;GUJARAT TECHNOLOGICAL UNIVERSITY

(GTU)

Narnarayan Shastri Institute Of Technology

Affiliated with GTU

A

Project Report

On

Head Controlled Mouse For Handicapped People

Prepared as a part of the requirements for the subject of

DESIGN ENGINEERING - I b

B.E Semester-IV (Computer branch)

Submitted by:

Group:

Sr.	Name of student	Enrollment No.
1	Alva Murli K.	160340107002
2	Desai Tanish D.	160340107012
3	Patel Aarsh S.	160340107029
4	Sharma Kamlesh R.	160340107050
5	Yeole Meet M.	160340107058

INTERNAL GUIDE:

Mrs. Sujata Panda

HEAD OF DEPARTMENT:

Mr. Pragnesh Patel

Academic Year

(2018)

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DEPARTMENT OF COMPUTER SCI & ENGG.

CERTIFICATE

This is to certify that the DESIGN ENGINEERING-**IB** project entitled **'HEAD CONTROLLED MOUSE FOR HANDICAPPED PEOPLE'** have been carried out by **ALVA MURLI K. (160340107002)** under my guidance in **COMPUTER SCIENCE & ENGINEERING (4-SEM)** of Gujarat Technological University, Ahmedabad during the academic year 2017-2018.

Internal Guide HOD CSE

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This is to certify that the DESIGN ENGINEERING-**IB** project entitled **'HEAD CONTROLLED MOUSE FOR HANDICAPPED PEOPLE'** have been carried out by **Sharma Kamlesh R. (160340107050)** under my guidance in **COMPUTER SCIENCE & ENGINEERING (4-SEM)** of Gujarat Technological University, Ahmedabad during the academic year 2017-2018.

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ACKNOWLEDGEMENT

I have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them.

I am highly indebted to Narnarayan Shastri Institute of Technology for their guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in completing the project.

I would like to express my gratitude towards my parents & group members for their kind co-operation and encouragement which help me in completion of this project.

I would like to express my special gratitude and thanks to all. Lastly, I would like to sincerely acknowledge and express my gratitude to all those who have directly or indirectly instrumental in preparing this report.

THANKS TO ALL GROUP MEMBERS & OTHER SUPPORT TEAM

ABSTRACT

In our project 'Head Controlled Mouse For Handicapped People', we made the following observations:

OBSERVATION 1] One day I met a person with hand disability. He Had a very good knowledge about computers, in both software and hardware field. But due to his detect he could not able to use the mouse or the keyboard. I felt very bad that day! The person who is having world full of knowledge about computers is not able to use it. So, there I got an Idea of making a Head Controlled Mouse, by which he can use a mouse's simulation on the computer by his head. Well the solution of using the keyboard was quite simple , as there are many virtual keyboards software's which are available for free on the internet.

OBSERVATION 2] One day I saw my elder brother playing a game on his PC. He was playing a real-world game; he was given a character and given some kind of mission of killing someone. The point is here is not the storyline of the game, rather it is about the controls used in the game. The character was having the mouse control, I meant turning the mouse left and right will move the character on the screen left and right respectively. I thought for the same idea again. If we use a Head controlled mouse for this, the game will be more awesome, I meant more realistic. So, we get one more user of our project 'HEAD CONTROLLED MOUSE'

INTRODUCTION

Design is a plan of a system, its implementation and utilization for attaining a goal. It is to change undesired situation into desired situation means to find solution for undesired/uncomfortable situation.

Design thinking gives a taste of the rich internal-remunerations associated with knowledge-creation and in curiosity and problem-driven contexts. Design need to satisfy technical functions, ergonomics functions, aesthetic functions, cost function and environment functions.

Essential features of Design:
Design solution of a problem starts with planned constructions for achieving goal/s. Designing means evolving goal oriented processes. At the beginning of the design process only goals are known while at the end, both the goals and plans are known and that to with more clarity. Goal and plans evolve together and they influencing each other. In designing process some goals are more important than others and similarly0 some plans are better than others. Designing does not guarantee that the design will work.

Design thinking process:

(1) Find goals or need

(2) Evaluate goals or need

(3) Generate proposals to satisfy goals

(4) Evaluate proposals

(5) Improve goals and proposals

MAIN OBJECTIVE: Here the objective is to make the simulation of a computer mouse operated by a hand to a computer mouse operated by a head. It can help literate / Handicapped people to get a job and earn their own living, rather than being dependent on someone else. This project might also be helpful for gamers for easy game simulation and realistic effect. The person who are paralysed from shoulder and downward can also use this project. This project will also help in increasing employment as a person who is unemployed due to hand disability can easily get a job (Computer) in the market. Well, the handicapped people wont be able to work fast as fast as normal one , but it will help them a lot.

ARDUINO: Arduino is an open source computer hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in physical and digital world. The project products are distributed as open source hardware and software, which are licensed under GNU lesser general public license (LGPL) or the GNU General public license, permitting the manufacture of Arduino boards and software distribution by anyone. Arduino board are available commercially in preassembled form, or as do-it-yourself (DIY) kits. Arduino board designs use of a variety of microprocessors and controllers. The board are equipped with set of digital and analog input/output pins that may be interfaced to various expansions boards as breadboards and other circuits. The board features serial communication interfaces, including universal serial bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages c and c++. In addition to using traditional compilers toolchains, the Arduino project provides an integrated development environment (IOE) based on the processing language project.

REVERSE ENGINEERING

1] Activity Canvas:

Description of canvas:

These are goal directed sets of actions – paths towards things people want to accomplish.
What are the modes people work in, and the specific activities and processor they go through?

Project keyword with description

1. Group discussion.

   We gathered our team and discussed the advantages and disadvantages, Problems faced by handicapped peoples, possible solutions, how to Implement our project in different areas, and other such topics.

2. Role Playing.

   We imagined ourselves as if we are handicapped, as if it is the best way to feel and understand the problems faced by them.

3. Survey.

   We did a brief survey research on the person having disabilities in India. As per the census 2011, in India out of the 121 cr population, 2.68 cr people are disabled which is 2.21% of the total population. Amongst them 20% were having disability in movement and 8% were having multiple disabilities. And amongst them 61% were attending educational institution.

4. Took Suggestions.

   We took suggestions from our family and friends about our project and got some ideas and got some errors.

