



**GUJARAT TECHNOLOGICAL UNIVERSITY**

Chandkheda, Ahmedabad



**Sarvajnik College Of Engineering And Technology ,  
Surat**

Report on –

**SMART BLIND STICK**

Under Subject of

**DESIGN ENGINEERING – 1B**

**B. E. II , Semester – IV**

**(Electronics & Communication Branch)**

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TECHNOLOGY**  
**(ELECTRONICS AND COMMUNICATION ENGINEERING)**



**CERTIFICATE**

This is to certify that the dissertation entitled “ **Smart blind stick** ” carried out by **Mohil jain, Gautam vatiani, Janvi shah, Shweta patel** .has been done under my guidance in fulfilment of Design Engineering 1B in ELECTRONICS & COMMUNICATION ENGINEERING (4th semester) of Gujarat Technological University, Ahmedabad during the year academic year 2021-22

Prof. Vandana Shah  
(Faculty guide)

Prof. Nehal Shah  
(Head of the Department)

## **ACKNOWLEDGEMENT**

Before putting a single word about the project, we would like to thank all those people who have directly or indirectly helped us in making our project and turn it into a successful piece of work. Many people have contributed in this project in a variety of ways. Words are not enough to describe their support to us. But still we would like to thank all of them.

Firstly we'd like to thank god and our parents who always motivate us to achieve our desired goal in life.

We also would like to thank our guides **Prof.Vandana Shah** and our HOD **Prof.Nehal Shah** who guided us as much as possible and giving us valuable information regarding to our project.

This project wouldn't have been successful without the constant help and motivation extended by our colleagues and friends who were always with us whenever we needed.

We are thankful to our electronics and communication engineering department for facilities that were provided to us in accessing the labs. It was a great experience where we learnt a lot of thing related to our field. We are indebted to all those who gave their precious reviews to us on our work and apologize if we have missed anyone.

Last but not the least, Thanks to **Sarvajanik College of Engineering and Technology** for giving us the platform for representing this project.

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## **Introduction**

An Intelligent Mobility Cane, or Smart Cane is a cane designed for the visually impaired which can offer the user the ability to navigate their surroundings,

rather than simply avoid hitting things.

To record information about the obstacles presence in a road, active or passive sensors can be used. In case of a passive sensor, the sensor just receives a

signal. It detects the reflected, emitted or transmitted electro-magnetic radiation provided by natural energy sources. In case of using an active sensor, the sensor emits a signal and receives a distorted version of the reflected signal.

It detects reflected responses from objects irradiated with artificially generated energy sources. These kind of active sensors are capable of sensing and

detecting far and near obstacles. In addition, it determines an accurate measurement of the distance between the blind and the obstacle.

## **Motivation**



The mobility of blind people in unknown environment seems impossible without external help, because they don't have any proper idea about their surroundings. So, we are developing a smart walking stick which helps them to know about their surroundings and also guide them during travelling.

❖ Main aim of our project:

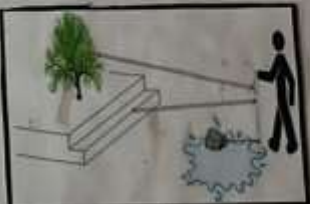

1. Blind people finding of way through a complex environment
2. The orientation and navigation for these people in unknown environment seems possible
3. Blind peoples are fearless or comfortable about independent mobility or travel

## AEIOU Canvases :

### Activity :

Activities		GROUP ID: <u>U24210</u>	PROJECT ON: _____
		DATE: _____	SHEET NO. _____
<b>General Impressions / Observations</b>		<b>EASY TO FOLD.</b>	<b>LIGHT IN WEIGHT</b>
<b>USER FRIENDLY</b>		<b>PROVIDE LONGITUDE &amp; LATITUDE OF LOCATION</b>	<b>DIG INFORMATION WITH RUBBER / ALUM</b>
<b>SIMPLE IN USE</b>		<b>GPS LOCATION (IT'S PROVIDE)</b>	<b>FAST RESPONSE IN AVERAGE DISTANCE</b>
<b>FAST RESPONSE</b>			
<b>Elements, Features and Special Notes</b>			
<b>EFFECTIVE</b>		<b>DETECTING OBSTACLES</b>	
	<b>DETECT WATER</b>		
<b>LOW POWER CONSUMPTION.</b>		<b>PORTABLE (EASY TO HANDLE)</b>	
		<b>Sketch/ Photo - Summary of activities</b>	
			
