KLE TECHNOLOGICAL UNIVERSITY | Belagavi Campus

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DR. M. S. SHESHGIRI COLLEGE OF ENGINEERING AND TECHNOLOGY

A Report on the Course Project of

Engineering Exploration (15ECRP101)

Titled

(MRP BHEL)

By

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Academic Year 2021-2022, Even Semester

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CERTIFICATE

This is to certify that the course project entitled “MRP BHEL” is carried out by the students MOHAMMEDASIM BAGE (02FE21BCS048), PRIYA J SIDDASAMUDRA (02FE21BEC066), ROHAN V ANVEKAR (02FE21BEC074) as part of Engineering Exploration Course (15ECRP101), during 2nd Semester of B.E program for the academic year 2021-22. The project report fulfils the requirements prescribed by KLE Technological University.

_____	_____
Guide	Division in charge
Prof. Sachidananda T G	Prof. Abhinay.Gupta

_____	_____
Examiner 1:	Examiner 2:

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DECLARATION

We hereby declare that the project work entitled “MRP BHEL” submitted as a part of Engineering Exploration Course during 2nd semester of academic year 2021-2022, is a record of an original work done by us under the guidance of Prof. Sachidananda T G. The project work and part of this report is not plagiarized to the best of our knowledge.

Date: 25-08-2022

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ACKNOWLEDGEMENT

In the accomplishment of this project successfully, many people have greased us with their blessings and the heart pledged support, this time we are utilizing to thank all the people who have been concerned with this project.

Primarily we would thank God for being able to complete this project with success. Then we would like to thank our mentor Prof. Sachidananda T G and Exploration staff, whose valuable guidance has been the ones that helped me patch this project and make it full proof success. His suggestions and his instructions have served as the major contributor towards the completion of the project. We would also like to thank our principal Dr. Basavaraj G Katageri for his constant encouragement and moral support, without which we would have never been able to give my best.

Then we would like to thank my parents and friends who have helped us with their valuable suggestions and guidance has been very helpful in various phases of the completion of the project.

Last but not the least we would like to thank my classmates who have helped us a lot.

Abstract:

The issue of hygiene is very important in preparing any dish, especially in chart stalls. Therefore, we intend to increase the hygiene factor and ease in preparing the dish which involves an individual to give input to the machine. By these inputs a person can get defined quality of food items completely mixed in the machine and ready to serve. The user can add or subtract ingredients if not needed. We also made sure that it is easy for the user to clean the mixing container and storing compartment. Our model would contain Arduino, actuator, buzzer, aluminium sheets and mixing container. Here an individual has to give the input for the quality required for preparing the dish once this is done mixing would begin and the dish would be ready in minutes. From this project we hope to build an alternative easy method for preparing the dish.

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1. Problem Definition

1.1. Need Statement

A Street Chat Vendor wants a Mixer to start Jalmuri as a new item on his menu.

1.2. Gathering Pertinent Information

Mixing more than 2 food ingredients to make the best quality food items comes from our deep rooted culture. The brief information is given in below link

The baseline to prepare this dish is mixing so steel vendors do it manually with the help of utensils. With advanced technology few people were also able to build their own mixing machine

https://m.indiamart.com/proddetail/bhel-making-machine-23022384048.html

As per our design model we would require Arduino, actuator, buzzer, aluminium sheets and mixing container

The basic information about using the above listed material is given in our engineers exploration course. How do we select the material, why do we select those components and on what basis is all covered in our course project.

We have discussed it with our team mentor, Amit Gadagi sir for 3D printing and also sushant sir for coding the Arduino

After discussing with other teams who had the same need statement, we got to know about different orientations used in mixing, different types of blades used and other materials used in their model

On discussing with other teams, we could find few inaccuracies in mixing of ingredients and building complex Structure.

Other teams had designed an accurate mixing container, selection of components used and structure of blade

People paying for the solution depends on the person as few would buy them based on cost or maybe on the function available in the model. But their budget won't exceed 3500rs.

Other factors important to the solution are based on hygiene in mixing the ingredients, storing them and after completing cleaning can be done in ease .

1.3. Questions asked to client / users for arriving at Objectives, Functions and Constraints

Sl. No.	Questions	Answers	O	C	F
1.	Should the machine be automated or manual?	The Machine should be automatic	✓		
2.	Do you require a machine that is portable or fixed?	The Machine should be portable			✓
3.	Weight of machine	3kg		✓	
4.	Size and dimension of machine	2ft X 2ft X 2ft		✓	
5.	Material of the machine	stainless steel	✓		
6.	Speed of machine	30-60rpm		✓	
7.	Type of input command	button	✓		
8.	Indication after task completion	Beep alert			✓
9.	Time limit for each plate	2-3 mins		✓	
10.	How many blades to be used for mixing?	3 blades		✓	
11.	What should be the material of lid?	Transparent material	✓		
12.	Should be auto cleaning?	yes			✓
13.	budget of model?	3500 rupees only		✓	
14.	Any aesthetic looks?	Cylindrical shape	✓		
15.	Time limit for completion of model	60 days		✓	

1.4. Objectives

Sl. No	Objectives
1..	It should be easy to carry and transportable
2.	The Machine should be automatic
3.	Lid must be of transparent material
4.	Cylindrical shape
5.	Minimum 3 blades
6.	It should be self-serving
7.	Machine should be User-friendly

Problem definition 1.1

Build a Mixer which is automatic which has a lid of transparent material which is of cylindrical shape and user-friendly.

