KLE Technological University
Creating Value
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B. V. Bhoomaraddi Engineering & Technology College Campus, Hubballi - India

MINI PROJECT

18EARW301_2022-23

Garden Maintaining Bot

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DEPARTMENT OF AUTOMATION AND ROBOTICS

CERTIFICATE

This is to certify that the below mentioned team has implemented the project entitled “Garden maintaining bot” as part of Mini Project course, code 18EARW301, in the department of Automation & Robotics, KLE Technological University, Hubballi, during 5th semester of B.E. program for the academic year 2022-23. The project report fulfills the requirements prescribed.

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1. INTRODUCTION TO BROAD THEME OR CHALLENGES:

There are a few common challenges that all of us gardeners face in our lives. Sometimes we learn our lesson the first time, and some of these challenges are out of our control, and we have to take them on as they come. Weeds are the bane of gardeners' existence. Getting them under control is challenging, and once they get too big, it can be overwhelming to tackle the problem.

Watering, too much or too little, is a balance that can be hard to achieve. It's one of those gardening skills that takes practice. For our outdoor gardens, this can sometimes be difficult to control since we get quite a bit of rain in Powell River. In the short term, fertilize your plants consistently through the summer. In the long term, amend your garden soil with compost, and consider following a crop rotation routine, so you're not growing the same kind of plant in the same space and same soil every year.

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3.2. MARKET RESEARCH AND ANALYSIS:

USER PERSONAS:

BHARATHI

AGE : 42
OCCUPATION : Gardener
ADDRESS : Unkal

USER STORY

Bharathi is from Unkal and has 6 months of experience in gardening. Earlier she had worked in fields as of now she manages her housework and reaches BVB College by 10 to work. While gardening she faces some issues such as mosquito biting and operating the machine. The work has to be completed within the given time

FRUSTRATION

There will be lots of mosquitoes in the garden, she cannot handle the cutting tool and she felt that machines are risky while operating

GOALS

The work in the garden has to be completed in which the area is allocated.

NAGAPPA

AGE : 48
OCCUPATION : Gardener
ADDRESS : Shirur

USER STORY

Nagappa is from a poor background who lives in Shirur. He is gardening since 2 years, earlier he owned a laundry but due to lockdown during COVID he was not able to continue his business. So he chose gardening as his occupation as he had to look after his family

FRUSTRATION

While gardening when he uses cutting machine sometimes the stones on the ground would damage the blade and may hurt the people standing around.

GOALS

The work has to be perfectly at the end of the day without any trouble.

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MANISHA PATIL

AGE : 36
OCCUPATION : Home Gardener
ADDRESS : Belgaum
Phone No. 8880433593

USER STORY

Mrs. Manisha is 36 years old women living in Belgaum with its 2 children and husband. She is a house wife and maintain homier garden by self. She has many types of plants in garden, different types of flowers and herbs with a few vegetables in it. She spent a lot of time online to research for maintenance for her garden.
She cleans, waters and remove unnecessary plants from the garden regularly.so she can't focus on her family and children, through that her mental health is also in trouble.
By reducing or daily maintaining the garden her hand and her body is ill. So, the current things are rainy and the garden ready for spring.

FRUSTRATION

Plants are very strong but also very fragile. They can die for any reason. Overwatering, underwatering, non-conductive temperature or humidity, insects' attacks, root damaging and totally unconditional weather.

GOALS

she wants the works to be done with less effort.
She needs something new components to make effort less system for sweeping, maintaining, watering, cutting and tie to time fertilizations

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GEETA

AGE : 35
OCCUPATION : Teacher
ADDRESS : Tattilli
Phone No. 9108645497

USER STORY

Geeta is a Kannada teacher at convent school, Tattilli. After finishing her school at 5. She look after her garden as well as her household chores. Where Geeta finds insufficient time to complete her daily activities.

FRUSTRATION

As Geeta is a working woman, she finds difficult to maintain her household chores and insufficient time for gardening, as she feels gardening is a time taking process.

GOALS

Making it easier for gardening Geeta can save her time by using the modern machine tools for gardening which is safer and easier to operate.

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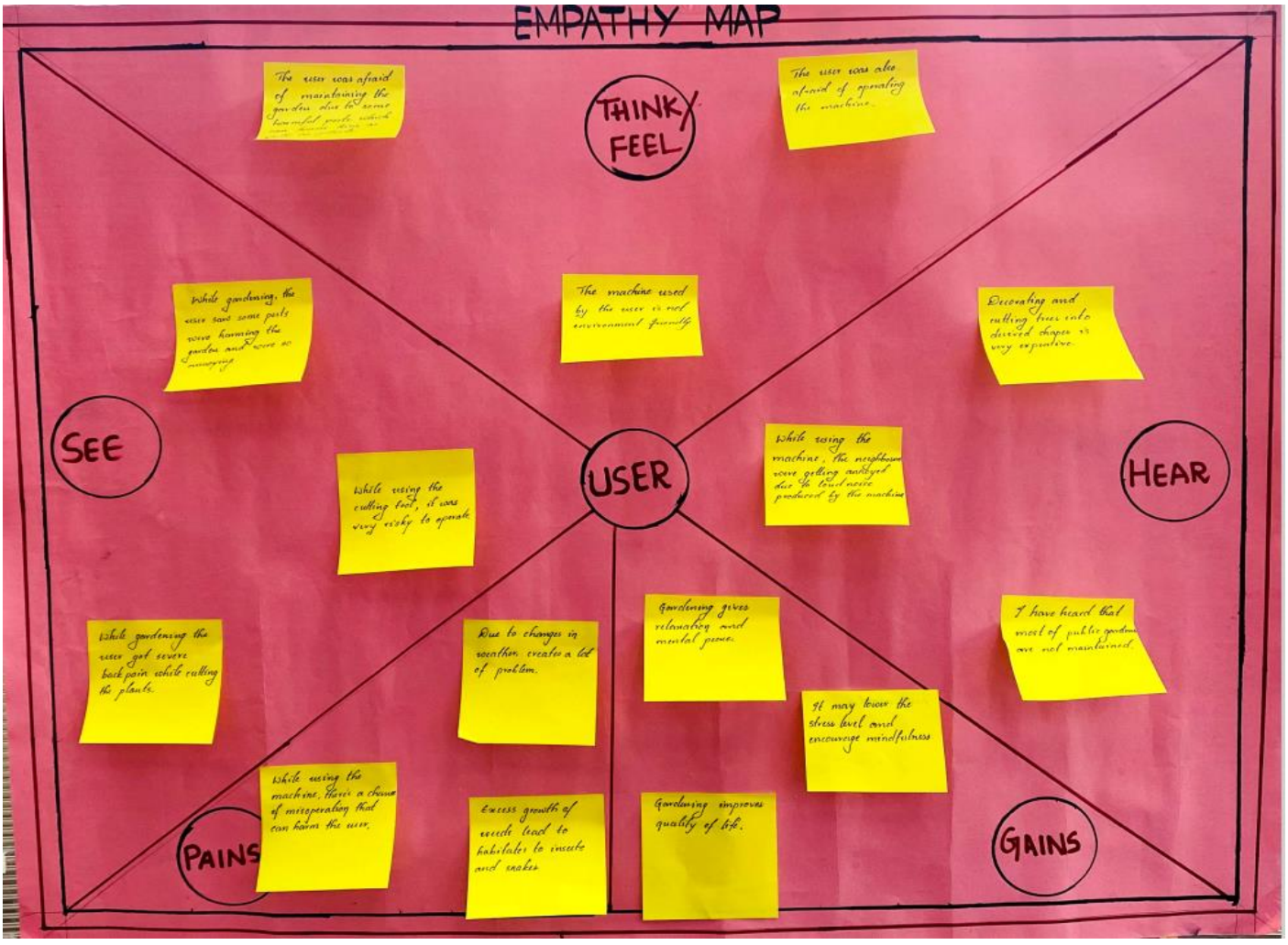
EMPATHY MAP:



USER STORIES:

