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GUJARAT TECHNOLOGICAL UNIVERSITY

Chandkheda, Ahmedabad

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GANDHINAGAR INSTITUTE OF TECHNOLOGY

A Report on

SMART DUSTBIN

Under the subject of

Design Engineering – 2 (B)

B.E. Semester - 6

(Mechanical Engineering Branch)

Submitted By

Team Id: - 235465

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Academic Year

2019-2020

CERTIFICATE

This is to certify that the project report on **"Smart Dustbin"** has been carried out by

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2. Gajjar Supreet Ketanbhai (180123119011)
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Empathy Canvas	**Completed**
Ideation Canvas	**Completed**
Product Development Canvas	**Completed**
Prototype	**Completed**
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Ideation Canvas	**Completed**
Product Development Canvas	**Completed**
Prototype	**Completed**
Report	**Completed**

Name of Student : Ghodeswar Krunal Gajanan Name of Guide : Mr. Harshal Rajendrakumar Oza

Signature of Student : _____ *Signature of Guide : _____

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ABSTRACT

In this recent world, urbanization has increased tremendously. At the same phase, there is increasing amount of in waste production. Waste management has been a crucial issue to be considered. This report is a different way to achieve this good cause. In this report, smart bin is built on a microcontroller based platform Arduino - Uno board, which is interfaced with Ultrasonic sensor. It will stop overflowing of dustbins along roadsides and localities as smart Dustbins are managed in real time. Once these smart bins are implemented on a large scale by replacing the traditional bins, the waste can be quickly managed to its efficient level as it avoids unnecessary lumping of wastes on roadside. Foul smell from these rotten wastes that remain untreated for a long time, due to negligence of authorities and carelessness of public may lead to long term problems. Breeding of insects and mosquitoes can create nuisance around promoting unclean environment. This may even cause dreadful diseases. The goal of this project is to keep our environment clean. It also aims at creating a clean as well as green environment.

ACKNOWLEDGEMENT

We are thankful to Gandhinagar Institute of Technology for giving us the opportunity to make the project for our semester subject Design Engineering 2-(B). We are also thankful to Gujarat Technological University for granting permission to Design Engineering subject adds in Bachelor of Engineering course.

We would also like to express our special gratitude and appreciation to report advisor and our internal guide Prof. Harshal Oza (Assistant Professor, Department of Mechanical Engineering, G.I.T.)His unique inimitable style has left an indelible impression on us. Without his insightful guidance and encouragement, this report would never have been accomplished. He has been always with us and giving us a lot of help with his cordial heart.

Most of all, we would like to special thank to our family for their endless support our parents are always giving us courage with their love. Without them, this report and project would never been come to fruition.

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C H A P T E R 1

INTRODUCTION

About Domain/Area

Though the world is in a stage of up gradation, there is yet another problem that has to be dealt with. Garbage! Pictures of garbage bins being overfull and the garbage being spilled out from the bins can be seen all around. This leads to various diseases as large number of insects and mosquitoes breed on it [1]. A big challenge in the urban cities is solid waste management. Hence, smart dustbin is a system which can eradicate this problem or at least reduce it to the minimum level. Our present Prime Minister of India, Sri Narendra Modi ji has introduced the concept of implementing 100 smart cities in India. "Swachh Bharat Abhiyaan" was initiated to ensure a clean environment. Majority of viruses and bacterial infections develop in polluted environment [5]. Safeguarding the environment using technology sources is needed at present. Majority of the public environment seems to be polluted with the waste material. So, modernization of the restaurants is needed by imparting the smart technology. Amounts of waste are largely determined by two factors: first, the population in any given area, and second, its consumption patterns.

- Most of the cities, towns and villages in India are not well designed to facilitate the suitable garbage collection methods.
- Common Public dustbins are filling over with the garbage and no one is concerned to clear them up as and when they get completely packed with overflowing garbage.
- Keeping in view of this big problem, it will be a good suggestion to do something to deal with this unmanaged waste and from this; the concept of 'Smart Dustbin' came out [1, 3, 12].

About the Definition

The smart bins are used as ultrasonic sensors which detect the garbage. The container is divided into three levels of garbage being collected in it. Every time the garbage crosses a level the sensors receives the data of comes garbage to the bin. This data is further goes to the servo motor threw the Arduino Uno circuit board. Placing the ultrasonic sensors at the top of the bin, like on the cover of

the bin [2]. The comparison is done with help of microcontroller. After analyzing the image an idea about level of garbage in the can and from the load cell sensor, weight of garbage can be known. Accordingly, information is processed that is controller checks if the threshold level is exceeded or not. This is convenient to use but economically not reliable. Instead of using plenty of bins in an unordered fashion around the city, minimal number of smart bins can be used. Using only one sensor at the surface level instead of three not only makes it affordable but also achieves the same result [6, 8, 14].

- To design a "Smart Dustbin" which is an Ultrasonic Sensor enabled in bin which automatically detects the garbage and set the code in the Arduino circuit board which help to open and close after detect the garbage [1].
- Smart bin is built on a microcontroller based platform Arduino Uno board which is interfaced with Ultrasonic sensor. And it's connected with the servo motor [2].

CHAPTER 2

OBSERVATION

AEIOU Framework

AEIOU Design Thinking Worksheets developed by Mark Baskinger and Bruce Hanington is an interrelated framework that guides designers in thinking through a problem or scenario from a variety of perspectives: activities, environments, interactions, objects, and users. They are useful in organizing thoughts, observations, and ideas into distinct categories. AEIOU differs from our Drawing Ideas Quick-Start Worksheets in its formality and strict adherence to these five dimensions of a design space [3, 4].