1.5. Constraints

Sl. No	Constraints
1.	Weight of machine should not be more than 2kg
2.	Dish should be ready in 2-3 mins
3.	Budget of model is 3500 rupees only
4.	Minimum 3 blades
5.	Size and dimension of machine

Problem definition 1.2

Build a Mixer which is automatics which has a lid of transparent material which is of cylindrical shape and user-friendly. The weight of the machine should be with in 3kg, the rotor must have at least 3 blades. It Size and dimension of machine must be 2 cubic feet and built with in 3500Rs. The dish must be ready in 2-3 mins.

1.6. Functions

Sl. No	Functions
1.	It should serve in definite quantities
2.	Should be self-serving
3.	Beep alert Indication should be given after task completion
4.	The Machine should be portable

Problem definition 1.3

Build a Mixer which is semi-automatics which has a lid of transparent material which is of cylindrical shape and user-friendly. The weight of the machine should be with in 3kg, the rotor must have at least 3 blades. It Size and dimension of machine must be 2 cubic feet and built with in 3500Rs. The dish must be ready in 2-3 mins. It should be self-serving and should give a beep alert Indication after task completion.

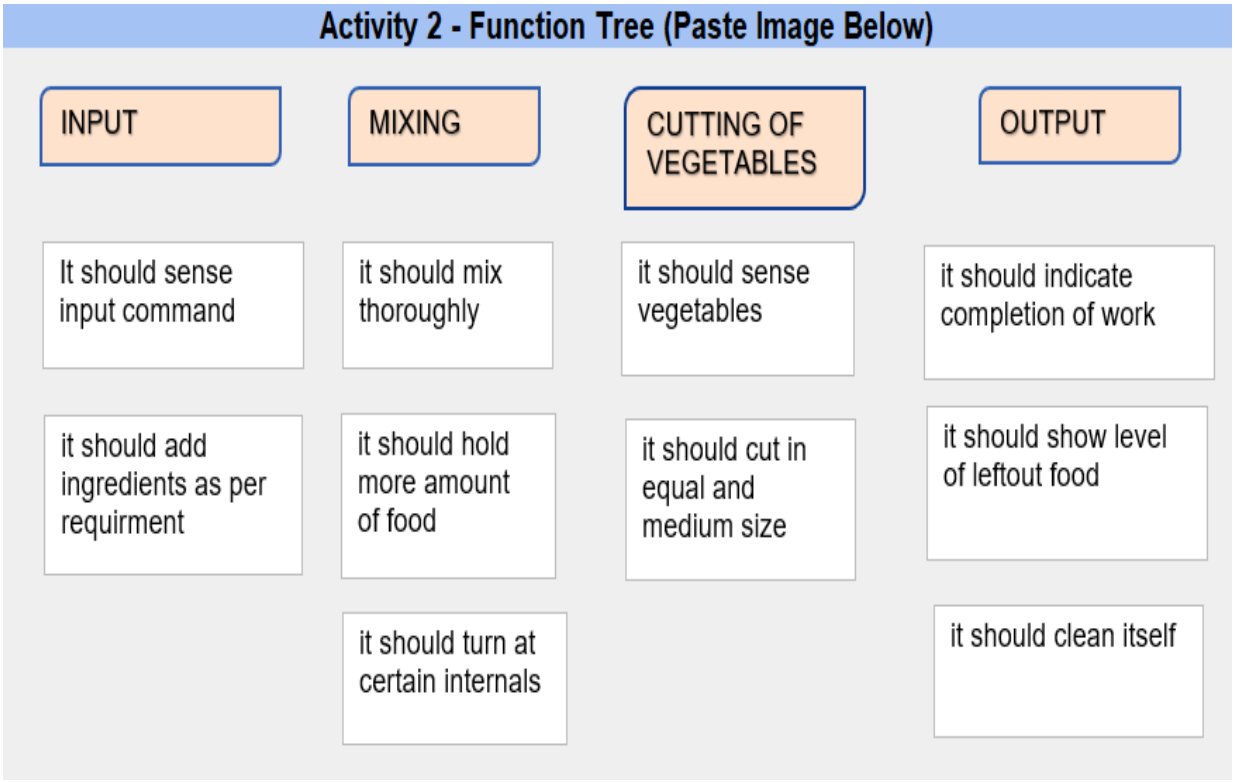
2.Conceptual Design

2.1. Establishing Functions

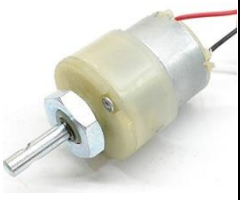
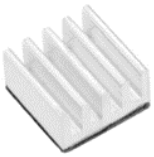
Sl. No	Functions from user perspective	Functions from the designer perspective
1.	All ingredients in one compartment	All ingredients in one compartment
2.	A specific of machine 2 cubic feet	2ft X 2ft X 2ft
3.	Notifying when the dish is ready	Notifying when the dish is ready
4.	Machine should be portable	Machine should be portable
5.	The mixer should be cylindrical in shape	The mixer should be cylindrical in shape
6.	Easily detachable from main body	Easily detachable from main body
7.	internal division in blending area	internal division in blending area
8.	machine should run on battery or electricity	machine should run on battery or electricity

