An-Najah National University

Faculty of Engineering & Information Technology

Department of Computer Engineering

Graduation Project II

Velvet Touch By Soap

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Disclaimer

Shafiqa Abdat and Marah Shakhshir have written this report as requirements for Bachelor's degree in Computer Engineering Department. No one modifies or corrects it because it will be evaluated by professors at An-Najah National University. It is worth mentioning that An-Najah National University does not have any responsibility for any word in this report.

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Abstract

In recent months, our community has faced a lack of job opportunities. Many women have turned to soap manufacturing as their primary occupation. To support these small-scale ventures, we decided to develop a mechanism for making medical soap in a faster and easier way.

Our project focuses on producing soap from scratch using water, olive oil, and soda as the main ingredients. Secondary ingredients include colors and medicinal oils like aloe vera, flower water, etc. The process begins by heating the oil, water, and soda with a heating source. Once heated, we mix them thoroughly. Then, we add the medicinal oils and colors, mix again, and pour the mixture into small templates or molds. To speed up the cooling process, fans are placed along the line to cool the molds and make the soap ready for use.

This project has many operations like making soaps by determining the number of soaps (max 4 at a time),heating the ingredients ,mixing them choosing colours and smells,pouring the mixture in molds and turning fans as a ventilation system.

This project is unique because it is tailored for small, home-based enterprises run by women. Although there are many large soap factories, such as those producing "Nablusian Soap," our focus is on enabling small-scale production so we will design and build a microcontroller system that achieves the description above.

Chapter 1

Introduction

Recently number of women that are working inside homes in handmade works is increasing specially in making soaps so idea of making a machine that making soap without effort came from here so it will help these women to make soaps with smells and colours without so much effort.

1.1 Problem Statement

The main problem lies in the harmful that will be resulted on hands of the women especially because of the materials used which are harmful materials like soda and on other hand the time that will be wasted for hours in making the soaps will be more less than this by the machine.

1.2 Objectives

The main objectives of the project is to build a machine that will works automatically by putting the quantities and measurements of the needed soap.This will reduce the need of humans for making the soaps handmade.
This machine introduces several features as follow:

1. Choosing number of wanted soaps and calculate the ratios for olive oil,water and soda.
2. Heating system which keeps the ingredients warm as a part of making the soap.
3. Mixing system which mixes the ingredients together to prepare the mixture to be ready for pouring.
4. RGB system will make the user free to choose which colour he wants for his soap.From RGB other colours are generated.

5. Pouring system for putting and pouring the mixture on molds by rotating 90° down.

6. Production line system for put all the molds in and to know where to stop.

7. Ventilation system by using fans to put an airing source for the soaps after pouring them in molds.

1.3 Scope of Work

1. Control the quantities of materials pumped from the plastic containers according to demand.

2. Develop a system that works sequentially to add materials in the required order and track the mixing and heating stages of the mixture at the appropriate time.

3. Testing and validating the system to ensure reliable performance within the safety standards.

4. Create an application that helps the owner control the selection of the amount of soap by choosing the number molds and also controlling the selection of color and aromatic scent.

1.4 Significance

The increasing trend of women running out of the home, especially in manual labor such as soap making, highlights the need for changes that emphasize the beauty of efficiency and safety. Traditional soap making methods are not only time consuming but also expose individuals to hazardous ingredients, including soda, which can cause health problems Consequently, artificial detergents non-project improvement is critical.
This machine will give simple and effective answers to the girls involved in soap making hygiene, enabling them to produce soaps with desired fragrance and color without the usual labour-intensive methods considered. By automating the processes of manufacturing, mixing and pouring, the system will significantly reduce the effort and time required, allowing women to see other products in their craft or them in the workplace
Additionally, the system's ability to reduce direct contact with hazardous materials adds to the aesthetics of safety, reducing the risk of personal injury and long-term health problems. This innovation does not currently support the growth of entirely home-based businesses but in addition contributes to the broader purpose of empowering women economically by allowing them to scale up production and enhance their livelihoods to the most improbable heights.

1.5 Organization of the report

The report starts with the introduction, included the problem statement, the objectives of the project, the scope of work, significance.
The second chapter takes the limitations and constraints the forces us during work on the project, also the standards we use and the programs we used in coding and application, finally the earlier coursework.
The next chapter takes the literature review, In that chapter, relevant work and results are included.
Then, the chapter of methodology, which goes deeply on the project, its structure, components used to build it, the electronic hardware components, and talking specifically with details about how the system works.
The fifth chapter includes the results and analysis, then the conclusion and discussion chapter, which give the summary of the project, and the future work that can be done to the project.

Chapter 2

Constraints and Earlier Coursework

2.1 Constraints and limitations

1. The main problem was in found the perfect ratios for making the soap correctly.
2. Ensuring of insulation of the connections of pipes and pumps connected with the ingredients, to prevent leaks and electrical short circuits.
3. The heating sensor did not work accurately, which affect the process steps while heating the heater.
4. Fixing the srygns on the wood box to not vibrate while processing.
5. Moving the heater on a belt without vibration.

2.2 Standards / Codes

- We developed our code using the Arduino IDE, enabling us to control the hardware via the Arduino platform.
- For communication, we utilized MQTT as our protocol, enabling clients to control the device through a specialized mobile application.
- We created the mobile application using the App Inventor platform that providing the ability for the users to control the system remotely.

2.3 Earlier Coursework

- Microprocessor and Microcontroller courses, we gained a knowledge of how to control the hardware components in our project.

- The critical thinking course, which helps us to search through researches on some issues, in addition of helping in documentation and writing reports skills.
- Wireless and networks courses played a vital role on understanding the communications between nodes, which help us in connecting the application with our system via connecting esp with Arduino.
- Electronics course that provides instruction in various aspects of electronic systems and technologies.
- Self-learning via YouTube Arduino courses, and different researches.

Chapter 3

Literature Review

The growth of small-scale cottage industries has been noteworthy in recent years, especially in areas where handicrafts such as soap were dominant This trend is an economic necessity, a growing interest in nature in terms of artifacts, work at home flexibility , and that is due to a number of factors but although this development is promising, it has raised various challenges that individuals engaged in such activities this, especially women, meet also emphasize

One of the most important challenges in making handmade soaps is the use of hazardous substances such as sodium hydroxide (commonly known as lye or soda), which is necessary in the saponification process Studies have established dangers emphasis associated with lye consumption, including chemical burns, respiratory issues and duration -term health problems if proper safety are not observed Patas the traditional soap making process Not only physically demanding but consuming time as well, often requiring hours of manual labor from start to finish

Automation has been a topic of interest for researchers aiming to increase efficiency and safety in domestic industries. For example, automated systems for mixing and pouring food and cosmetic products showed that this technology could significantly reduce the physical stress on workers and improve product stability and safety developed. Economic empowerment of women through home-based businesses is another important focus area. Research shows that when women are able to increase their productivity through technological advances , it not only improves their economic well-being but also contributes to broader socio-economic development . By reducing labor in the production of soap, automated systems can help women increase their productivity without sacrificing the quality of their products, thereby enabling them to compete more effectively in the marketplace

In summary, although handmade soap is a labor-intensive and potentially dangerous process, automation integration offers a viable solution to these challenges Literature supports the potential benefits of automated systems to provide safety , efficiency and customization have improved, ultimately contributing to the economic empowerment of women participants

Chapter 4

Methodology

4.1 System Structure

4.1.1 External structure of soap making machine

This structure was made of wood to facilitate drilling operations and fixing the pieces used in the project. It looks like a box from the outside, considering that the machine does not see the operations taking place inside it. What is important is the soap it produces, as illustrated in the image that describes the model. As in figure 4.1 it's the project's design on solid work to know all the measurements and how the frame would be.