5. Interviewed an amputee.

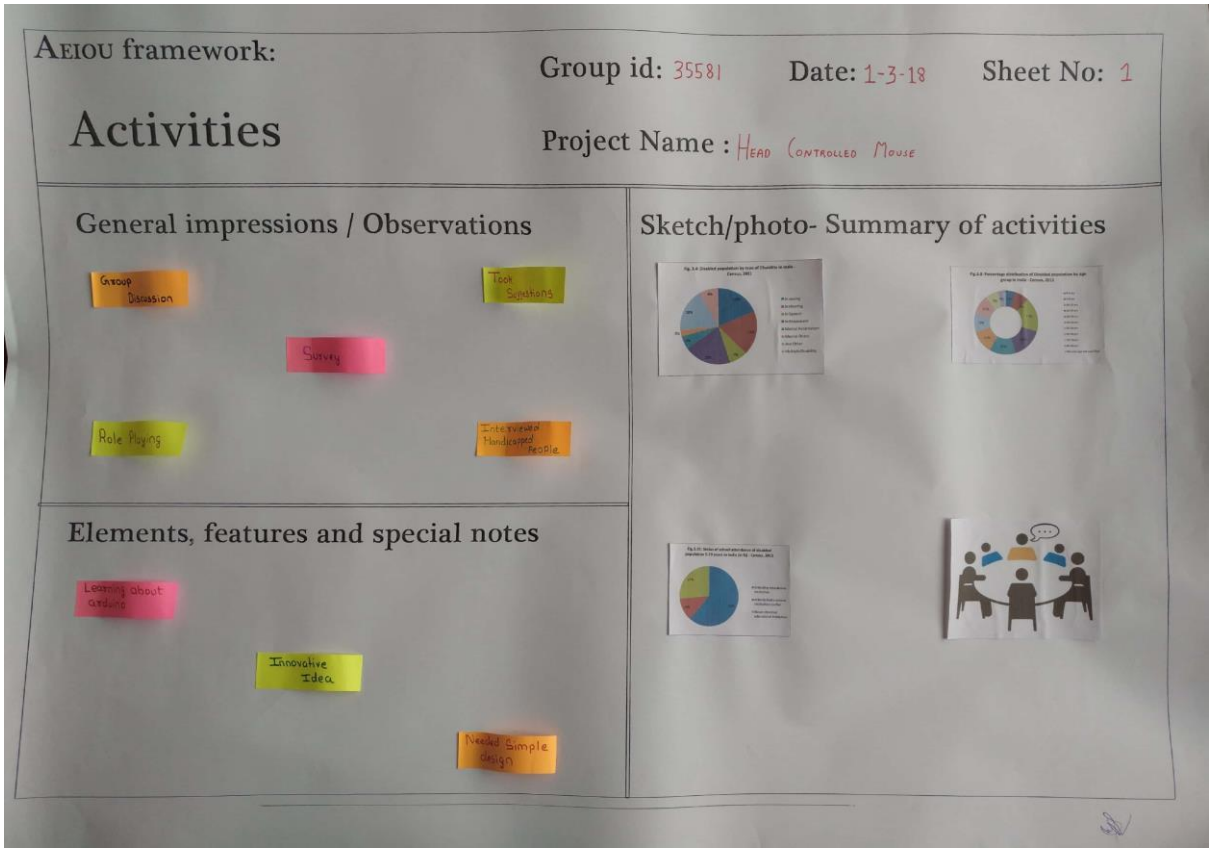
   We met an educated amputee to research more on our topic and find the problems faced by them. The Q/A session brought some more ideas for our project.

6. Learning about Arduino.

   The best part, we worked and gathered different information on Arduino from the internet. Learned about the circuit and coding, understand who to use its IDE, etc.

7. Searching simple design.

   We searched for the best design for our prototype, that would optimize the weight of it, and would be really comfortable in wearing and very easy and simple to use.


AEIOU framework:
Group id: 35581
Date: 1-3-18
Sheet No: 1
Activities
Project Name : HEAD CONTROLLED MOUSE
General impressions / Observations
Group Discussion
Took Synthong
Survey
Role Playing
Interviewed Handicapped People
Sketch/photo- Summary of activities
Elements, features and special notes
Learning about Grading
Innovative Idea
Needed Simple Design

2] ENVIRONMENT CANVAS

DESCRIPTION OF CANVAS:

It includes the entire arena where activities take place. What is the character and function of the space overall, of each individual space, and of shared spaces?

PROJECT KEYWORDS WITH DESCRIPTION:

1) No seasonal effect:

There is no seasonal/climate/atmospheric effect on the product. It works fine in all seasons.

2) Works in different environment:

Whether it is a day or a night, sunny or cloudy outside, the product is compatible with different environment, and can work with no issues at all.

3) Cross platform:

In computing, cross-platform software is a computer software that is implemented on multiple computing platforms. It need not to be a software, it can be a hardware which can be used with different OS.

4) Can be used anywhere:

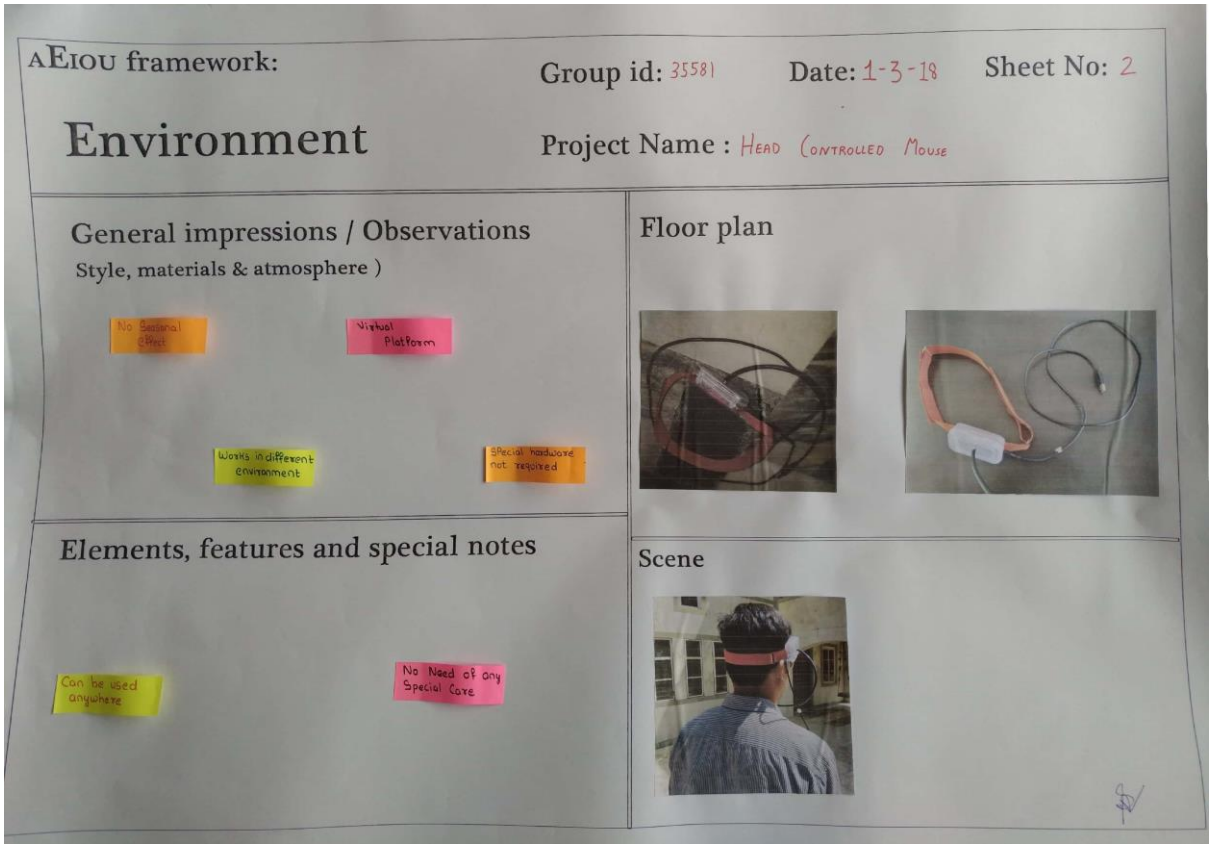
The product can be used in office, at home, in school, and so on.

5) No need of any special care:

The product is so light in weight, that if it falls down, it won't break. We can even make it water resistive. So, any kind of special care need not to be taken!

6) Special hardware not required:

The device works as a whole, it does not need any additional hardware connected to it.