9.	Smart interlocking system with main body	Smart interlocking system with main body

2.2. Functions Tree

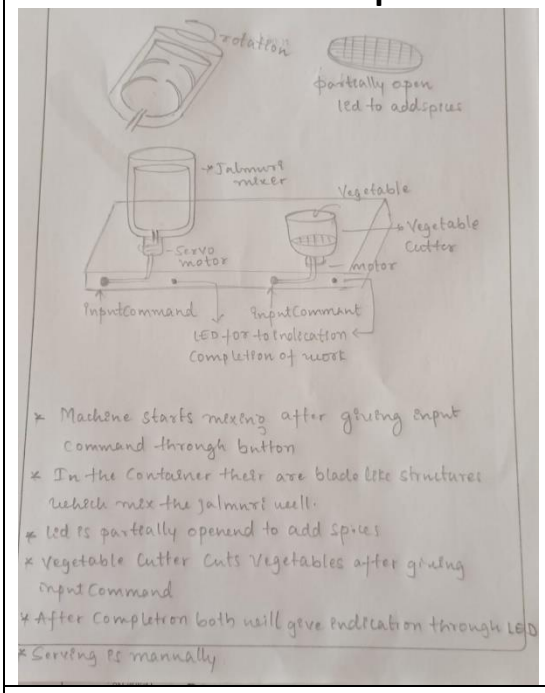


2.3. Morphological Chart

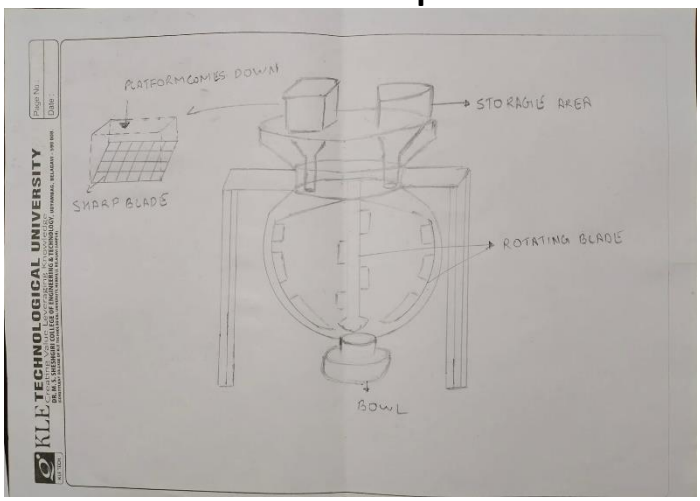
SI.NO	Sub functions	means 1	means 2	means 3
1	60 or 30 rmp dc motor			
2	Indication when the dish is ready			
3	Internal division in jar/single rod with blades			
4	Cylindrical jar			
5	Arduino			
6	Rubber brush			

