A Report on,

Prototype product development in the course

Digital Prototyping

Module-Hardware Prototyping

U-Turn Indicator

SECOND YEAR BACHELOR OF TECHNOLOGY

In

Mechanical Engineering

By

	Name	Roll No	PRN No	EXAM No
1	Yash Deshpande	2123	0120190099	S209022
2	Amey Vaikar	2128	0120190110	S209026
3	Rohan Kotkar	2131	0120190119	S209029
4	Ranjeet Bhosale	2132	0120190120	S209030

SCHOOL OF ELECTRICAL ENGINEERING

MIT | Academy of Engineering

(An Autonomous Institute affiliated to Savitribai Phule Pune University)

Alandi (D), Pune - 412105, Maharashtra (INDIA)

Sept 2020

MIT | Academy of Engineering

(An Autonomous Institute affiliated to Savitribai Phule Pune University)

CERTIFICATE

It is hereby certified that the work which is being presented in this report for **"DIGITAL PROTOTYPING—MODULE: HARDWARE PROTOTYPING",** conducted at School of Electrical Engineering, MIT Academy of Engineering, Alandi (D), Pune for internship program in partial fulfilment of the requirements for the **Second year Bachelor of Technology in Mechanical Engineering** and submitted to the SCHOOL OF ELECTRICAL ENGINEERING of MIT Academy of engineering, Alandi(D), Pune is an authentic record of work carried out during a period from Jan 2021 to May 2021 under the supervision of Prof. Vinayak Kulkarni, School of Electrical Engineering.

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Ranjeet Bhosale	2132	0120190120	S209030

Date: 28th APRIL 2021

(Vinayak B Kulkarni)

Course Instructor faculty

Dean,
School of Electrical Engineering,
MIT Academy of Engineering, Alandi (D), Pune

Seal of School

GRADE SHEET

[Referred from Learning Management System-Collpoll]

No	Coursework	Marks	Out of
1	Assignment-1 Product concept development		40
2	Quiz-1 Soldering and Wiring		10
3	Assignment-2 PCB Design		20
4	Quiz-2 PCB Design		30
5	Quiz-3 Basic circuit simulation		10
6	Assignment-3 Prototype Simulation		30
7	Assignment-4 Product Finishing		20
	Subtotal		160
8	Prototype Product Development Report		50
9	Power point Presentation		40
	Total		240

10	Total Daily Quiz score		
11	Attendance		%

ABSTRACT

A prototype is an original form or an instance that serves as a basis for others processes. We can say that it is an early sample, model or release of a product built to test a concept or a process including semantics, design, electronics. The main aim of the project is to satisfy the customer in terms of indication needed for driver as well as it needs to look nice to attract customers, most of the times customers faces the difficulty when it comes to cost of the product. If it looks attractive then it costs more but our main aim is to reduce the cost as well as make it more attractive with the help of the material which is already available. When we survey about the product, we come to know that this is very rare type and they were hearing this kind of product first time so we were getting positive response also customer raised some issues too like the day visibility then glass quality and many more.

So, by considering all these problems which are faced by customers we made a product which can become user friendly and easy to use and also most importantly affordable. And which can serve much more time and not so delicate.

For making this product sir helped us. They gave us information about the reference material and because of this we were able to make the product in lesser time with more efficient way. He also guided us for working with electrical components in a sophisticated and proper way.

Product Design Team

	Amaterasu industries
	Making the journey safer...

	**Name:**	Vaikar Amey
	Role:	Leader
	Email ID:	aavaikar@mitaoe.ac.in
	Mobile No.:	9657508499
	Area of interest:	Technical
	Skills:	1.Designing
		2.Marketing
		3.Communication

	**Name:**	Yash Deshpande
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	Area of interest:	Technical
	Skills:	1.Presentation
		2.Problem Solving
		3.Drawing

	**Name:**	Ranjeet Bhosale
	Role:	Marketing
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		2.Management
		3.Marketing

	**Name:**	Rohan Kotkar
	Role:	Marketing
	Email ID:	rrkotkar@mitaoe.ac.in
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	Area of interest:	Technical
	Skills:	1.Management
		2.Presentation
		3.Marketing

ACKNOWLEDGEMENT

We, Team U-Turn Indicator would like to thank the course instructors, for giving us the opportunity to experience the procedure of creating a product.

In today's world, innumerable products are made and it is important for soon-to-be engineers to learn the whole process of making a successful product and presenting it to the outside world. It is integral for developers to understand what a customer requires, and how their product would make people's lives easier.

So, a big big thanks to our teachers who led us through this course in a step-by-step way, starting from the importance of prototyping to designing circuits and finally emphasizing on the importance of product evaluation.

We would also like to thank the people who gave them feedbacks on our product. These feedbacks helped us to realize what our product lacked and how we can it make better.

