

GUJARAT TECHNOLOGICAL UNIVERSITY

CHANDKHEDA, AHMEDABAD



L.J.INSTITUTE OF ENGINEERING AND TECHNOLOGY

A REPORT ON

HACKSAW MACHINE

UNDER THE SUBJECT OF

DESIGN ENGINEERING – 1B. (2140002)

B.E. 2, SEMESTER – 4

(MECHANICAL ENGINEERING)

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Ms. Prexa H. Parikh

(Head of the Department)

Academic Year

2017-18



L.J. INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Mechanical Engineering

2017 – 18

CERTIFICATE

Date:

This is the certify that Design Engineering – 1B. Work entitled
“ HACKSAW MACHINE ”, Carried out by the group of students mentioned below under my guidance is approved for the Degree of Bachelor of Engineering in **Mechanical Engineering** (Semester – 4) of Gujarat Technological University , Ahmedabad during the academic year 2017 – 18.

List of Students :-

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Guide

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Name and Sign

Internal Examiner

Name and Sign

External Examiner

<u>INDEX</u>	PAGE NO.
CHAPTER 1. INTRODUCTION	6-7
1.1 Introduction about team members	
1.2 Introduction to Faculty Guide	
1.3 Understanding about Reverse Engineering	
1.4 Identification of Component for Reverse Engineering	
CHAPTER 2. APPLICATION OF REVERSE ENGINEERING	8-9
2.1 Details of component	
2.2 Prior Art Search	
2.3 Understanding the Hacksaw Machine	
CHAPTER 3. EMPATHY MAPPING	11-15
3.1 Selected Users and its Stakeholders	
3.2 Activities of Users and its Stakeholders	
3.3 Story Telling	
3.4 Snapshot of Empathy Mapping	
CHAPTER 4. INDEATION CANVAS	15-17
4.1 Explanation of People and their Activities	

- 4.2 Understanding about Situation/Context and Location
- 4.3 Relevant and Irrelevant Props
- 4.4 Explanation of Different Iterations
- 4.5 Snapshot of Ideation Canvas

CHAPTER 5. PRODUCTION DEVELOPMENT CANVAS 18-21

- 5.1 Description of Final Problem Statement
- 5.2 Description of Problem Solution
- 5.3 Explanation of Product Components, Functions and Features.
- 5.4 Discussion on Product Experience
- 5.5 Customer Revalidation
- 5.6 Discussion of Reject, Redesign and Retain Parameters
- 5.7 Snapshot of Product Development Canvas

CHAPTER 6. LEARNING NEED MATRIX 22-23

- 6.1 Introduction to Learning need matrix.
- 6.2 Description of Learning need matrix.
- 6.3 Snapshot of Learning need matrix.

CHAPTER 7. PROTOTYPE DESIGN 24

- 7.1 Basic design Calculation

7.2 Snapshot of Prototype

7.3 Snapshot of mind mapping

Chapter – 1 INTRODUCTION

1.1 Introduction About Team Members

- **SUTHAR DHRUV S. (160320119167)**
- **PRAJAPATI MITESH B. (160320119547)**
- **IMAM ZAKIRHUSEN J. (160320119040)**
- **DARUWALA MOINUDDIN I. (160320119509)**
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1.2 Introduction to faculty guide

~ Ms Prexa H. Parikh

- Head of Department at L.J.I.E.T.
- Assistant Professor of F.M.(Fluid Mechanics)
- She have 10 Years Experience in Engineering Thermodynamics.
- She has very wide knowledge in mechanical based subjects.

1.3 Understanding about Reverse Engineering

- Reverse engineering can be used when a system is required to interface to another system and how both system would negotiate is to be established. Such requirement typically exist for interoperability.
- However, the reverse engineering process in itself is not concerned with creating a copy of changing the artifact in some way. It is only an analysis in order to deduce design features from products with little or no additional about the procedures involved in their Original production.

