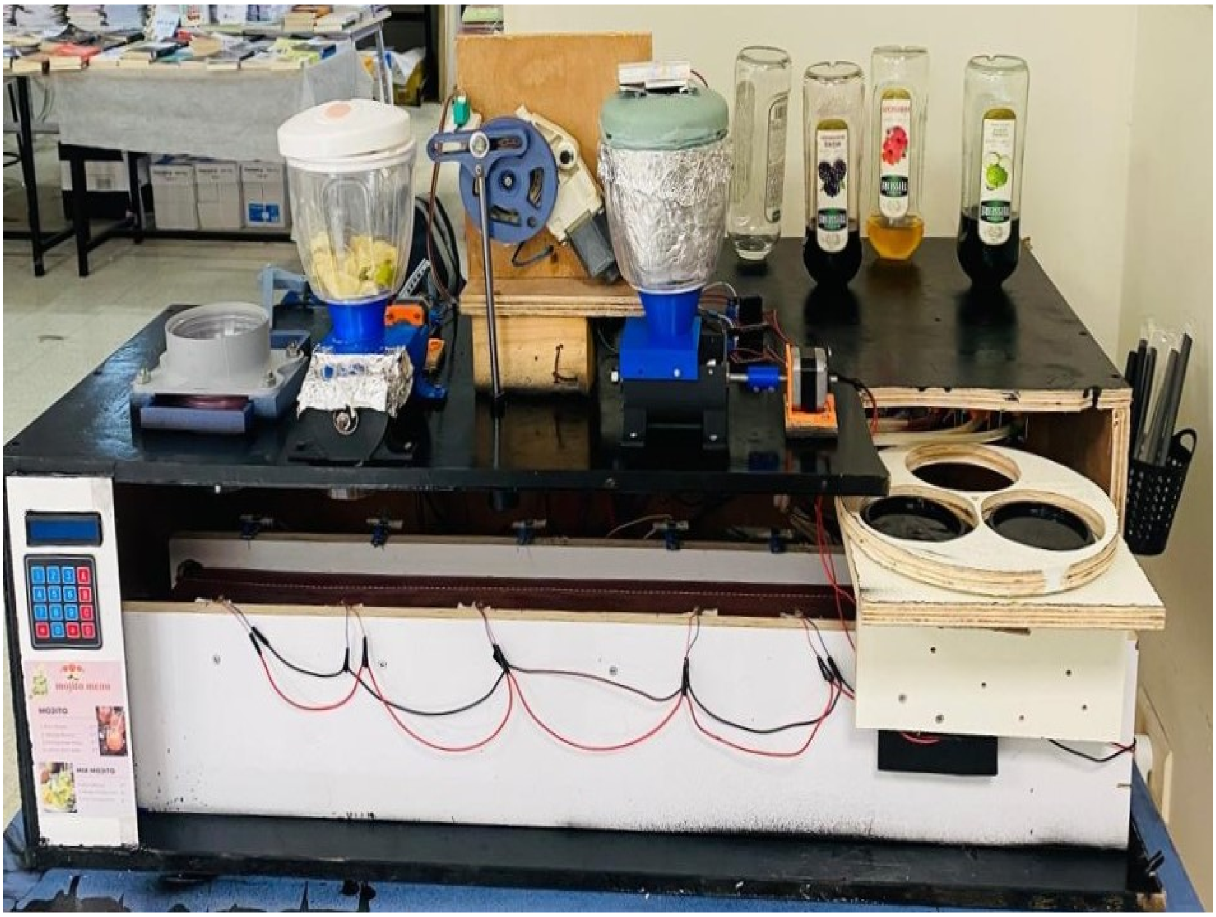


Figure 4.35: All Parts Assembled

Chapter 5

Conclusion And Future Work

Contents

5.1 Conclusion

This work was accomplished with precision and high quality, and it became possible to make a complete cup of mojito from scratch without human intervention and in the required form. It had a good effect in terms of the effort used in making this drink, with few hands and in an automatic manner.

5.2 Future Work

The project is not finished yet and can be developed and improved to include several additional features:

1- Adding an automatic container to preserve ice cubes for the longest possible period

2- Adding an automatic lemon cutting machine so that the whole lemon is added and the machine cuts it and drops the ready-made lemon pieces

3- Using other sizes for the cups and dealing with each cup in the required manner

4- Adding pressure and fixing to the cup cover in an accurate, effective and smooth manner

5- Adding straws automatically to the cup with the cover to be complete in the required manner

Chapter 6

Results And Discussion

Contents

6.1 Results

The results of the project were generally positive. The mojito machine was able to dispense mojitos quickly and accurately, without the need for human intervention. The machine was also able to maintain a consistent level of quality and achieved the following:

1- The Mojito glass is fully packed according to the required flavor and ready to drink

2- The project is working as planned and the tools used are very effective and have the necessary mechanisms to deliver the final

6.2 Discussion

The mojito project achieved speed and accuracy in work, but there were some points that needed discussion, such as the ice cubes that we were not able to find a solution to preserve in their container in this short period. We added the electronic cooling piece, but it did not achieve the desired goal. This was a problem we faced during the work. We hope that in the near future, as we mentioned in the future work, we will find a solution to this problem.