Yash Deshpande
Amey Vaikar
Rohan Kotkar
Ranjeet Bhosale

CONTENTS

1. Product Concept Development
Theme- U-Turn Indicator

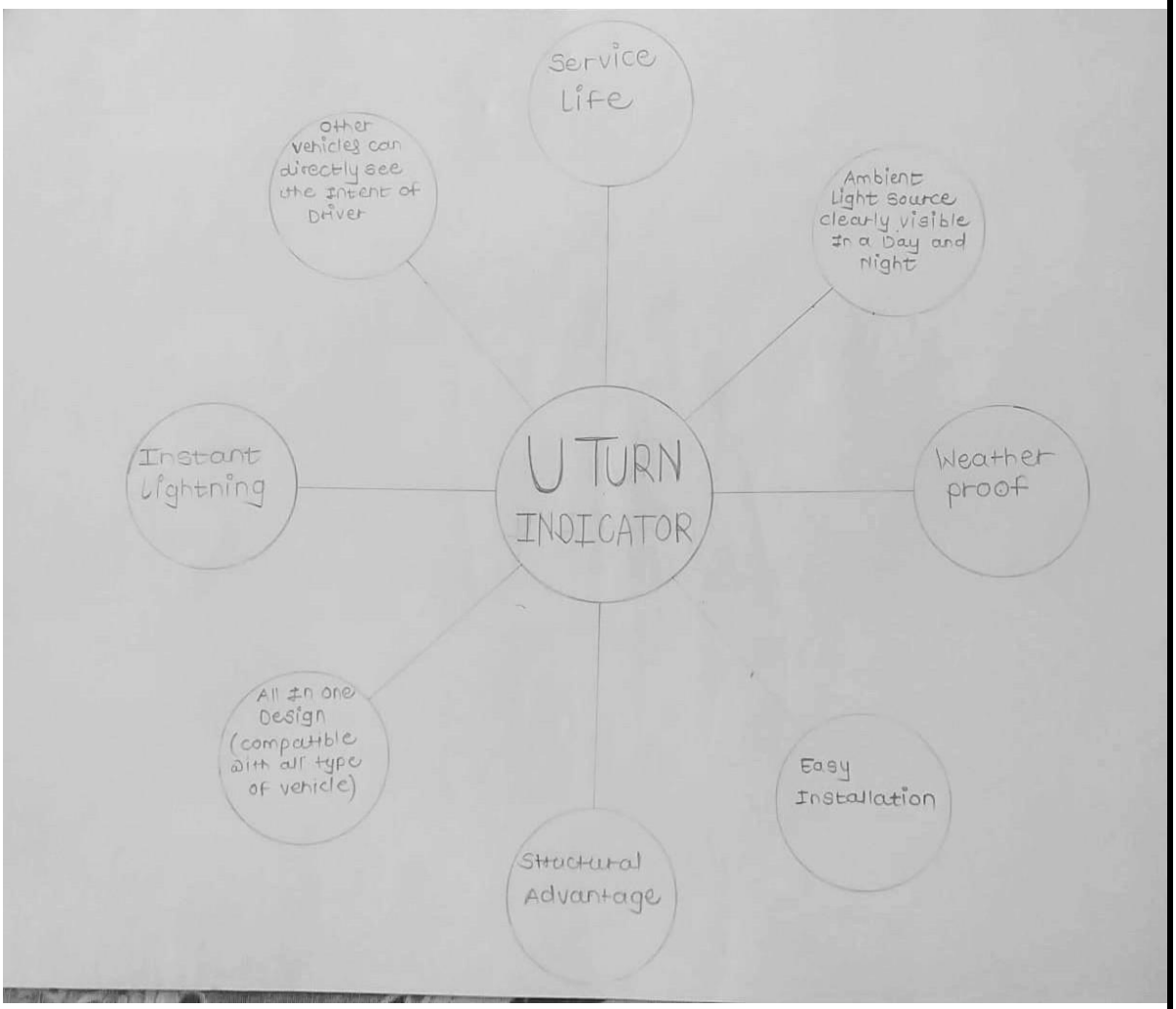
PROBLEM STATEMENT

[Attach Image from pdf of your allocated theme or Write your Problem Statement for Allocated theme by stating Considerations or Assumptions]

While Driving it is very difficult to give indication to other cars that whether you are taking right/left turn or an **U-Turn.**

So we are developing a U-Turn Indicator for cars to make the safe drive.

CONCEPT DESCRIPTION SHEET (CDS)



Concept Description (150-200 Words [*font Aerial-11*]):

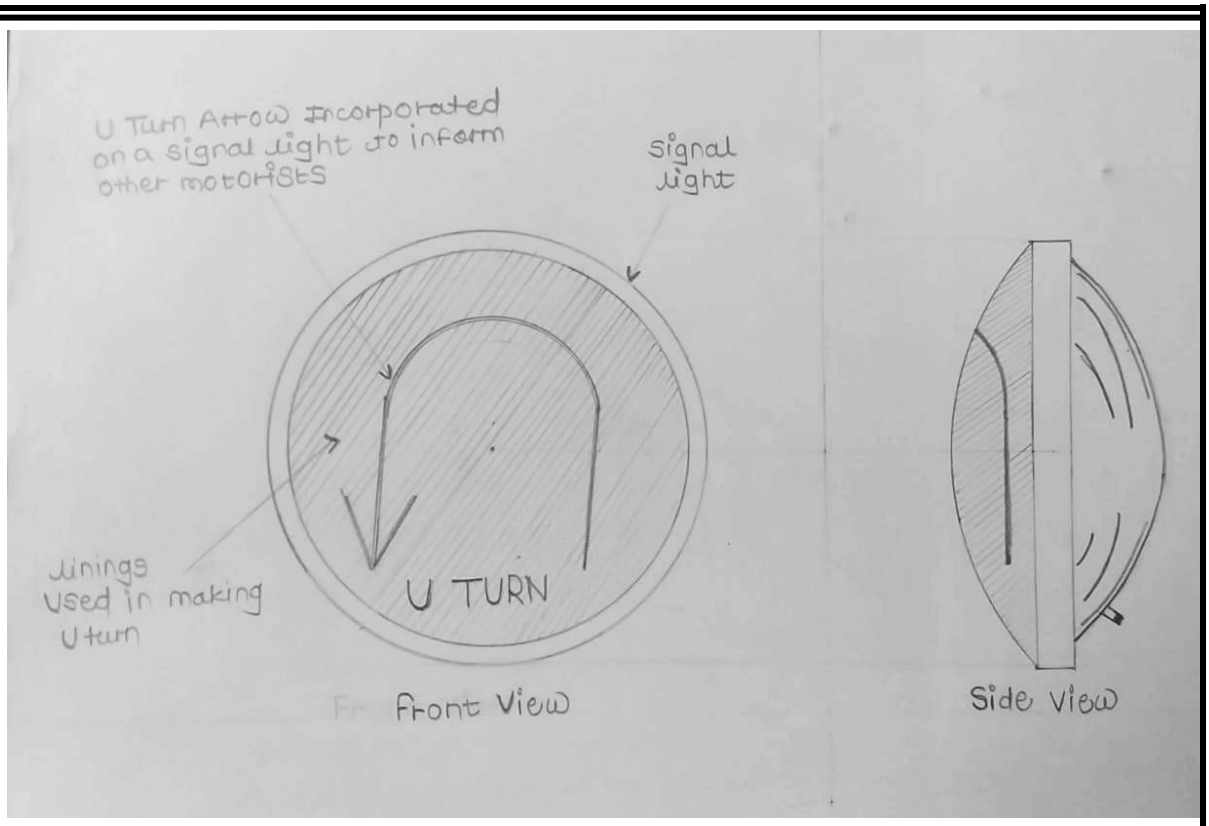
The This Project relates generally to motor vehicle Signalling devices and, more specifically to a signal light for vehicles having a U-turn Symbol incorporated on a signal light to inform other motorists of the vehicle's intent.

- The Signal is used when making a U-turn and is located on the driver's side front and rear of the vehicle and/or rear windshield of the vehicle.
- The device is activated by the vehicle's operator by means of a Switch that is located on the dashboard of Said vehicle.
- U-turn vehicle, can clearly See the intent of the driver, avoiding what could be a potential accident.
- The U-turn light is located on the vehicle in conjunction with turn signal lights and headlights.
- The Signal light comprises an ambient light Source Visible during day light and night hours.