1.4 Identification of component for reverse Engineering

- In this machine rotational motion will transmit into axial motion. In this machine blades are used for cutting. For better cutting sharp edge Blade is used. This Mechanism is called cross head mechanism.

Chapter – 2 APPLICATION OF REVERSE ENGINEERING

2.1 Details of component

Component:

- 1) Hacksaw Blade
- 2) Motor
- 3) Disc
- 4) Electricity

2.2 Prior Art Search

These days automation has changed the world and easier as we know. We need more and more automated system to make human tasks faster and easier. So here we automate another strenuous work of hacksaw cutting. Human hacksaw cutting is very strenuous and requires a lot of effort. This is not feasible large scale and accurate cutting. So our proposed system automates the hacksaw cutting with double sided technique where we operate 2 hacksaws using a single mechanism. We here use a motor with shaft attached. The motor and shaft is attached using appropriate mounts to hold it in position. Then we use a hacksaw

frame and build mounting panels for it using metal structure. We also use a bed and holder to hold the workpiece in place. Now we drive the motor using a supply circuit to operate it and move the shaft. We attach the shaft to saw frames in a way that saw moves in a direction perpendicular to the work piece. Attaching 2 hack saw in either directions enables us to operate hacksaw in both directions and operate both of them at the same time. Thus we put forth a smart and efficient hacksaw that can be used for accurate bulk productions.

2.3 Understanding the SCAMPER Tool

SCAMPER stands for:

- Substitute.
- Combine.
- Adapt.
- Modify
- Put to another use.
- Eliminate.
- Reverse.

- Substitute:
 - Cross head mechanism.
- Combine
 - Cross head Mechanism.
 - Gear arrangement.
- Adapt

In this machine we adapt cross head mechanism.

- Modify
Double Slide operation can done at one time.
Automatic machine.
- Put to other use
Automatic cutting.
- Eliminate
This machine eliminate hard work to cut a part or component.
Eliminate belt pulley arrangement by gear arrangement.
- Reverse
Use of gear arrangement instead of belt-pulley arrangement is more accurate to transmit torque.

Chapter – 3 EMPATHY MAPPING

3.1 AEIOU Sheet And Its Summary

- **Environment**

- There was more noise of machines.
- Workers are busy in there work.
- Student are work on lathe machine.
- Engineers guide to workers.
- There was winter season.

- **Activities**

- Students are performing there job on a lathe machine.
- One engineer doing alignment test on lathe machine.
- Workers are guided by engineers.
- Many machine are in operation so that there was more noise.
- There was tea time so one worker call tea man.

- **Interactions**

- Guide and workers are talking with each other.
- Students do discussion about lathe machine.
- Workers are talking with each other.
- Engineer is talking with the head of workshop.
- Engineers discussion with each other.

- **Objects**

- Workers
- Lathe machine
- Drilling machine
- Engineers
- Student
- Many machines

- **Users**

- Business me
- Engineers
- Technician
- Student
- Head of workshop
- Carpenter
- Workers

AEIOU Summary :		Group ID :	Date :	Version :
Environment :		Interactions :		Objects :
<p>THERE WAS MORE NOISE OF MACHINES</p> <p>WORKERS ARE BUSY IN THEIR WORK</p> <p>STUDENT ARE WORK ON LATHE MACHINE</p> <p>ENGINEERS GUID TO WORKERS</p> <p>THERE WAS WINTER SEASON</p>	<p>QUIN AND WORKERS ARE TALKING WITH EACH OTHER</p> <p>STUDENT DO REVISION ABOUT LATHE MACHINE</p> <p>WORKERS ARE TALKING WITH EACH OTHER</p> <p>ENGINEER IS TALKING WITH THE HEAD OF WORKSHOP</p> <p>ENGINEERS DISCUSSING WITH EACH OTHER</p>	<p>WORKERS</p> <p>LATHE MACHINE</p> <p>DILLING MACHINE</p> <p>ENGINEERS</p> <p>STUDENT</p> <p>MANY MACHINES</p>		
Activities :		Users :		
<p>STUDENTS ARE PERFORMING THEIR JOB ON A LATHE MACHINE</p> <p>ONE ENGINEER DOING ALIGNMENT TEST ON LATHE MACHINE</p> <p>WORKERS ARE ADVISED BY ENGINEERS</p> <p>MANY MACHINES ARE IN OPERATION SO THAT THEY HAD MORE NOISE</p> <p>THERE WAS TEA TIME SO THE WORKER LATE TEA MAN.</p>	<p>STUDENTS</p> <p>BUSINESS MEN</p> <p>ENGINEERS</p> <p>TECHNICIAN</p> <p>WORKERS</p> <p>HEAD OF WORKSHOP</p> <p>CARPENTER</p>			