AEIOU framework:

Group id: 35581 Date: 1-3-18 Sheet No: 2

Environment

Project Name : Head Controlled Mouse

General impressions / Observations

Style, materials & atmosphere)

No Seasonal Effect

Virtual Platform

Works in different environment

Special hardware not required

Floor plan

Elements, features and special notes

Can be used anywhere

No Need of any Special Care

Scene

3] INTERACTION CANVAS

DESCRIPTION OF CANVAS:

These are between a person and someone or something else. What is the nature of routine and special interaction between people, between people and objects in their environment, and across distances?

PROJECT KEYWORDS WITH DESCRIPTION:

1) Head movement:

The user has to interact with the device by head movement, in order to move the cursor on the screen.

2) Clicking:

The device comes with two buttons, one for left click and one for right click. The user has to press the buttons by his mouth for clicking.

3) Users:

The first question that anyone would ask is, who is interacting? Well, animals don't use computers! Humans are the only users.

4) Plug in:

The device needs to be plugged in to a computer via USB, when there is a need for using it.

5) Plug out:

After the work is finished, the USB connection from the computer should be removed.

6) Installation:

If there is any other platform, rather than the known ones, the arduino driver's software should be installed first to the computer.

7) User should be guided first:

Not much, but at the first time the user must be guided a little for the movement control of the prototype.

8) Reliable and Comfortable:

The device is reliable as it is handy and light in weight. It is comfortable because it is easy to wear.

9) Easy to use:

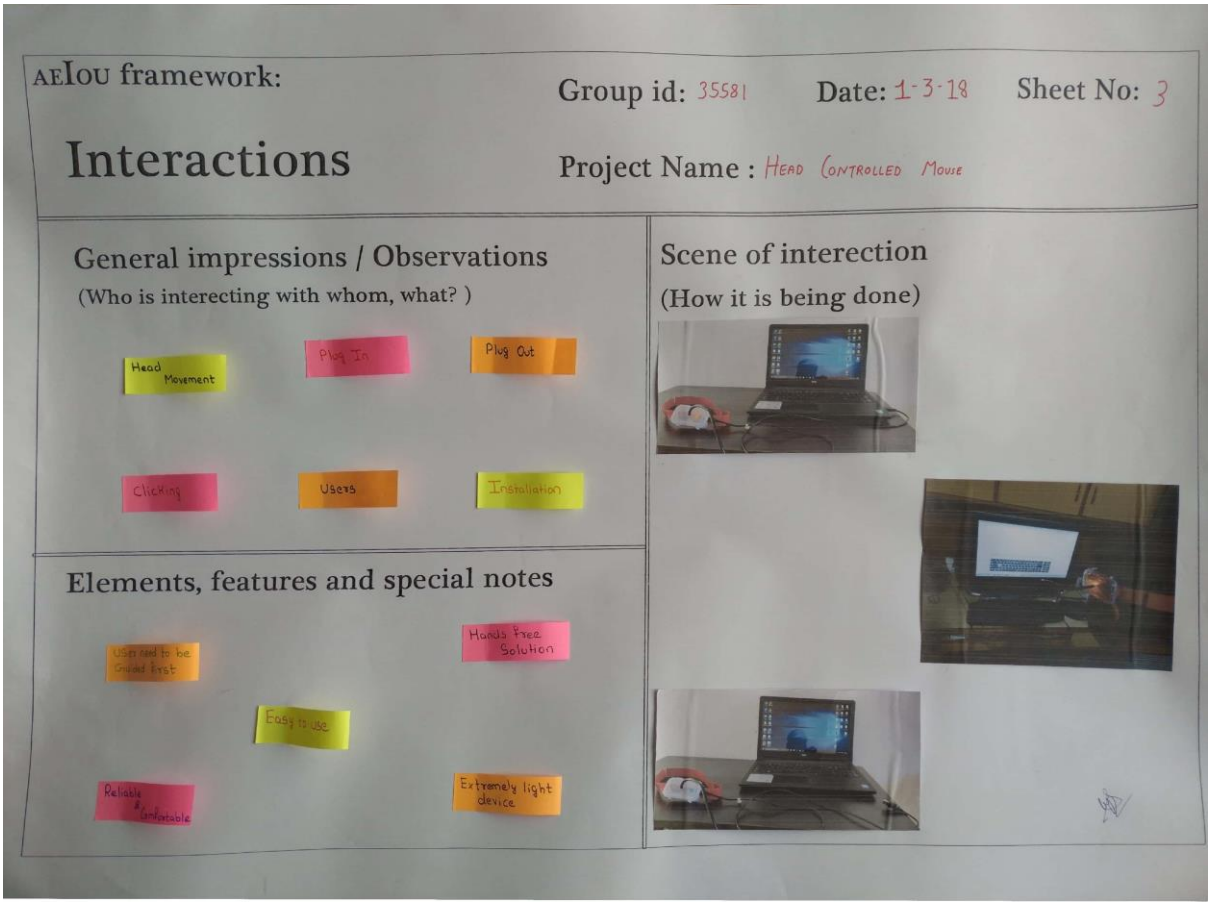
A ready product! Just wear it, plug it and it is ready to use.

10) Hands free solution:

For lazy people, it's a handsfree solution.

11) Extremely light in weight:

The circuit is of very small size, hence optimizing the weight. The belt, cover and wire also doesn't weigh much.



4] OBJECTS CANVAS

DESCRIPTION OF THE CANVAS:

These are building blocks of the environment. What are the objects and devices people have in their environments and how do they relate to their activities?

PROJECT KEYWORDS WITH DESCRIPTION:

1)Arduino Pro micro:

It is the smallest board of the family, easy to integrate it in everyday objects to make them interactive. The micro is based on the ATmega32U4 microcontroller featuring a built-in USB which makes the micro recognisable as a mouse or a keyboard.

2) MPU-6050 module:

The MPU-6050 sensor contains a accelerometer and a gyroscope in a single chip. It is very accurate, as it contains 16-bits analog to digital conversion hardware for each channel. Therefore, it captures the x, y and z channel at the same time. The sensor uses the 12C bus to interface with the arduino.

3) Switches:

Two button switches are required for the work of left and right mouse buttons. These buttons are operated by mouth.

4) USB (Type-B):

USB is required to connect arduino with the PC.

5) Wires:

Wires are needed for connection of different components of the circuit.

6) Plastic Body:

For covering as well as for the safety of the circuit.

7) Arduino IDE:

For writing, compiling and debugging the code, arduino IDE must be installed on the computer.

8) Uploading the code:

After the code has been written, it must be uploaded to the circuit via arduino IDE.