Priority	Stages	User Story templates	Demand/wishes
1)	Engagement	**USER STORY:** As a houseowner I need my garden to be watered properly so that leaves remain fresh even during summers **ACCEPTANCE CRITERIA:** Given 10*10 sq ft garden when water storing capacity is installed then such garden can be watered twice without feeling it	Demand
2)	Engagement	**USER STORY:** As a houseowner I need to cut the grass at proper heights so that it should look uniform and beautiful **ACCEPTANCE CRITERIA:** When grass cutting is done then approximately 2 inches of grass remains.	Demand
3)	Acquisition	**USER STORY:** As a houseowner I need to whisk away fallen leaves and debris, so that the garden looks well maintained. **ACCEPTANCE CRITERIA:** When using the rake to remove the debris then the no of leaves and debris remaining in garden can be removed entirely.	Wishes
4)	Engagement	**USER STORY:** As a houseowner I need to get rid of insects and pests, so that the plants can grow in a healthy environment.	Demand

		ACCEPTANCE CRITERIA: Given a garden with diseased plants, when organic pesticides are spread at least once every 90 days then plant grow healthy	
5)	Acquisition	**USER STORY:** As a houseowner I want the product to consume less power and yield high efficiency **ACCEPTANCE CRITERIA:** The product should save 50% of energy compared to other products	Demand
6)	Loyalty	**USER STORY:** As a garden I want the product to weigh less so that it can be carried easily **ACCEPTANCE CRITERIA:** The product must be less than 10 kg in weight	Demand
7)	Loyalty	**USER STORY:** As a garden I want the product to overcome certain critical conditions and should have long durability **ACCEPTANCE CRITERIA:** The weather should have a temperature ranging from 20-30 degree Celsius.	Demand
8)	Loyalty	**USER STORY:** As a gardener I want the product to be environmentally friendly and should work properly in all conditions. **ACCEPTANCE CRITERIA:** The product should work at least for 1 hour continously	Wishes
9)	Engagement	**USER STORY:** As a gardener she wants the product to cut grass with more speed and accuracy. **ACCEPTANCE CRITERIA:**	Demand

		The product should possess more than 90% of accuracy in cutting the grass	
10)	Engagement	**USER STORY:** As a gardener she wants to water the plants and spray pesticides on time **ACCEPTANCE CRITERIA:** The product should hold at least 3 liters of water.	Wishes
11)	Engagement	**USER STORY:** The product should remove all weeds Which disturbs the growth of plants **ACCEPTANCE CRITERIA:** The product should have at least 1 liter of pesticide holding tray.	Wishes
12)	Acquisition	**USER STORY:** The user needs the product to be advance and user friendly so that everyone can access it **ACCEPTANCE CRITERIA:** The product should be upgraded at least once a year	Demand
13)	Engagement	**USER STORY:** As a house owner the product have warranty so that I can repair the product anytime without spending money. **ACCEPTANCE CRITERIA:** The product should have at least 3 years of warranty.	Wishes
14)	Acquisitions	**USER STORY:** As a house owner, I need the product to be small and compact so that it can occupy less space **ACCEPTANCE CRITERIA:** The product should not exceed a length of 4 ft and breadth of 3 ft	Demand

15)	Acquisition	**USER STORY:** The user needs the product to be easily repairable so that the user will not spare much time on it. **ACCEPTANCE CRITERIA:** It should be serviced once in a month	Demand
16)	Loyalty	**USER STORY:** As a house owner, I need product component to be easily replaceable it found faculty **ACCEPTANCE CRITERIA:** The product component should be replaced within a week .	Demand
17)	Loyalty	**USER STORY:** The product should be made up of tough material which can withstand high loads. **ACCEPTANCE CRITERIA:** It should withstand at least 7 kgs of loads.	Demand
18)	Loyalty	**USER STORY:** I need the product to be cheaper so that it can be affordable by anyone. **ACCEPTANCE CRITERIA:** The product should be 50% cheaper than the other products in the market.	Demand
19)	Acquisition	**USER STORY:** As a gardener I need the proper tools for cutting so that plants look attractive . **ACCEPTANCE CRITERIA:** The sharpness of cutting tool should be 100% accurate.	Demand

20)	Activation	**USER STORY:** The product should have a rechargeable battery so that it can work in power cut situations. **ACCEPTANCE CRITERIA:** The product should work for at least an hour running on battery.	Demand
21)	Activation	**USER STORY:** As a user I need a product that has good ground clearance so that I can use it on unequal surface**ACCEPTANCE CRITERIA:** When the user manual is read by the customer, then User should easily understand how to operate the product easily.	Demand
22)	Reach	**USER STORY:** As a house owner, I want a convincing product advertisement so that it feels the product is reliable and trustworthy. **ACCEPTANCE CRITERIA:** When a product advertisement is done, then it should present the product features which are convincing enough for the customers to buy the product.	Demand
23)	Loyalty	**USER STORY:** As a user I needs the product should be cheaper than other products in market **ACCEPTANCE CRITERIA:** All parts and assembling cost should be cheaper so that it can afford by everyone	Demand
24)	Loyalty	**USER STORY:** As a owner, I need the product to work on battery so that it can easily work without electricity. **ACCEPTANCE CRITERIA:**	Demand

		The power of battery should be at least 30 volts.	
25)	Reach	**USER STORY:** As a the product should indicate the water level so that I can fill it whenever required **ACCEPTANCE CRITERIA:** The product should indicate that water should be filled when it is less than 250ml.	Wishes

SOURCE AND REQUIREMENTS

SI NO	SOURCE	REQUIREMENTS
1	Client	The product should be affordable
2	Team	The product should be rigid and durable
3	Survey	Product should be accessible in every condition
4	Client	Product must be user friendly
5	Survey	It should have low risk factor
6	Survey	It should have low maintenance
7	Survey	The product should yield high efficiency
8	Survey	Product should be water resistant
9	Team	Product should be semi-automatic
10	Client	The blade should stop rotating when user comes in contact of the product
11	Survey	The grass should be cut precisely
12	Client	The body of the product should be rust proof
13	Survey	It should be also used on different surfaces
14	Client	The product should make least noise
15	Client	It should be compact in size
16	Team	The product should also be battery operated
17	Team	The product material should be of good quality
18	Team	The sharpness of the cutting tool must be high
19	Team	It should indicate water level
20	Client	The product should consume less power
21	Client	The product should occupy less space
22	Client	The product should consume less energy
23	Team	The product should be eco friendly
24	Team	It should contain gentle water sprinkler
25	Survey	Water storage facility must be made available
26	Team	Efficiency in the type of sprinkler so that water can be saved
27	Survey	The product must be easier to operate
28	Team	Separate garbage holding tray must be provided
29	Team	Easy waste disposal must be made available
30	Team	Separate pesticide holding tray must be provided
31	Team	There must not get damaged, as it has to deal with the

31	Team	There must not get damaged, as it has to deal with the pesticides
32	Client	The product should be aesthetically pleasing
33	Team	Emergency override must be provided
34	Survey	The product should have longer lifespan
35	Survey	The product should be able to cut the grass uniformly
36	Team	The product should be locomotive
37	Team	The product should be controlled with the remote also
38	Client	It should be easier to install
39	Team	It should be controlled by all users
40	Client	The product should be water resistant
41	Team	It should have high RPM motors, to drive the blades
42	Client	The product should be easily repairable
43	Team	The product should work in all the conditions

44	Team	The user interface of the product should be simple
45	Survey	Easy to clean after use
46	Team	The product should have ground clearance of 4-8 cm
47	Survey	The product should withstand load of at least 10kg
48	Team	The battery must take less than hour to get charged
49	Team	The product should hold at least 3 litres of water
50	Survey	The product should be made up of hard material to withstand damages