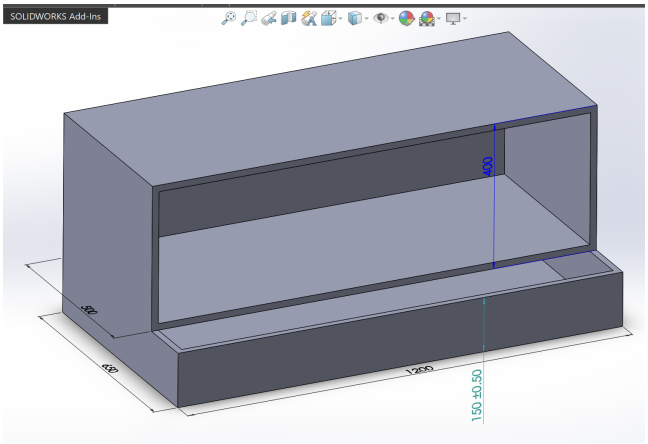

Figure 4.1: Machine frame design.

And after designing the frame,we made it to wood frame on a carpentry as shown in figure 4.2

Figure 4.2: Machine frame

4.1.2 Control system

The machine has a control system, through which the number of soap flakes is determined, as each quantity is produced according to specific proportions of olive oil, water and soda, as one bar of soap needs 30 grams of water... The control system gives the manufacturer the ability to choose the number of soap flakes and the chosen color based on the RGB system and the freedom to choose a scent or not and confirm his request to start the manufacturing process.
This is done by using a keypad with an LCD screen to display the instructions to be followed for the process to proceed properly.

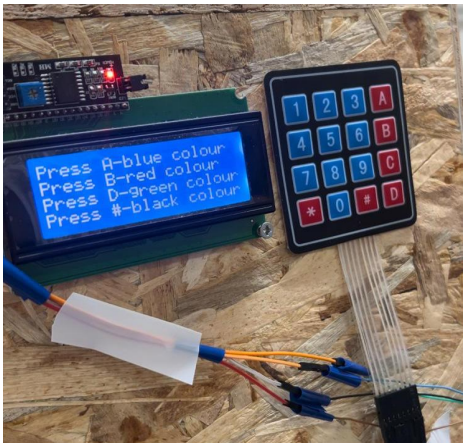

Figure 4.3: control system

4.1.3 Pumping system

The pumping system pumps liquid materials (olive oil, water and soda) from inside the plastic containers to pass through pipes to the valve that allows them to pass through it at that moment directly to the heater.

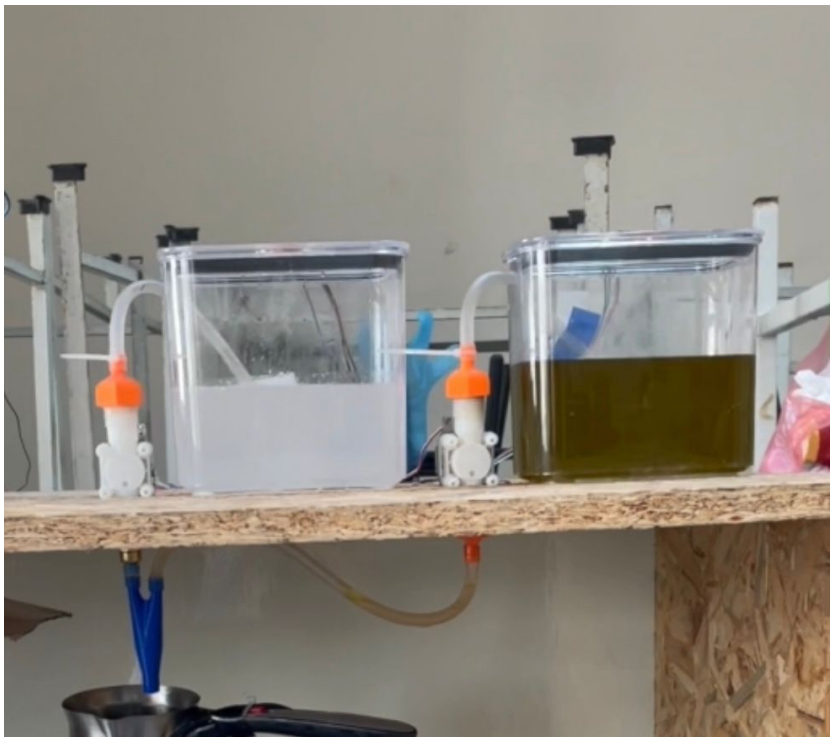

Figure 4.4: Pumping for oil , water and soda

Figure 4.5: Pumping for oil , water and soda

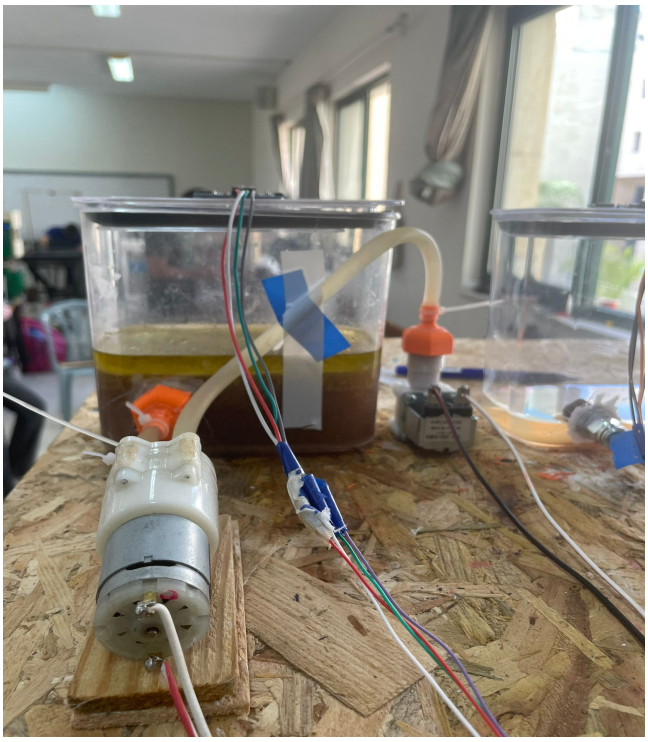

Figure 4.6: Pumping for oil , water and soda

4.1.4 Heating and temperature sensing process

The heating stage is completed after pouring the basic components into the heater, as the heating process continues until the temperature reaches 70 degrees Celsius using dales temperature sensor, and then, if the temperature sensor reads the maximum limit, it immediately turns off the heater.