9) Circuit design:

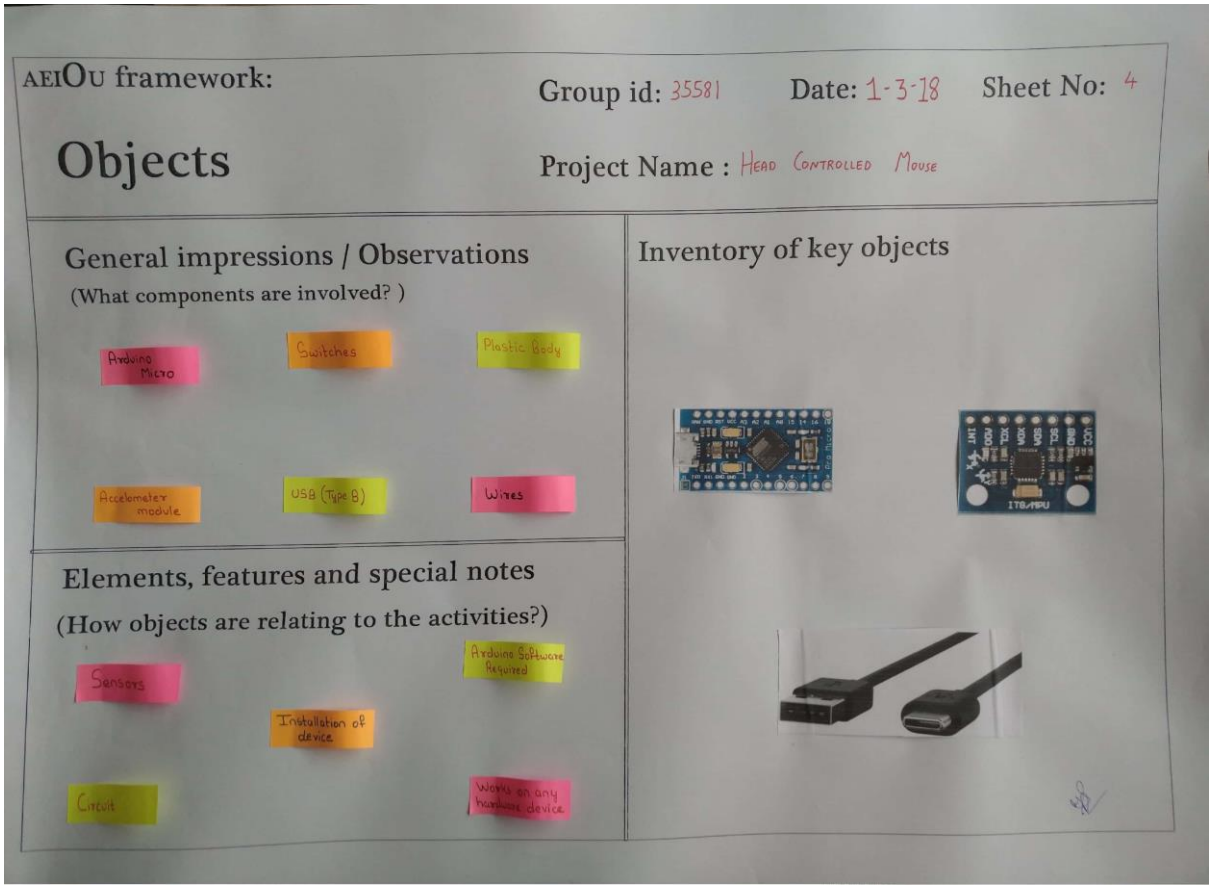
The MPU-6050 module is connected with the arduino pro micro with only the necessary and useful terminals. The pro micro is connected to the PC via USB.

10) Installing the library:

Before writing the code/program, MPU-6050 and I2Cdev libraries must be installed to the arduino IDE.

11) Works on any hardware device:

Again, a cross -platform product!



5] USERS CANVAS

DESCRIPTION OF THE CANVAS:

Users are the people whose behaviours, preferences, and needs are being observed.

PROJECT KEYWORDS WITH DESCRIPTION:

1) Handicapped people:

The product is made keeping in mind the problems faced by people with hand disabilities.

2) Patients who are paralysed from shoulder and downward:

The person who has lost control of his whole body expect his head can also use Head Controlled Mouse. Through which he can use computers and smartphones.

3) Gamers:

As head-controlled mouse will give a more realistic experience for some kind of simulation games, it can be used by gamers. They can also use this product with buttons.

4) Students:

Students can use this for development and learning purpose.

5) Lazy people:

People who are tired of using mouse with hand can choose this alternative.

6) More useful for amputee:

Amputation is the removal of the limb by trauma, medical illness, or surgery. As a surgical measure, it is used to control pain or a disease process in the affected limb. So it is more useful for an amputee.

7) Easy to learn:

A simple device! Very easy of getting used to!

AEIOU framework:

Group id: 35581 Date: 1-3-18 Sheet No: 5

Users

Project Name : HEAD CONTROLLED MOUSE

General impressions / Observations

(Who is present roles & responsibilities?)

Handicapped people

Patients who are paralysed from shoulder and downward

Gamers

Students

Scene of users in context

Elements, features and special notes

(List of identified people involved)

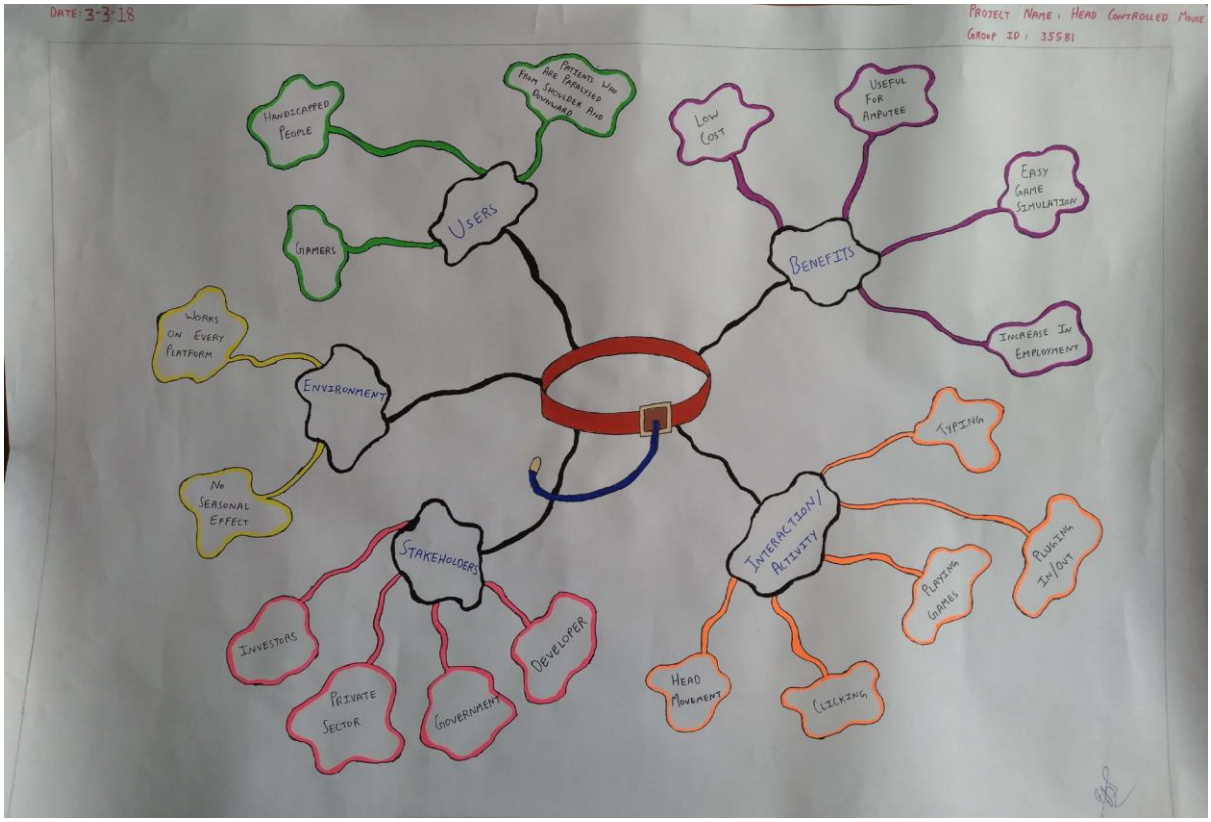
Easy to learn

More useful for Amputee

6] MIND MAPPING CANVAS

DESCRIPTION OF THE CANVAS:

A mind map is a visual representation of hierarchical information that includes a central idea surrounded by connected branches of associated topics.