Appendices

Appendix A: Arduino Code

Arduino Code in GitHub

Appendix B: ESP Code

```
#include <WiFi.h>

// تعريف الـ LED المتصل على بن رقم 12
const int ledPin = 12;

// معلومات الـ Wi-Fi
const char* ssid = "Malak Jawabreh";
const char* password = "Malak1234";

WiFiServer server(80);
String data = "";

void setup() {
  Serial.begin(9600);  // الاتصال السيريالي مع الكمبيوتر
  Serial1.begin(9600, SERIAL_8N1, 16, 17); // الاتصال السيريالي مع Arduino Mega عبر RX1 و TX1

  pinMode(ledPin, OUTPUT);  // تعيين بن 12 كإخراج للـ LED
  digitalWrite(ledPin, LOW); // التأكد من أن الـ LED مطفأ في البداية

  WiFi.softAP(ssid, password); // تفعيل وضع نقطة الوصول

  IPAddress IP = WiFi.softAPIP(); // الحصول على عنوان الـ IP
  Serial.print("AP IP address: ");
  Serial.println(IP);

  server.begin(); // بدء السيرفر
}
```

Figure 6.1: Esp Code 1

```
void loop() {
  WiFiClient client = server.available();

  if (client) {
    String currentLine = "";
    String postData = "";
    bool isPost = false;
    int contentLength = 0;

    while (client.connected()) {
      if (client.available()) {
        char c = client.read();

        if (c == '\n') {
          if (currentLine.length() == 0) {
            if (isPost) {
              // قراءة بيانات POST
              while (postData.length() < contentLength) {
                if (client.available()) {
                  char c = client.read();
                  postData += c;
                }
              }
              Serial.print("POST Data: ");
              Serial.println(postData);
```

Figure 6.2: Esp Code 2

```
                        Serial.print("POST Data: ");
                        Serial.println(postData);

                        // هنا يمكنك معالجة بيانات POST، مثل تشغيل الـ LED أو إرسال البيانات إلى Arduino Mega
                        if (postData == "kiwi" || postData == "Mango" || postData == "Pome" ||
                            postData == "lemon" || postData == "kiwi_man" || postData == "man_pome"|| postData == "kiwi_pome") {
                          digitalWrite(ledPin, HIGH); // تشغيل الـ LED
                          Serial1.println(postData); // إرسال بيانات إلى Arduino Mega
                        } else {
                          digitalWrite(ledPin, LOW); // إيقاف الـ LED إذا لم تكن البيانات مطابقة
                        }


                   unsigned long startTime = millis();
while (millis() - startTime < 30000) {

  // انتظار حتى تصل البيانات أو مرور 30 ثانية (30000 مللي ثانية)
}
 client.print("HTTP/1.1 200 OK\r\nContent-Type: text/plain\r\n\r\n");
                    client.print("hi, "); // إرسال الرسالة المستلمة من Arduino Mega

while (!Serial1.available()) {
  // انتظار حتى تصل البيانات أو مرور 30 ثانية (30000 مللي ثانية)
}

                        if (Serial1.available()) {
                          data = Serial1.readString();
                          Serial.println("Received from Arduino MEGA: " + data);
                        } else {
                          data = "No Data Received"; // إذا لم تصل بيانات في الوقت المحدد
                        }
```

Figure 6.3: Esp Code 3

```


                client.print(data); // إرسال الرسالة المستلمة من Arduino Mega

                // الآن يمكنك إنهاء الاتصال
                client.stop(); // إنهاء الاتصال
                break;
              }
            } else {
              // تحليل الهيدر
              if (currentLine.startsWith("Content-Length: ")) {
                contentLength = currentLine.substring(16).toInt();
              }

              if (currentLine.startsWith("POST ")) {
                isPost = true;
              }

              currentLine = "";
            }
          } else if (c != '\r') {
            currentLine += c;
          }
        }
      }
    }
  }
```

Figure 6.4: Esp Code 4

Appendix C: Components and Quantity

Component	Quantity
NEMA 17 Stepper Motors	3
DC Motors	3
LDR Sensor	6
Arduino Board	1
Keypad	1
LCD Display with I2C	1
L298N Motor Driver	4
Relay 4 Channel	1
Relay 2 Channel	1
Relay 1 Channel	2
Water Pump	4
Solenoid Valve	4
Fan	1
Heat Sink	1
Peltier cooler	1
Ultrasonic sensor	
Laser	6

Table 6.1: Component Quantity

Chapter 7

References

NOTE: You can click on any link

1- **Design and Assembly of An Automated Juice Mixing Machine.**

2- **Design and fabrication of fresh juice vending machine for commercial applications.**

3- **Intelligent Juice Extractor By Arduino.**