Figure 4.7: Heating the heater

4.1.5 Mixing mechanism

After pouring the basic ingredients into the heater, we need to mix the mixture to get a homogeneous consistency, which are the basic ingredients for making

Nabulsi soap. The mixing process takes between 40-60 minutes to reach a thick consistency. In this process, we need a mixer and a motor to move it up and down until it enters the heater, and we also need a motor for the mixing process. A cover was placed on the nozzle of the heater during mixing to prevent spray leakage due to mixing

Figure 4.8: Mixing down

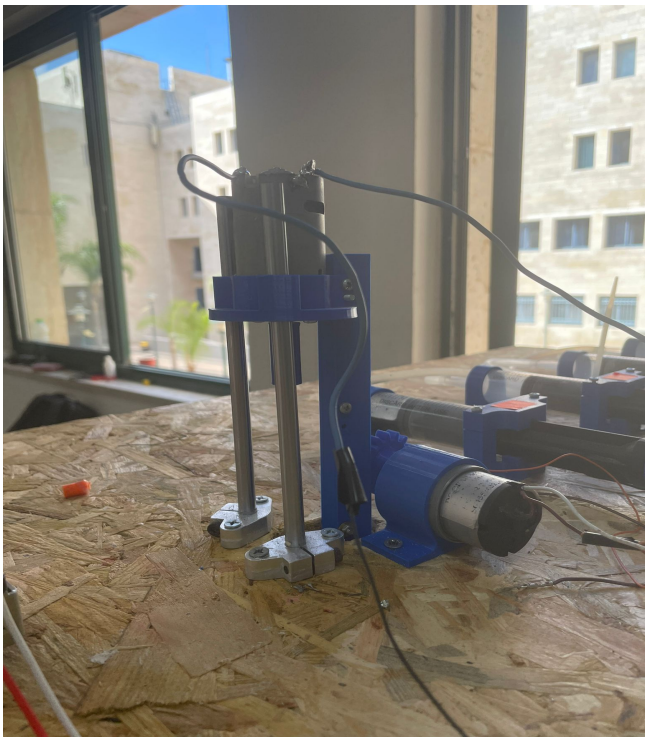

Figure 4.9: Mixing up

4.1.6 Adding colors and smell

At this stage we used the injector to push the selected dye through the tube into the heater, then push the scent, which is an oil, each through its own tube to finally come together in one collector that pours into the heater.

Figure 4.10: Adding colors and smell

Figure 4.11: Adding colors and smell

4.1.7 Heater moving system along the production line

We used two cylindrical columns and a scraper to help move the heater by the motor to the right and left, so that the heater stops at the bottom of each tube, and on the sides of the scraper we put a limit switch to stop the motor from moving if the heater reaches the end of the production line

Figure 4.12: Heater moving system along the production line

4.1.8 Mixture casting process

The pouring process is done by moving the heater at a 90 degree angle using a motor. After the heater contents are emptied of the mixture into a funnel-shaped sheet, the heater rises at the same angle to return to its upright position.

Figure 4.13: Mixture casting process

Figure 4.14: Mixture casting process

4.1.9 Mold preparation stage

The soap molds are placed on a stirring rod, the rod starts moving when the final mixing of the mixture is complete, the molds are interrupted by a light sensor installed below the last heater stop. Once the sensor senses the blocking of light, it stops the scraping and thus stops the mold below the heater, thus starting the pouring process.

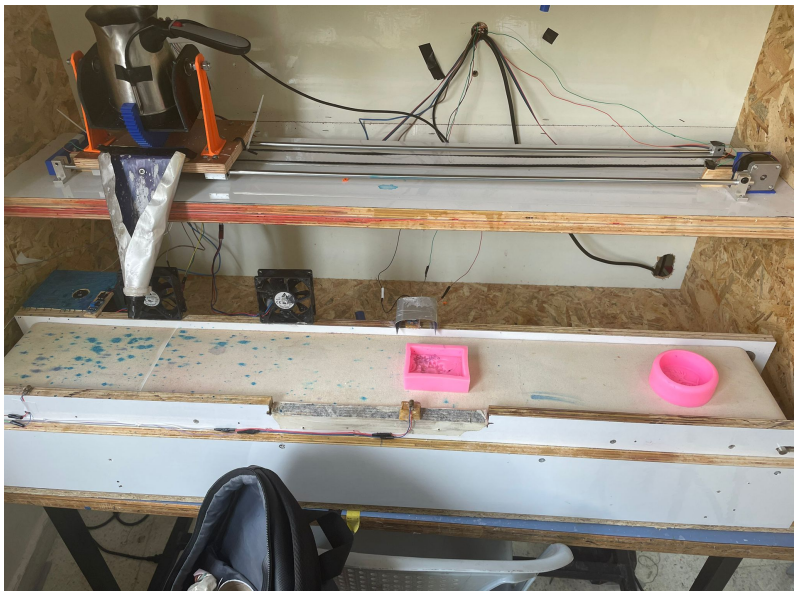

Figure 4.15: molds in the production line

Figure 4.16: Mold preparation stage

4.1.10 Ventilation system

After the pouring process is completed, the fans start working, thus helping in the process of cooling the soap until it freezes and becomes ready for use.