CONCEPTUAL DRAWING

A] Free hand Drawing

B] Mechanical Drawing



BILL OF MATERIAL & COST OF PRODUCT

No	Item Description	Manufacturer/Agency	Quantity	Rate	Amount
1.	Diode IN4007	robu.in	2	60	120
2.	IC 7812	robu.in	2	119	238
3.	IC CA 3140	robu.in	1	92	92
4.	IC NE555	robu.in	1	225	225
5.	Resistor 10k	robu.in	5	150	150
6.	Resistor 100k	robu.in	1		
7.	Resistor 470Ω	robu.in	2		
8.	Resistor 470k	robu.in	1		
9.	Capacitor 1000µF, 25V	robu.in	2	21	42
10.	Capacitor 100µF, 25V	robu.in	1	3	3
11.	Capacitor 10µF, 25V	robu.in	2	5.50	11
12.	DC Socket 12V	robu.in	1	150	150
13.	Brake Switch	robu.in	1	25-50	50-100
14.	RED LED	robu.in	5	10	50
15.	Piezo Buzzer	robu.in	1	50	50
16.	Ignition Switch	robu.in	1	60	60
17.	Capacitor 0.01µF	robu.in	1	3	3
18.	Capacitor 0.02µF	robu.in	1	57.36	57.36
19.					
20.					

Costing: *[Extracted from above table,]*

No	Head	Cost/Product
1	Material cost / Product	Rs. 1000
2	Electronic Component cost/Product	Rs. 1351
3	Packaging Cost/ Product	Rs. 100
4	Special Process Cost/ Product	—
5	Manpower/ Product	Rs. 100
6	Logistics/ Product	—-
7	Partial expenditure from (other Rent, Electricity etc.)	—
8	Marketing cost	Rs. 100
9	Any other cost/ Product (Commissions/Discount)	—
	Total Making cost	Rs. 2651
	Profit Margin	9%
	Taxes (CGST/SGST)	18%
	Selling Cost	Rs. 3366
	Final Cost of product	**Rs. 3370 /-**

PRODUCT DEVELOPMENT PLAN

Week 1 : Clearing the the concept of the connection in the circuit of the thermometer and listening down the different comports required.

Week 2 : Assembling all the parts

sequentially Week 3 : Developed the

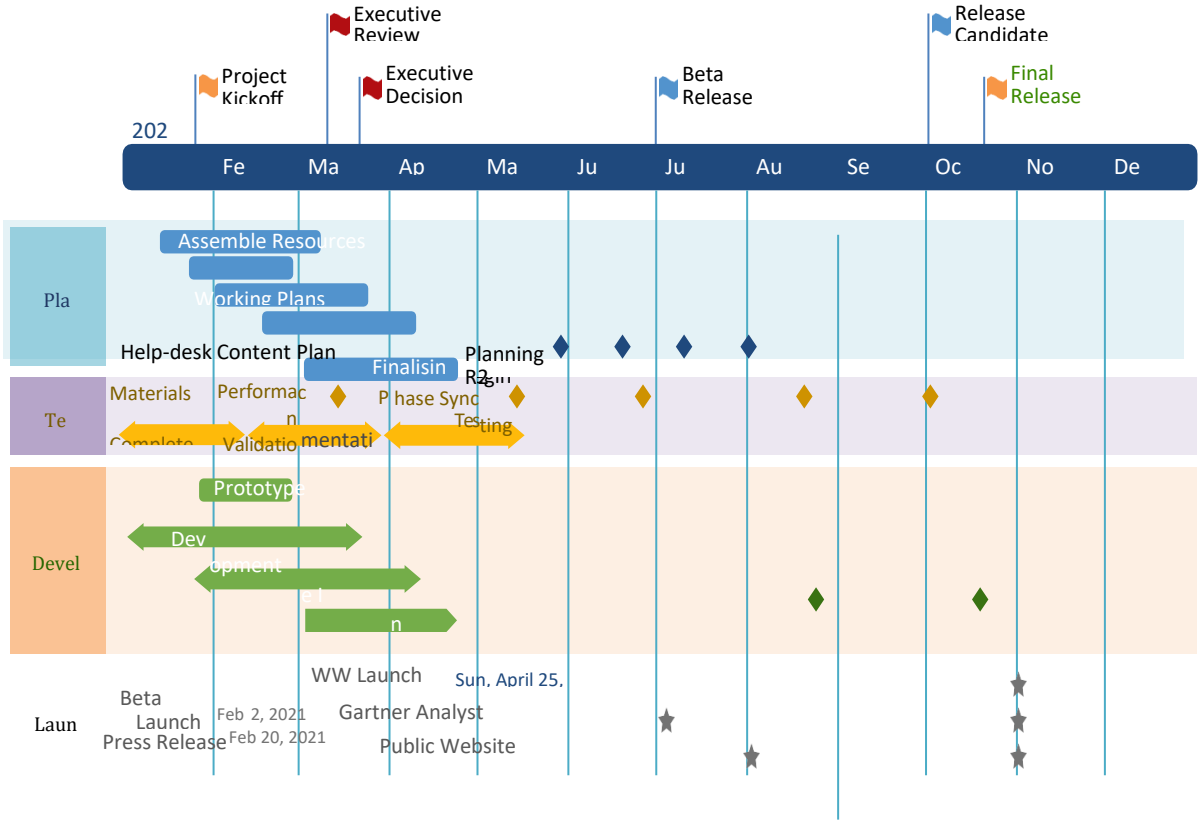
prototype.

Week 4 : Joining the connection properly to complete the circuits and obtain the required result