			

# Environment :

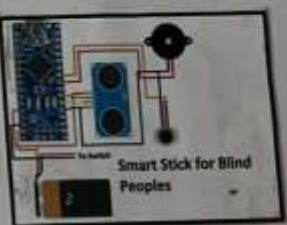
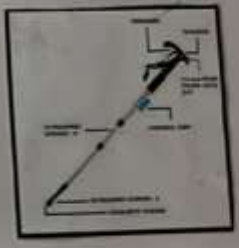
Environment		GROUP ID: 024210	PROJECT ON: _____
		DATE: _____	SHEET NO. _____
General Impressions / Observations (Style, materials & atmosphere)		Floor plan:	
POLLUTION FREE	ELECTRIC POLES	WELL MAINTAINED	
PEACEFUL SURROUNDINGS	DIFFICULTIES IN OUTSIDE WORLD.	COULD NOT PARTICIPATE IN SOCIAL ACTIVITIES	
Elements, Features and Special Notes		Scene:	
TRAFFIC	TREE	LESS ACCIDENTS WILL BE ACCURED FOR BLIND PEOPLE	
MANHOLE	ROADS		





## Interaction :

Interaction		GROUP ID: 424210	PROJECT ON: _____
		DATE: _____	SHEET NO. _____
<b>General Impressions / Observations</b> (Who is interacting with whom, what?)	<p>DIRECTIONS ASSISTANCE WITH SOUND.</p> <p>SENSORS DETECT DISTANCE B/W OBSTACLE</p> <p>OBSTACLES DETECTION SENSORS WITH ENVIRONMENT</p> <p>COLLISION WITH OBSTACLE.</p> <p>DETECT OBSTACLES WITH SMART STICK</p> <p>HIDDEN WORDS SUCH AS DOWNHILL, MOLES, WIND, MORE.</p>	<b>Scene of Interaction</b> (How it is being done)	
<b>Elements, Features and Special Notes</b>	<p>ULTRASONIC FREQUENCIES (120 MHZ) FROM SENSORS.</p> <p>SMART AT FEATURE BLIND</p> <p>WATER RECOGNITION</p> <p>STICK WITH VIBRATING MOTOR</p> <p>OBSTACLE WITH BU</p>	 	

# Object :

Objects		GROUP ID: 424210	PROJECT ON: _____
DATE: _____		SHEET NO. _____	
General Impressions / Observations (How components are involved?)	<div>AROUND NANO</div> <div>VIBRATOR</div> <div>SWITCH</div> <div>VIBRATING MOTOR</div> <div>BATTERY</div>	Inventory of Key Objects (Prepare a list here of 'THE THINGS' involved)	
Elements, Features and Special Notes (How objects are relating to the activities?)	<div>ULTRASONIC SENSORS.</div> <div>WOODEN STICK OR PLASTIC STICK</div> <div>WIRES</div> <div>SUPPLY</div> <div>BUZZER (Sound)</div>	 <p>Smart Stick for Blind Peoples</p> 	

User :

Users		GROUP ID: 4210210	PROJECT ON: _____
		DATE: _____	SHEET NO. _____
<p>General Impressions of people (Who is present? Roles &amp; responsibilities?)</p>	<p>VISUALLY IMPAIRED (BLIND PEOPLE)</p> <p>CHILDRENS WITH LOW EYE SIGHT</p> <p>ENGINEERS</p>	<p>Scene of users in context</p>  	
<p>Inventory of people (List of identified people involved)</p>	<p>OLD PEOPLE WITH LOW EYE SIGHT</p> <p>PEOPLE OF ANY AGE GROUP (WITH LOW EYE SIGHT)</p>		