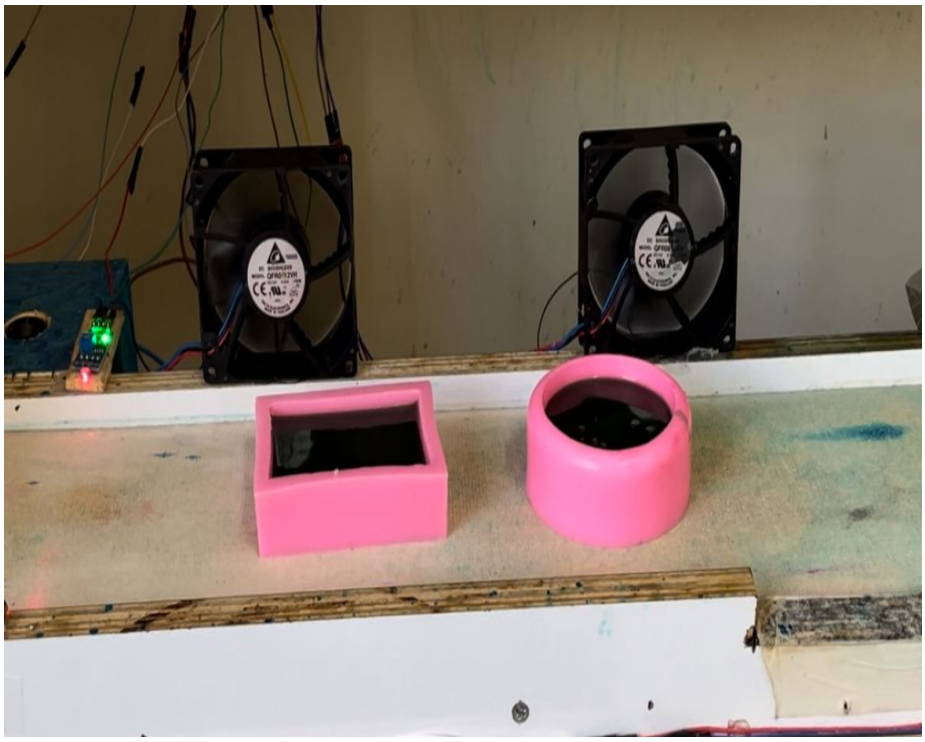

Figure 4.17: Ventilation system

4.2 Hardware components

4.2.1 Arduino MEGA

The Arduino Mega 2560 is a powerful microcontroller board designed for more complex and demanding projects. It is built around the ATmega2560 microcontroller, offering a larger number of input/output pins and more memory compared to other Arduino boards like the Uno. Specifically, it has 54 digital I/O pins, 15 of which can be used as PWM outputs, and 16 analog input pins, making it suitable for handling multiple sensors and actuators. The board also features 256 KB of flash memory, 8 KB of SRAM, and 4 KB of EEPROM, allowing for the storage of more complex programs and data. With 4 hardware serial ports (UARTs), it supports multiple communication channels simultaneously. Operating at a clock speed of 16 MHz, the Mega 2560 is equipped with a USB port for easy programming and communication, as well as a power jack and reset button. It is widely used in larger projects requiring more resources, such as robotics, automation, or multi-sensor systems, and is compatible with the Arduino IDE, making it accessible for developers of all levels.[**?**]

Figure 4.18: Arduino MEGA.

4.2.2 ESP8266 NodeMCU

The ESP8266 NodeMCU is a cost-effective microcontroller board that comes with built-in Wi-Fi capabilities, making it ideal for IoT applications. Based on the ESP8266's Wi-Fi chip, it enables easy wireless connectivity to the Internet or local networks. The board features 11 GPIO pins that can be used to connect sensors, motors, and other external devices, along with PWM support for specific applications. It also includes a micro-USB port for device power and code upload, which can be done through popular programming environments such as the Arduino IDE or Lua. Thanks to its built-in flash memory, the NodeMCU can store necessary programs and data. The combination of Wi-Fi support, ease of programming, and compatibility with a wide range of IoT applications makes the ESP8266 NodeMCU a popular choice for connecting devices to the Internet.[**?**]

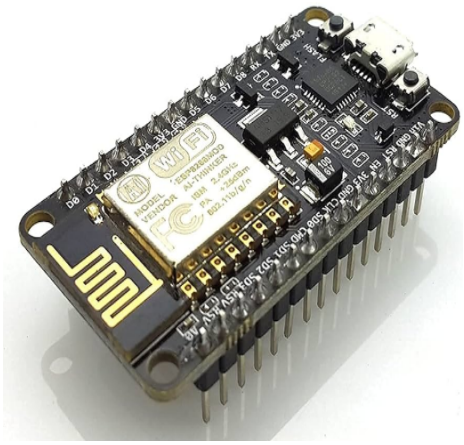

Figure 4.19: ESP8266 NodeMCU

4.2.3 Computer Power Supply

A computer power supply (PSU) converts AC power from an external source into the low-voltage DC power required by internal computer components. It provides different voltage levels like 3.3V, 5V, and 12V to power the motherboard, CPU, graphics card, and storage devices. The PSU's wattage rating determines how much power it can supply, and it comes with various connectors for different components. Many PSUs are 80 PLUS certified for energy efficiency and feature built-in fans for cooling. They also include safety protections such as over-voltage and short-circuit protection to ensure system stability and prevent damage.

Figure 4.20: Power Supply

4.2.4 Water Pump

High Pressure DC 12V 3.7A Water Pump. We used it to pump water forcefully from place to place. It used to pump water with soda and olive oil. .

Figure 4.21: Water Pump

4.2.5 Water Valve

GEMS SENSORS and CONTROLS P/N- A2017-S174 / 24VDC / 7.4W. Valves are used to control water flow in pipes. They can allow water to flow in one direction only (check valves), control the flow rate (control valves), or completely stop water flow (shut-off valves).Three valves are used for one for filling and two for control the direction of water in the cans olive oile and water with soda.

Figure 4.22: Water Vlave

4.2.6 DS18B20 Temperature Sensor

Waterproof DS18B20-Compatible Temperature Sensor is a digital thermo probe or sensor that employs DALLAS DS18B20 used to measure water temperature inside a heater.

Figure 4.23: Temerature sensor

4.2.7 Ultrasonic sensor

Ultrasonic Sensor that measures the distance to an object using ultrasonic sound waves. In this project we used two ultrasonic sensors to measure the height of the cans of the water and soda and olive oil -level in the containers.

Figure 4.24: Ultrasonic Sensor

4.2.8 LDR Sensor

An LDR, or photoresistor, is a passive electronic component that modifications its electrical resistance due to varying light intensity. In the presence of light, LDR's resistance lessens; when hidden from light, its resistance intensifies. By harnessing their light-sensitive properties. It was used to sense the absence of the mold to make the heater molding the mixture on it.

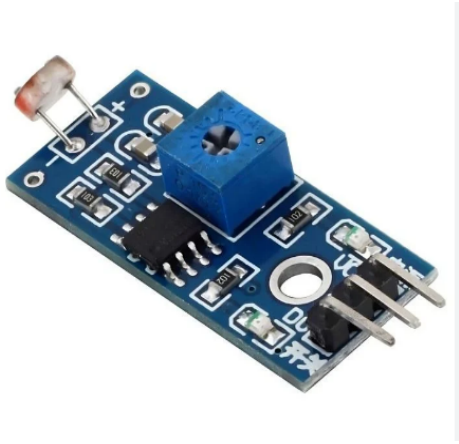

Figure 4.25: LDR Sensor

4.2.9 NEMA 17 Stepper Motor

There is a wide spread popularity of the NEMA17 stepper motor because of its small size as well as its great torque output, which makes it to be used in

many places. It needs 200 steps to complete a revolution and these steps have an accurate angle of 1.8 degrees per step. Its coils can take a maximum current rating of 3.5 A each and one can also apply voltage inputs that range from 3 to 12 volts. It was used for the process of moving the heater forward and reverse,rotate the heater 90 degrees and for the syrngs containing smells and colours to move forward to put the colour or smell in the heater or reverse to fill them.