6. Source and requirements with D/W

SI NO	SOURCE	REQUIREMENTS	DEMAND/ WISHES	CATEGORY
1	Client	The product should be affordable	Demand	Costs
2	Team	The product should be rigid and durable	Demand	Geometry
3	Survey	Product should be accessible in every condition	Demand	Weather
4	Client	Product must be user friendly	Demand	Safety
5	Survey	It should have low risk factor	Demand	Safety
6	Survey	It should have low maintenance	Wish	Maintenances
7	Survey	The product should yield high efficiency	Demand	Ergonomics
8	Survey	Product should be water resistant	Demand	Quality
9	Team	Product should be semi-automatic	Wish	operation
10	Client	The blade should stop rotating when user comes in contact of the product	Wish	Operation/ Safety
11	Survey	The grass should be cut precisely	Wish	Operation
12	Client	The body of the product should be rust proof	Wish	Quality
13	Survey	It should be also used on different surfaces	Wish	Geometry
14	Client	The product should make least noise	Demand	Signals
15	Client	It should be compact in size	Demand	Geometry
16	Team	The product should also be battery operated	Demand	Energy/ operation
17	Team	The product material should be of good quality	Demand	Quality
18	Team	The sharpness of the cutting tool must be high	Wish	Operation
19	Team	It should indicate water level	Wish	Signal
20	Client	The product should consume less power	Demand	Energy
21	Client	The product should occupy less space	Demand	Geometry
22	Client	The product should consume less energy	Demand	Energy
23	Team	The product should be eco friendly	Demand	Safety
24	Team	It should contain gentle water sprinkler	Wish	Operation
25	Survey	Water storage facility must be made available	Demand	Storage
26	Team	Efficiency in the type of sprinkler so that water can be saved	Wish	Ergonomics
27	Survey	The product must be easier to operate	Demand	Operation
28	Team	Separate garbage holding tray must be provided	Demand	Storage
29	Team	Easy waste disposal must be made available	Wish	Maintenance
30	Team	Separate pesticide holding tray must be provided	Demands	Storage
31	Team	There must not get damaged, as it has to deal with the pesticides	Wish	Quality/ Material
32	Client	The product should be aesthetically pleasing	Wish	Geometry
33	Team	Emergency override must be provided	Demand	Safety/operation

31	Team	There must not get damaged, as it has to deal with the pesticides	Wish	Quality/ Material
32	Client	The product should be aesthetically pleasing	Wish	Geometry
33	Team	Emergency override must be provided	Demand	Safety/operation
34	Survey	The product should have longer lifespan	Demand	Quality
35	Survey	The product should be able to cut the grass uniformly	Demand	Operation
36	Team	The product should be locomotive	Demand	Transport
37	Team	The product should be controlled with the remote also	Wish	Operation
38	Client	It should be easier to install	Wish	Kinematics
39	Team	It should be controlled by all users	Wish	Kinematics
40	Client	The product should be water resistant	Demand	Material
41	Team	It should have high RPM motors, to drive the blades	Wish	Energy/ Forces
42	Client	The product should be easily repairable	Demand	Maintenance
43	Team	The product should work in all the conditions	Demand	Quality
44	Team	The user interface of the product should be simple	Wish	Operation
45	Survey	Easy to clean after use	Demand	Maintenance
46	Team	The product should have ground clearance of 4-8 cm	Demand	Geometry
47	Survey	The product should withstand load of at least 10kg	Demand	Material
48	Team	The battery must take less than hour to get charged	Demand	Energy
49	Team	The product should hold at least 3 litres of water	Wish	Storage
50	Survey	The product should be made up of hard material to withstand damages	Wish	Material

7. **AFFINITY DIAGRAM**

TABLE 4

SI NO	CATEGORY	SUB CATEGORY 1	SUB CATEGORY 2	SUB CATEGORY 3	SUB CATEGORY 4	SUB CATEGORY 5
1	GEOMETRY	COMPACT	DURABLE			
2	MAINTENANCE	DURABLE	REPAIR	WARRANTY	RIGIDITY	COST OF MAINTENANCE
3	SAFETY	USER FRIENDLY	LOW RISK			
4	OPERATION	REMOTE CONTROL	SEMI AUTOMATIC			
5	ENERGY	POWER	BATTERY	CURRENT		
6	QUALITY	RUST PROOF	MATERIAL	LIFESPAN	WATER PROOF	
7	SIGNAL	FREQUENCY	INDICATION	SOUND		
8	COST	AFFORDABLE	LOW			
9	STORAGE	CAPACITY	VOLUME			
10	KINEMATICS	INSTALLATION	CONTROL	NOISE		
11	ERGONOMICS	USER INTERFACE				

8. NEED STATEMENT:

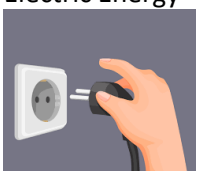
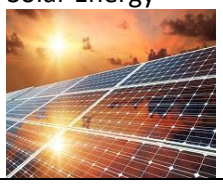
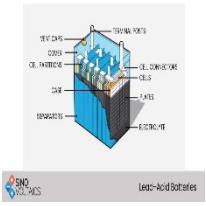
- User needs a product which is easier to operate and can cut various kinds of plants in garden within a minimum time. So that they can manage their time to do other work.

9. PROBLEM STATEMENT:

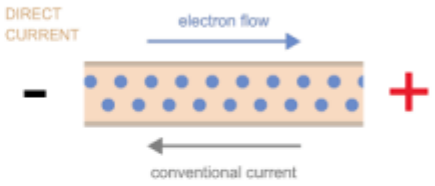
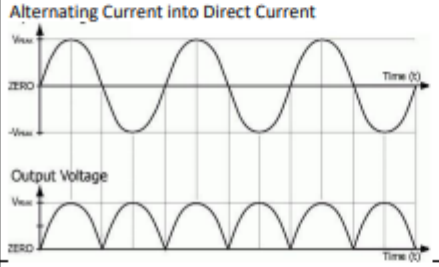
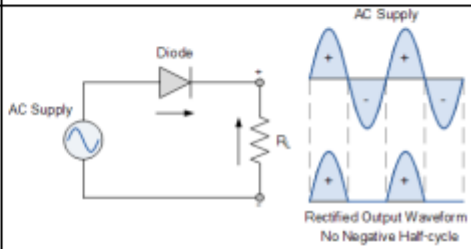
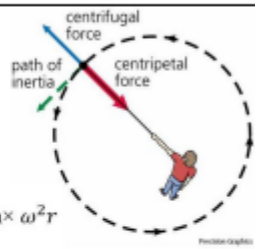
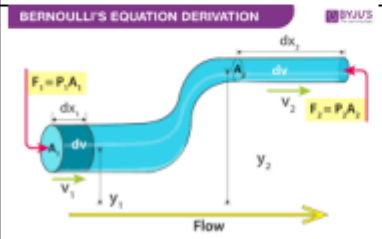
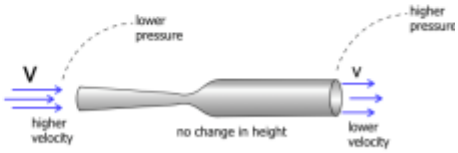
- "Design a prototype that can cut the grass efficiently, water the plants and should be semiautomatic, cost effective and reliable."