7] EMPATHY CANVAS

DESCRIPTION OF THE CANVAS:

To empathize the user, one need to have observation again and again. For better empathy of user, students need to follow below mentioned steps:

1. Observe

2. Immerse

3. Engage

PROJECT KEYWORDS WITH DESCRIPTION:

(I) STAKEHOLDERS

1) Government: Government can implement and use this design and provide handicapped people with low cost.

2) Developers: Developers are the ones who can develop and make innovative changes in the product.

3) Private sector companies: Private companies can own this product.

4) Investors: They can invest for the research and development of more such products.

(II) USER

1) Handicapped people

2) Gamers

3) Patients who are paralysed from shoulder and downward

(III) ACTIVITIES

1) Group discussion

2) Role playing

3) Survey

4) Took suggestion

5) Met amputee

6) Interviewed an handicapped person

Empathy Mapping Canvas

ALVA MURLI K. 160340107002
DESAI TANISH D. 160340107012
PATEL AARSH S. 160340107029
SHARMA KAMLESH R. 160340107050
YEOLE MEET M. 160340107058

Design For HEAD CONTROLLED MOUSE **Design By**

Date 5-3-18 **Version** 1.0

USER

- Handicapped People
- Gamers
- Patients who are Paralysed from shoulder and downward

STAKEHOLDERS

- Government
- Developers
- Private Sector Companies
- Investors

ACTIVITIES

- Group Discussion
- Met Amputee
- Interviewed an handicapped person
- Role Playing
- Survey
- Took Suggestions from different People

STORY BOARDING

HAPPY

We had done a Survey for this project. From it we came to know that 75% of the amputee were literate and most of them were jobless. So we decided to take our idea and present it to the whole world, in order that all the citizen gets employment and can earn their living easily.

HAPPY

My younger brother is a real fan of e sports. He loves playing games on Computer. So to make his playing a little more fun, I gifted him the head Controlled mouse which we made.

SAD

Once I met a person who was an amputee but was very much interested in Computers. He had a worldfull Knowledge of abaut Softwares. But was not able to use the mouse.

SAD

One of my relatives was a Software engineer in (Infosys). But one day his body got Paralysed. He lost Control from his body movements. but was still able to move his head. So from this incident we got an idea of making a head Controlled mouse.

PRINTED BY- RADHEY XEROX MANINAGAR

8] IDEATION CANVAS

DESCRIPTION OF THE CANVAS:

Ideation is the creative process of generating, developing, and communicating new ideas, whereas idea is understood as a basic element of thought that can be either visual, concrete, or abstract. Ideation comprises all stages of a though cycle, from innovation, to development, to actualization.

PROJECT KEYWORDS WITH DESCRIPTION:

(I) PEOPLE

1) Amputee

2) Gamers

3) Lazy people

4) Patients who are paralyzed from shoulder and downward

(II) ACTIVITIES

1) Group discussion

2) Role playing

3) Survey

4) Took suggestion

5) Met amputee

6) Interviewed an handicapped person

(III) SITUATION/ COTEXT/ LOCATION

1) Workplace

2) Cybercafe

3) House

4) For easy simulation

5) Hand factures

6) Laziness

(IV) PROS/POSSIBLE SOLUTION

PROS:

1) Jaw pain: By excess use of the product.

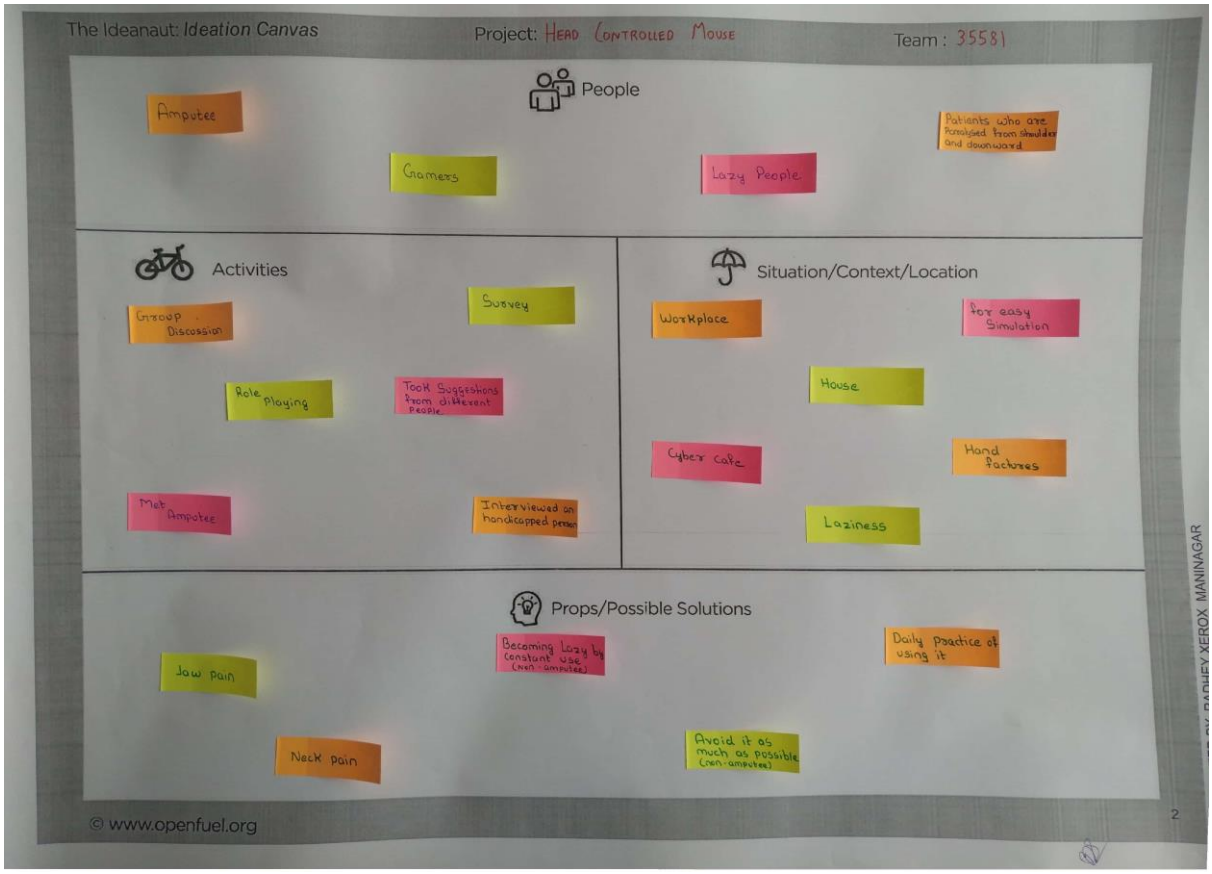
2) Neck pain: By excess use of the product.

3) Laziness: Becoming lazy by constant use (for non-amputee).

POSSIBLE SOLUTION:

1) Daily practice of using it: Reduces jaw pain and neck pain.