Figure 4.26: Stepper Motor

4.2.10 SG37BL-A DC Brushless Gear Motor

A 12 volt DC Motor is used when both a high starting torque and good speed regulation is needed. In this project we used 3 DC motors to move the mixer up and down,make the mixer mixing and for the production line.

Figure 4.27: DC Motor

4.2.11 L298N Motor Drive Controller Board Module Dual H-Bridge

The H-bridge configuration is usually utilized to reverse the polarity /direction of the motor but sometimes it's also possible to use it for 'braking' the motor i.e. when its terminals are connected together, the motor abruptly stops.

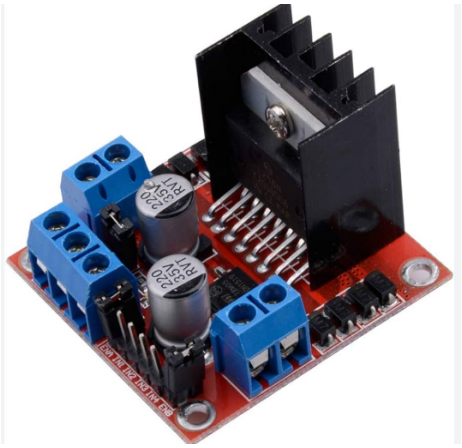

Figure 4.28: H-bridge

4.2.12 Micro Limit Switch

Micro Limit switches are a simple but effective solution to stop an axis on a machine from travelling out of limits. We used two limit switch to stop the

stepper motor from keeping the heater moving forward or reverse on the rods and for knowing the ratio remaining in each syringe.

Figure 4.29: Limit Switch

4.2.13 A4988 driver Stepper Motor Driver

The A4988 driver Stepper Motor Driver is a complete micro-stepping motor driver with a built-in converter, easy to operate. It operates from 8 V to 35 V and can deliver up to approximately 1 A per phase without a heat sink or forced air flow (it is rated for 2 A per coil with sufficient additional cooling).

Figure 4.30: A4988 driver Stepper Motor

4.2.14 Relays

Relay is a device which is electrically controlled to initiate and end electrical connections, or activate and deactivate operation of other appliances within the same or different electrical network. We used active low relays to turn on/off the heater, water pumps, valves and fans.

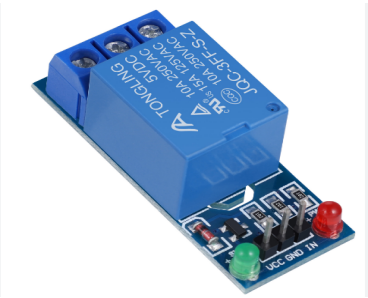

Figure 4.31: Relay

4.2.15 Stainless Steel Rods

Stainless steel round bars are utilized in the manufacture of structures, appliances, and machinery. We used it to put the heater above it to move on also the belayas.

Figure 4.32: Stainless Steel Rods

4.2.16 4 x 4 Matrix Keypad

The 4 x 4 Matrix Keypad Module is a non-encoded matrix keypad consisting of 16 keys in parallel. The keys of each row and column are connected through the pins outside – pin R1-R4 as labeled beside control the rows, when L1-L4, the columns, we used it to make it as the controlling system of the machine to choose number of soaps,colours and smell and to show statistics for admin.

Figure 4.33: 4 x 4 Matrix Keypad

4.2.17 Intercom Wires

We used them for wiring and connecting different components together.

Figure 4.34: Intercom Wire

4.2.18 Arduino Wires

To be able to connect the components to the Arduino.

Figure 4.35: Arduino Wires

4.2.19 4.7K ohm resistor

It is connected to the 1DS18B20 Temperature Sensor.

Figure 4.36: 4.7K Ohm

4.2.20 20x4 LCD screen

Being a popular alphanumeric display type, a 20x4 LCD screen can showcase up to 20 characters arranged into 4 columns. Widely used in electronic projects and devices, computing can display data/message via alphanumeric characters in devices such as thermometers, clocks, and interfaces. It displays all the choices that the admin can choose to make a soap and the statistics of the machine.

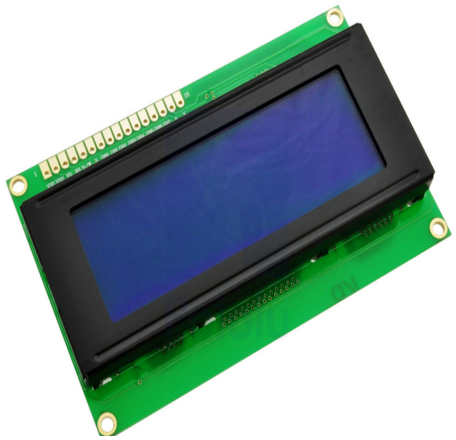

Figure 4.37: LCD Screen

4.2.21 I2C LCD Driver

I2C LCD Display Adapter is specially designed o drive LCD Display using only 2 data pin. This module uses the I2C serial bus to communicate with microcontroller like arduino. Normally it requires minimum 6 data pins to use a lcd display. It creates a problem when multiple sensor and is module is using with arduino at the same time. Because Arduino has limitation of I/O pins. This I2C LCD Display driver will helps to reduce the uses of pin of your arduino and makes the project more easier. You can use this module with other I2C supported device on the same line and at the same time.

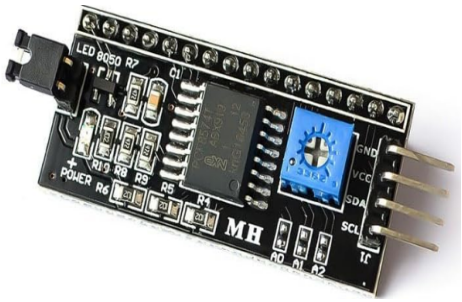

Figure 4.38: I2C LCD Driver

4.3 Mobile Application

The system connected with an application that enable remote controlling by the owner of the machine, the application has 7 interfaces as follow:

4.3.1 Start page

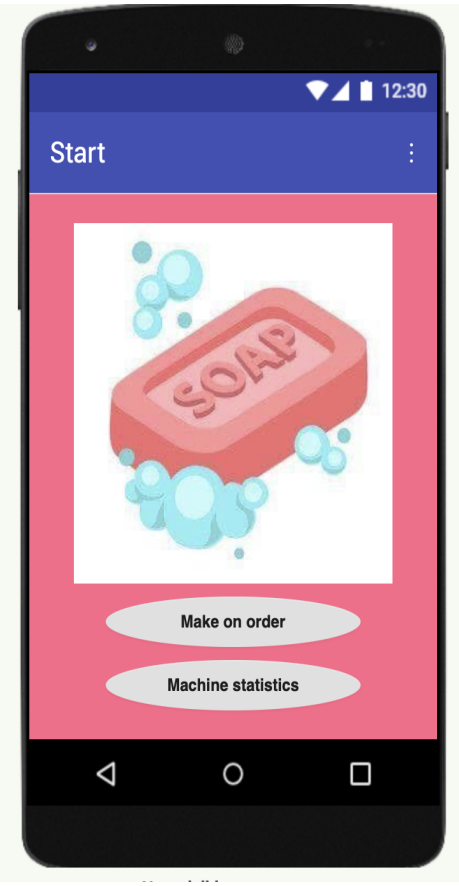

Figure 4.39: Start page of application

The page includes 2 buttons implies to other pages, make an order or show machine statistics.