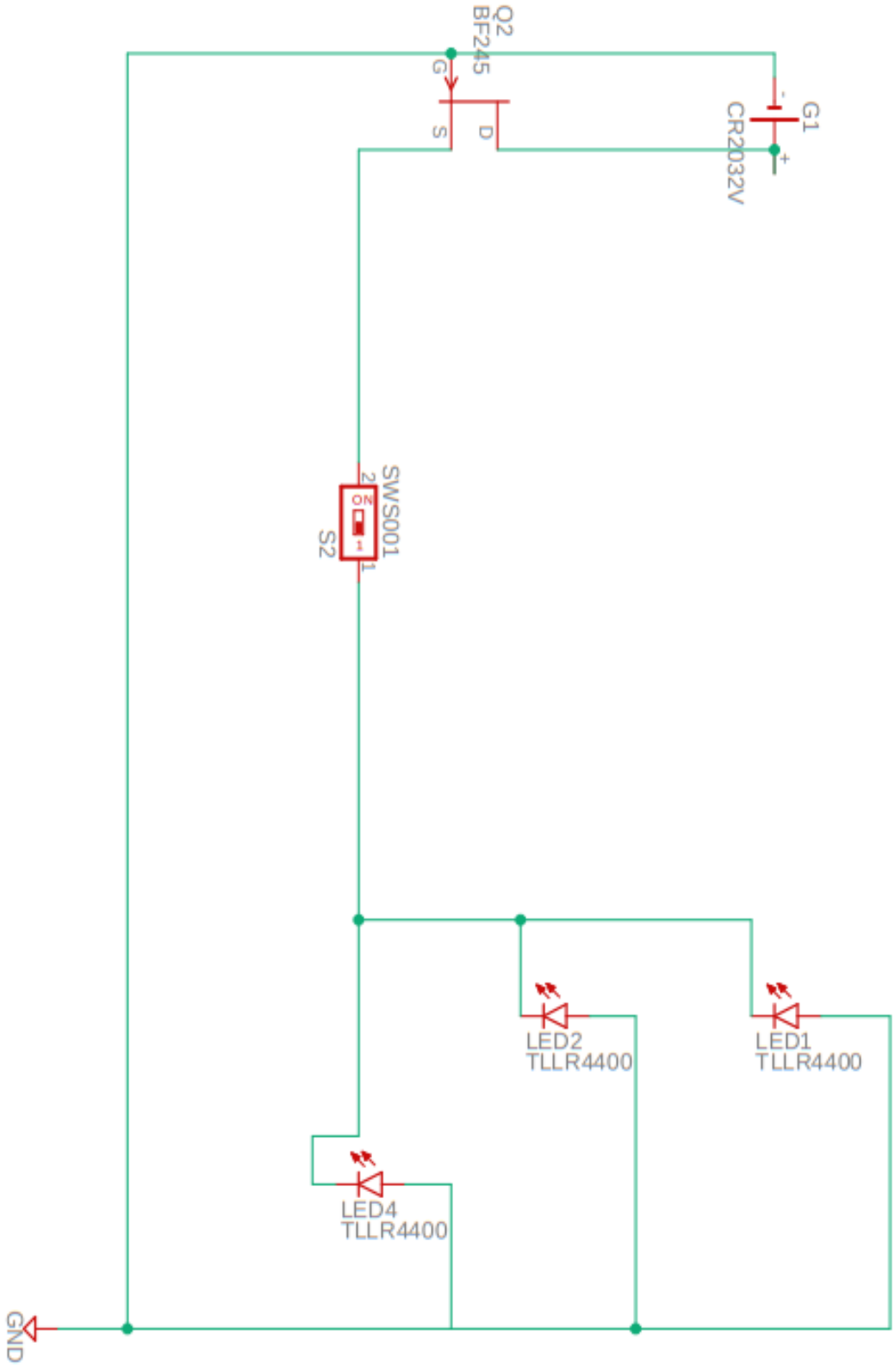
Week 5 : Finalising the prototype

Week 6 : Testing the product, conducting the surveys and them comparing it with other market