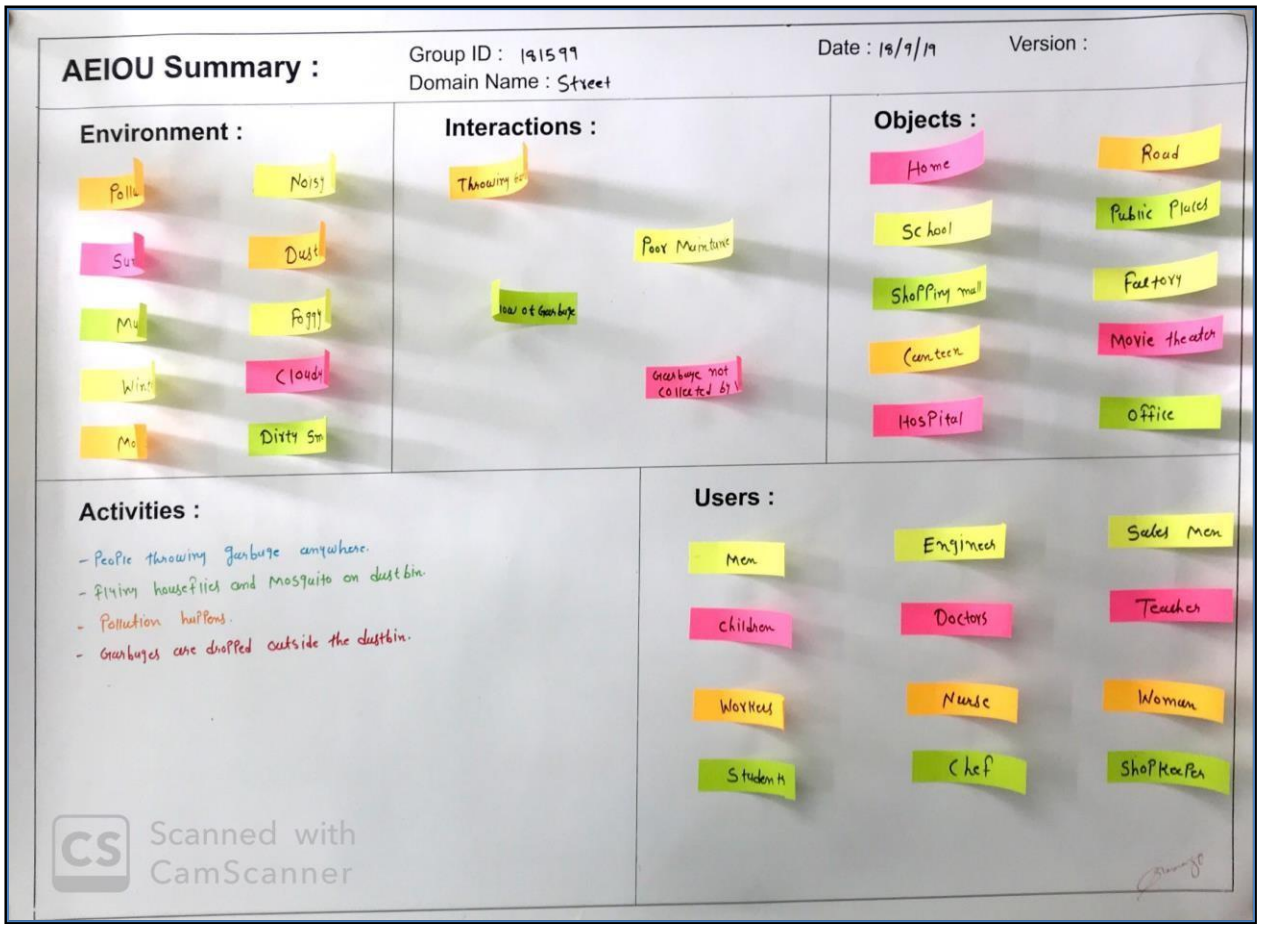

Figure 2.1 AEIOU CANVAS

Activity (A) Canvas

Activities observation record sheet involves micro observation of the activity process. It includes activities which are done by users [3].

Environment (E) Canvas

Environment observation involves the observation of surrounding like activities that take place in. The atmosphere at project or in such field areas is very crucial. Environments involved in our project are places with overflowed trash in bin [3].

Interaction (I) Canvas

Interaction observation involves the observation that who is interacting or communication with whom and for what purpose at project. The interactions involved in our project are Common people, Students, etc [6].

Object (O) Canvas

Object observation record sheet involves the observation of object or materials or components used for project. Object involved in project are bin, GPS, Ultrasonic sensors, Plastic [7].

User (U) Canvas

User observation record sheet involves the observation of how user uses the product for their need or to get a solution from a problem and what responsibilities they perform. Users involved in our project are people walking by, drivers, near school, for clean environment [6].

C H A P T E R 3

EMPATHY MAPPING

Mind Mapping Canvas

A mind map is a diagram used to visually organize information. A mind map is hierarchical and shows relationships among pieces of the whole. It is often created around a single concept, drawn as an image in the center of a blank page, to which associated representations of ideas such as images, words and parts of words are added. Major ideas are connected directly to the central concept, and other ideas branch out from those major ideas [5].

Mind maps can also be drawn by hand, either as "rough notes" during a lecture, meeting or planning session, for example, or as higher quality pictures when more time is available. Mind maps are considered to be a type of spider diagram.

- The following guidelines for creating mind maps:
  1) Start in the center with an image of the topic, using at least 3 colors.
  2) Use images, symbols, codes, and dimensions throughout your mind map.
  3) Select key words and print using upper or lower case letters.
  4) Each word/image is best alone and sitting on its own line.
  5) The lines should be connected, starting from the central image. The lines become thinner as they radiate out from the center.
  6) Make the lines the same length as the word/image they support.
  7) Use multiple colors throughout the mind map, for visual stimulation and also for encoding or grouping.
  8) Develop your own personal style of mind mapping.
  9) Use emphasis and show associations in your mind map.
  10) Keep the mind map clear by using radial hierarchy or outlines to embrace your branches [5, 6, 8].