2) Avoid: Avoid it as much as possible to overcome laziness.



9] PRODUCT DEVELOPMENT CANVAS:

DESCRIPTION OF THE CANVAS:

The product development canvas is a strategic product planning tool that allows you to quickly capture, describe, challenge, and pivot your product strategy on just a single page.

PRODUCT KEYWORDS WITH DESCRIPTION:

(I) PURPOSE

1) Helping handicapped people

2) For easy game simulation

3) Control cursor movement using head

(II) PEOPLE

1) Gamers

2) Handicapped people

3) Lazy people

4) Patients who are paralysed from shoulder and downward

(III) PRODUCT EXPERIENCE

1) 4 stars

2) Very good

(IV) PRODUCT FUNCTIONS

1) Cursor movement

2) Measuring input

3) Sensing movement

4) Transferring the input to the computer

(Basically, the function of a mouse)

(V) PRODUCT FEATURES

1) Simple design

2) Normal weight

3) Easy to use

4) Delay: Delay can be added for left click purpose.

(VI) COMPONENTS

1) Arduino pro micro

2) MPU-6050 module

3) USB (Type-B)

4) Plastic body

5) Elastic belt

6) Bellow material

7) Wires

8) Switches

9) Resistors

10) General Purpose Board (GPB)

(VII) CUSTOMER REVALIDATION

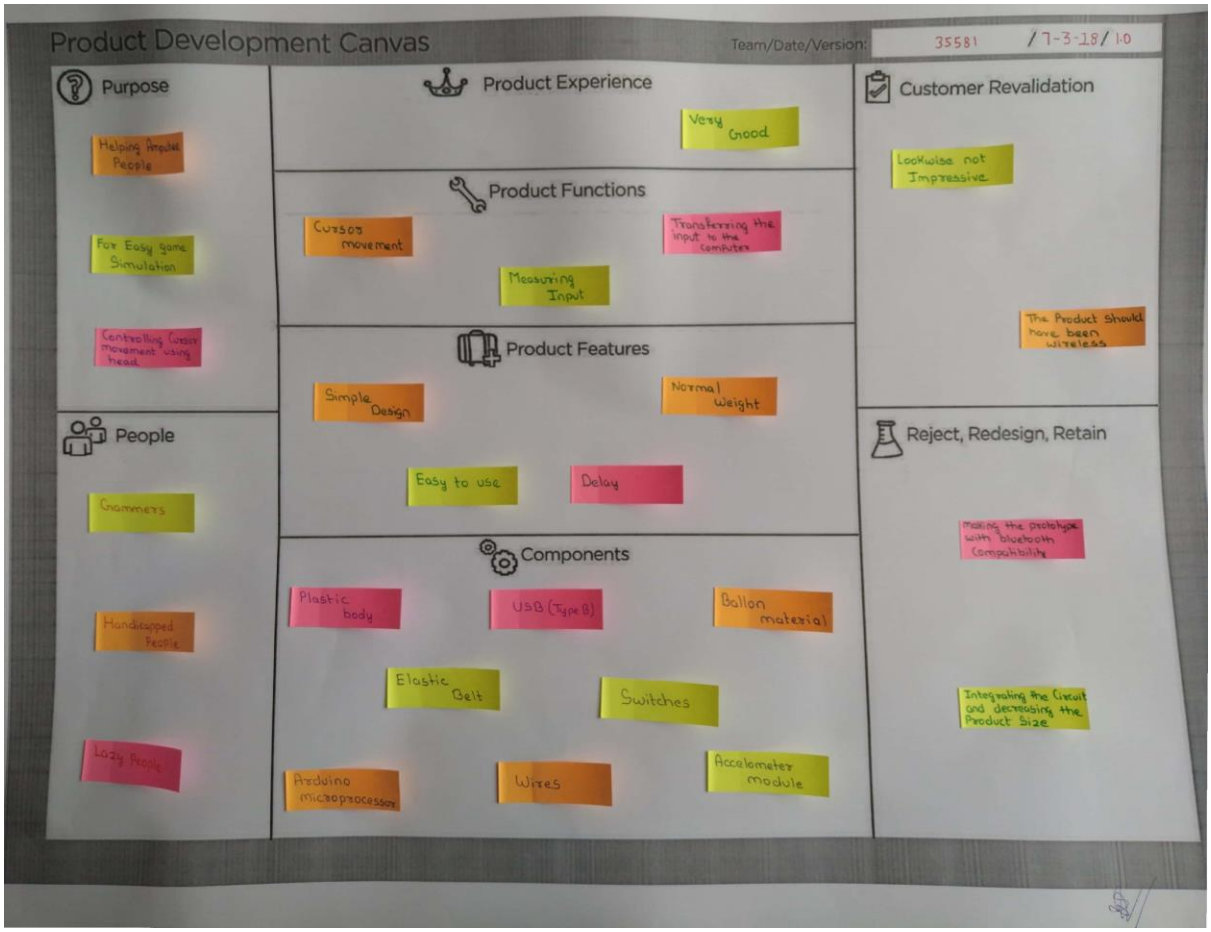
1) Look wise could have been like spectacles without glasses.

2) The product could have been wireless.

(VIII) REJECT, REDESIGN, RETAIN

1) Integrating the product to a much lower extent, for a better design.

2) Making the product with bluetooth compatibility.


Product Development Canvas
Team/Date/Version:
35581
/7-3-18/1.0
Purpose
Helping Amputee People
For Easy game Simulation
Controlling Cursor movement using head
People
Gamers
Handicaped People
Lazy People
Product Experience
Very Good
Product Functions
Cursor movement
Transferring the input to the computer
Measuring Input
Product Features
Simple Design
Normal Weight
Easy to use
Delay
Components
Plastic body
USB (Type B)
Ballon material
Elastic Belt
Switches
Arduino microprocessor
Wires
Accelometer module
Customer Revalidation
Lookwise not Impressive
The Product should have been witeless
Reject, Redesign, Retain
making the prototype with bluetooth compatibility
Integrating the Circuit and decreasing the Product Size

PRE-DESIGN

C.1 LEARNING NEED MATRIX

DESCRIPTION OF THE CANVAS:

Learning need matrix (LNM) helps students to identify the learning requirements at an early stage along with prioritization of specific learning along with defined time duration/ time allocation for each learning priority.

PROJECT KEYWORDS WITH DESCRIPTION:

(I) PURPOSE/ PRODUCT CONCEPT

1) Controlling movement using head

2) Helping handicapped people

(II) DURING B.E II/ STAGE I

1) Basic electronics: knowledge of resistors, switches, etc. electrical circuit components.

2) Procedure oriented programming: concepts of POP and top down approach.

3) C language: Programming the computer using C language.

4) Met handicapped person: From where the idea came.

(III) DURING B.E III/ STAGE II

1) Digital electronics: Practical knowledge of soldering circuits via end sem projects.

2) Object oriented programming: OOP concepts and basic difference between POP and OOP.

3) Survey: Surveing handicapped people of India by census 2011.

4) Group discussion

(IV) DURING B.E IV/ STAGE III

1) Arduino circuit concepts: Understanding the circuits and different pins.

2) Arduino IDE: Starting up with arduino IDE with program code.

3) Arduino programming: Using C and C++ and learning use of more arduino libraries.