11. MORPHOLOGICAL CHART:

Sl.No	SUB FUNCTIONS	SOLUTIONS IDEAS

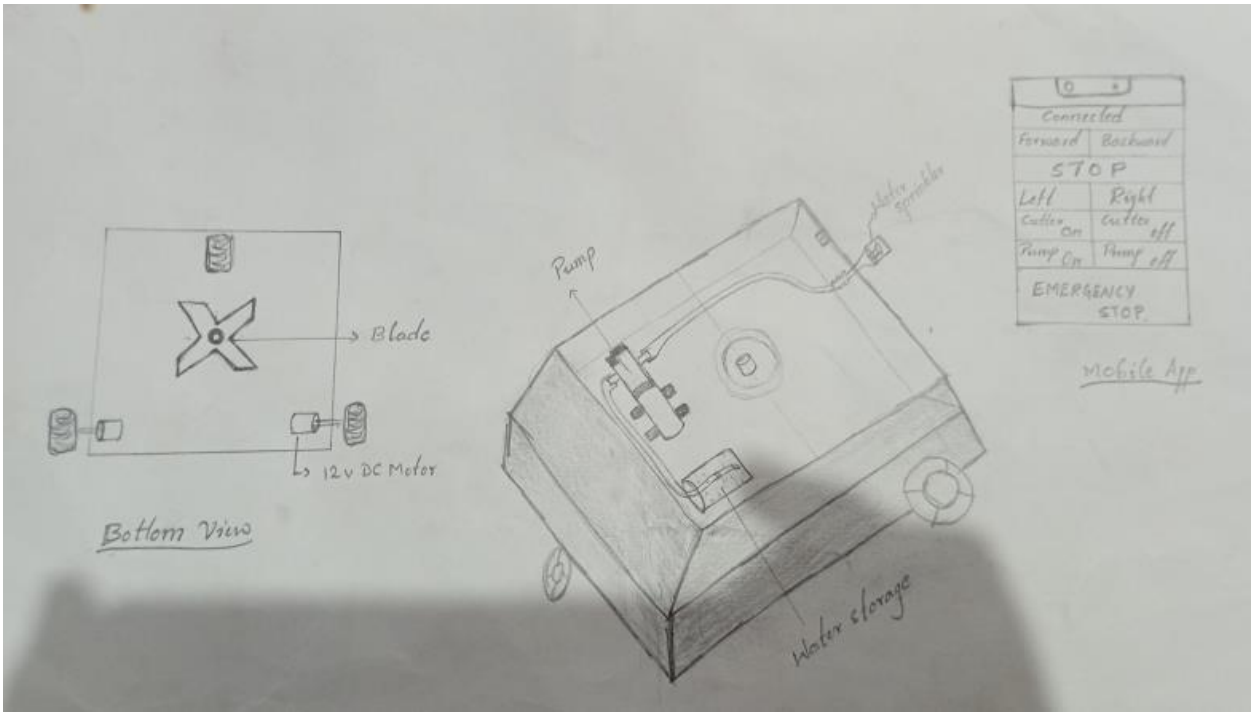
1	Power Source	Electric Energy 	Solar Energy 	Gasoline 	
2	Accept energy	AC adapter 	Solar panels 	Gasoline valve 	
3.	Store energy	Lead acid battery 	Lithium-ion battery 	Nickle-Cadmium Battery 	
4	Flow of energy	Copper Cable 	Aluminum Cable 	Steel Cable 	Nickle-plated copper cable 
5	User interface	APP	Manual	Website	

					
6	Controller	Arduino-Uno 	Node MCU 	Arduino Mega 2560 	
7	Actuation	BDC MOTOR 	BLDC MOTOR 	SERVO MOTOR 	Internal Combustion Engine 
8	Wheel rotation	Semi-Solid Rubbered Wheels 	Hard Plastic Wheels 	Swivel Caster Wheels 	Alloy Wheels 
9	Cut the grass & weeds	Helical Blade 	Mulching Blades 	Bagging Blade 	Circular Saw Blade 

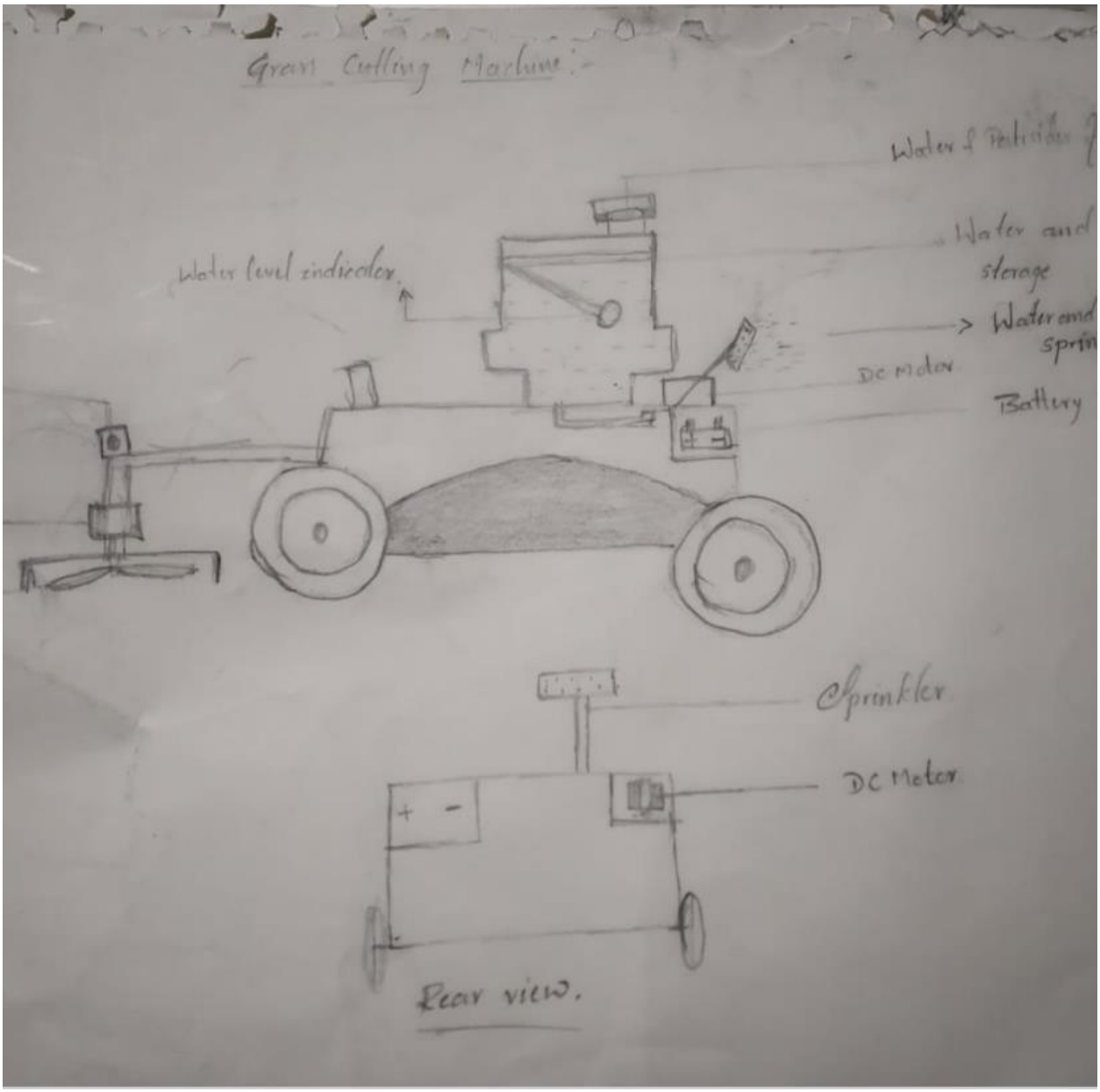
Sub function	Physical Effect	Working Principle
Accept Energy	**Charge and Current** A current of 1 Ampere = 1 Coulomb of charge flowing in 1 second $I = \frac{Q}{t}$ $Q = It$  I = Current in amperes (A) Q = Charge in coulombs (C) t = time in seconds (s)	
Rectification	Rectification is the process of conversion of Alternating Current into Direct Current 	
Blade Rotation	$F_c = \frac{mv^2}{r}$	**Centrifugal Force** $F = m \times \frac{v^2}{r}$ $F = m \times \frac{(\omega r)^2}{r}$ or $F = m \times \omega^2 r$ 
Pressurizing the water		