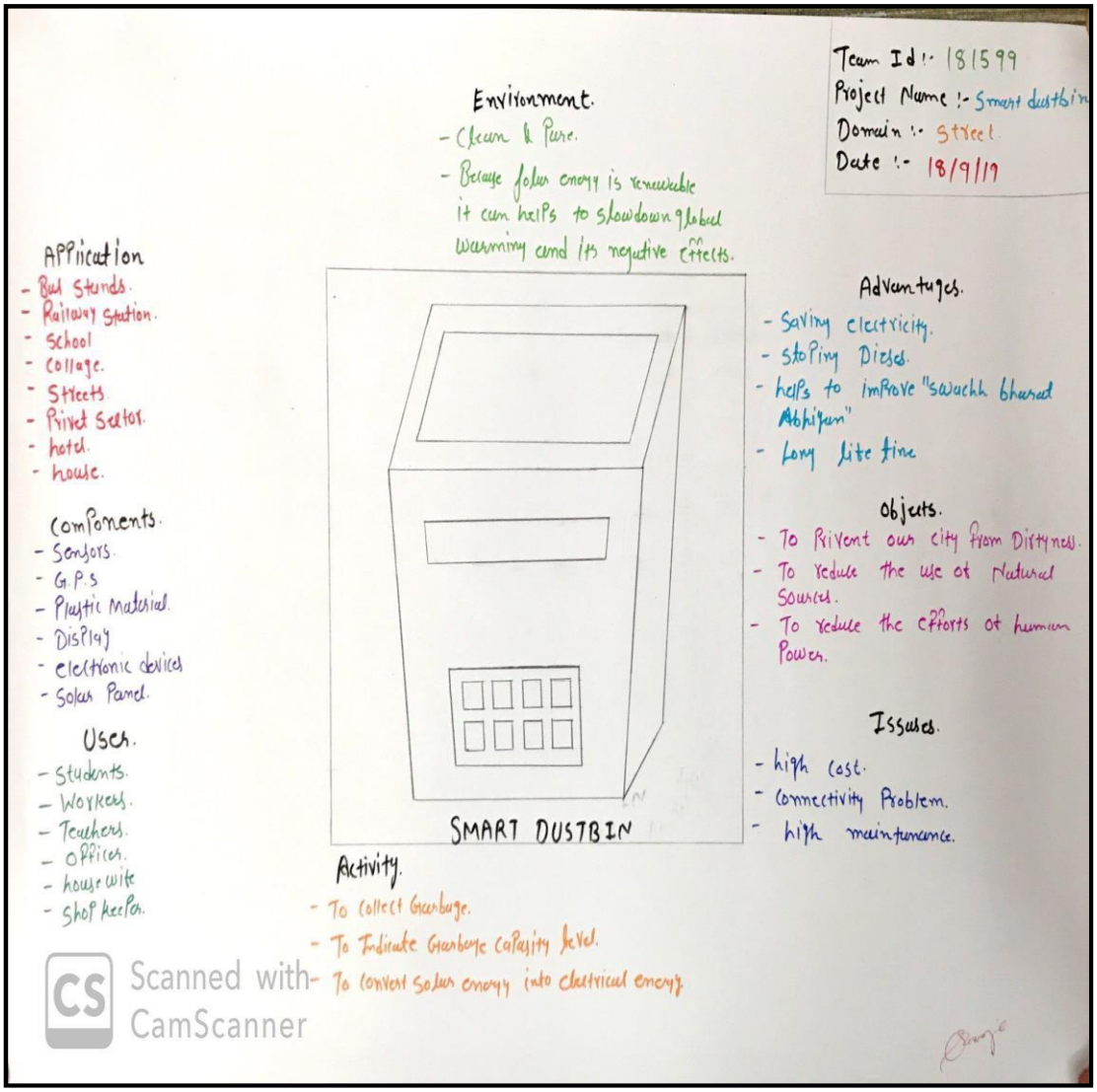

Figure 3.1 mind mapping canvas

Empathy Mapping Canvas

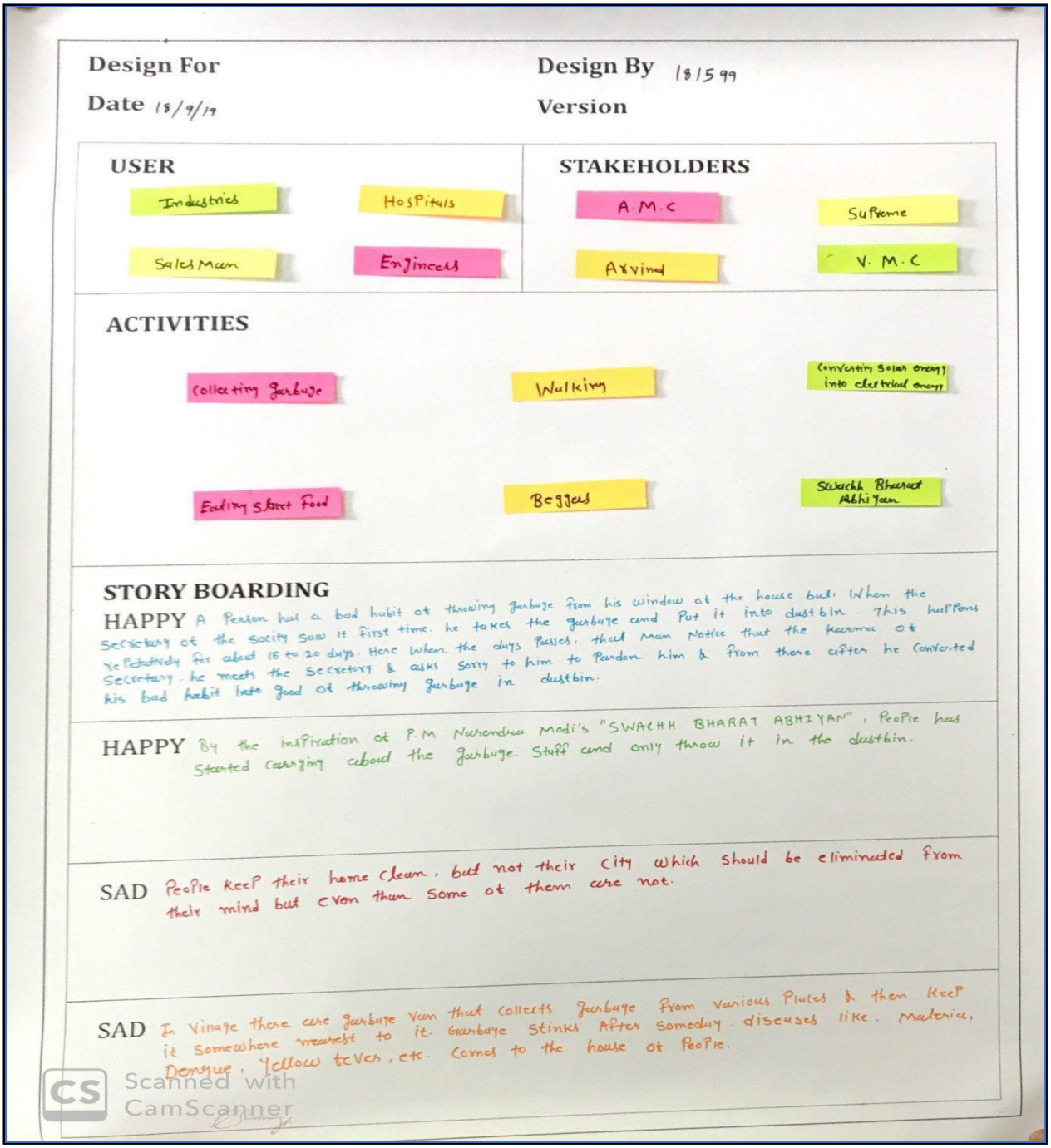

Figure 3.2 empathy mapping canvas

Users

In this stage, we find the various users which are directly or indirectly related to our project.

For example: person travelling somewhere, driver, food stalls and students.

Stake-holders

Stakeholders mean person or organization with an interest. In this stage, we find who will directly or indirectly relate to users.

For example: Transporter, manufacturer, cleaner.

Activities

Activities are directly or indirectly related to stakeholders.

Story Boarding

It consists of a happy story and a sad story regarding our project which shows the problem being tolerated by users.

CHAPTER 4

PRIORITIZING AND FINALIZING

Ideation Canvas

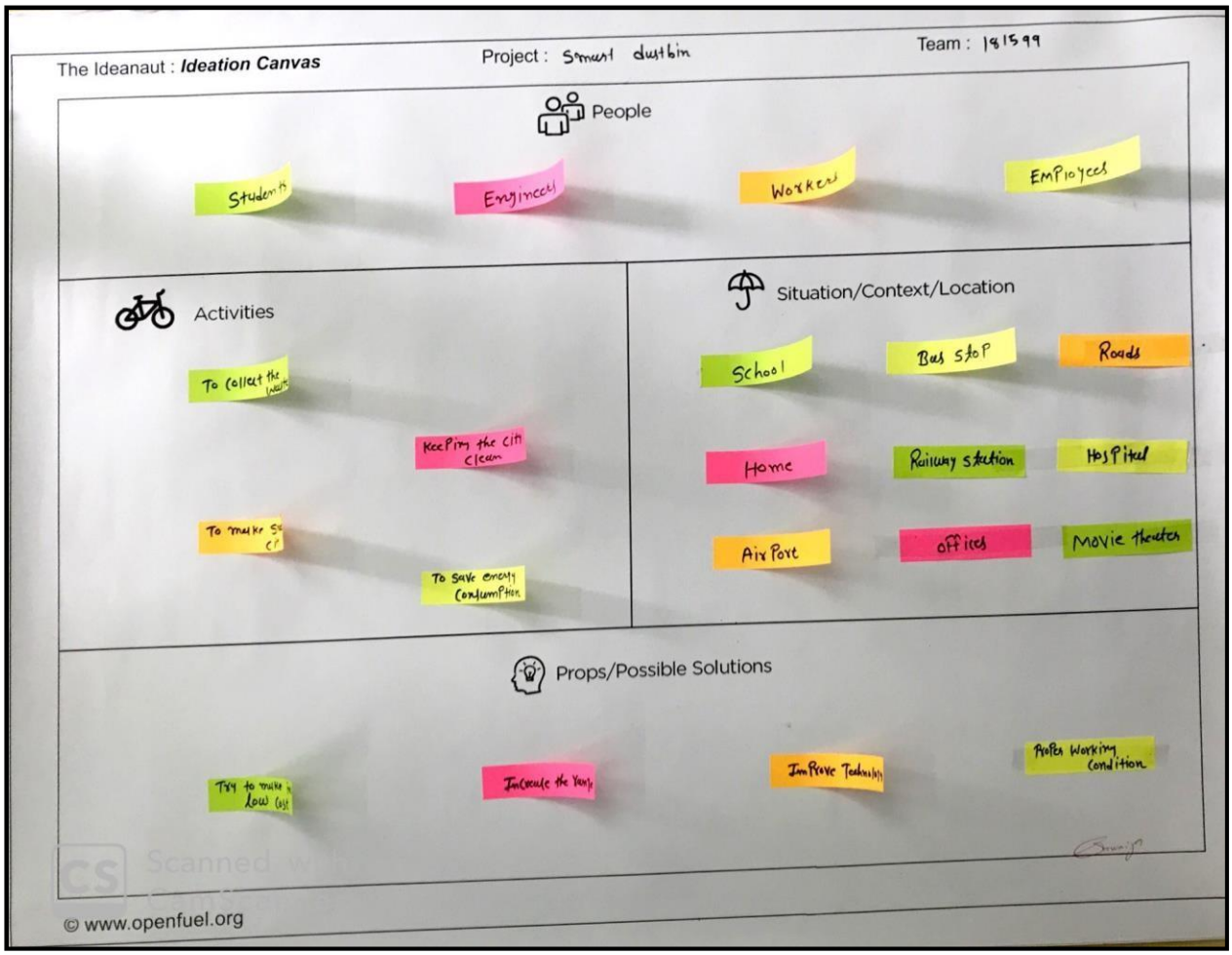

Figure 4.1 ideation canvas

People

- Common people
- Students
- Families

Activities

- Travelling tours for men and women.