4.3.2 Make an order page

Figure 4.40: Make an order page of application

This page contains the number of soaps that the admin wants to make, since the owner click the button, it will still kept until finishing the order to start making it.(To pouring the oil ans water with soda in the haeter with a measured ratios of both.

1. One soap
2. Two soaps
3. Three soaps.
4. Four soaps.
5. next for go to colours page.

4.3.3 Choosing colour page-GRB

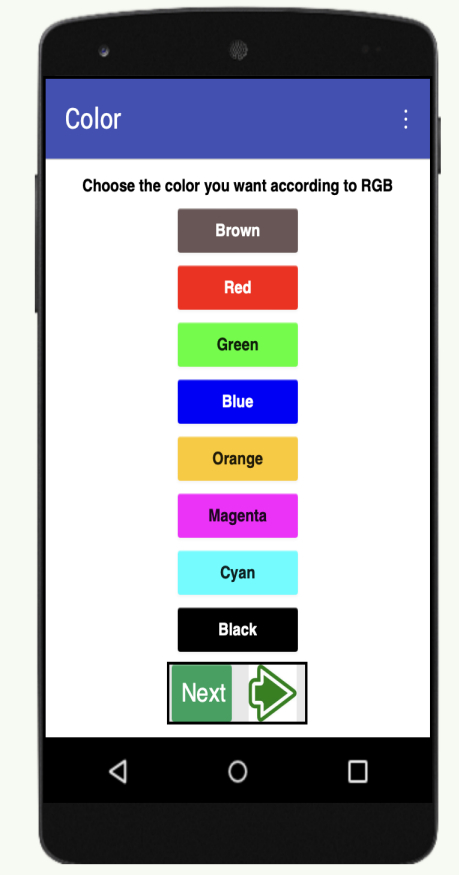

Figure 4.41: Choosing colour page-GRB of application

This page helps the owner to specify the colour he wants for the soap. We used RGB system.

4.3.4 Determining the smell page

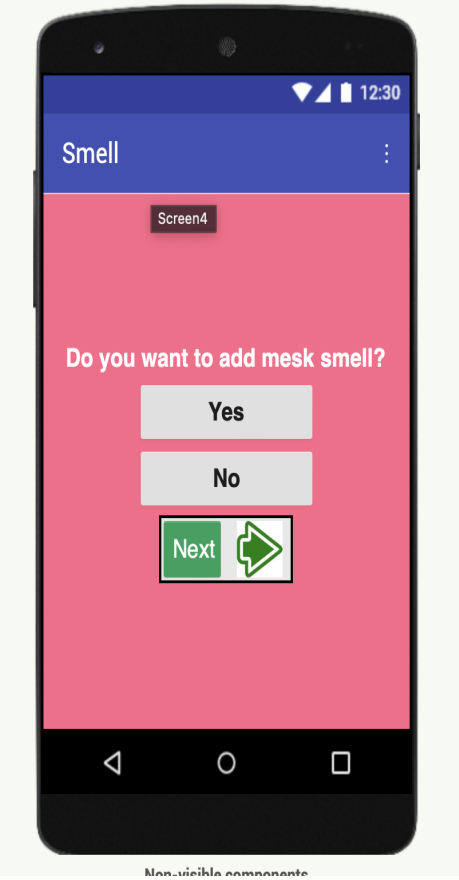

Figure 4.42: Status page of application

In this page admin choose if he wants to add the smell or not ,if he choose yes he will add it to the soap and otherwise no.when he press next he will go to final step of the process.

4.3.5 Starting process page

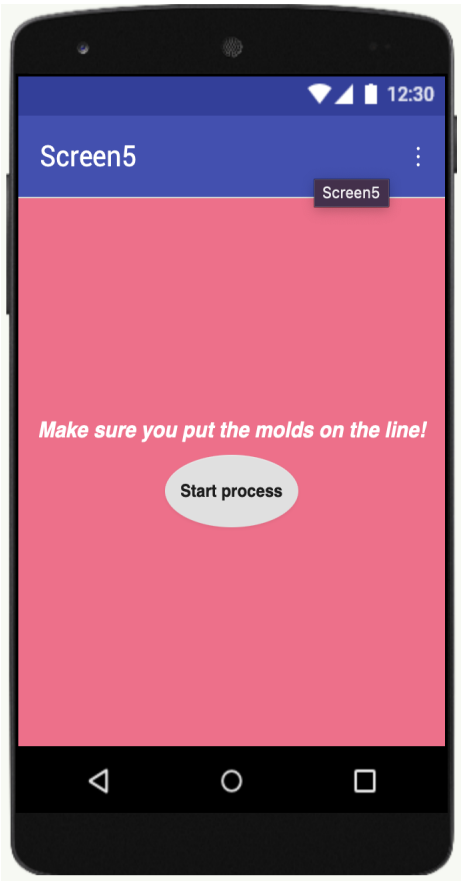

Figure 4.43: Status page of application

This page has one button to start the process and start making the soap.

4.3.6 Machine statistics page

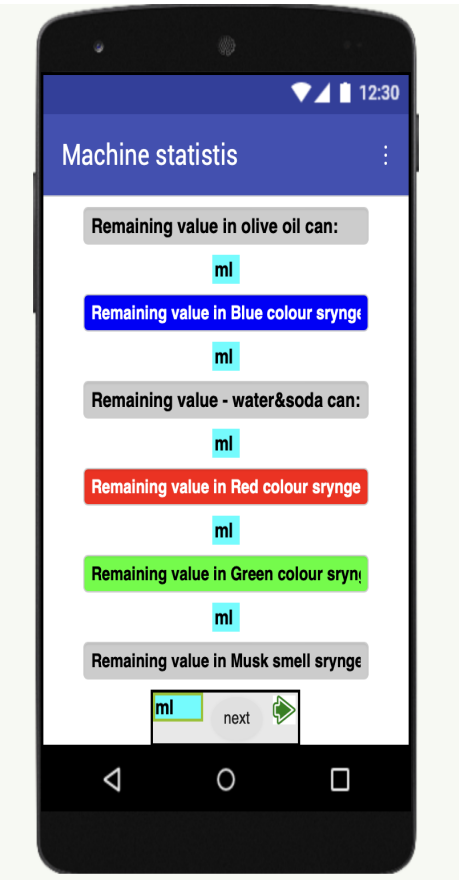

Figure 4.44: Machine statistics of application

In this page the admin can get feedback about the machine :

- The amount of remaining olive oil in the container.
- The amount of remaining Water with soda in the container.
- The amount of remaining Blue colour in the syringe.
- The amount of remaining Red colour in the syringe.
- The amount of remaining Green colour in the syringe.
- The amount of remaining Musk smell in the syringe.