12. CONCEPTUAL DESIGN

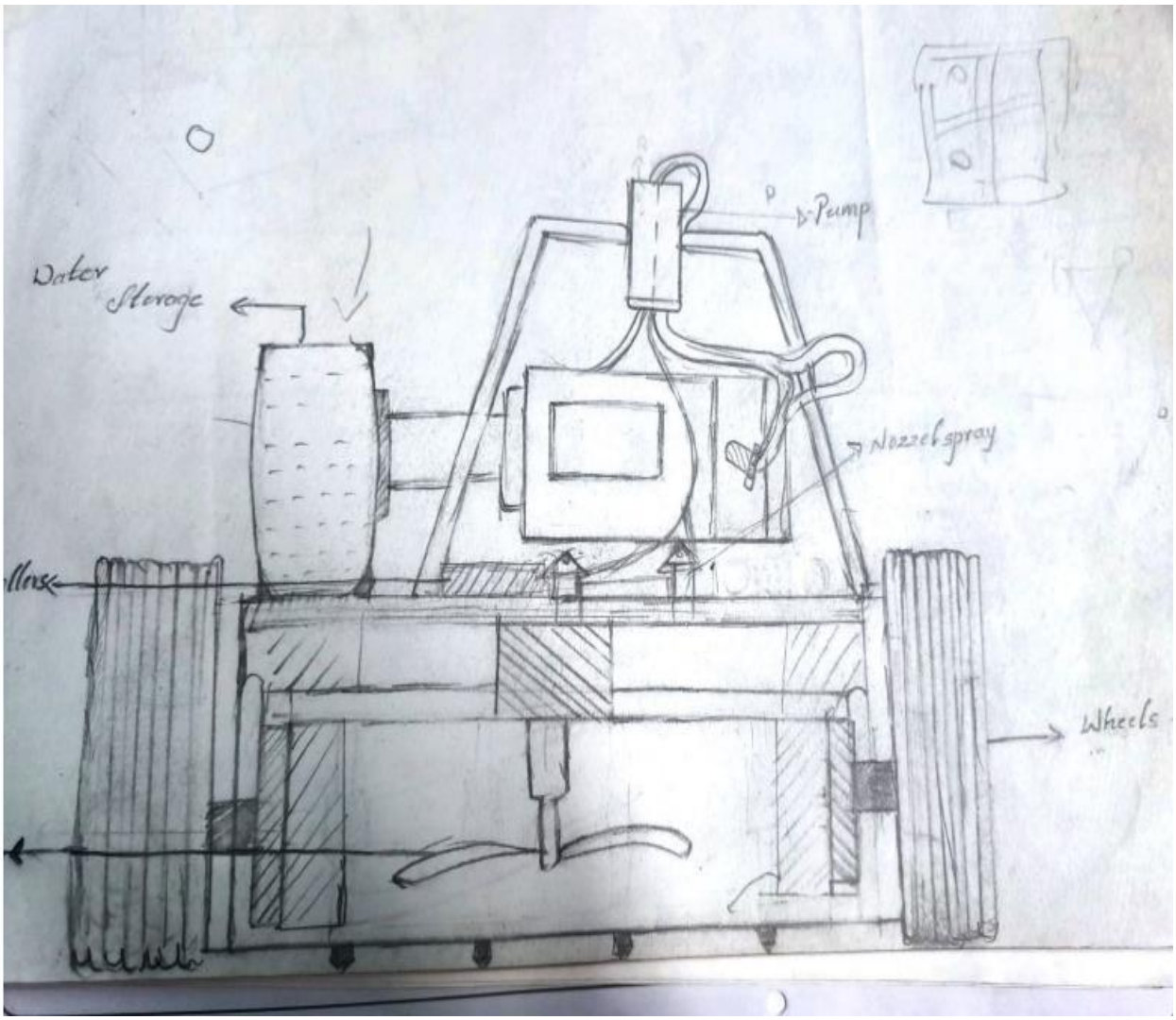
CONCEPT-A:



CONCEPT-B:


Grass Cutting Machine:-
Water level indicator.
Water and
storage
DC Motor
Battery
Sprinkler
DC Motor
+ -
Rear view.

CONCEPT-C:



13. CONCEPT SCREENING:(PUGH'S METHOD)

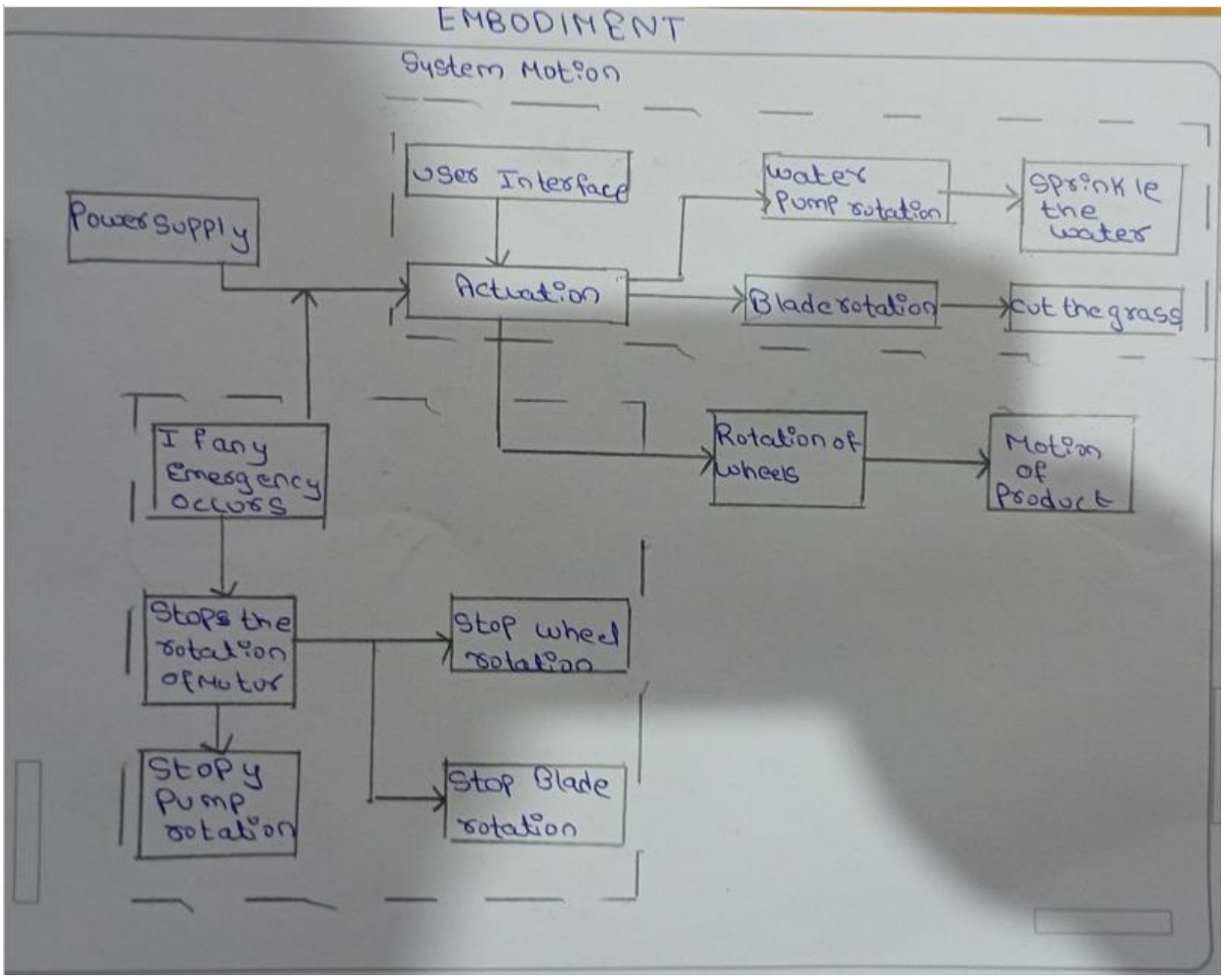
SL.No.	Selection criteria	A	B	C	D (datum)	REF
1.	Cost	0	0	-	0	0
2	Maintenance	0	-	+	+	0
3.	Power consumption	+	-	+	+	0
4.	Safety	0	+	0	-	0
5.	Energy	+	0	+	+	0
6.	Storage	+	-	+	0	0
7.	Kinematics	-	+	0	-	0
PLUSES		3	2	4	3	
SAMES		3	2	2	2	
MINUSES		1	3	1	2	
NET		1	-1	3	0	
RANK		2	4	1	3	
CONTINUE?		YES	NO	YES	NO	

CONCEPT SCORING:

Concept Scoring

		Concepts									
		REFERENCES		A		B		C		D	
Selection criteria	Weight	Rating	Weighted score	Rating	Weighted score	Rating	Weighted score	Rating	Weighted score	Rating	Weighted score
Cost	20%	2	0.4	4	0.8	3	0.6	4	0.8	3	0.6
Maintenance	10%	2	0.2	3	0.3	3	0.3	3	0.3	2	0.2
Power consumption	10%	3	0.3	3	0.3	2	0.2	4	0.4	2	0.2
Safety	10%	3	0.3	4	0.4	4	0.4	5	0.5	4	0.4
Energy	10%	4	0.4	4	0.4	3	0.3	4	0.4	4	0.4
Storage	20%	3	0.6	4	0.8	3	0.6	4	0.8	4	0.8
Kinematics	20%	4	0.8	4	0.8	3	0.6	4	0.8	3	0.6
Total Score Rank		3.0		3.8		3.0		4		3.2	
Continue?		NO		YES		NO		YES		NO	