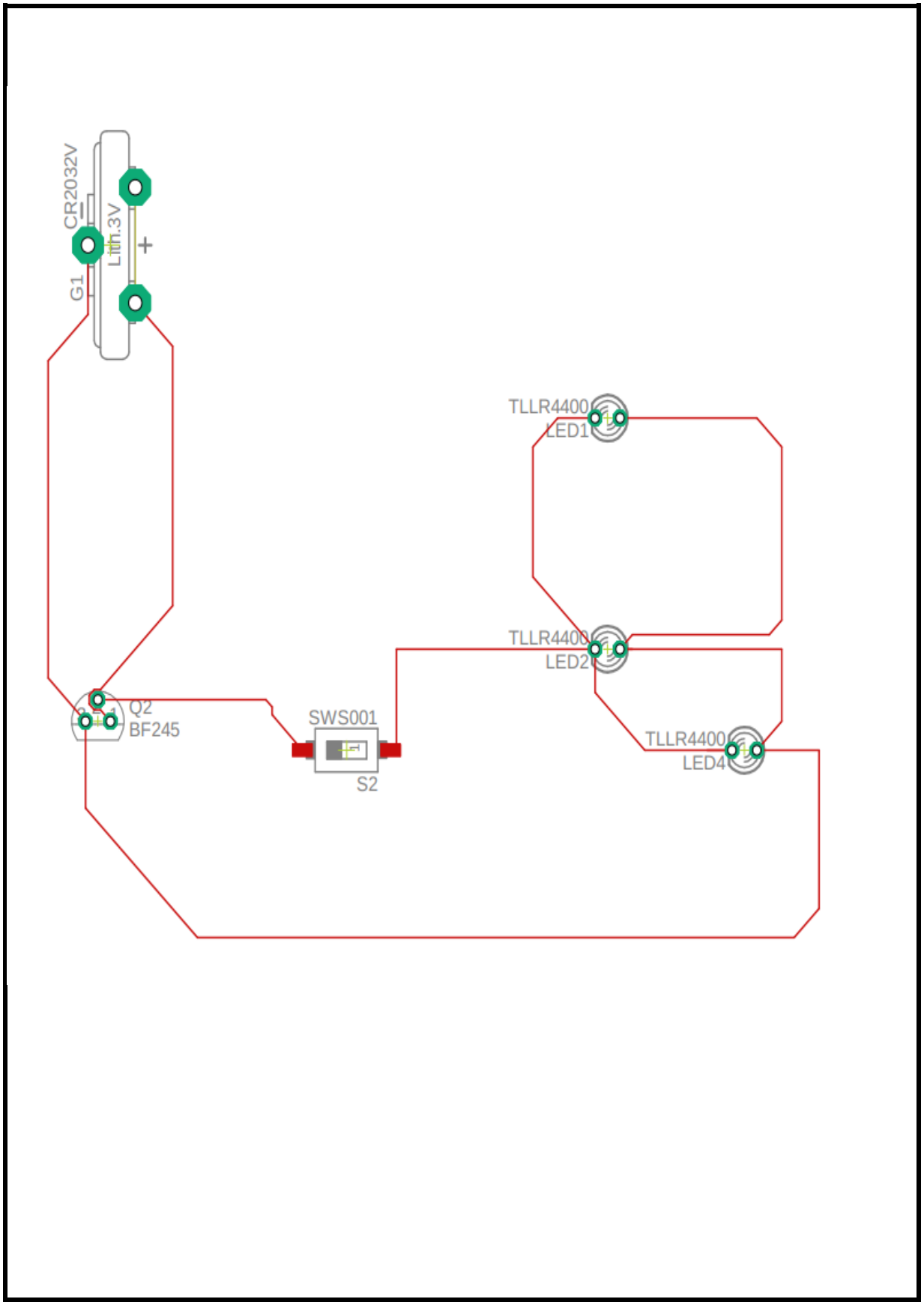
Week 7 : Final presentation



PCB Schematic Design



PCB TRACK LAYOUT



PCB TECHNICAL INFORMATION

No	Item	Details		
1.	**PCB Dimensions:**	**Length**	**Width**	**Height**
	[L X W X H] MM	**144.62**	**1.5**	**97.815**
	**W-Copper clad thickness*			
2.	**Total No of Components**	**Passive**	**Active**	**Total**
				7
3.	**Name of software /app**	**Eagle**		
	Version with date	**9.6.2 education**		
4.	**Distance of Track from border** *(Mil & MM)*	**Mil**	**MM**	
	**Mil is unit of distance*		**12**	
5.	**Track width** *(Mil & MM)*	**Mil**	**MM**	
	Ground Track		**0.508**	
	Signal Track		**0.508**	
6.	**Pad Size** *(Mil & MM)*	**Mil**	**MM**	

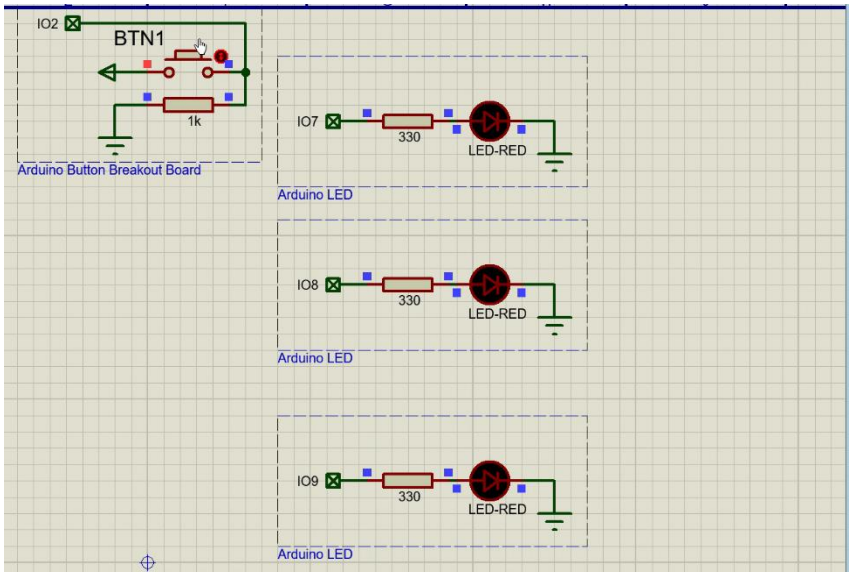
i)			
ii)			
7.	**Name of Schematic pdf file uploaded on CollPoll** *(*.pdf)*	**Schematic Design(2123,2128,2131 &2132)**	
8.	**Name of track layout pdf file uploaded on CollPoll** *(*.pdf)*	**Track Layout Design(2123,2128,2131 &2132)**	
9.	**Name of Gerber file uploaded on CollPoll** *(*.gbr)*	**Gerber file(2123,2128,2131,2132)** **https://drive.google.com/file/d/115_Y7f2LpZe0FPjah5cYFL0iE7jX9OXb/view?usp=sharing**	
10.	**Name of Track layout uploaded on CollPoll** *file name. extension)*	**Track layout** **https://drive.google.com/file/d/1H9LlG7EKJ6WJvJkvuJs2sO3jY8YNXX1z/view?usp=sharing**	
11.	***Link of Google drive where all the files are uploaded.***	**https://drive.google.com/drive/folders/1PtKSjG3DnrbSRBxXeJpkrSfdMUZwAXES?usp=sharing**	

CIRCUIT SIMULATION RESULTS

2. Simulation Result

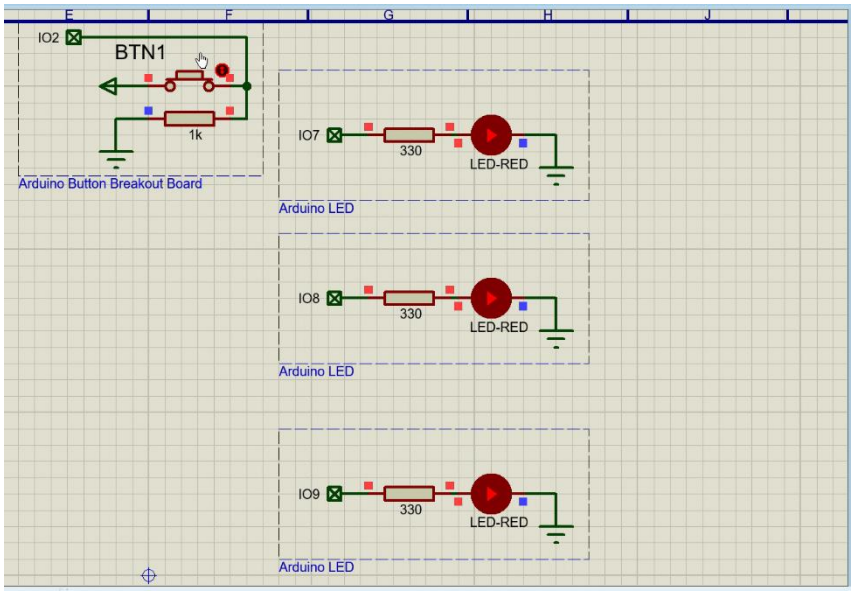
a. U Turn Button is Off (Normal State):

Led used as Indicator are not blowing.