4.3.7 Controling page for the machine

Figure 4.45: Status page of application

By this page, the owner can refill the colours and smell in the machine by pressing which he wants to refill.

- Refill the blue colour.
- Refill the red colour.
- Refill the green colour.
- Refill the Musk smell.

4.4 How the system works?

Since the Arduino mega and esp8266 connected to the power, and the application is now opened and the WIFI network is the one for the Esp, the system starts, and all components are stopped, waiting for the user to choose what process he need, the processes are as follow:

4.4.1 Start the system (Pumping, Filling,Heating,ventilation,Pouring)

When the user selects start the system option from the application, the processes system starts.

4.4.2 Ingredient Selection and Preparation

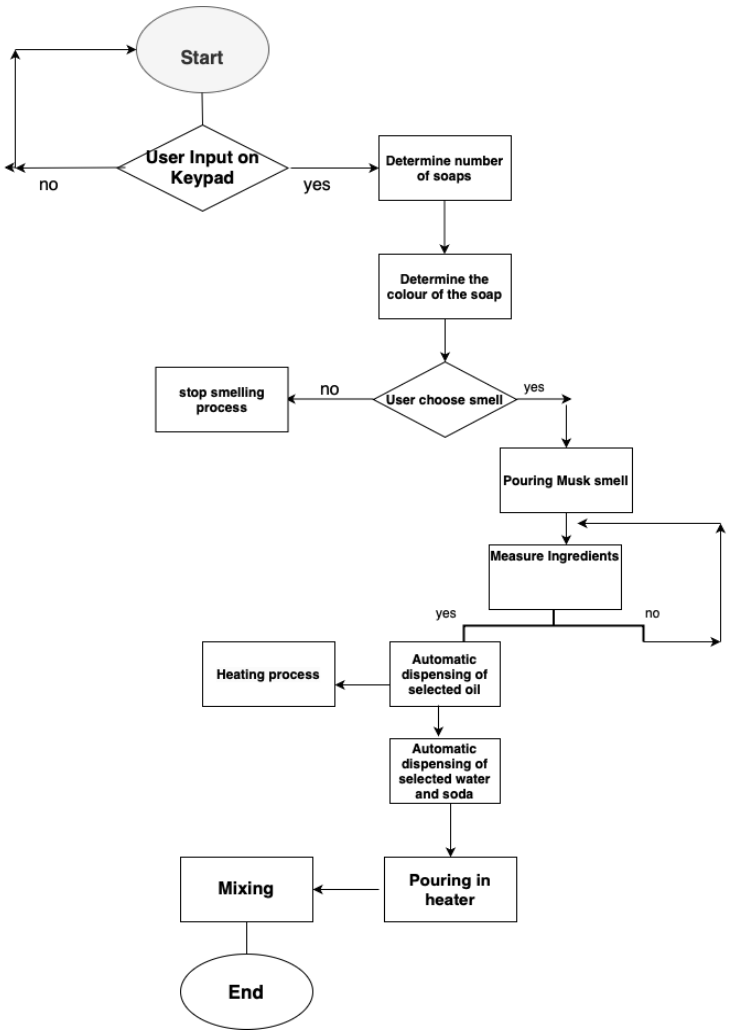

Figure 4.46: Making order Flow chart

- Start
- User Input on Keypad
- Select oil type
- Select water quantity
- Select soda amount

- Select color
- Select scent
- Measure Ingredients
- Automatic dispensing of selected oil
- Automatic dispensing of selected water
- Automatic dispensing of selected soda
- Move to Mixing Section

4.4.3 Heating

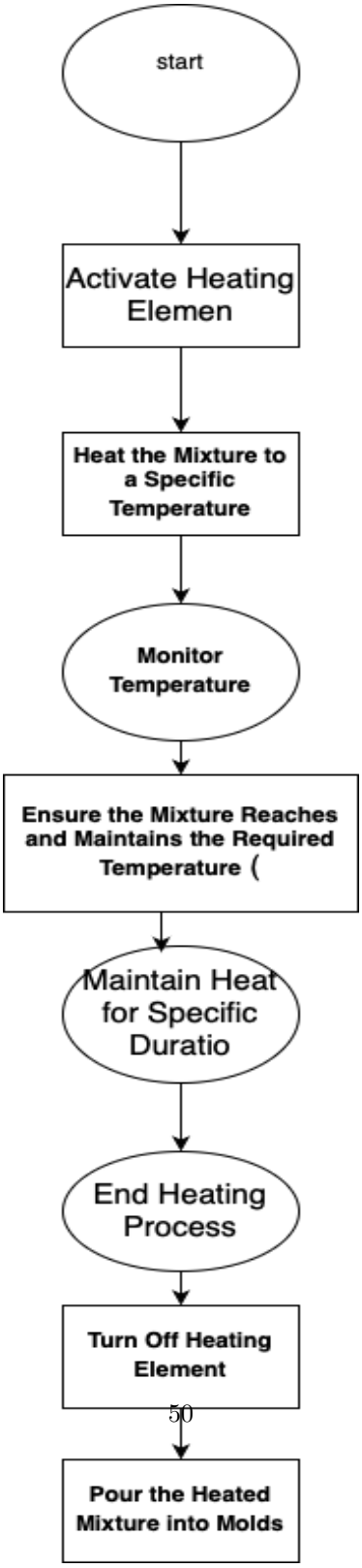

Figure 4.47: Heating Flow chart

If the temperature read is less than 46°C or the specified temperature by the user, the heating system will be activated. The heater will turn on.
The process continues until the temperature sample reads the required temperature.