14. EMBODIMENT

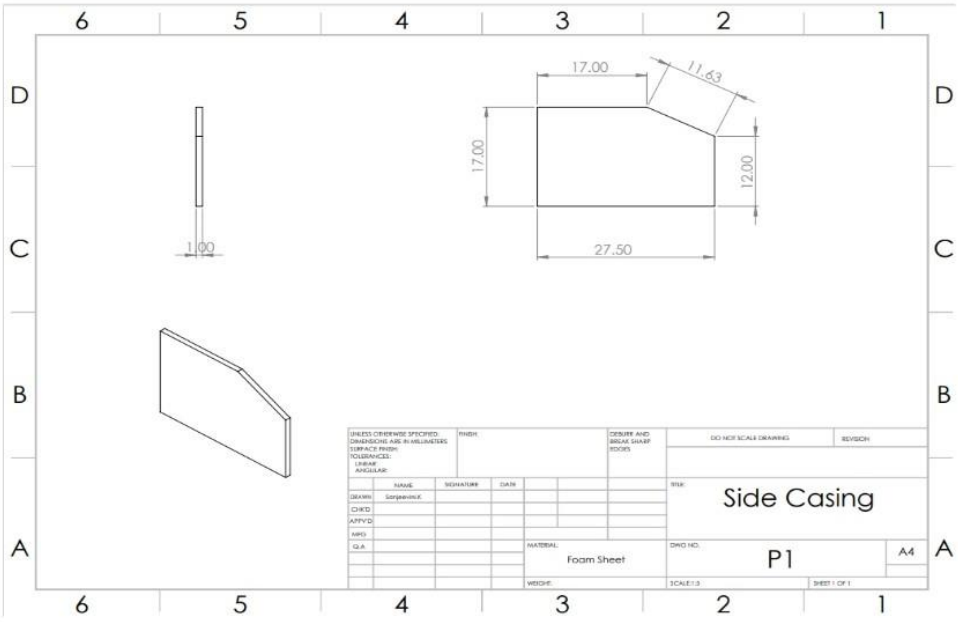


BILL OF MATERIALS

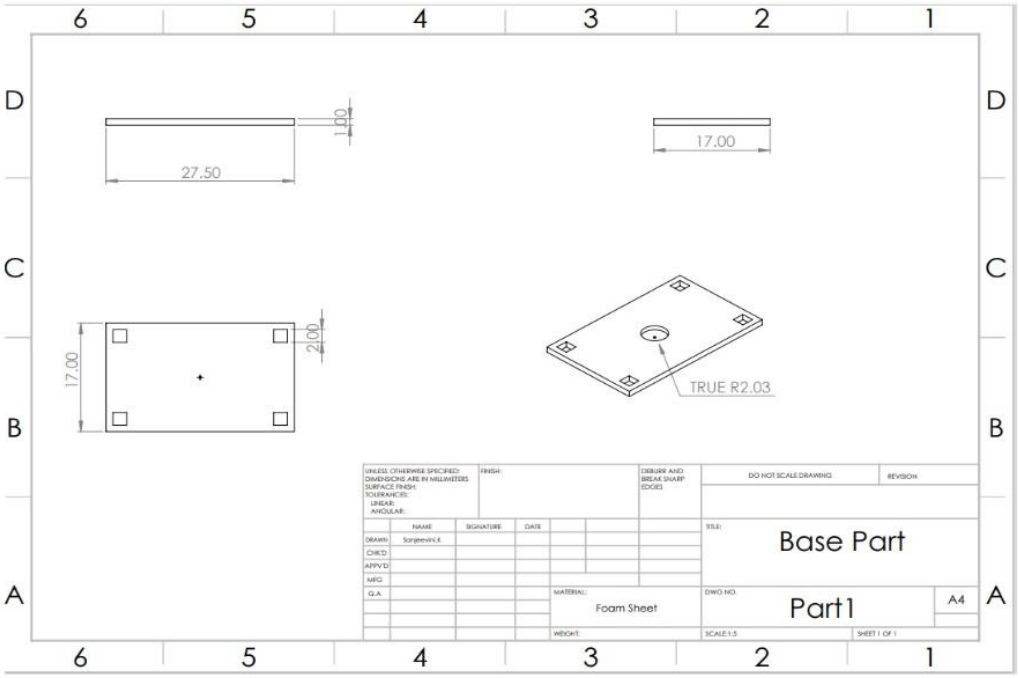
SI NO	COMPONENTS	QUANTIY	RATE
1	DC MOTOR	2	360
2	WHEELS	2	40
3	HIGH SPEED DC MOTOR	1	200
4	BLUEETOTH MODULE	1	150
5	ARDUINO UNO	1	400
6	MOTOR PUMP	1	320
7	MOTOR DRIVER	2	500
8	CUTTER	1	100
9	SPRINKLER	1	100
10	WIRES	-----	200
11	FOAM SHEET	1	200
12	CROSS WHEEL	1	20
13	CLAMPS/NUTS	-----	200
Total	------	-----	2790

I. Components Drawing:

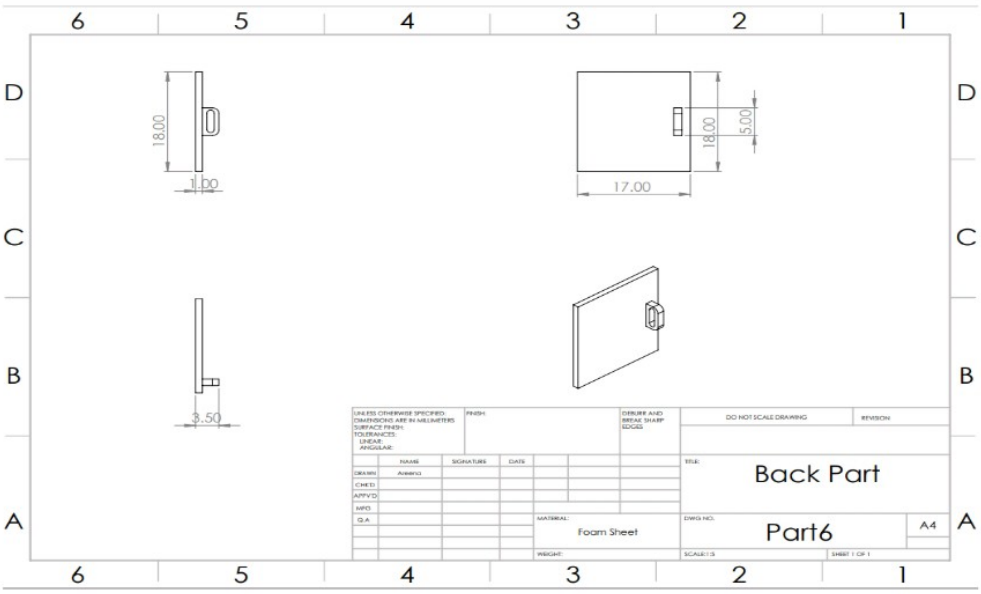
SIDE CASE



BOTTOM VIEW:


6
5
4
3
2
1
D
C
B
A
1.00
27.50
17.00
17.00
2.00
TRUE R2.03
DO NOT SCALE DRAWING
REVISION
NAME
SIGNATURE
DATE
DRAWN
Sanjeevini.K
CHK'D
APPV'D
MFG
Q.A.
MATERIAL:
Foam Sheet
WEIGHT:
TITLE:
Base Part
DWG NO.
Part1
A4
SCALE:1:5
SHEET 1 OF 1

BACK VIEW:



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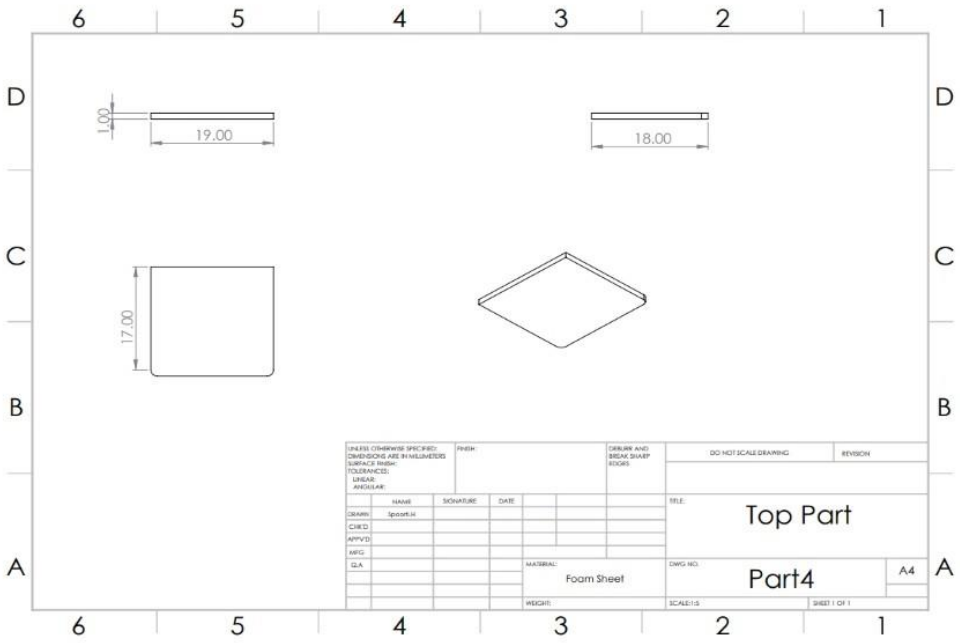
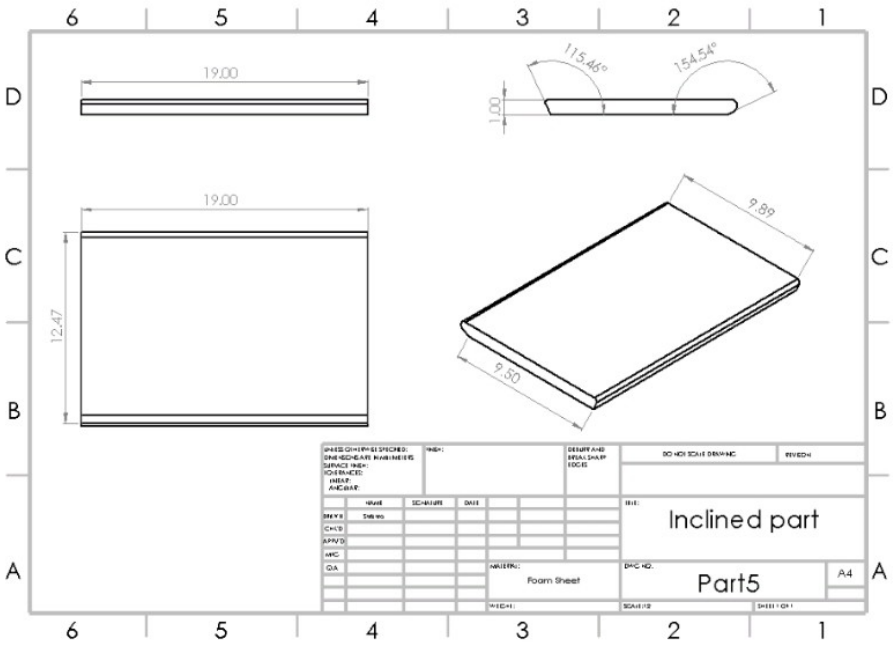
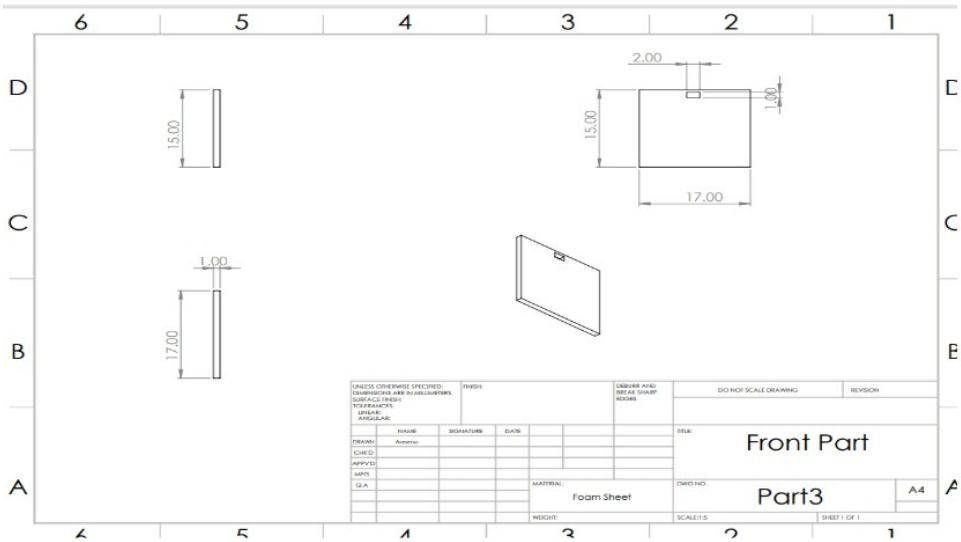
TOP VIEW



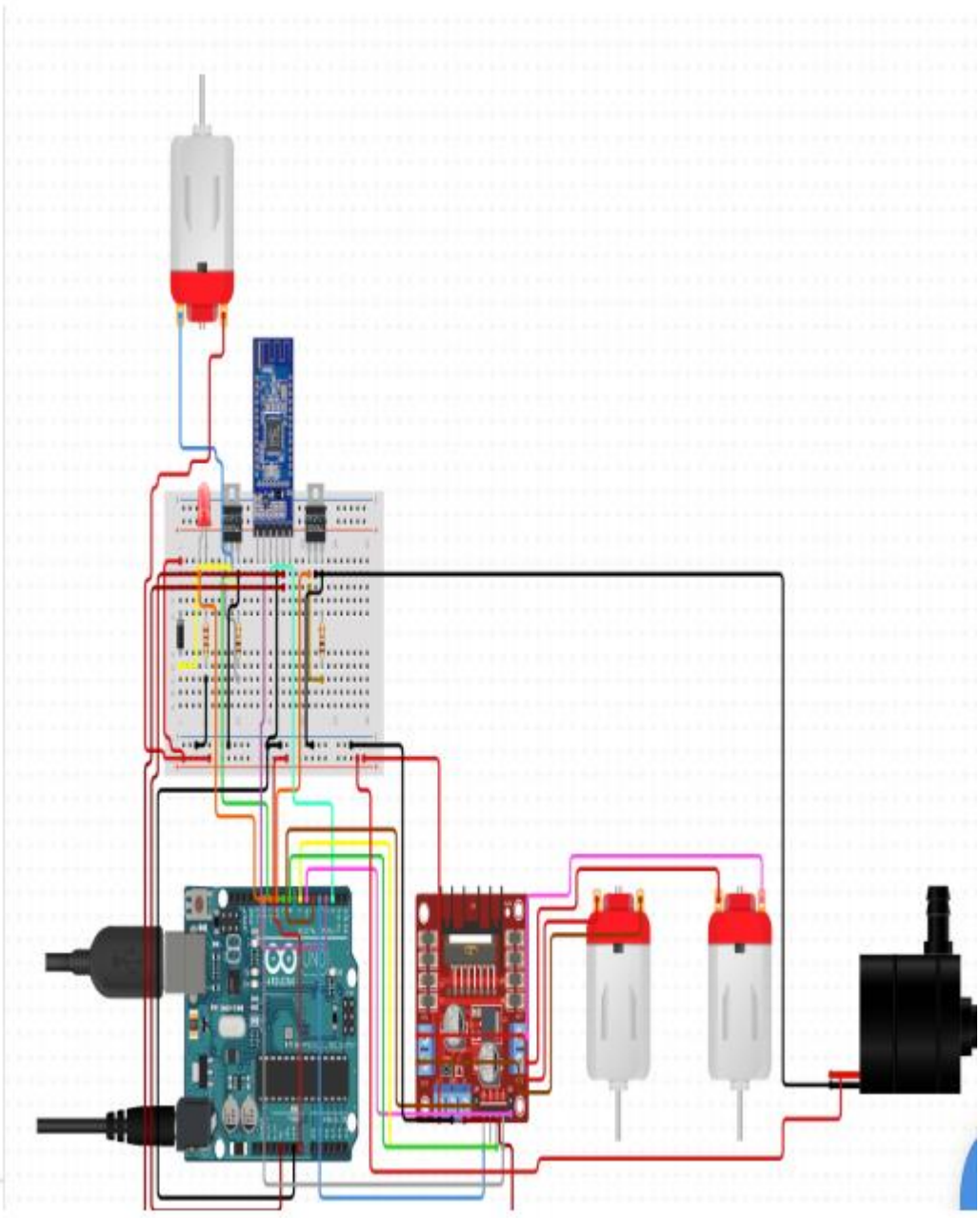
INCLINED PART:



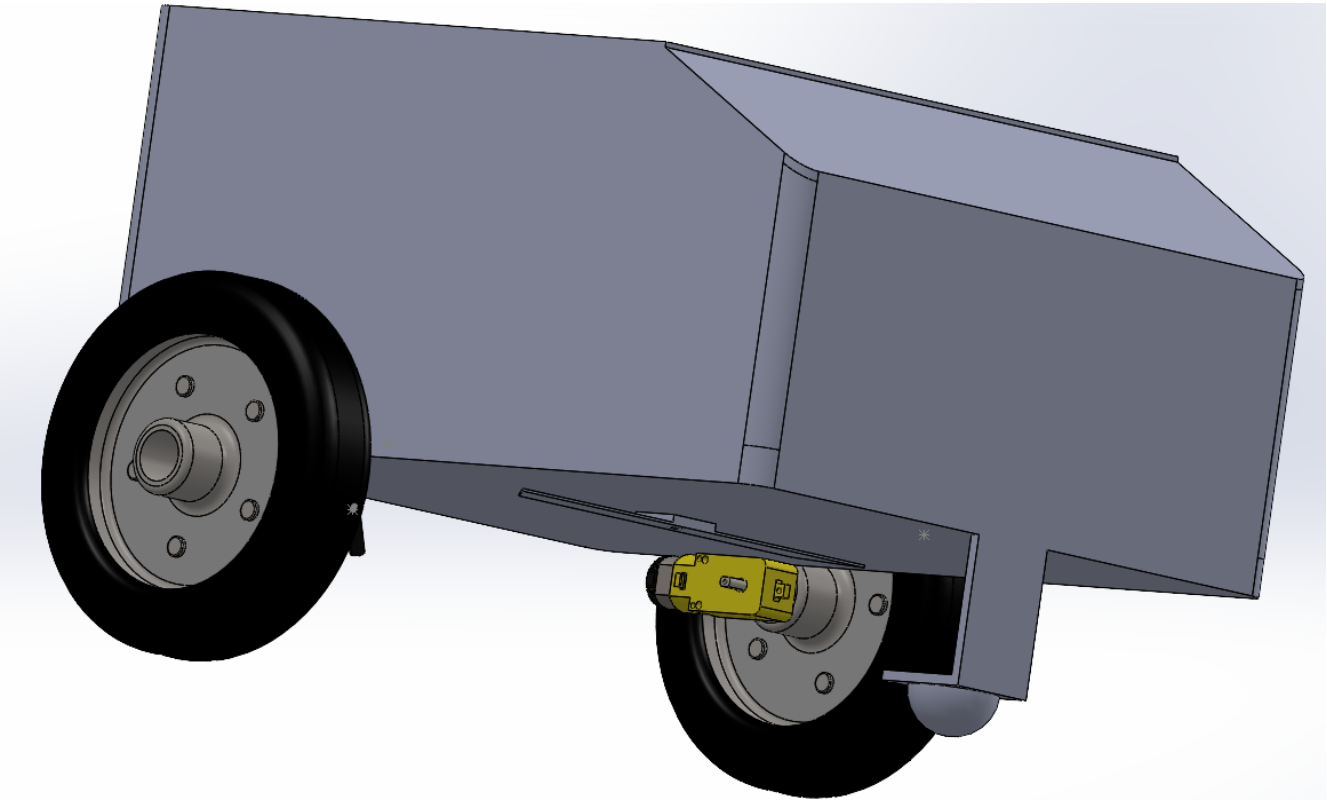
FRONT VIEW:


2.00
1.00
15.00
17.00
15.00
1.00
17.00
Front Part
Part3
Foam Sheet
A4

I. Circuit Diagram:



15. SOLIDWORKS MODELLING:



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ARDUINO PROGRAM

```
int m1a = 4;
int m1b = 5;
int m2a = 6;
int m2b = 7;
int m3a = 8;
int m3b = 9;
int m4a = 11;
int m4b = 12;
char val;

void setup()
{
pinMode(m1a, OUTPUT);  // Digital pin 10 set as output Pin
pinMode(m1b, OUTPUT);  // Digital pin 11 set as output Pin
pinMode(m2a, OUTPUT);  // Digital pin 10 set as output Pin
pinMode(m2b, OUTPUT);  // Digital pin 11 set as output Pin
pinMode(m3a, OUTPUT);  // Digital pin 10 set as output Pin
pinMode(m3b, OUTPUT);  // Digital pin 11 set as output Pin
pinMode(m4a, OUTPUT);  // Digital pin 12 set as output Pin
pinMode(m4b, OUTPUT);  // Digital pin 13 set as output Pin
Serial.begin(9600);
}

void loop()
{
  while (Serial.available() > 0)
  {
    val = Serial.read();
    Serial.println(val);
     if( val == 'F') // Forward
      {
```

```
        digitalWrite(m1a, HIGH);
        digitalWrite(m1b, LOW);
        digitalWrite(m2a, LOW);

        digitalWrite(m2b, HIGH);
      }
 else if(val == 'B') // Backward
      {
        digitalWrite(m1a, LOW);
        digitalWrite(m1b, HIGH);
        digitalWrite(m2a, HIGH);
        digitalWrite(m2b, LOW);
      }
      if (val=='R') //right
      {
      digitalWrite(m1a, HIGH);.
        digitalWrite(m2a, LOW);
        digitalWrite(m2b, LOW);
        }
      else if(val=='L') //left
        {
        digitalWrite(m1a, LOW);
        digitalWrite(m1b,LOW);
        digitalWrite(m2a, LOW);
        digitalWrite(m2b, HIGH);
}
else if (val=='S') //stop
{
  digitalWrite(m1a, LOW);
        digitalWrite(m1b,LOW);
        digitalWrite(m2a, LOW);
        digitalWrite(m2b, LOW);
        }
        if( val == 'C') // CUTTER ON
    {
      digitalWrite(m3a, HIGH);
      digitalWrite(m3b, LOW);
```

```
    }
  else if(val == 'V') // cutter off
    {
      digitalWrite(m3a, LOW);
      digitalWrite(m3b, LOW);



    }

    if( val == 'P') // PUMP ON
    {
      digitalWrite(m4a, HIGH);
      digitalWrite(m4b, LOW);

    }
  else if(val == 'O') // pump off
    {
      digitalWrite(m4a, LOW);
      digitalWrite(m4b, LOW);
    }
{
  if (val=='E') //Emergency stop
  digitalWrite(m1a, LOW);
        digitalWrite(m1b,LOW);
        digitalWrite(m2a, LOW);
        digitalWrite(m2b, LOW);
         digitalWrite(m3a, LOW);
      digitalWrite(m3b, LOW);
      digitalWrite(m4a, LOW);
      digitalWrite(m4b, LOW);  }}}
```

CONCLUSION

According to the implementation plan, we have implemented the sub function such as the product must be semi-automatic .We have Built an MIT app to control the movement and functions of garden maintaining bot . The product basically can perform three functions such as watering, pesticide spraying and grass cutting. Our prototype can move forward, backward, left and right as we press buttons in app.

The challenging thing here was our prototype was not able to move in left and right directions when two wheels were mounted in front side. But we were able to tackle the problem by replacing those two wheels with a caster wheel.

APPENDIX

The product comes with an immaculate and extraordinary features. It mainly keeps the user safety as a top priority. The product comes with an Emergency Stop button through which the user can completely stop product from functioning.

REFRENCES

Arduino coding

https://youtu.be/zGjD1TbTZmE

Circuit Diagram

Circuito.io(https://www.circuito.io/app?components=512,11021)

Wiring

https://youtu.be/zGjD1TbTZmE