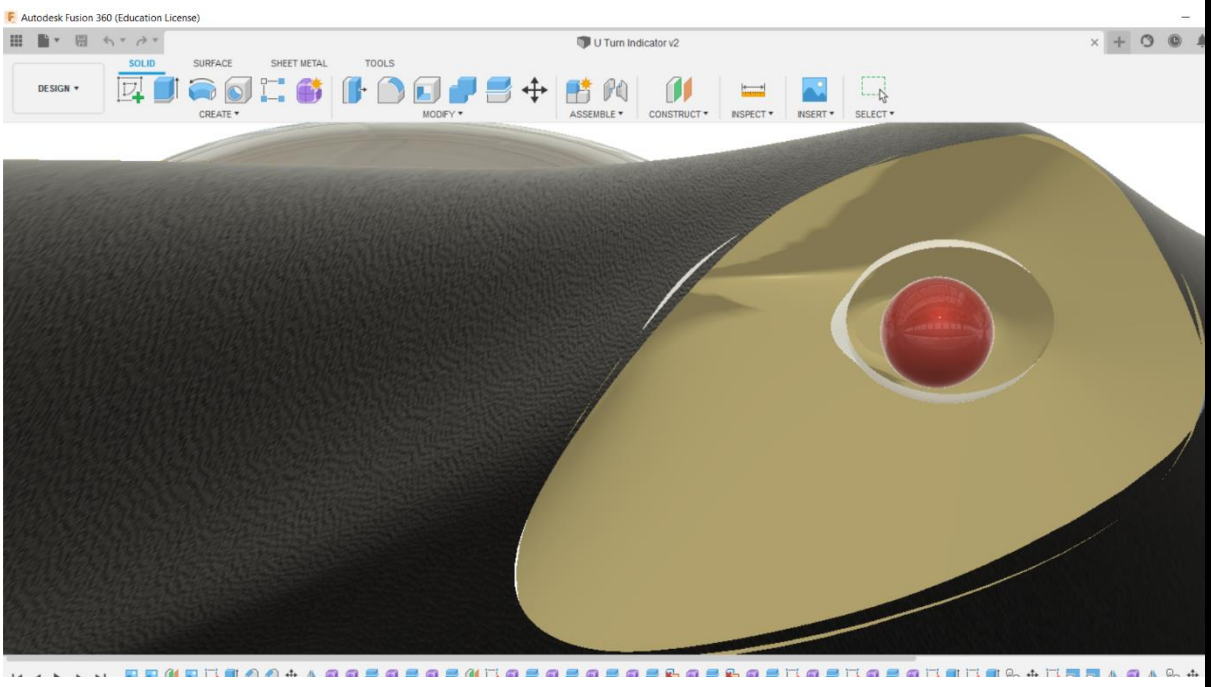


b. U Turn Button is On (Completely pressed):

Led are blowing.

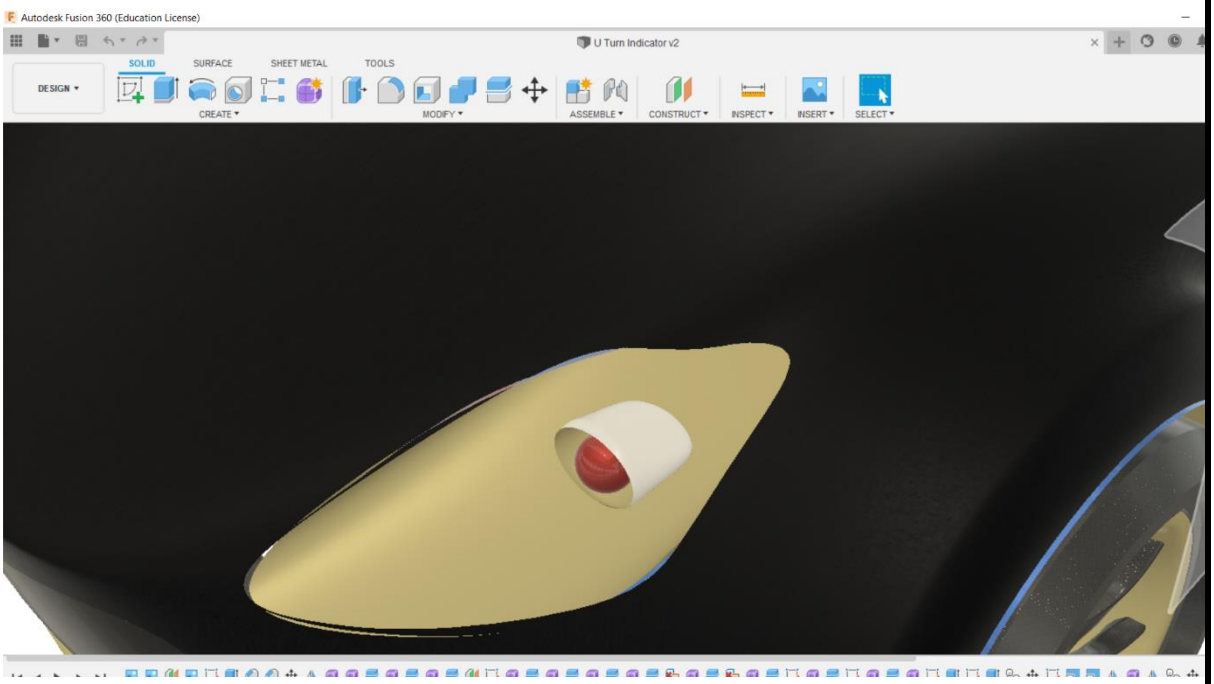


ENCLOSURE/CABINET DESIGN



Enclosure/Cabinet Design

(Other Views)



Cabinet Technical Information

No	Item	Details		
1.	**Dimensions:**	**Length**	**Width**	**Height**
	[L X W X H] MM	**150**	**100**	**80**
	**W-Copper clad thickness*			
2.	**Material Selected**	**ABS, Polycarbonate , PMMA**		
3.	**Name of software/app used**	**Fusion 360**		
	Version			
4.	**Protections & Features**	Excellent optical performance		
		Light transmittance up to 90%~92%		
		Refractive index 1.49		
		Good weather resistance		
		High surface hardness		
		Excellent overall performance		
5.	**Approximate Cost:**	**2000/-**		

User Manual [Optional]

(Paste Image o/p of User manual page-1 here)

User Manual [Optional]

(Paste Image o/p of User manual page-2 here)

Product Evaluation form

Product Evaluation Form

Thank You for opening this form.
We are Evaluating our Product on the basis of your Experience so please submit this Form.

* Required

Email Address *

Your answer

Name *

Your answer

Product Evaluation form

*

	Very Bad	Bad	Good	Very Good
Flash Quality of Red Light	○	○	○	○
Indicator Visibility	○	○	○	○
Material Used Outside to Protect damage	○	○	○	○
Quality of LEDs used Inside	○	○	○	○
Push Button working	○	○	○	○
Your Overall Experience with this product	○	○	○	○

Submit

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https://docs.google.com/forms/d/13TJIjzavrQ6_Fi3gq-pgXLOzG4iEdBKWFgdjvVlznpU/edit?usp=sharing

CUSTOMER FEEDBACK FORM

Customer Feedback Form

Hello Respected Customers,

We are Pleased to know that you are using our Product i.e. U Turn Indicator.
Our Company is very dedicated for providing better customer service so please invest your 2 mins to fill up this feedback form.
Your Reviews will help us to Upgrade.
Thank You!
k

* Required

U Turn Indicators

Email Address *

Your answer

CUSTOMER FEEDBACK FORM

Name *

Your answer

Mobile No. *

Your answer

Ever you have seen U Turn Indicators in any vehicle ? *

- ◯ Yes
- ◯ No
- ◯ Maybe

If Yes, can you please tell how different is it?