2.4. Generated Concepts

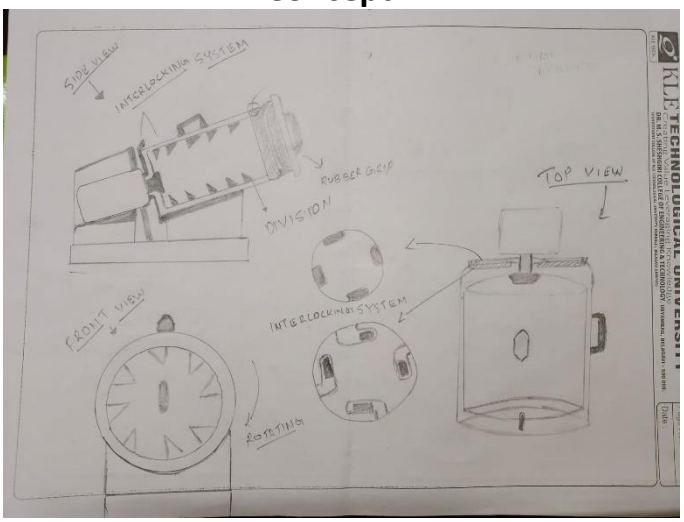
Concept 1



Concept 3



Concept 2



3.Conceptual Evaluation and Product Architecture

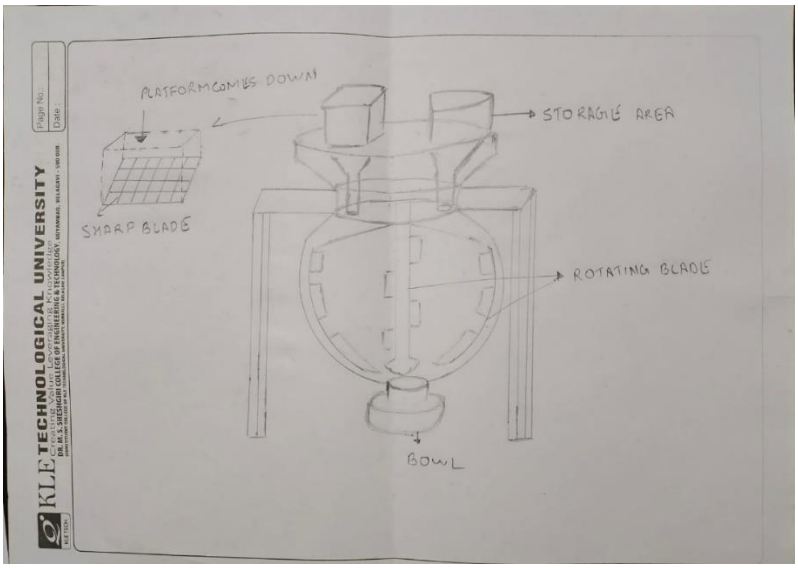
3.1. Pugh Chart

DESIGN NO.	Design Objectives	Score Allocated	Justification for the score
1	Safety	8	partially opened lid
	Ease of use	7	semiautomated mixer
	Portability	2	Can be carried easily like a normal mixer
	Use of standard parts	6	Using of 3D printed parts
	Cost	5	cost is equal to an average mixer
2	Safety	+	Completely packed with rubber grips
	Ease of use	0	Require simple inputs
	Portability	0	Can be carried easily like a normal mixer
	Use of standard parts	0	Using of 3D printed parts
	Cost	-	cost is equal to an average mixer
3	Safety	+	Completely packed
	Ease of use	+	Fully automatic
	Portability	-	large
	Use of standard parts	0	Using of 3D printed parts
	Cost	+	cost is less than an average mixer

3.2. Justification for the Scores

Objective	weights
Safety	8
Ease of use	7
Portability	2
Use of standard parts	6
Cost	5

3.3 Selected Design



3.4 Product Architecture

3.4.1 Function Clustering

INPUT	MIXING	CUTTING OF VEGETABLES	OUTPUT
It should sense input command	It should mix thoroughly	It should sense	It should indicate completion of work
It should add ingredients as per requirement	It should hold more amount of food	It should cut in equal and medium size	It should show level of left out food
	It should turn at certain internals		It should clean itself

3.4.2 Interaction between subsystems

		Sub System 2	Sub System 3	Sub System 4
Sub System 1	Material Interaction	X	✓	X
	Data Interaction	✓	X	✓
	Spatial Interaction	X	✓	X

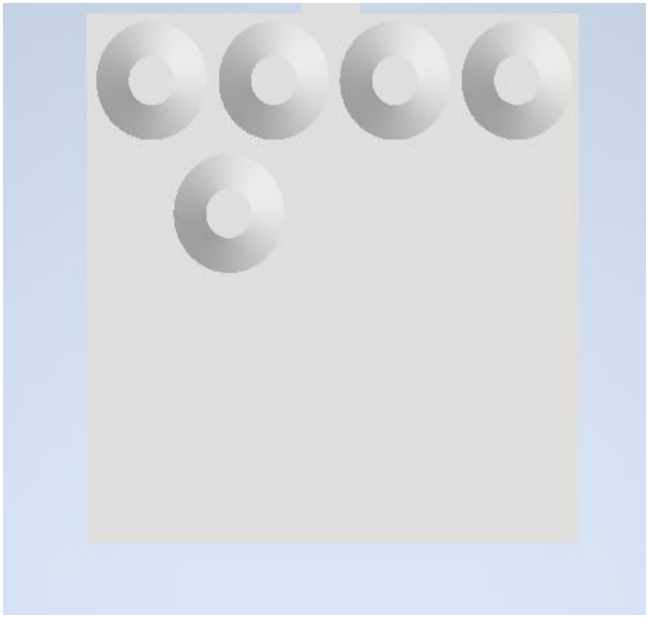
		Sub System 1	Sub System 3	Sub System 4
Sub System 2	Material Interaction	X	X	X
	Data Interaction	✓	✓	X
	Spatial Interaction	X	X	✓

		Sub System 1	Sub System 2	Sub System 4
Sub System 3	Material Interaction	X	X	✓
	Data Interaction	✓	X	X
	Spatial Interaction	X	✓	✓