Situations and Locations

- Reaches office late
- When travelling to tours
- Streets.

Props/Object

- Metal
- Plastic
- GPS
- Sensor
- Cover.

Product Development Canvas

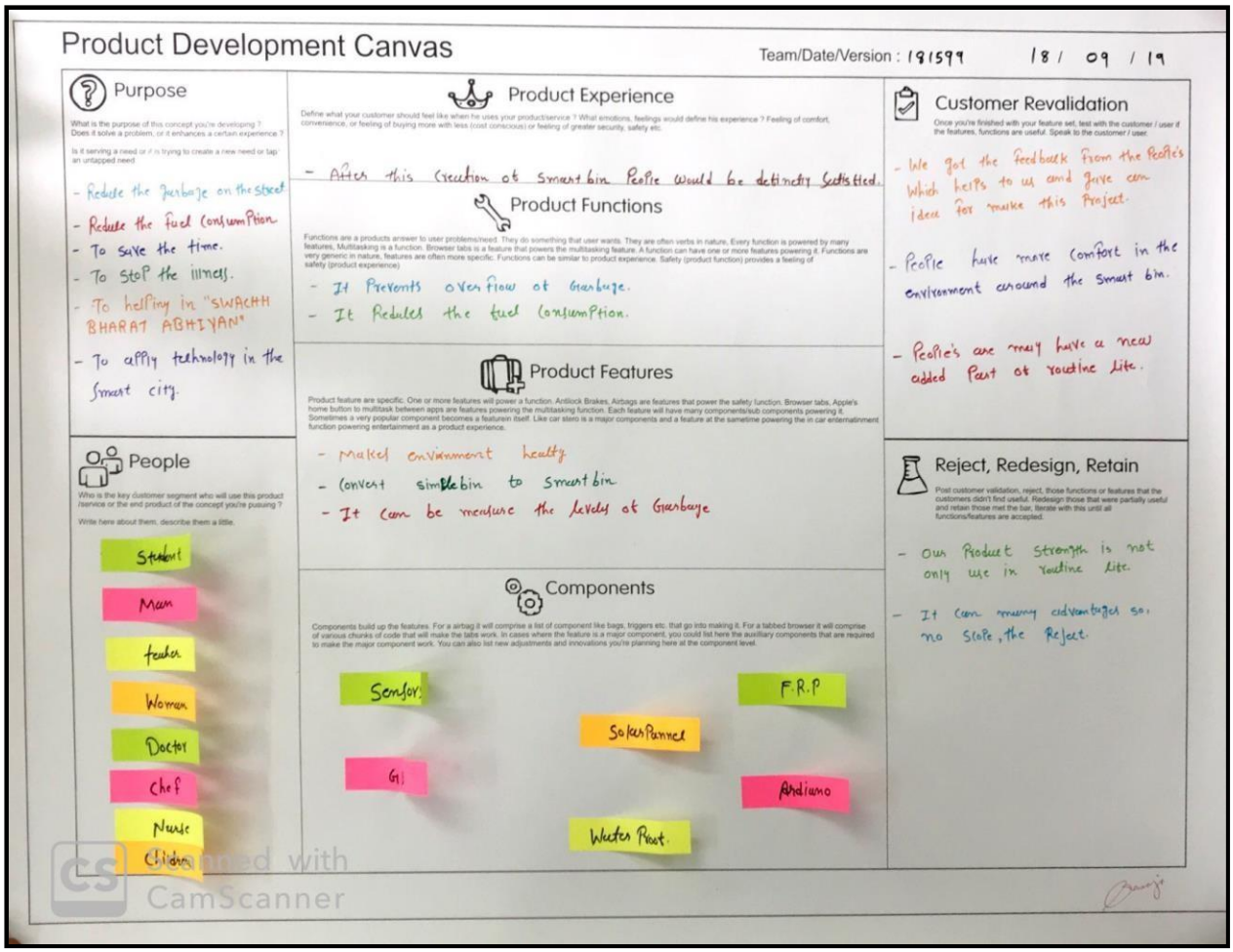

Figure 4.2 product development canvases

Purpose

- Providing cleaning whenever, and wherever

People

- Student
- Employees
- Travelers
- Shopkeepers.

Product Experience

- Clean environment
- Fresh air
- Comfort

Product Function

- To provide comfort
- Clean environment and safe area for children.

Product Features

- Cleanliness
- Fresh air
- Diseases free area.

Key Component

- Bin
- GPS
- sensor

Customer Revalidation

- Very clean area while walking.
- Good and may have a new trend for cleanliness and dustbin.

Reject/Redesign/Retain

- Nothing is added for decoration
- Hence no extra unnecessary charges.

CHAPTER 5

LEARNING NEED MATRIX

5.1 Learning Need Matrix

Learning's Need Matrix for the use by the students across all engineering branches. This tool was developed for exploring its usage in the semester IV, when a refinement is carried out in the Product Development Canvas. The purpose of LNM is to identify the requirements of learning among the team members. While a new product/process is under development based on a unique idea, the team members need to learn and explore a lot of new skills and documents, methods and guidelines [4, 9].

Each learning need identified is required to be mentioned in form of a word. Using a sticky note, it should be pasted in a particular quadrant considering timeline decided to accomplish the learning/exploring. Below is the LNM format.