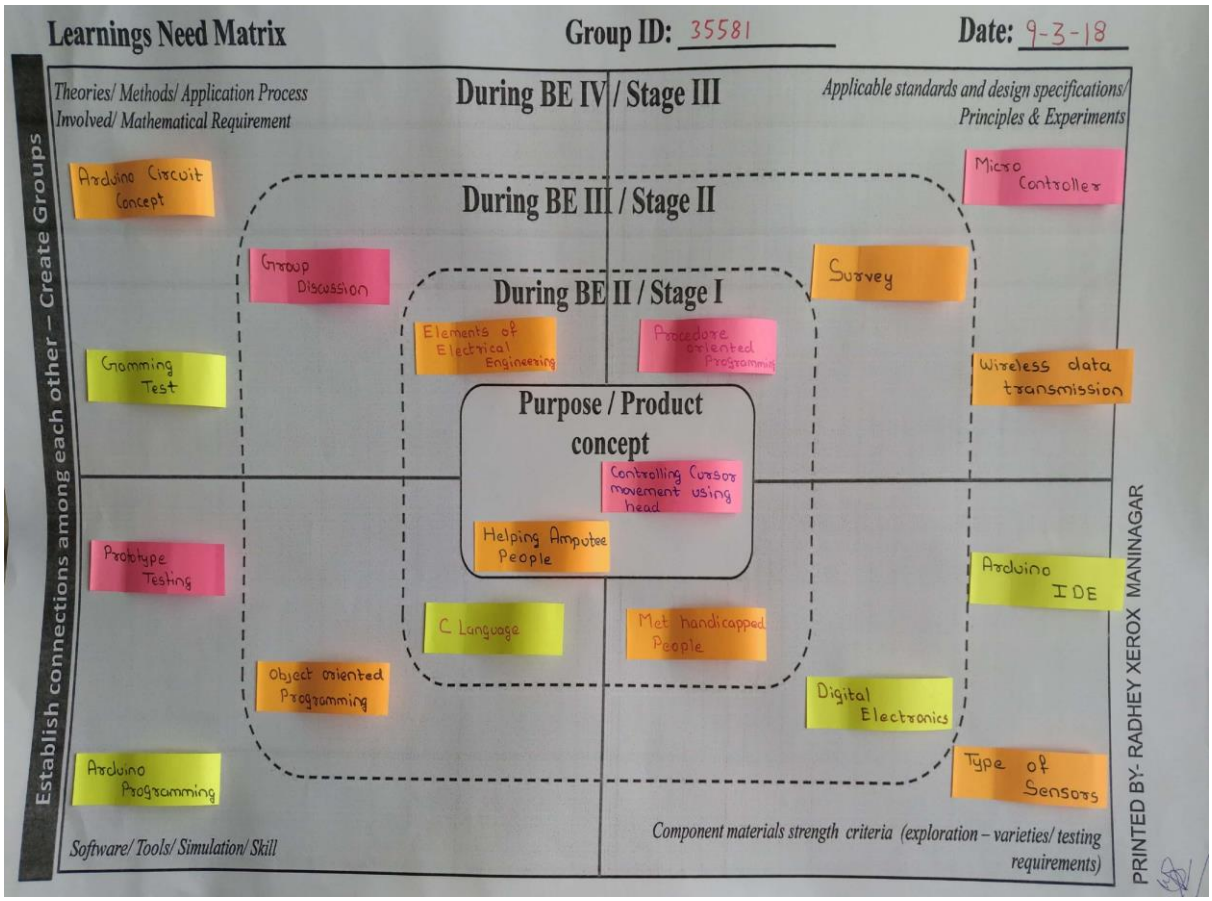
4) Types of sensors: Learning the circuits and types of sensors available in the market. We choose MPU-6050 module with both accelerometer and gyroscope.

5) Microcontrollers: Learning more about the micro-controllers and their usage.

6) Wireless data transmission: Learned and gained some knowledge of wireless data transmission for making our device bluetooth compatible.

7) Prototype testing: Finally, testing the prototype connecting to a PC.

8) Gaming test: Testing the prototype for playing games.



ROUGH PROTOTYPE MODEL

We are trying to make our prototype using the components that we told. It will be a rough working prototype, not an actual product.

(I) COMPONENTS REQUIRED

1) GPB (General Purpose Board)

2) Arduino pro micro

3) MPU-6050 module

4) 10k ohm resistor

5) Push buttons

6) Wires

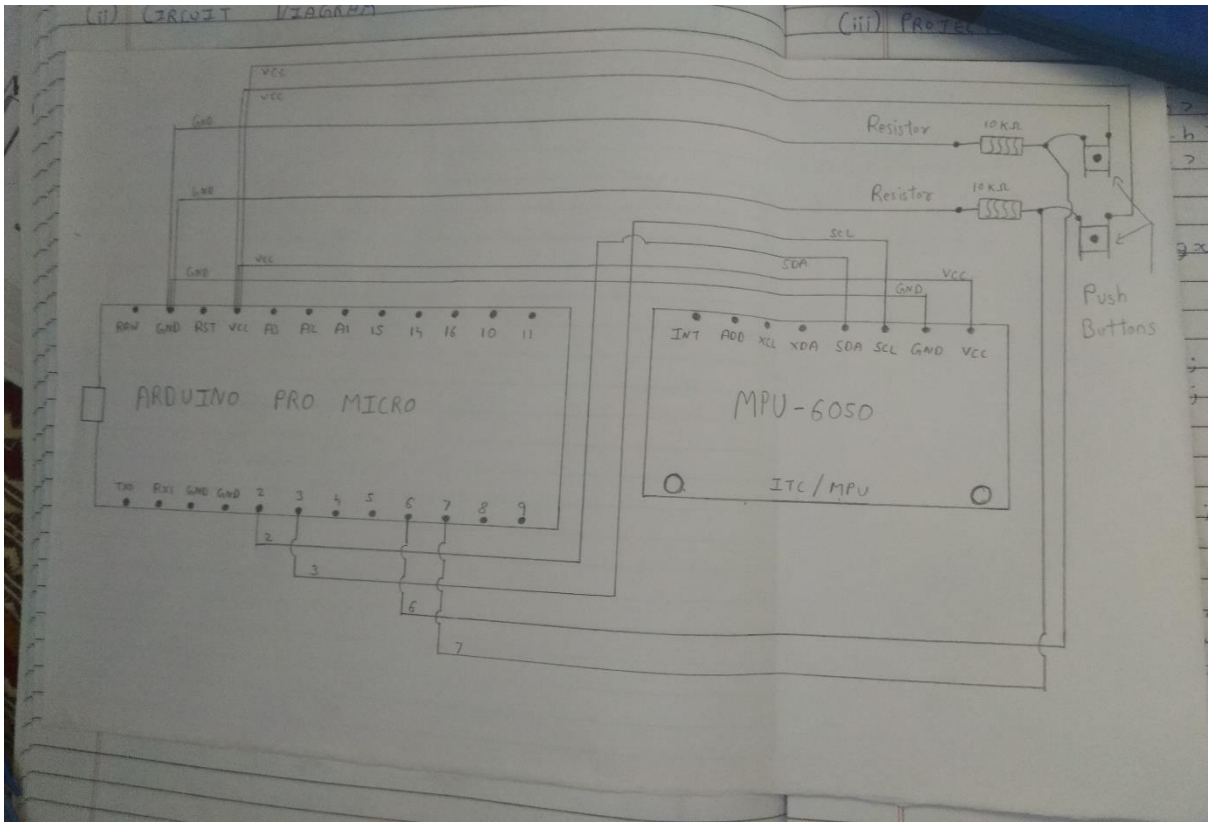
7) Plastic box

8) Elastic band

9) Bellow/ Rubber material

10) SS rod (less in width)