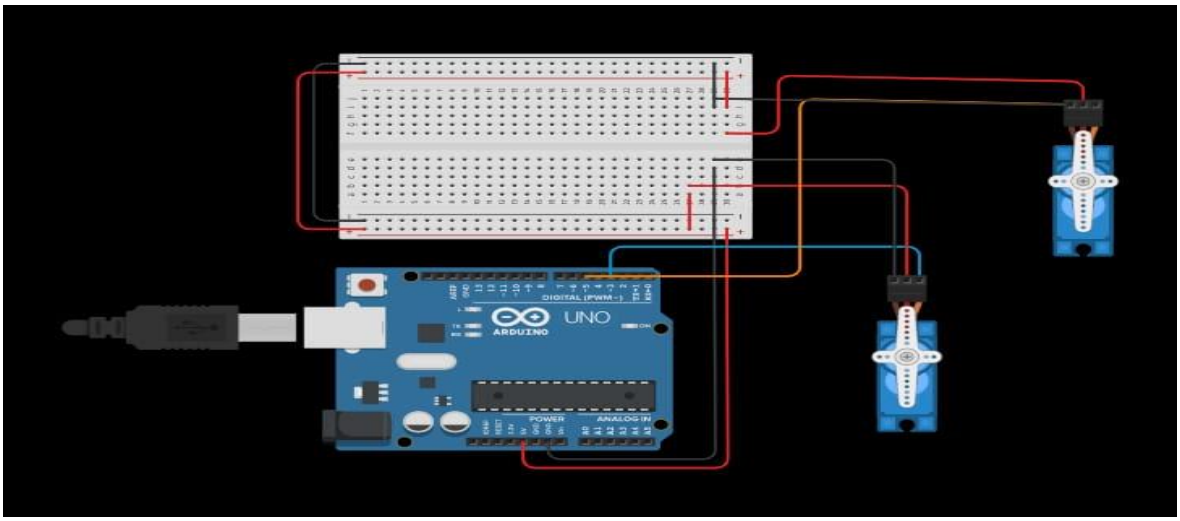
4.Implementation

4.1.Sprint 1 Implementation

4.1.1. 3D model of the sprint 1 subsystem



4.1.3. Circuit diagram of the sprint 1



1.1.2. Flow chart of the sprint 1

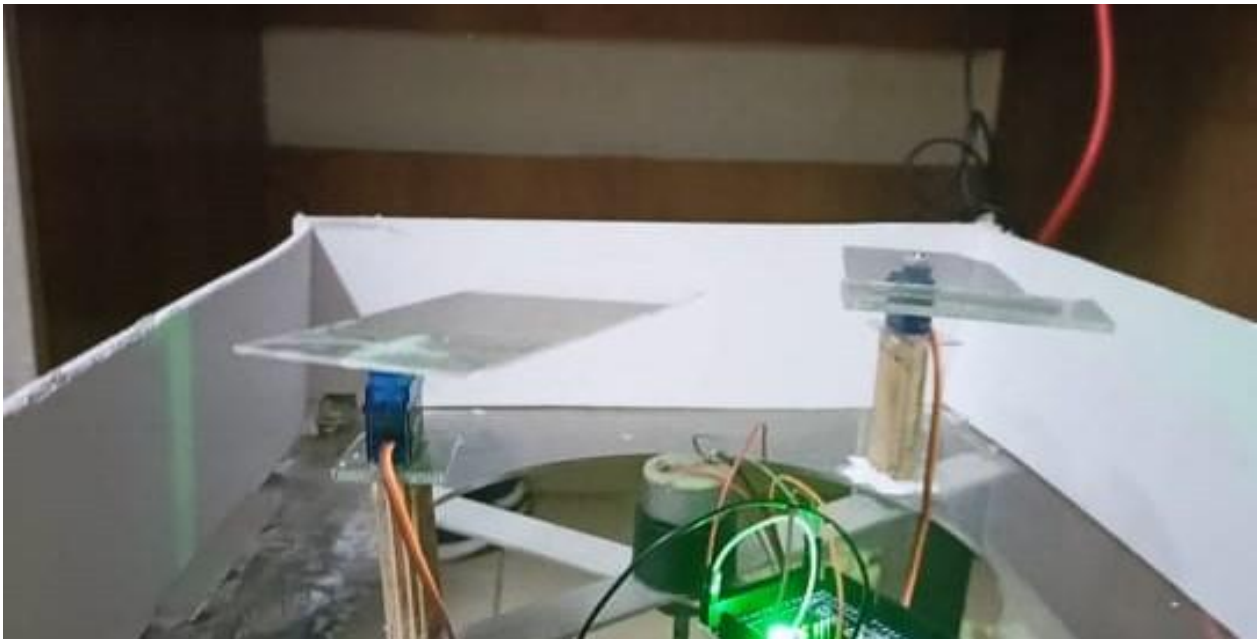
1.start.

2.servo 1 opens and closes.

3. servo 2 opens and closes.

4. stop.

4.1.5. Physical implementation image of the sprint 1



4.2.Sprint 2 Implementation

4.2.1. 3D model of the sprint 2

Fig . Blades.