Your answer

CUSTOMER FEEDBACK FORM

You have installed U Turn Indicators please tell us how you are convinced with features of the Product? *

1	2	3	4	5
○	○	○	○	○

According to your experience with this product, how would you like to recommend this to someone ? *

	1	2	3	4	5	
Not Likely	○	○	○	○	○	Extremely

Can you please tell us how is the quality of material used in it ? *

	1	2	3	4	5	
Worse Quality	○	○	○	○	○	Best Quality

CUSTOMER FEEDBACK FORM

Can you please tell us how is the quality of material used in it ? *

	1	2	3	4	5	
Worse Quality	○	○	○	○	○	Best Quality

Please Give Us rating for your overall satisfaction of the product. *

	1	2	3	4	5	6	7	8	9	10	
Not Satisfied	○	○	○	○	○	○	○	○	○	○	Very Satisfied

Anything Else You want to tell us. Please Write it.

Your answer

Submit

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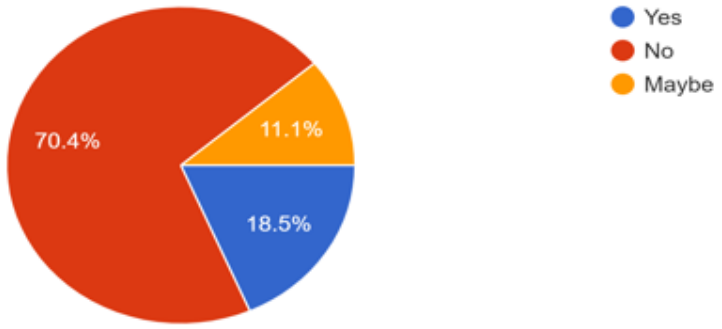
Google Forms

https://docs.google.com/forms/d/1zcFmt8nLbLkyUCPpXxNKgIOLyXgYI-eX1jju3KLBAHY/edit?usp=sharing

CUSTOMER FEEDBACK ANALYSIS

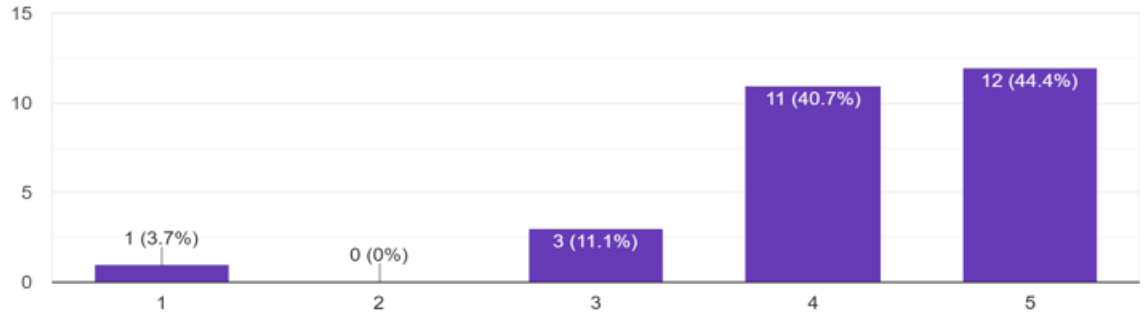
Ever you have seen U Turn Indicators in any vehicle ?

27 responses



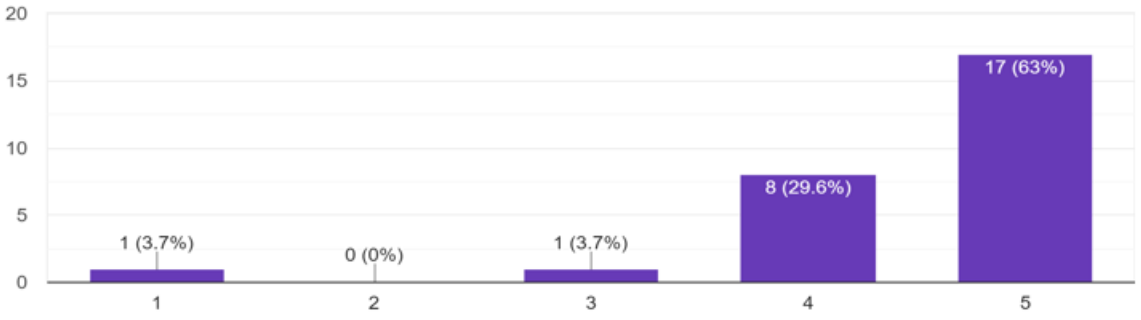
You have installed U Turn Indicators please tell us how you are convinced with features of the Product?