AEIOU SUMMARY SHEET

3.2 Activities of Users and its Stockholders

- Many machine are in operation so that there was more noise.
- Students are performing there job on a lathe

machine.

- One engineer doing alignment test on lathe machine.
- Workers are guided by engineers.
- There was tea time so one worker call tea man.

3.3 Story Telling

- HAPPY:

1) This type of machine can be use to perform various operations on a workpiece at a time.

2) This machine can be used for mass

Production, where spontaneous operation

Can be done on workpiece.

- SAD:

1) This machine can cannot be used for doing

operations on different operations at a same

time.

- 2) This type of machine requires more Electricity to run and high maintenance.

Design For
Date

Design By
Version

USER
STUDENTS
TECHNICIAN
BUSINESS MAN

STAKEHOLDERS
WORKERS
CARPENTER
HEAD OF WORKSHOP

ACTIVITIES
MANY MACHINES ARE IN OPERATION SATURDAY
MORNING WHEN THERE
ONE CARPENTER DOING ALIGNMENT TEST ON LATHE MACHINE
STUDENTS ARE OPERATING THERE ON A LATHE MACHINE
WORKER ARE KILLED BY ENGINEER
THERE WERE TENSE SO THE WORKER CALL THE MAN

STORY BOARDING

HAPPY
THIS TYPE OF MACHINE CAN BE USE TO PERFORM VARIOUS OPERATIONS ON A WORKPIECE AT A TIME.

HAPPY
THIS MACHINE CAN BE USED FOR MASS PRODUCTION, WHERE SPONTANEOUS OPERATION CAN BE DONE ON WORKPIECE.

SAD
THIS MACHINE CANNOT BE USED FOR DOZENS OPERATIONS ON DIFFERENT OPERATIONS AT A SAME TIME.

SAD
THIS TYPE OF MACHINE REQUIRES MORE ELECTRICITY TO RUN AND HIGH MAINTANANCE.

Excellent

SHEET OF EMPATHY MAPPING

Chapter -4 IDEATION CANVAS

4.1 Explanation of people and their activities

- Alignment test of machine.
- Drilling operation done by student on lathe machine.
- Cutting operation done on a workpiece.