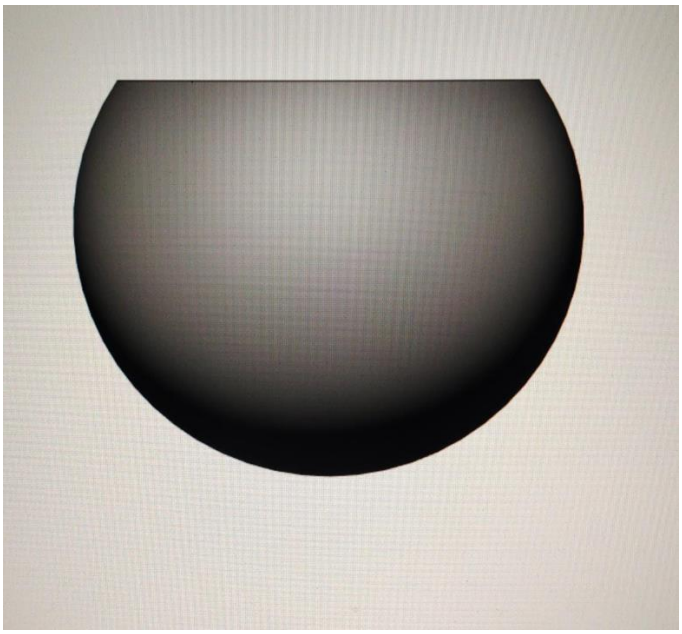
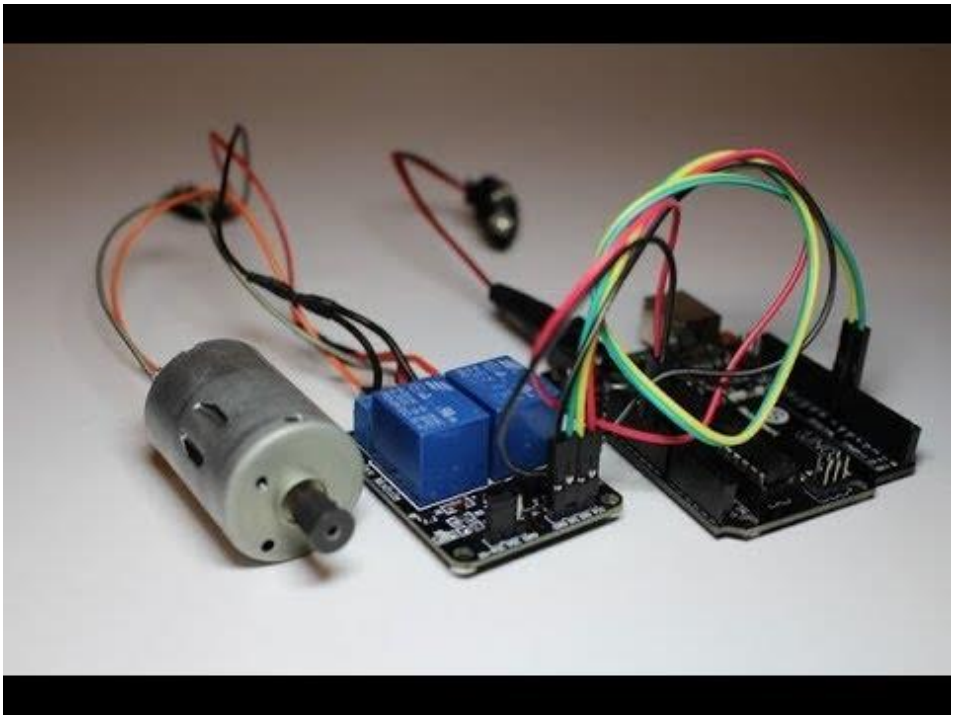