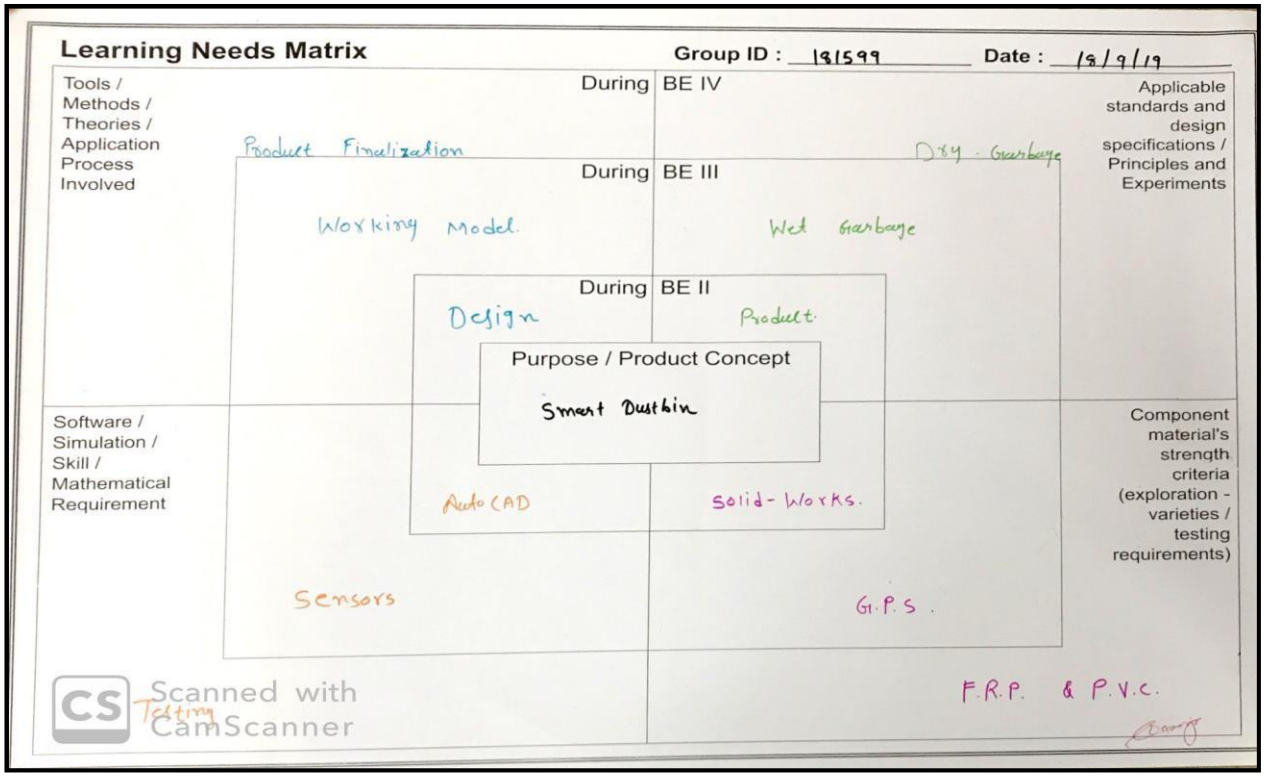

Figure 5.1 lnm canvas

Top-right quadrant identified the learning requirement regarding applicable standards, design specification, exploration and understanding of scientific principles and identification of different types of experiment to be performed over a period of time.

Top-left quadrant suggests making identification of learning the use of various tools, processes, methods of application, theories to apply tools involved.

The lower-left quadrant contains identified needs for learning of software, simulation techniques, skills, mathematical learning requirements and so on.

Lastly, the lower-right quadrant shall have the needs identified pertaining to an understanding of various alternative materials, its strength and other properties, standards, as well as its testing requirements, depending upon envisaged quality.

CHAPTER 6

REQUIREMENT SPECIFICATION

6.1 Arduino

Arduino is an open source, computer hardware and software company, project, and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it-yourself kits. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers [3,8, 9].

Arduino/Genuine Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform, for an extensive list of current, past or outdated boards see the Arduino index of boards [6, 9].

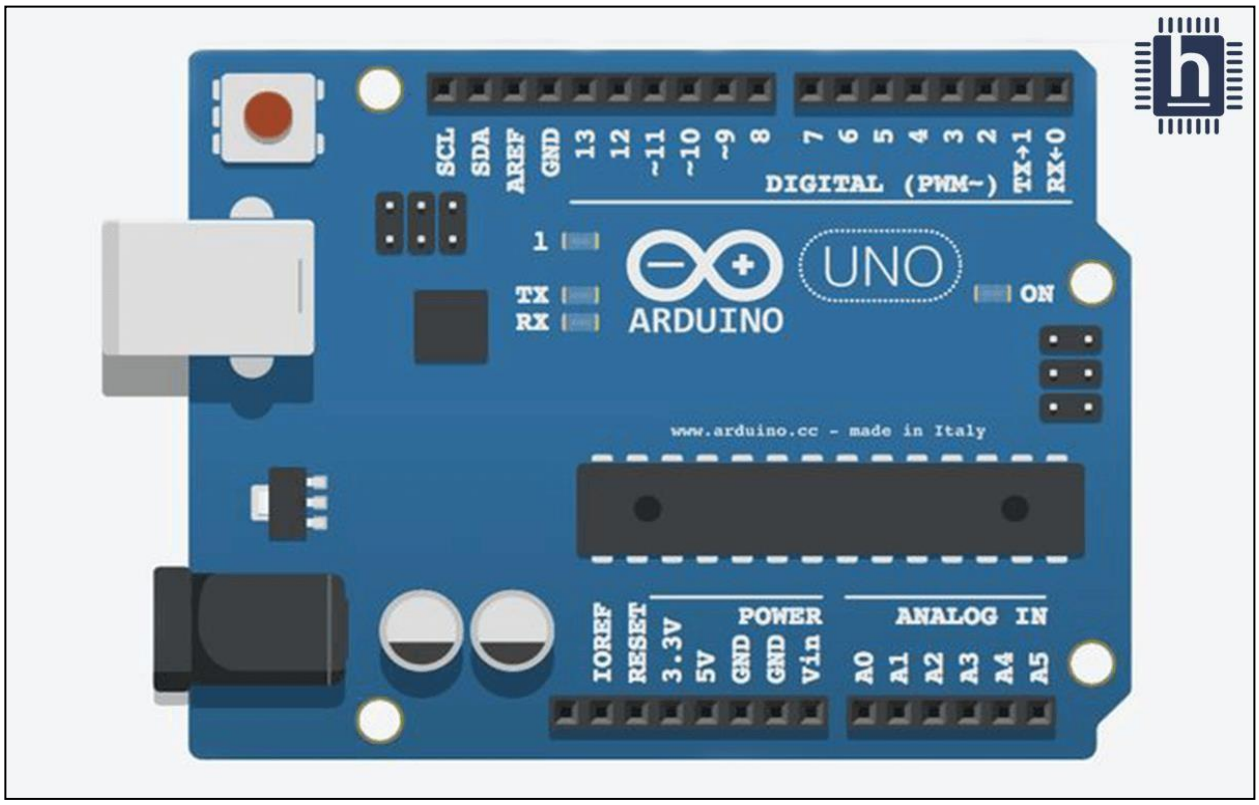

Figure 6.1 Arduino Uno Board

(i) Power USB- Arduino board can be powered by using the USB cable from your computer. All you need to do is connect the USB cable to the USB connection

(ii) Power (Barrel Jack)

Arduino boards can be powered directly from the AC mains power supply by connecting it to the Barrel Jack.

(iii) Voltage Regulator

The function of the voltage regulator is to control the voltage given to the Arduino board and stabilize the DC voltages used by the processor and other elements.

(iv) Crystal Oscillator

The crystal oscillator helps Arduino in dealing with time issues. How does Arduino calculate time? The answer is, by using the crystal oscillator. The number printed on top of the Arduino crystal is 16.000H9H. It tells us that the frequency is 16,000,000 Hertz or 16 MHz

(V, xvii) Arduino Reset

You can reset your Arduino board, i.e., starts your program from the beginning. You can reset the UNO board in two ways. First, by using the reset button (17) on the board. Second, you can connect an external reset button to the Arduino pin labelled RESET (5).

(vi, vii, viii, ix) Pins (3.3, 5, GND, Vin)

3.3V (6) − Supply 3.3 output volt

5V (7) − Supply 5 output volt

Most of the components used with Arduino board works fine with 3.3 volt and 5 volt.

GND (8) (Ground) − There are several GND pins on the Arduino, any of which can be used to ground your circuit.

VIN (9) − this pin also can be used to power the Arduino board from an external power source, like AC mains power supply.

(x) Analog pins- The Arduino UNO board has five analog input pins A0 through A5. These pins can read the signal from an analog sensor like the humidity sensor or temperature sensor and convert it into a digital value that can be read by the microprocessor.

(xi) Main microcontroller- Each Arduino board has its own microcontroller (11). You can assume it as the brain of your board. The main IC (integrated circuit) on the Arduino is slightly different from board to board. The microcontrollers are usually of the ATMEL Company. You must know what IC your board has before loading up a new program from the Arduino IDE. This information is available on the top of the IC. For more details about the IC construction and functions, you can refer to the data sheet.

(xii) ICSP pin- Mostly, ICSP (12) is an AVR, a tiny programming header for the Arduino consisting of MOSI, MISO, SCK, RESET, VCC, and GND. It is often referred to as an SPI (Serial Peripheral Interface), which could be considered as an "expansion" of the output. Actually, you are slaving the output device to the master of the SPI bus.