27 responses

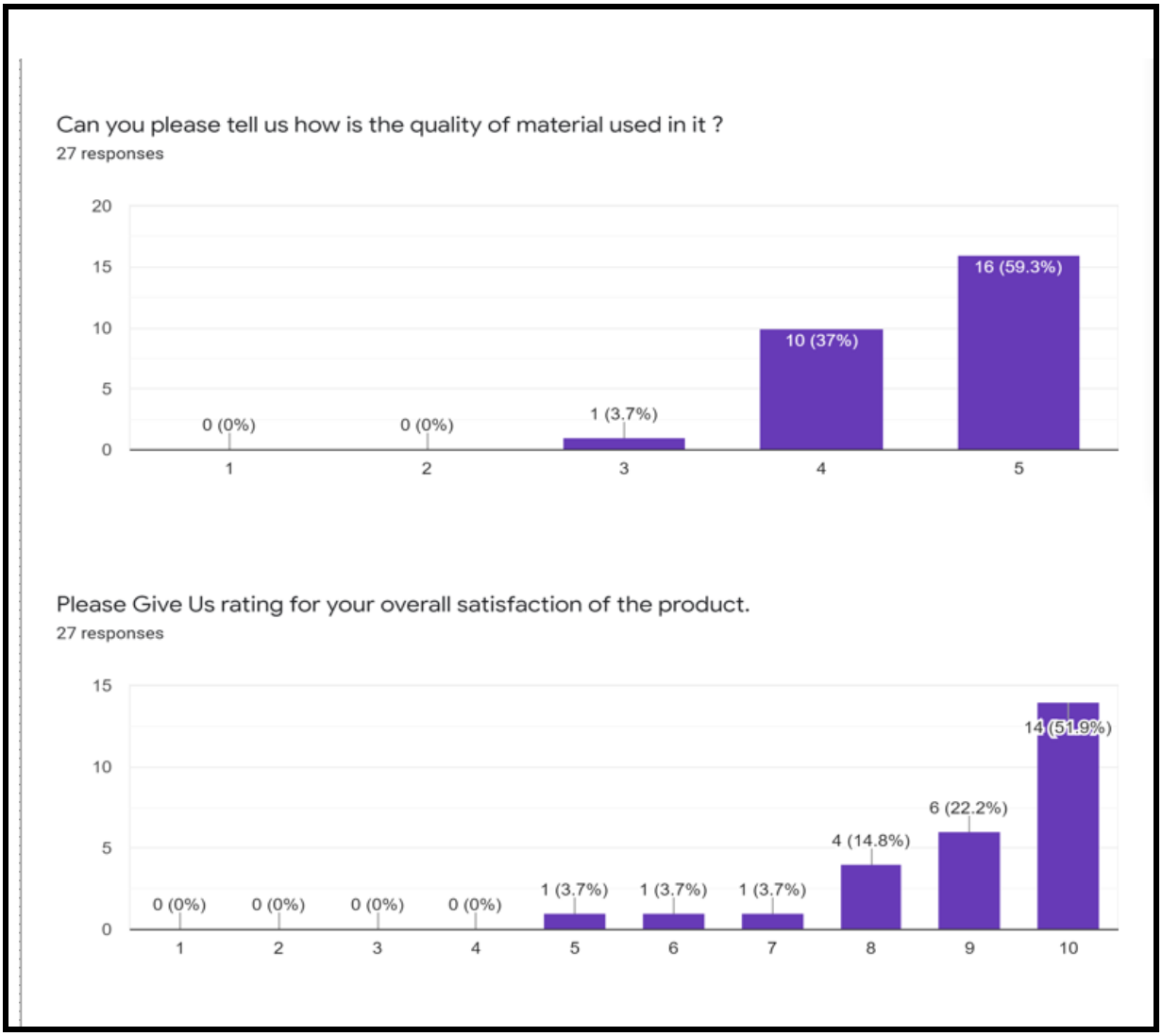


According to your experience with this product, how would you like to recommend this to someone ?

27 responses



CUSTOMER FEEDBACK ANALYSIS



IMPROVEMENTS FROM ANALYSIS

- After our product analysis, what we get to know is that our product is definitely worth the cost and meets the expectation of what a U-Turn Indicator is supposed to do (warn others that driver is going to take U-Turn).
- But some responses also had suggestions stating that our product would have been better if there were more features in it.
- So in our U-Turn Indicator, the other features that we can add are-
    1. Wide and long range of light.
    2. Best material for glass protection for the light to avoid the damage.
    3. Easy on/off button below the parking light button so use of proper space in the dashboard of car.

PRODUCT ADVERTISEMENT [Optional]

(Printed)

(* Paste Image o/p Printed Advertisement here)

PRODUCT MANUAL [Optional]

(Multi fold)

(* Paste Image o/p Product Manual here)

CONCLUSION

Engineering is the branch where we apply the laws of science and nature to the real life and solve the problems and using the prototype system, we can provide the working model of the product even before building it. And this prototype project helped us to sufficiently complete the design and build the phases of the product.

By conducting survey on the electronics related problems. We came across the problems of customers and then we solved it using our knowledge and creativity and also with the guidance of mentor and by gaining some information through references.

The main aim is to make the product affordable and user friendly and also is to increase the technical knowledge and solve the customer problems so that it applies our knowledge to the real-world problems.

REFERENCES

- http://www.irjaet.com/Volume4-Issue-2/paper48.pdf
- Google
- YouTube

ANNEXURE-1

CODE FOR PROTOTYPE (if applicable)

```
int UButton = 0;

void setup () {
   pinMode(2,INPUT);
   pinMode(7,OUTPUT);
   pinMode(8,OUTPUT);
   pinMode(9,OUTPUT);
}

void loop() {
   UButton = digitalRead(2);
   if( UButton == HIGH){
   digitalWrite(7,HIGH);
   digitalWrite(8,HIGH);
   digitalWrite(9,HIGH);
   }

   else{
   digitalWrite(7,LOW);
   digitalWrite(8,LOW);
   digitalWrite(9,LOW);
   }

   delay (100);
}
```

ANNEXURE-2

Final Bill of Material

BILL OF MATERIAL & COST OF PRODUCT

No	Item Description	Manufacturer/Agency	Quantity	Rate	Amount
1.	Diode IN4007	robu.in	2	60	120
2.	IC 7812	robu.in	2	119	238
3.	IC CA 3140	robu.in	1	92	92
4.	IC NE555	robu.in	1	225	225
5.	Resistor 10k	robu.in	5	150	150
6.	Resistor 100k	robu.in	1		
7.	Resistor 470Ω	robu.in	2		
8.	Resistor 470k	robu.in	1		
9.	Capacitor 1000µF, 25V	robu.in	2	21	42
10.	Capacitor 100µF, 25V	robu.in	1	3	3
11.	Capacitor 10µF, 25V	robu.in	2	5.50	11
12.	DC Socket 12V	robu.in	1	150	150
13.	Brake Switch	robu.in	1	25-50	50-100
14.	RED LED	robu.in	5	10	50
15.	Piezo Buzzer	robu.in	1	50	50
16.	Ignition Switch	robu.in	1	60	60
17.	Capacitor 0.01µF	robu.in	1	3	3
18.	Capacitor 0.02µF	robu.in	1	57.36	57.36
19.					
20.					

Costing: *[Extracted from above table,]*

No	Head	Cost/Product
1	Material cost / Product	Rs. 1000
2	Electronic Component cost/Product	Rs. 1351
3	Packaging Cost/ Product	Rs. 100
4	Special Process Cost/ Product	—
5	Manpower/ Product	Rs. 100
6	Logistics/ Product	—-
7	Partial expenditure from (other Rent, Electricity etc.)	—
8	Marketing cost	Rs. 100
9	Any other cost/ Product (Commissions/Discount)	—
	Total Making cost	Rs. 2651
	Profit Margin	9%
	Taxes (CGST/SGST)	18%
	Selling Cost	Rs. 3366
	Final Cost of product	Rs. 3370 /-

Designed By

Amey Vaikar
Yash Deshpande
Rohan Kotkar
Ranjeet Bhosale

Logo
Change font if you want