(II) CIRCUIT DIAGRAM



(III) PROJECT CODE

```
#include <Wire.h>
#include <I2Cdev.h>
#include <MPU6050.h>
#include <Mouse.h>

MPU6050 mpu;
    int16_t ax, ay, az, gx, gy, gz;
    int vx, vy;
    int button1 = 6;
    int button2 = 7;
    int buttonState1 = 0;
    int buttonState2 = 0;

    void setup()
        {
            Serial.begin(9600);
            Wire.begin();
            pinMode(button1, INPUT);
            pinMode(button2, INPUT);
            mpu.initialize();
            if (!mpu.testConnection()) { while (1); }
        }

void loop()
    {
```

```
mpu.getMotion6(&ax, &ay, &az, &gx, &gy, &gz);
 vx = (gx+15)/150;
vy = -(gz-100)/150;

 Serial.print("gx = ");
Serial.print(gx);
Serial.print(" | gz = ");
Serial.print(gz);

Serial.print("       | X = ");
Serial.print(vx);
Serial.print(" | Y = ");
Serial.println(vy);

Mouse.move(vx, vy);

buttonState1 = digitalRead(button1);
buttonState2 = digitalRead(button2);

if (buttonState1 == HIGH)
        {
                Mouse.press(MOUSE_LEFT);
                delay(100);
                Mouse.release(MOUSE_LEFT);
                delay(200);
        }
```

```
        else if(buttonState2 == HIGH)
    {
        Mouse.press(MOUSE_RIGHT);
        delay(100);
        Mouse.release(MOUSE_RIGHT);
        delay(200);
    }
    delay(80);
}
```

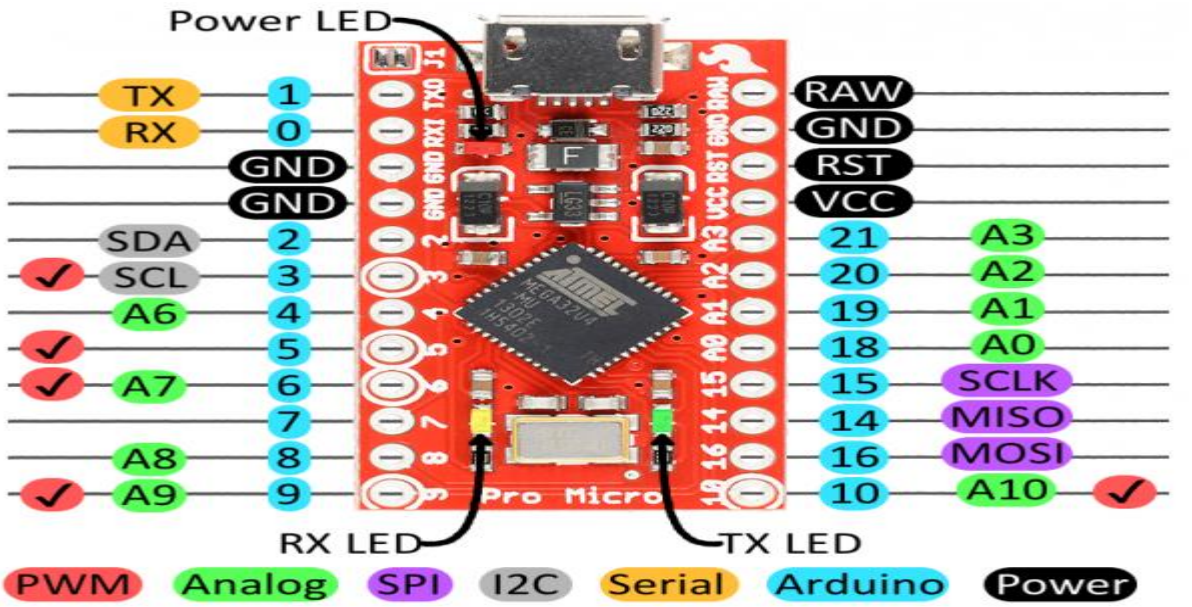
(IV) ARDUINO PRO MICRO

Introduction:

The Arduino Pro Micro [3.3V/8MHz and 5V/16MHz] is a really cool, little development board. It's an Arduino-compatible microcontroller, micro-sized, and it accomplishes with one single chip what old Arduino Uno's, Duemilanoves, and Diecimeillas could never dream of: true USB functionality.

The Pinout

All of the Pro Micro's I/O and power pins are broken out to two, parallel headers. Some pins are for power input or output, other pins are dedicated I/O pins. Further, the I/O pins can have special abilities, like analog input. Here's a map of which pin is where, and what special hardware functions it may have:



Power Pins

There are a variety of power and power-related nets broken out:

1) RAW is the unregulated voltage input for the Pro Micro. If the board is powered via USB, the voltage at this pin will be about 4.8V (USB's 5V minus a schottkey diode drop). On the other hand, if the board is powered externally, through this pin, the applied voltage can be up to 12V.

2) VCC is the voltage supplied to the on-board ATmega32U4. This voltage will depend on whether you're using a 3.3V/8MHz Pro Micro or a 5V/16MHz version, it'll be either 3.3V or 5V respectively. This voltage is regulated by the voltage applied to the RAW pin. If the board is powered through the 'RAW' pin (or USB), this pin can be used as an output to supply other devices.

3) RST can be used to restart the Pro Micro. This pin is pulled high by a 10k&Ohm; resistor on the board, and is active-low, so it must be connected to ground to initiate a reset. The Pro Micro will remain "off" until the reset line is pulled back to high.

4) GND, of course, is the common, ground voltage (0V reference) for the system.

I/O Pins

The Pro Micro's I/O pins – 18 in all – are multi-talented. Every pin can be used as a digital input or output, for blinking LEDs or reading button

presses. These pins are referenced in the Arduino IDE via an integer value between 0 and 21. (The A0-A3 pins can be referenced digitally using either their analog or digital pin number).

Nine pins feature analog to digital converters (ADCs) and can be used as analog inputs. These are useful for reading potentiometers or other analog devices using the analog Read([pin]) function.

There are five pins with pulse width modulation (PWM) functionality, which allows for a form of analog output using the analogWrite([pin], [value]) function. These pins are indicated on-board with a faint, white circle around them.

There are hardware UART (serial), I2C, and SPI pins available as well. These can be used to interface with digital devices like serial LCDs, XBees, IMUs, and other serial sensors.

The Pro Micro has five external interrupts, which allow you to instantly trigger a function when a pin goes either high or low (or both). If you attach an interrupt to an interrupt-enabled pin, you'll need to know the specific interrupt that pin triggers: pin 3 maps to interrupt 0, pin 2 is interrupt 1, pin 0 is interrupt 2, pin 1 is interrupt 3, and pin 7 is interrupt 4.

On-Board LEDs

There are three LEDs on the Pro Micro. One red LED indicates whether power is present.

The other two LEDs help indicate when data is transferring over USB. A yellow LED represents USB data coming into (RX) the the Pro Micro, and a green LED indicates USB data going out (TX).

CONCLUSION:

By our project 'HEAD CONTROLLED MOUSE', we conclude that it is a very innovative product for the disabled. It will be helpful for the society if it is implemented in a correct and effective