Fig .Rotating part

4.2.3. Circuit diagram of the sprint 2



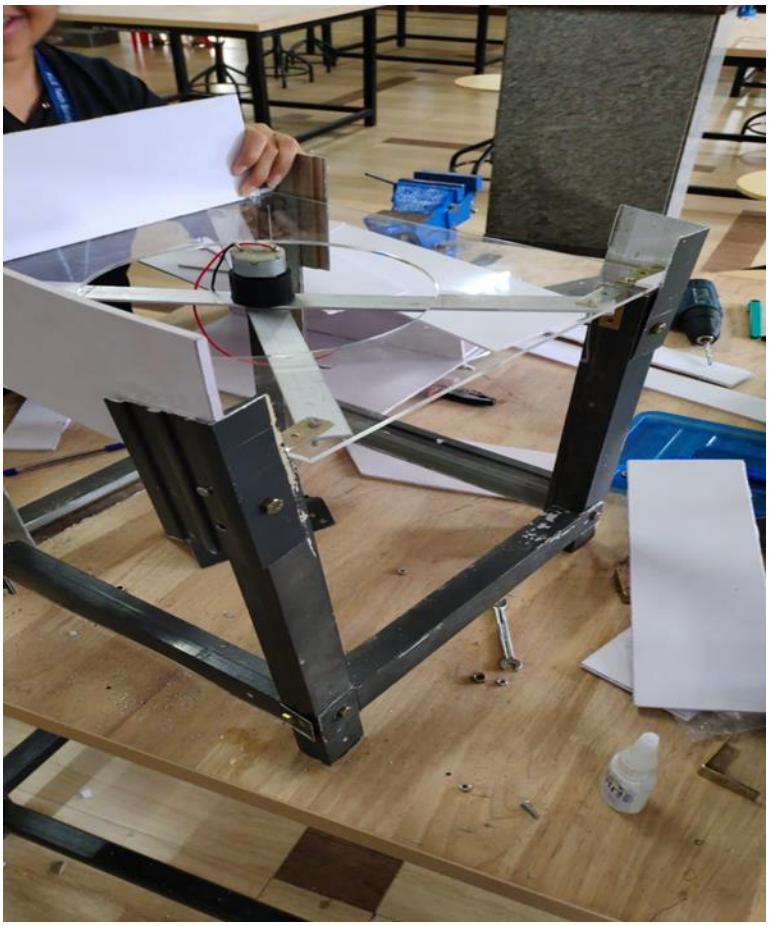
4.2.4. Flow chart of the sprint 2

1. Start.

2. DC motor will rotate for 30 seconds.

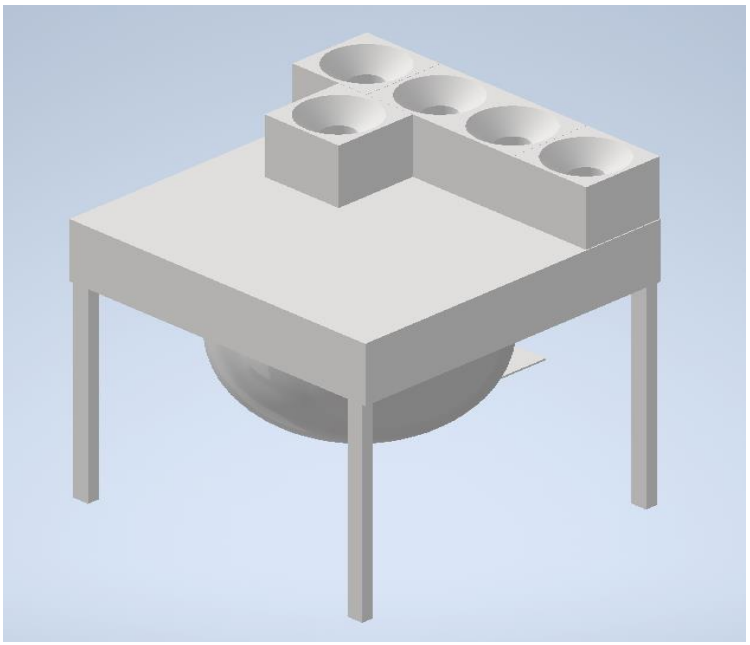
3.Stop.

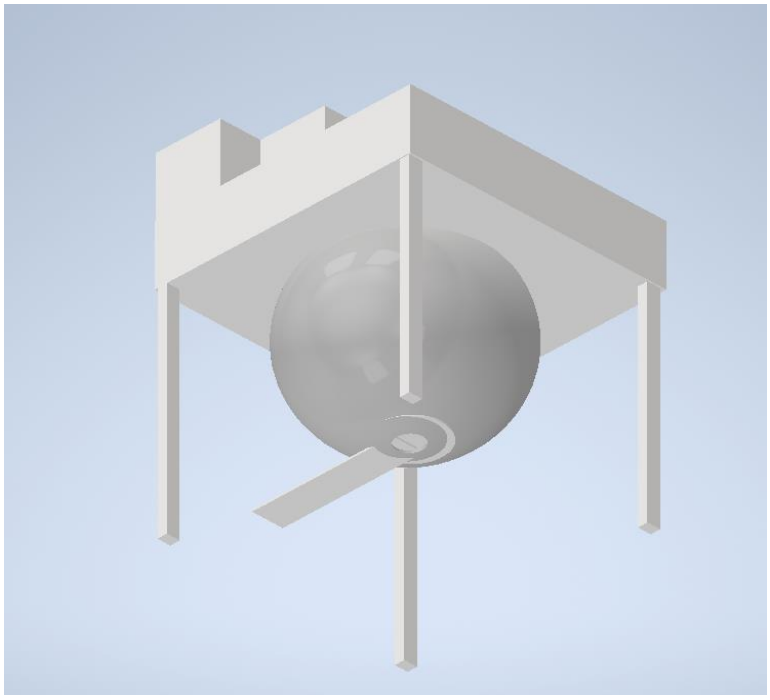
4.2.5. Physical implementation image of the sprint 2