(xiii) Power LED indicator- This LED should light up when you plug your Arduino into a power source to indicate that your board is powered up correctly. If this light does not turn on, then there is something wrong with the connection.

(xiv) TX and RX LEDs- On your board, you will find two labels: TX (transmit) and RX (receive). They appear in two places on the Arduino UNO board. First, at the digital pins 0 and 1, to indicate the pins responsible for serial communication. Second, the TX and RX led (13). The TX led flashes with different speed while sending the serial data. The speed of flashing depends on the baud rate used by the board. RX flashes during the receiving process.

(xv) Digital I/O- The Arduino UNO board has 14 digital I/O pins (15) (of which 6 provide PWM (Pulse Width Modulation) output. These pins can be configured to work as input digital pins to read logic values (0 or 1) or as digital output pins to drive different modules like LEDs, relays, etc. The pins labelled can be used to generate PWM.

(xvi) AREF- AREF stands for Analog Reference. It is sometimes, used to set an external reference voltage (between 0 and 5 Volts) as the upper limit for the analog input pins.

Microcontroller- ATmega2560

Operating Voltage -5V

Input Voltage (recommended)- 7-12V

Input Voltage (limit)- 6-20V

Digital I/O Pins 54 (of which 15 provide PWM output)

Analog Input 16 [5, 10, 14].

Ultrasonic sensor

The HC-SR04 ultrasonic sensor uses SONAR to determine the distance of an object just like the bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package from 2 cm to 400 cm or 1" to 13 feet. The operation is not affected by sunlight or black material, although acoustically, soft materials like cloth can be difficult to detect. It comes complete with ultrasonic transmitter and receiver module [1].

Figure 6.2Ultrasonic sensor

Technical Specifications

Power Supply − +5V DC

Quiescent Current − <2mA

Working Current − 15mA

Effectual Angle − <15°

Ranging Distance − 2cm – 400 cm/1″ – 13ft

Resolution − 0.3 cm [8].

Servo motor (SG 90)

There are lots of servo motors available in the market and each one has its own speciality and applications. Most of the hobby Servo motors operates from 4.8V to 6.5V, the higher the voltage higher the torque we can achieve, but most commonly they are operated at +5V. Almost all hobby servo motors can rotate only from 0° to 180° due to their gear arrangement so make sure you project can live with the half circle if no, you can prefer for a 0° to 360° motor or modify the motor to make a full circle. The gears in the motors are easily subjected to wear and tear, so if your application requires stronger and long running motors you can go with metal gears or just stick with normal plastic gear [5, 7, 13].

Next comes the most important parameter, which is the **torque** at which the motor operates. Again there are many choices here but the commonly available one is the 2.5kg/cm torque which comes with the Towerpro SG90 Motor. This 2.5kg/cm torque means that the motor can pull a weight of 2.5kg when it is suspended at a distance of 1cm. So if you suspend the load at 0.5cm then the motor can pull a load of 5kg similarly if you suspend the load at 2cm then can pull only 1.25. Based on the load which you use in the project you can select the motor with proper torque. The below picture will illustrate the same [3, 7, 11].

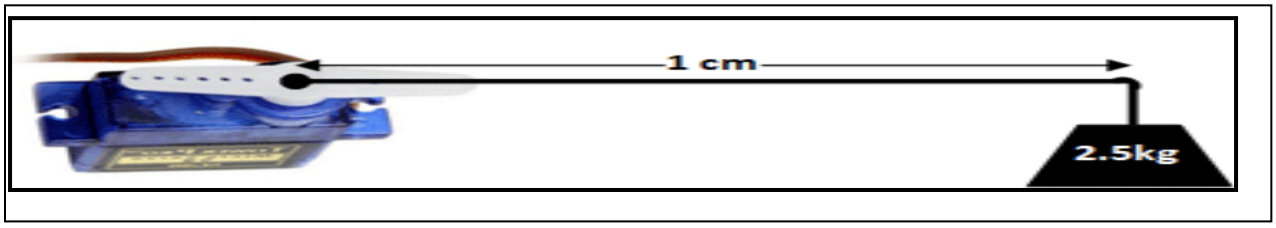

Figure 6.3 Servo motor

Working of a Servo Motor

The servo motor has some control circuits and a potentiometer (a variable resistor, aka pot) connected to the output shaft. In the pot can be seen on the right side of the

circuit board. This pot allows the control circuitry to monitor the current angle of the servo motor [6, 9].

If the shaft is at the correct angle, then the motor shuts off. If the circuit finds that the angle is not correct, it will turn the motor until it is at a desired angle. The output shaft of the servo is capable of traveling somewhere around 180 degrees. Usually, it is somewhere in the 210-degree range, however, it varies depending on the manufacturer. A normal servo is used to control an angular motion of 0 to 180 degrees. It is mechanically not capable of turning any farther due to a mechanical stop built on to the main output gear [6].

The power applied to the motor is proportional to the distance it needs to travel. So, if the shaft needs to turn a large distance, the motor will run at full speed. If it needs to turn only a small amount, the motor will run at a slower speed. This is called proportional control [4].

Switch

In electrical engineering, a switch is an electrical component that can disconnect or connect the conducting path in an electrical circuit, interrupting the electric current or diverting it from one conductor to another.

Here we using a simple switch which can help us to engage and disengage to power supply and working of servo motor [3, 4].

Battery

A power supply is responsible for providing a circuit with all the power it will need during normal operation. It provides the circuit with a certain voltage and current. ...
For proper operation, we need to find a way to convert the voltage of our main supply (battery or wall adapter) down to 5V.

A power supply is responsible for providing a circuit with all the power it will need during normal operation. It provides the circuit with a certain voltage and current [6, 9].

Figure 6.4 Battery

Jumper wires

The term "jumper wire" simply refers to a conducting wire that establishes an electrical connection between two points in a circuit. A jump wire is an electrical wire, or group of them in a cable, with a connector or pin at each end, which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering [8, 9].