# AEIOU SUMMARY

**AEIOU summary**    Group ID: 424210    Date:    version:

Domain name:

Environment:	Interactions:	Objects:										
<p>WELL MAINTAINED</p> <p>PEACEFUL CHAIRS</p> <p>POLLUTION FREE</p>	<p>COLLISION WITH OBSTACLE</p> <p>ULTRASONIC (SOUND) FREQUENCIES</p> <p>DIRECTIONS ASSISTANCE WITH SOUND</p>	<p>ARDUINO NANO</p> <p>ULTRASONIC SENSORS</p> <p>WOODEN STICK</p>										
Activities:	Users:											
<p>EFFECTIVE</p> <p>USER FRIENDLY</p> <p>PORTABLE</p> <p>LOW POWER CONSUMPTION</p>	<p>BLIND PEOPLE</p> <p>OLD PERSON (WITH LOW EYE SIGHT)</p> <table border="1"><thead><tr><th>AGE GROUP NAME</th><th>AGE RANGES</th></tr></thead><tbody><tr><td>BABIES</td><td>0-2</td></tr><tr><td>CHILDREN</td><td>3-16</td></tr><tr><td>YOUNG PEOPLE</td><td>17-20</td></tr><tr><td>ADULTS</td><td>31- Above</td></tr></tbody></table>	AGE GROUP NAME	AGE RANGES	BABIES	0-2	CHILDREN	3-16	YOUNG PEOPLE	17-20	ADULTS	31- Above	
AGE GROUP NAME	AGE RANGES											
BABIES	0-2											
CHILDREN	3-16											
YOUNG PEOPLE	17-20											
ADULTS	31- Above											

## **AEIOU SUMMARY**

### **DOMAIN NAME: OBSTACLE DETECTION SYSTEM FOR BLINDS**

#### **ACTIVITIES:**

- USER FRIENDLY
- EFFECTIVE
- PORTABLE (EASY TO HANDLE)
- LOW POWER CONSUMPTION
- SIMPLE IN USE
- FAST RESPONSE
- EASY TO FOLD
- DETECTING OBSTACLES

#### **OBJECTS:**

- WOODEN STICK / PLASTIC STICK
- ARDUINO NANO
- ULTRASONIC SENSORS
- BUZZER
- BATTERY
- SWITCH
- VIBRATING MOTOR

#### **ENVIRONMENT:**

- LESS ACCIDENTS WILL BE ACCRUED FROM BLIND PEOPLE
- POLLUTION FREE
- WELL MAINTAINED
- PEACEFUL SURROUNDINGS

#### **INTERACTIONS:**

- DIRECTIONS ASSISTANCE WITH SOUND
- OBSTACLES DETECTION SENSORS WITH ENVIRONMENT
- HIDDEN OBSTACLES SUCH AS DOWNWARDS STAIRS, HOLES WITH BLIND PEOPLE
- ULTRASONIC FREQUENCIES(500 MHz) FROM SENSORS
- SENSORY ASSISTING FEATURES OF SMART BLIND STICK .

#### **USERS:**

- VISUALLY IMPAIRED (BLIND PEOPLE)
- OLD PEOPLE WITH LOW EYE SIGHT
- PEOPLE OF ANY GROUP AGE (WITH LOW EYE SIGHT)
- ENGINEERS