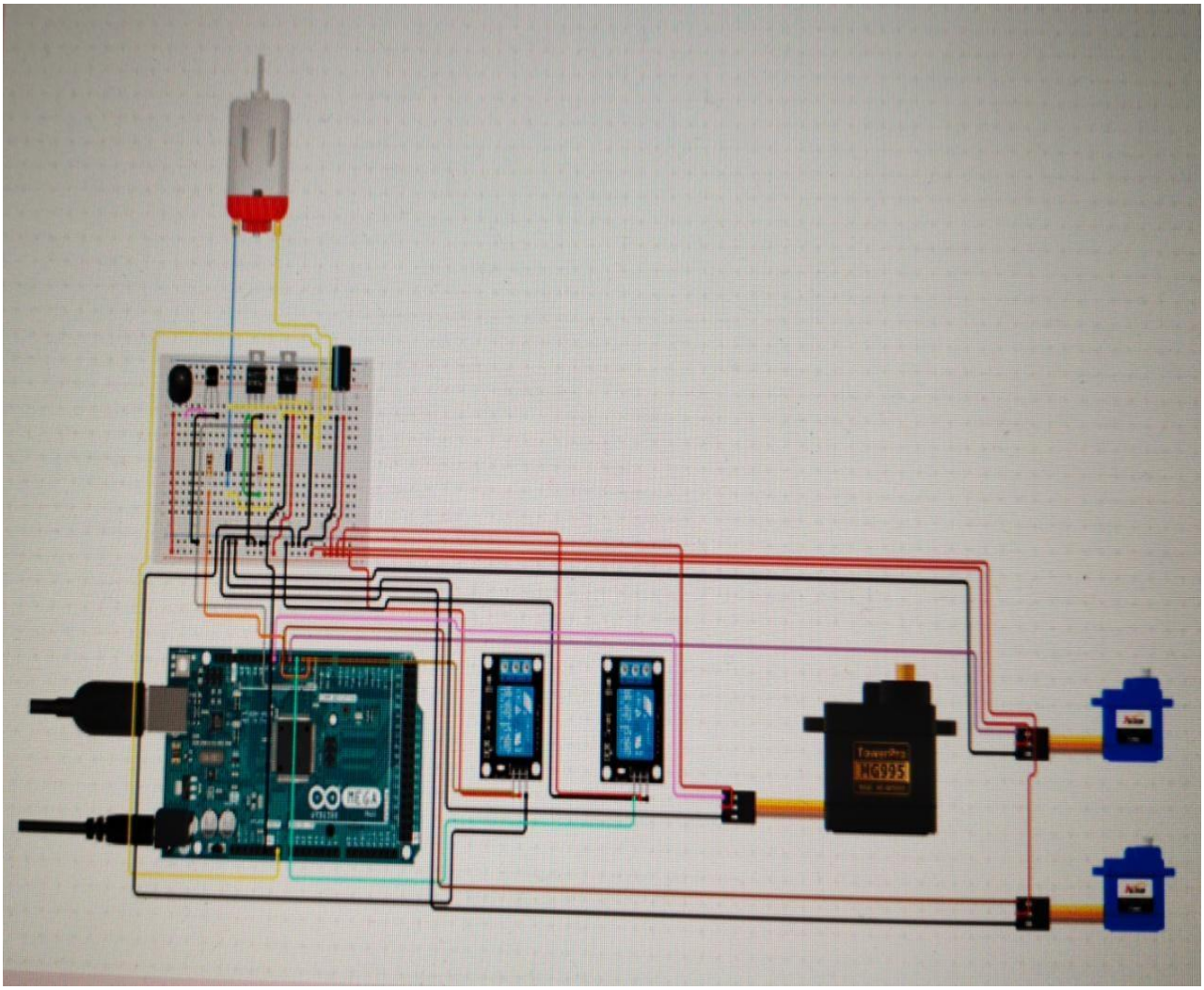
4.3.Sprint 3 Implementation

4.3.1. 3D model of the sprint 3 subsystem





4.3.3. Circuit diagram of the sprint 3



4.3.4. Flow chart of the sprint 3

1.Start.

2.Servo 1 opens and closes.

3.Servo 2 opens and closes.

4.DC motor will rotate for 30 seconds.

5.Buzzer comes when DC motors stops.

6.Servo 3 opens and closes.

7.Stop.

4.3.5. Physical implementation image of the sprint 3

Bill of materials

Sl. No	Item with description	Quantity	Price in Rs.
1	Acrylic sheet	35x35(cm)	350
2	Foam sheet	60x60(cm)	120
3	Nuts and bolts	30	15
4	Aluminium flat	70cm	70
		Total	555

5.Statement of Expenditure

t

SI.NO	components	Quantity	price
1.	DC motor(60rpm)	1	135
2.	Servo motor(sg90)	2	200
3.	Servo motor(mg995)	1	300
4.	Buzzer	1	195
5.	Jumper wires	40	100
		total	930

6. Limitations of Present work and Future Scope

Limitations:

- Machine cannot clean itself.
- It does not serve in definite quantities.
- There is no vegetable cutter.
- It doesn’t show the left-out thing in the container.

Future scope:

- To build machine that it should clean itself.
- It should serve in definite quantities.
- Adding automatic vegetable cutter.
- It should show the left-out thing in the container.
- Adding scan and pay.

References:

1. https://m.indiamart.com/proddetail/bhel-making-machine-23022384048.html

2. https://youtu.be/1R3fqSFCAjM

3. https://processinginsights.tetrapak.com/a-short-history-of-mixing-from-mortar-and-pestle-to-microns/

4. https://www.circuito.io/

5. https://youtu.be/6QfLZ_2KPCg