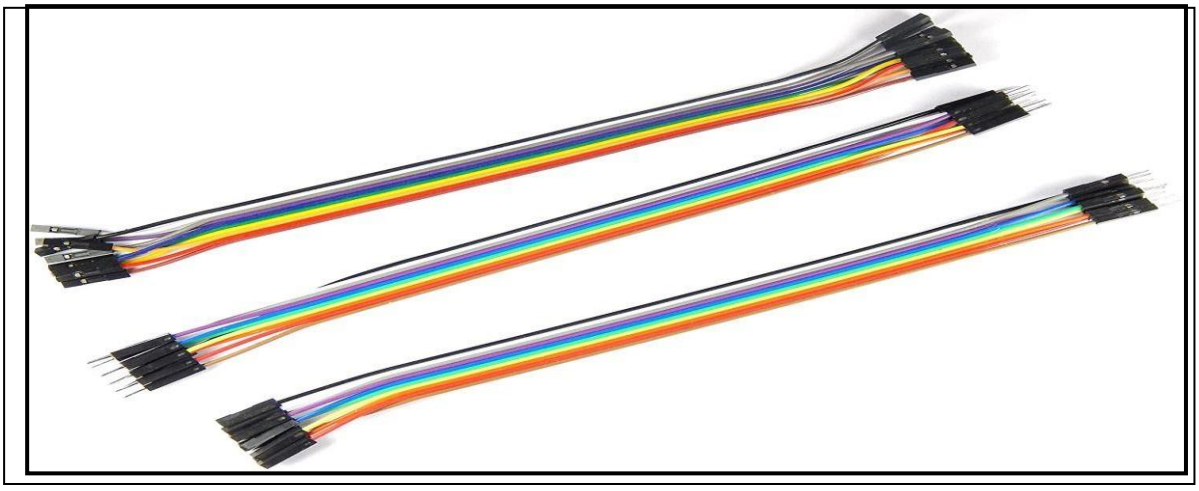

Figure 6.5 Jumper wires

C H A P T E R 7

IMPLEMENTATION

7.1 Integrated codes

```
 #include

//servo  library

Servo servo;

int trigPin = 5;

int echoPin = 6;

int servoPin = 7;

int led= 10;

long duration, dist, average;

long aver[3]; //array for average

void setup() {

Serial.begin(9600);

servo.attach(servoPin);

pinMode(trigPin, OUTPUT);

pinMode(echoPin, INPUT);

servo.write(0); //close cap on power on

delay(100);
```

```
servo.detach();
}
void measure() {
digitalWrite(10,HIGH);
digitalWrite(trigPin, LOW);
delayMicroseconds(5);
digitalWrite(trigPin, HIGH);
delayMicroseconds(15);
digitalWrite(trigPin, LOW);
pinMode(echoPin, INPUT);
duration = pulseIn(echoPin, HIGH);
dist = (duration/2) / 29.1; //obtain distance
}
void loop() {
for (int i=0;i<=2;i++) { //average distance
measure();
aver[i]=dist;
delay(10); //delay between measurements
}
dist=(aver[0]+aver[1]+aver[2])/3;
```

```
if ( dist<50 ) {

//Change distance as per your need

servo.attach(servoPin);

delay(1);

servo.write(0);

delay(3000);

servo.write(150);

delay(1000);

servo.detach();

}

Serial.print(dist);

}
```

CHAPTER 8

PROTOTYPE

A prototype is an operating version of a solution. It is often made with different materials than the final version. This step is essential for Design Engineering Process. This will help students to implement future version their product.

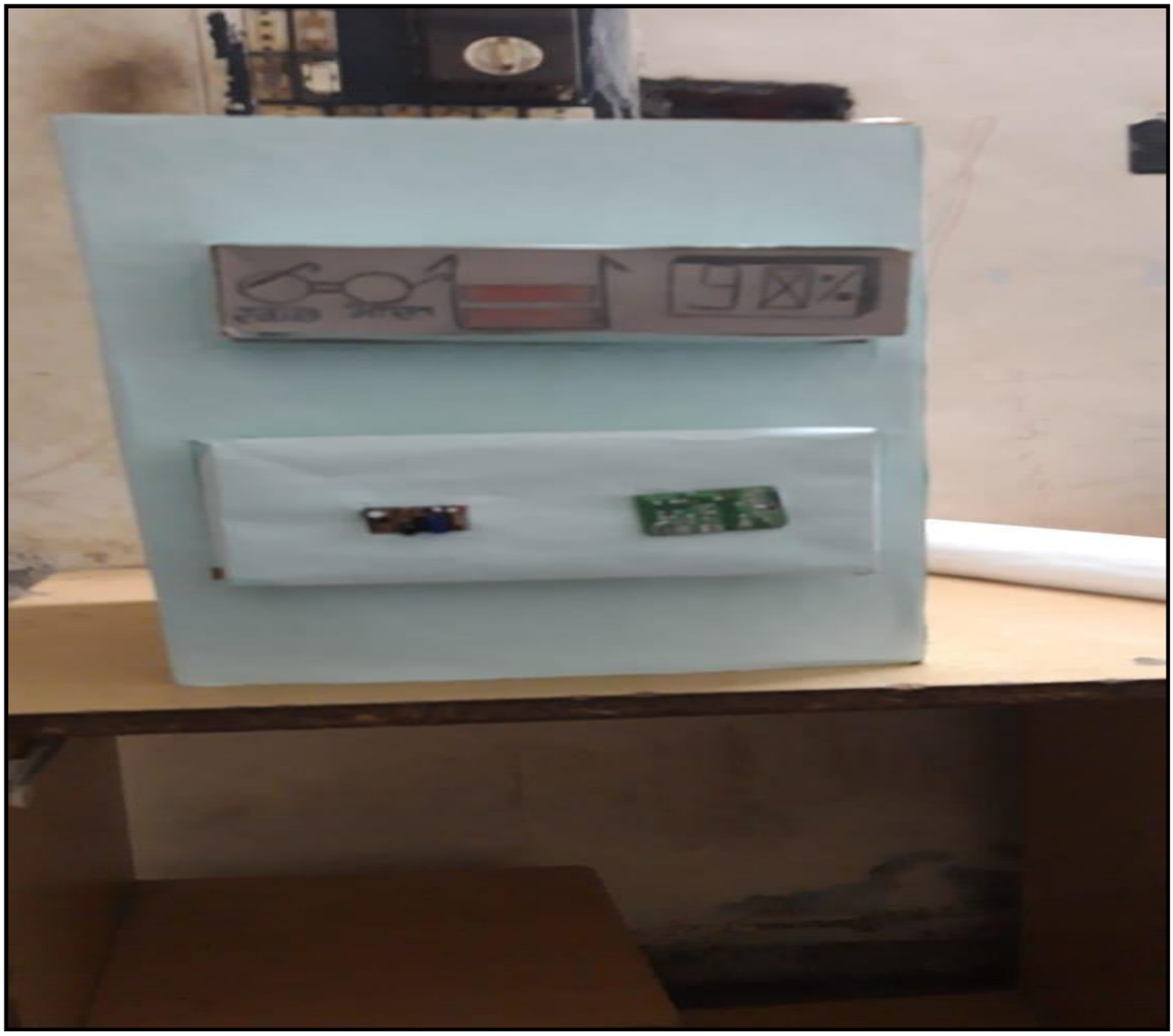

Figure 8.1 prototype

C H A P T E R 9

CONCLUSION AND FUTURE SCOPE

Conclusion

We able to know how people suffer from this problem and we also got to knew about the working functionality of cleanliness.

- This project work is the implementation of Automatic Garbage Fill Alerting system using Ultrasonic sensor, Arduino Uno, Buzzer and Wi-Fi module. This system assures the cleaning of dustbins soon when the garbage level reaches its maximum. It will take power supply with the help of Piezoelectric Device .If the dustbin is not cleaned in specific time.
- Then the record is sent to the Sweeper or higher authority who can take appropriate action against the concerned contractor. This system also helps to monitor the fake reports and hence can reduce the corruption in the overall management system. This reduces the total number of trips of garbage collection vehicle and hence reduces the overall expenditure associated with the garbage collection. It ultimately helps to keep cleanliness in the society. Therefore, the Automatic Garbage Fill Alerting system makes the garbage collection more efficient.

Future Work

Automatic garbage fill alerting system helps us to reduce the pollution. Many times garbage dustbin is overflow and many animals like dog or cow enters inside or near the dustbin. Also some birds are also trying to take out garbage from dustbin. This project can avoid such situations. And the message can be sent directly to the cleaning vehicle instead of the contractor's office. Apart from this, differentiation can be made between dry trash bin and wet trash bin collecting plastic dry waste and biodegradable waste respectively. To implement this methane and smell sensors can be used. This helps in distinguishing the waste at the source and hence reducing the requirement of manpower [6, 8].

- To enhance it further, an automated system can be developed which is able to pick up waste in and around the bin, segregate them and put them in respective bins.
- We have try to new innovation in this project like we think about fit the GSM module which helps to send a message to particular service room and around the smart bin area it indicates dustbin was full in shortly please collect the garbage from the bin.
- New one adding feature is solar panel which is natural recourses and its works on solar energy it's fully automated and all the components of smart bin works upon the solar energy.
- Another we think on artificial intelligence its guide to peoples which compartment is dry west and wet west it is very helpful for blind peoples who don't look where is the compartment of dry and wet garbage. In this feature we need to proximity sensors and computer master in artificial intelligence [2, 3, 8].