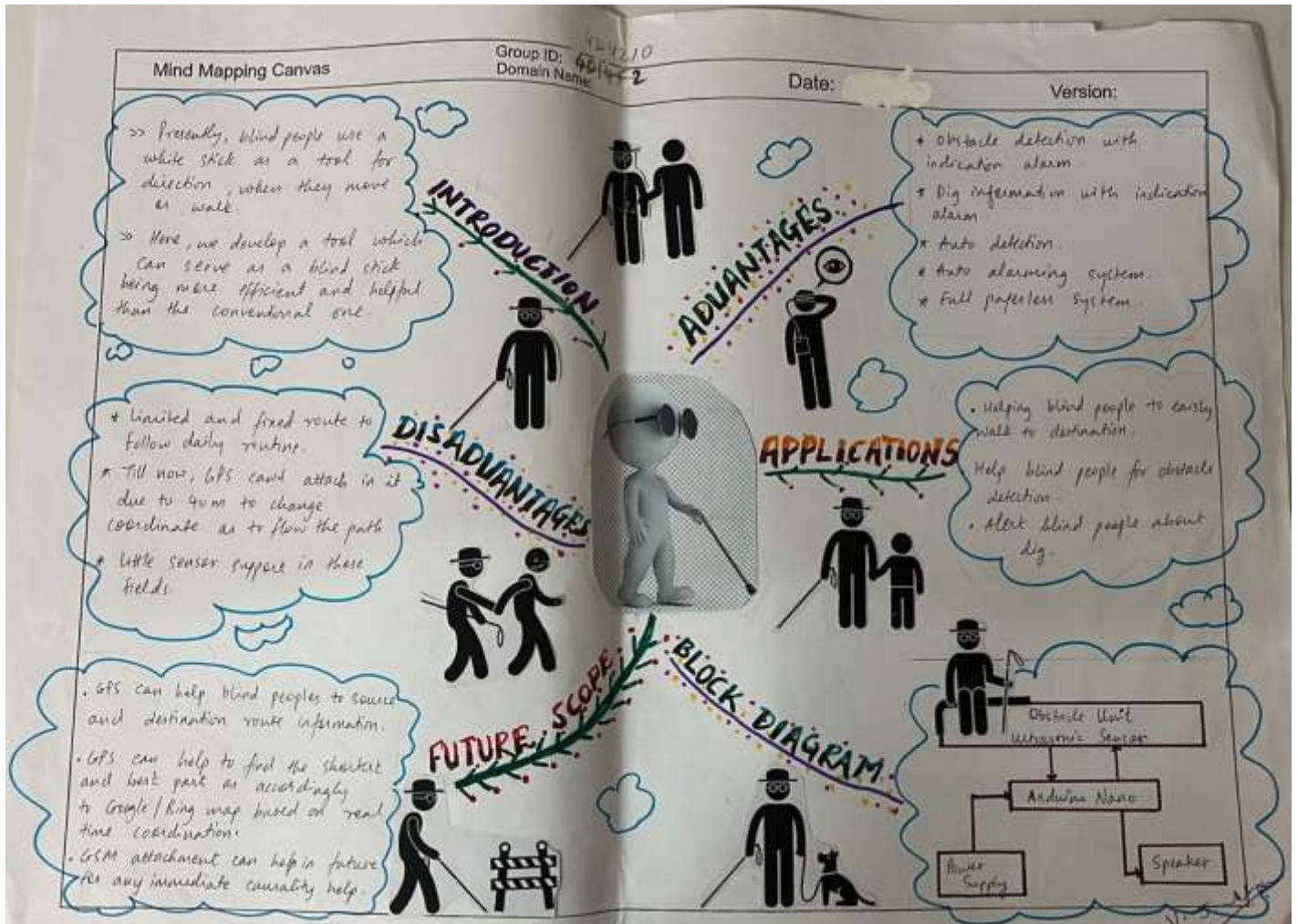
## Empathy Mapping:-

Design For Date	Design By Version
<b>USER</b> BLIND PEOPLE PEOPLE WITH LOW EYE SIGHT	<b>STAKEHOLDERS</b> DEVELOPERS OPERATORS
<b>ACTIVITIES</b> DETECTING OBSTACLES EASY TO FOLD FAST RESPONSE LOW POWER CONSUMPTION LESS COLLISION	
<b>STORY BOARDING</b>	
<b>HAPPY</b> A blind person can cross the road with the help of blind stick so they are independent by themselves, not rely on others. 😊	
<b>HAPPY</b> By using smart devices (i.e, blind stick, Iris Vision electronic glasses etc) They can solve their small problems by themselves. so they will be emotionally happy. 😊	
<b>SAD</b> Blind people dealing with sight loss, have to face isolation and cannot interact with other people. 😞	
<b>SAD</b> Blind people cannot navigate around places by themselves, so they need some external help. by the people to navigate from one place to another. so they are dependent on others. 😞	