4.4.4 Mixing and Soap Formation

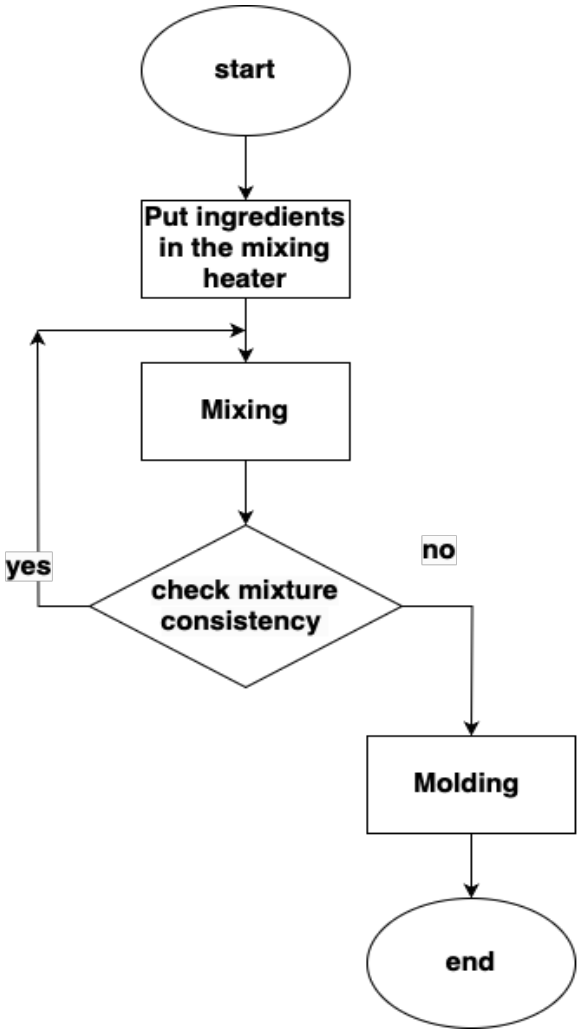

Figure 4.48: Mixing and Soap Formation Flow chart

- Start Mixing Process
- Automatic pouring of ingredients into mixing chamber

- Mix Ingredients
- Mixing until homogeneous
- Check Mixture Consistency
- Sensors monitor consistency
- Select scent
- Move to Molding Section

4.4.5 Molding and Setting

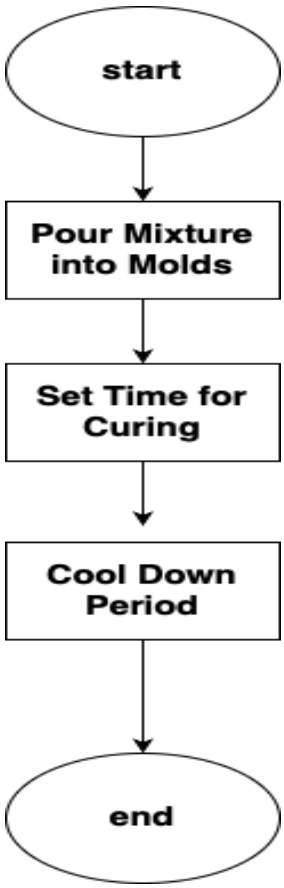

Figure 4.49: Molding and Setting Flow chart

- Start

- Pour Mixture into Molds
- Set Time for Curing
- Cool Down Period
- End Process

4.4.6 ventilation

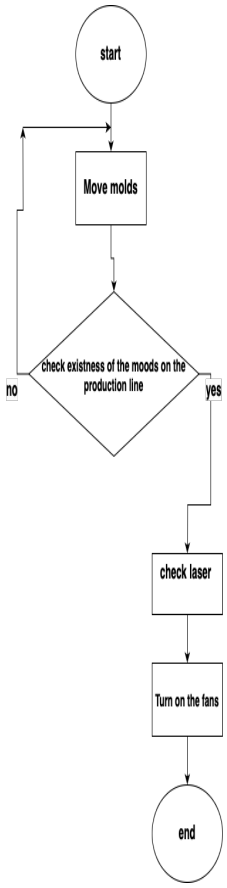

Figure 4.50: ventilation Flow chart

Chapter 5

Results and Discussion

The foray into the creation of the soap making machine has produced both encouraging developments. This section details the key results we have obtained and how we think they change the future of soap making more-so in the households, as well as other perspectives.
Efficiency in Production
One of the most exciting results was how much time we saved in the soap making process. In the past, soap making from scratch rather than using an industrial process was an arduous affair owing to the long processes that could take the whole day or more. However, with our machine, the whole process was simplified and there was less time and effort put across. This is not only about gaining back a few hours; it is about utilizing some important hours elsewhere thus making the process of producing soaps less hectic and efficient.
For women who are doing soap-making alongside several other functions, this time-winning factor is revolutionary. The machine not only fastens the entire process but also allows doing more production without making more effort. This benefit may benefit great output and therefore these women may expand their businesses and do higher demands more easily.

5.1 Safety Improvements

As stated above, safety was a critical concern for this project, and we believe we are right in saying that the machine significantly eliminates the need to manual work while handling the dangerous materials such as sodium hydroxide (soda). In the case of mixing and pouring stage, we have integrated automation technology and greatly reduced the requirement of coming into contact with such substances directly, thus making it safer for the user.
This improvement in safety can be particularly useful for those, who work from home and have limited access to professional safety equipment. As the machine performs the most risky operations in the process, the health of the user is protected and the chance for injuries or chronic disorders is minimised. This is

an important component in the progress of reformulating soap-making processes to be safer and ecologically friendly.

5.2 Customization Capabilities

Apart from it, we also added an RGB system, which enables one to select any color of a soap from a variety of colors. This also makes it possible to offer individual custom made soaps with different colors which are new in the market. These different features were rated during the tests and this one received proper acceptance as it encouraged more creativity from the users.
Customization does provide an edge in a market where consumers are more inclined towards the artisanal and handmade products. It helps soap manufacturers to penetrate the niche markets and gives an alternative from the mass produced soaps. This feature not only makes the soaps more marketable than before but also puts in a personal touch that the buyers appreciate.

5.3 Consistency in Production

Over the years developing of the soap making machine, the most important accomplishment has been the ability of the machine to make soap of the same high quality at all times. Because of the sealing and the automated mixing and heating systems each batch is expected to maintain the same standard which is very important for gaining and maintaining customer loyalty and trust.
The Need to Maintain Quality Control Is Essential. In any production procedure, including for handmade goods, there is the need for maintaining quality. Having a cyclical approach to preparation allows the brand to ensure and reassure more absolute quality with all bar soaps regardless of the product being manufactured. This kind of reliability can lead to repeat purchases and grows the brand's standing in the waters which is very crucial for micro business men and women.

5.4 Reduction in Labor

The burden that the machine encumbers helps to take tasks away from the user thus reducing the amount of muscle power exerted in use. Operation that would have required unbroken attention, that is, stirring, temperature taking and so on have been automated.
For many women, especially the ones who have numerous responsibilities, easing the burden of physically struggling during soap making is a welcome change. This results in the preservation of health and contributes in making the process of work more convenient and enjoyable.

5.5 User Interface and Control

We designed a mobile application to control the machine such that even the non-technical people will find it easy to use. The app lets the user define the quantity of bars to be made, the colors, the fragrances, and the entire process through a smartphone.
Aside from the costs of general acceptance of technology, the general interface and mobile app should be designed to have the additional layer of ease of use for all people. The mobile app also integrates with the busy lifestyles of the users. It has control of the cabinet within the soap production cycle, thus making it more flexible for the users.

5.6 Challenges and Limitations

Bumpy roads aside, it will be noted that challenges were not lacking. As we struggled, we encountered some challenges on how to manage the ratios of the ingredients as well as the temperature control over the process. Of course, the operation of the machine was fairly ok, there emerged instances when one had to nurse the soap in an ordinary way to the desired state which exhibits the varying degrees of malleability attributed by the tension imposed by the contents.

5.7 Future work

Make the admin have the flexibility to choose the mold he wants and to put it on the production line using an arm.