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GUJARAT TECHNOLOGICAL UNIVERSITY

Centre for Industrial Design (Open Design School)

DESIGN ENGINEERING

CONTINUOUS ASSESSMENT CARD

COLLEGE NAME: Gandhinagar Institute Of Technology COLLEGE CODE: 012	
SUBJECT NAME: Design Engineering 2 - (B)	
SUBJECT CODE: 2160001	SEMESTER: 6th
BRANCH: Mechanical	ACADEMIC YEAR: 2019-2020

TEAM NAME:	TEAM ID: 235465
PROJECT TITLE/DOMAIN: Smart Dustbin	

SR. NO.	TEAM MEMBER'S NAME	ENROLLMENT NO.
01	Bariya Amarbhai Mangalbhai	180123119005
02	Gajjar Supreet Ketanbhai	180123119011
03	Ghodeswar Krunal Gajanan	180123119012

INTERNAL GUIDE NAME: Prof. Harshal Oza
INTERNAL GUIDE SIGN:

Head of Department College Seal

MONTHLY ASSESSMENT - I (Observation, Empathy and Define Phase)
(DATE: 06 / 03 / 2020)

1. Why students/team has taken above mentioned domain? (Please specify the reason)
   (Note: For more content or information, one may attach additional pages to this card.)

   We have traveled from college to home and seen the things related to the domain and thought of a way to improve it.

2. How frequently student team has gone for observation on field, mention with date, place, time etc.? Which are the key observations that they have noticed?

   We have gone for observation for more than 20days a month. 6th February 2019 was the date and the place was food street at 11:00a.m.

3. A. How many interactions/interviews team members have done?

   We have done up to 10 to 12 interactions with other.

   B. Who are the user and various stakeholders on domain? Describe their persona (Name, age, occupation/education, roles and responsibility etc.)

   We have stakeholders like AMC, VMC & ARVIND.

   C. List out the questions asked by team while having observation and interview?

   i). Why people are throwing waste eve if dustbin is full?
   ii). Why the collecting van comes too late?

4. What is something special/random/unusual (i.e. activity, environment, interaction, object or user) team has observed at the domain? Please elaborate the conditions with photographs if available.

   Once I was walking on the street and I found that dustbin was full, but still people were dropping garbage near to the dustbin and that thing was smelling so bad and creating pollution so this activity was I observed around the domain area and environment was not healthy yet.

5. Enlist any five major problems observed by your team in the respective domain. Mention any one for which you have empathize user the most and which might become your problem statement. Give reasons of selection of particular problem/issue based on empathy.

   1). Overflow of garbage.

   2). Fuel consumption.

   3). Less effort and time.

   4). Spread dieses.

   5). some part of street was stinking.

6. Define your "PROBLEM DEFINITION" for the project as per below format. Which might be refining till end of Ideation phase if you wish?

SUGESTIONS BY INTERNAL GUIDE:

AEIOU CANVAS SUGGESTIONS:
EMPATHY CANVAS SUGGESTIONS:
MIND MAPPING SUGGESTIONS:
GENERAL SUGESTIONS:
Overall Mark (Out of 05):

GUIDE SIGNATURE:

Date:

MONTHLY ASSESSMENT – II (Ideation and Product Development Phase) (DATE: 13 / 04 / 2020)

1. Explain briefly Ideation thought process and efforts of your team to reach ideas for listed problems.

   Our team applied too many efforts to reach this kind of idea and to make it possible we are still working and we will definitely work on it.

2. Enlist any five effective ideas to address the probable listed problems with reason.

   1). Use sensor (To measure the garbage)
   2). Use solar panel (To reduce the electricity usage)
   3). Using G.S.M. & G.P.S. module (To connectivity)
   4). Using Arduino (For programming)
   5). Using F.R.P. material (For manufacturing the body)

3. Explain the most effective possible solution proposed for the problem.

   Using the ultrasonic sensor which is connected with servo motor and whenever anyone can comes to near dustbin and when garbage are comes near on cover of the bin its automatically open after then its closed. We are done with the help of the Arduino Uno programming circuit board.

4. Explain the features, functions and working principles/technology/pattern of your proposed solution.

   The Arduino Uno board is a microcontroller based on the Atmega 328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHZ ceramic resonator as ICSP header, a USB connection, 6 Analog inputs, a power jack and a reset button.

5. Enlist major advantages and disadvantages (at least three) of the proposed solution.

   Advantages: Less effort, less time, reducing electricity consumption.

   Disadvantages: Costly, connectivity problems, coding problems

6. Briefly mention refinement on PDC based on User/Stakeholder's feedback onyour concept.

   We got the feedback from the people which helps us and gave an idea for make this project possible. After completing this project our stakeholders profit graph will rise because there is no other product like this.

SUGESTIONS BY GUIDE:

IDEATION CANVAS SUGGESTIONS:
PRODUCT DEVELOPMENT CANVAS SUGGESTIONS:
LEARNING NEEDS MATRIX SUGGESTIONS (in case of 4th sem and onwards):
GENERAL SUGGESTIONS:
Overall Mark, considering assessment I (Out of 05):

GUIDE SIGNATURE:

Date:

MONTHLY ASSESSMENT -III (Detail Design, Prototype and Test phase)
(This assessment shall be done by another guide of department or interdepartmentally along with guide) **(DATE: 04/ 05/ 2020)**

1. Which theoretical subjects/concepts are involved with your project? How it is useful to your project?

   The main subjects are like machine design, control engineering, coding system, etc. are very useful for designing and understanding this project easily.

2. Which software/design tool/Skills you have learned/applied during the project?Explain the features of it.

   Solid works and Arduino software that our team mates learned during this semester and previous semester of Design Engineering subject and other thing our team mate is also learned how to use Arduino and how to do coding for it. So our project will work according to the codes.

3. Explain the prototype/model prepared by the student/team.

   We have the main body made of F.R.P. which is in square shape. And on the top of the dustbin we attached solar panel and another thing like G.P.S. and G.S.M. and other electrical device are attached on the main body in the special case. And above we have thinking attached the screen to indicate the level of garbage.

4. What are the materials, technology, things have utilized to make the prototype/model?

   Materials: F.R.P., Plastic, P.V.C., Metal.

   Technology: Solar panel, Display, G.P.S. & G.S.M .module, Arduino Uno.

5. How many Iterations have you done to reach final solution? Explain modification/revise parameters/characteristics for each iteration.

   We have done up to 10 to 12 interactions to reach up to final solution. And in one interaction with someone and he told me to how it will be safe from the thief's? So we work on that point in future.

6. What is the scope of the project? How you are planning to implement it in future?

   Solar panel and G.S.M module this two things we will work on future because we have ver less knowledge about these things.

SUGESTIONS BY EVALUATOR:

PROTOTYPE/MODEL SUGGESTIONS:
GENERAL SUGESTIONS:
Overall Mark, considering assessment I & II (Out of 10):

Department/Interdepartmental Evaluator name and sign:
Guide sign:

Date:

ENROLLMENT NO: 180123119005 **TEAM ID: 235465**
180123119011
180123119012

FINAL ASSESSMENT AT THE END OF SEMESTER

EVALUATOR MEMBERS DETAILS:

NAME	INSTITUTE & DEPARTMENT	SIGN.
1.		
2.		
3.		

ASSESSMENT SUMMARY:

CONTINUOUS ASSESSMENT SUMMARY:	MARKS OBTAINED
MONTHLY ASSESSMENT - I	
MONTHLY ASSESSMENT - II	
MONTHLY ASSESSMENT - III	
TOTAL (Out of 20)	
FINAL EVALUATION/VIVA MARKS (Out of 80)	
TOTAL (Out of 100)	
EXAMINER COMMENTS/SUGGESTIONS:	

DATE:

INTERNAL GUIDE SIGN **HOD SIGN** **COLLEGE SEAL**

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