## Ideation Canvas :

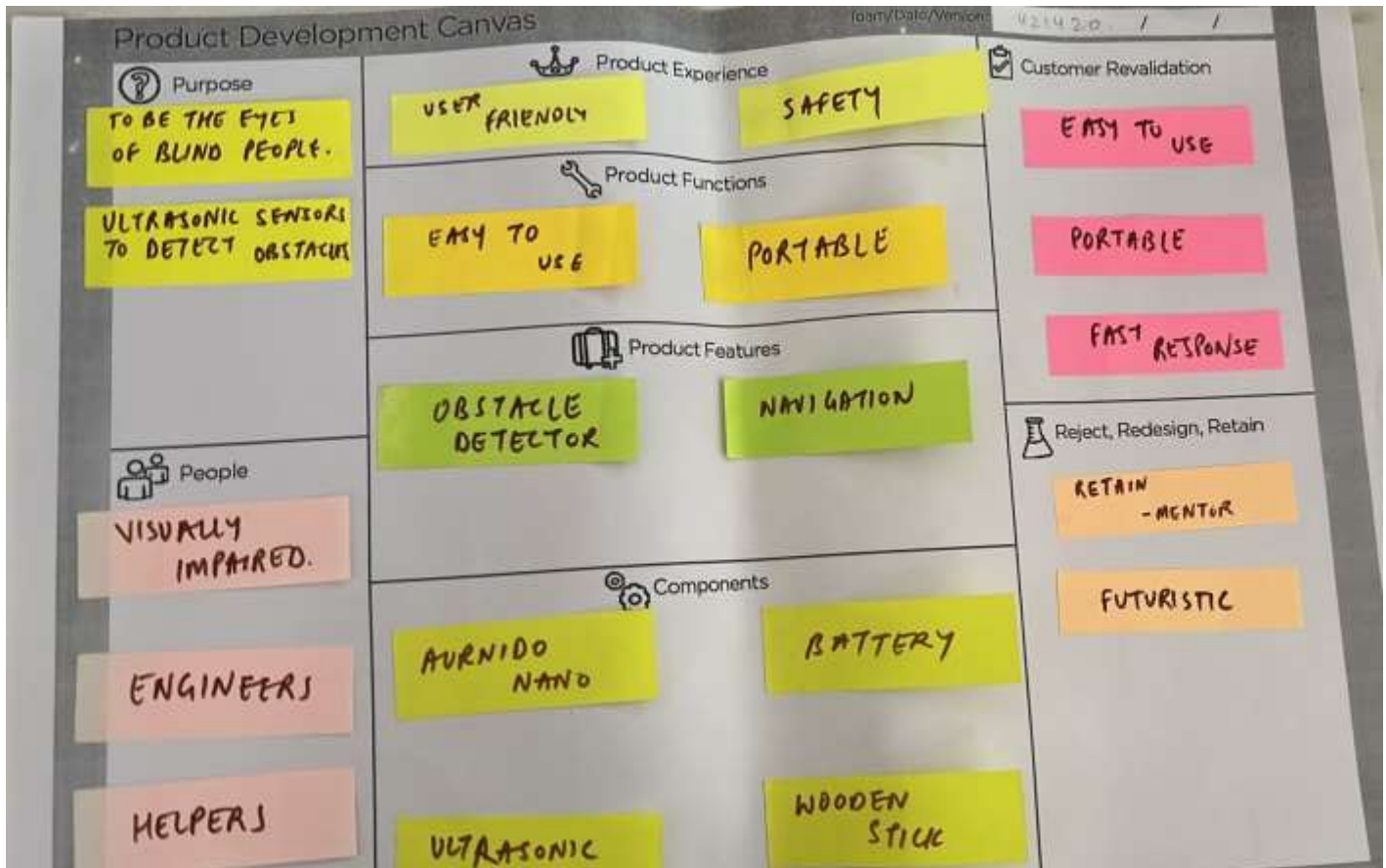


# Mind Mapping:-





## Product Development Canvas :



## Learning Need Matrix:-

421420  
Group ID: 01452 Date: \_\_\_\_\_

**Learnings Need Matrix**

Tools/Methods/Theories/Application Process involved

Applicable standards and design specifications/Principles & Experiments

Establish connections among each other – Create Groups

During BE IV / Stage II

During BE III / Stage II

During BE II / Stage I

**Purpose / Product concept**  
SMART BLIND  
A DEVICE FOR  
BLIND PE

TO GUIDE THE  
DESTINATION  
AVOID COLLISION

USING FOR  
ARDUINO NANO

WOODEN STICK, BUZZER  
BATTERY, SENSORS

ARDUINO NANO  
SWITCH  
VIBRATING MOTOR

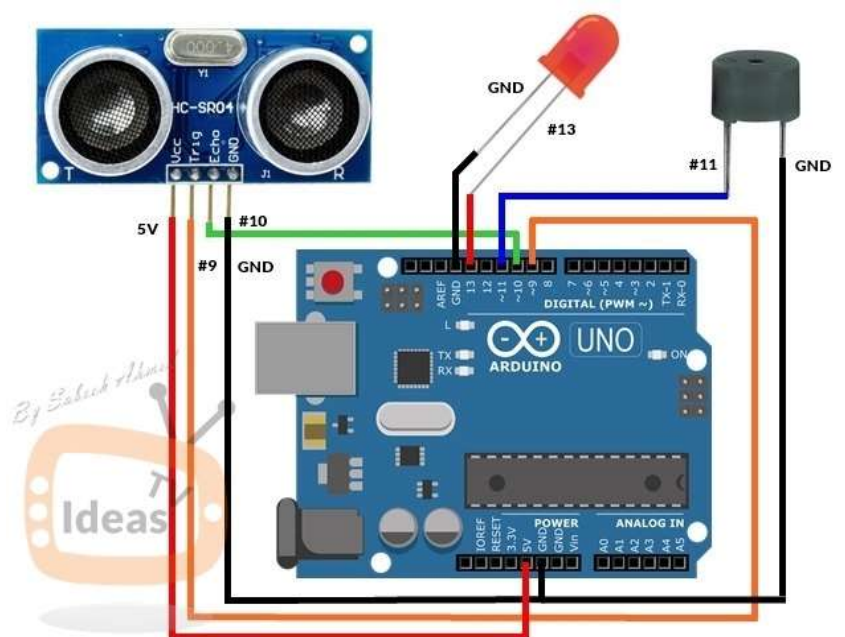
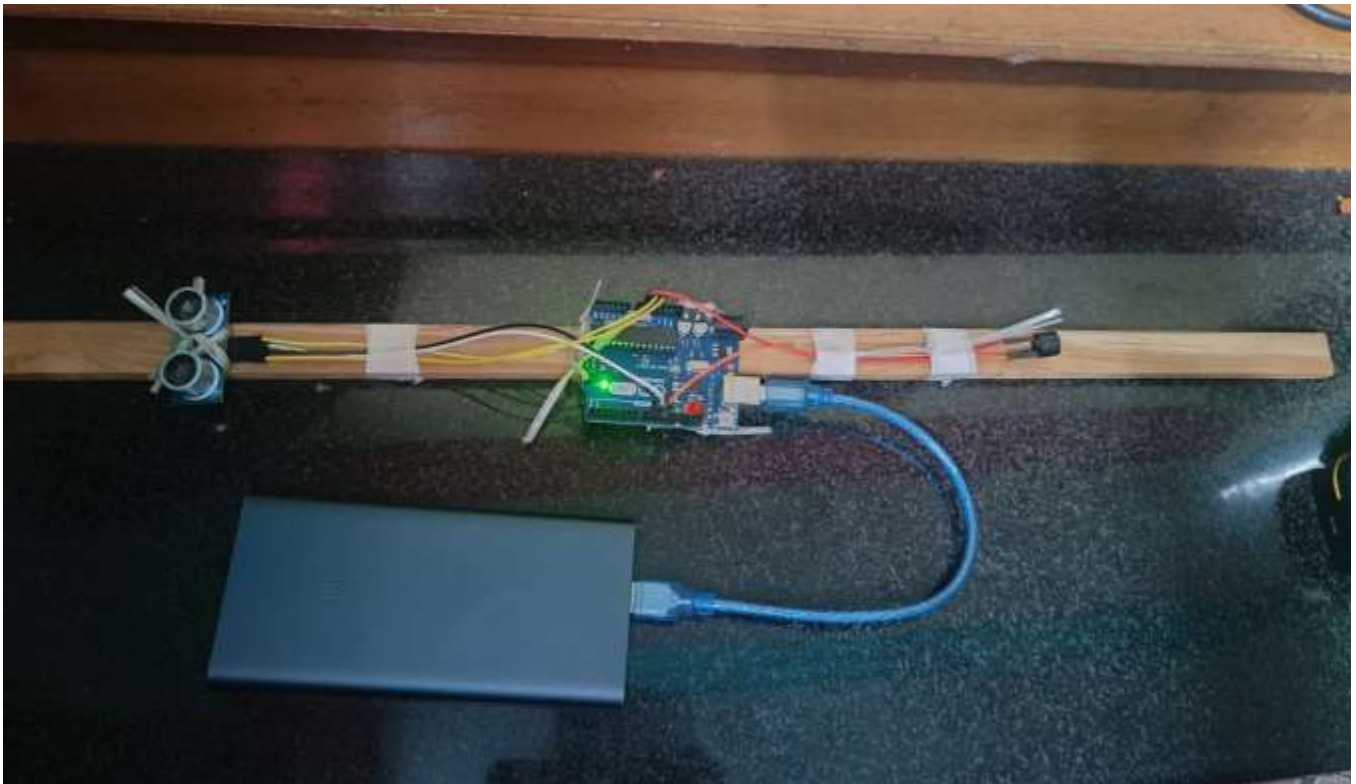
BASEBALL COMPONENTS  
ON HARDWARE

Software/Simulation/Skill/Mathematical Requirement

Component/materials strength criteria (exploration – varieties/testing requirements)

Version: 93

*Prototype:*



### **Conclusion :-**

Humans are not disabled. A person can never be broken. Our built environment, our technologies, is broken and disabled. We the people need not accept our limitations, but can transfer disability through technological innovation.

This system offers a low-cost, reliable, portable, low-power consumption and robust solution for navigation with obvious short response time. Though the system is hard-wired with sensors and other components, it's light in weight. Further aspects of this system can be improved via wireless connectivity between the system components, thus, increasing the range of the ultrasonic sensor and implementing a technology for determining the speed of approaching obstacles. While developing such an empowering solution, visually impaired and blind people in all developing countries were on top of our priorities.

## **Summary :**

After going through different stages of design engineering, we have learnt a lot of things which has helped us in making our project in a very innovative and user-friendly manner. Through the process of empathy mapping, mind mapping, ideation and product development canvases, we have learnt about users' needs and their problems. We also brainstormed about the various possible solutions that can be included. Finally, we interpreted our ideas through the design of the final prototype. From this, we understand this aspect and realisation of this scenario, how it will work and improvisation about the thing.