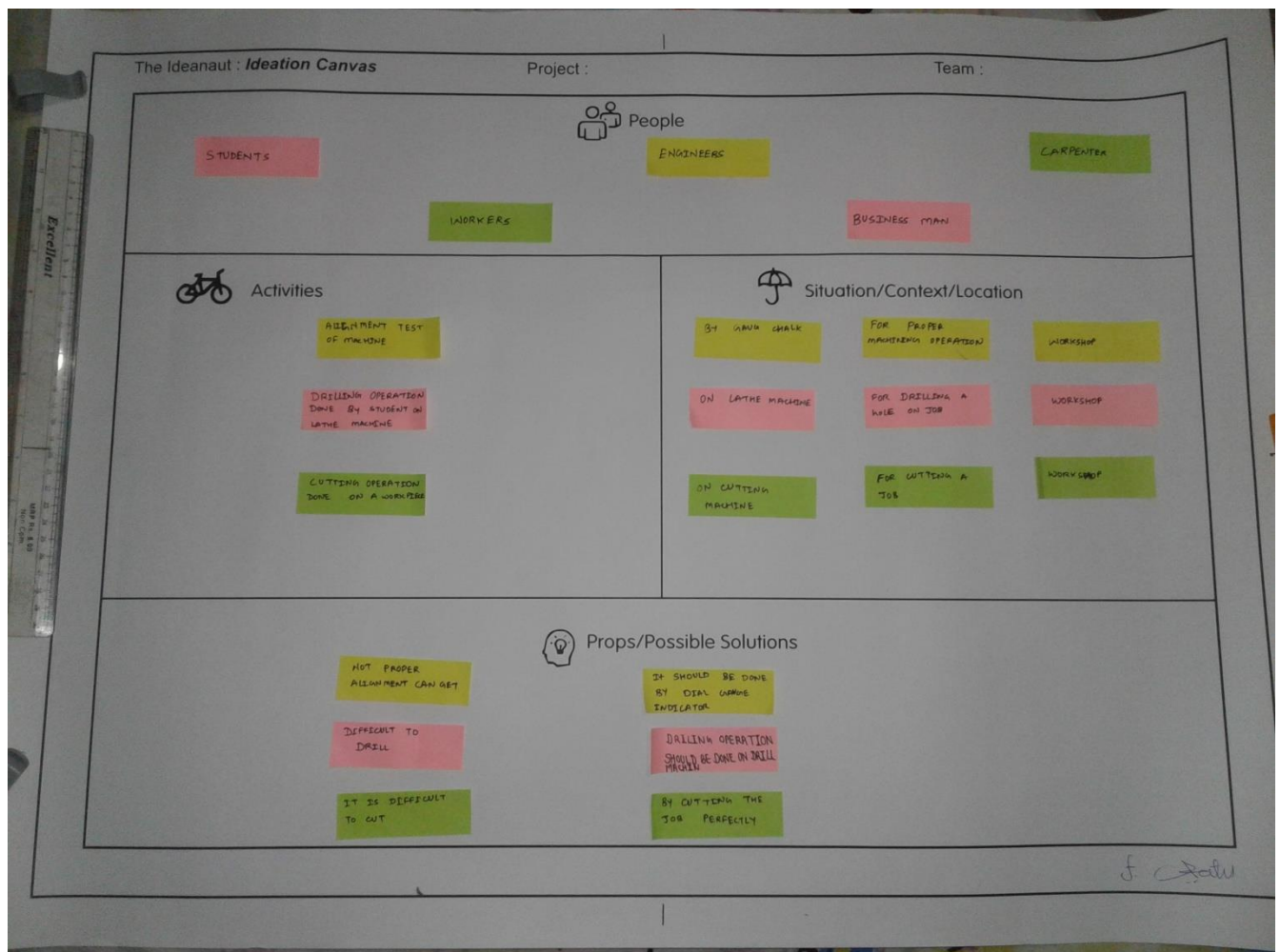
4.2 Understanding about Situation

- By gaug chalk – For proper machining
Operation – Workshop
- On lathe machine – For drilling a hole on job
- Workshop
- On cutting machine – For cutting a job
– Workshop

4.3 Relevant and Irrelevant Props

- Not proper alignment can get
- Difficult to drill
- It is difficult to cut

- It should be done by dial gauge indicator.
- Drilling operation should be done on drill machine.
- By cutting the job perfectly.



SHEET OF IDEATION CANVAS

Chapter -5 PRODUCT DEVELOPMENT

CANVAS

5.1 Purpose of Hacksaw machine

- It is used for cutting
- Multiple operation can be done
- Also in mass production

5.2 People

- Carpenter
- Engineers
- Business man
- Head of workshop

5.3 Explanation of product components, Functions And Features

- Require Electricity to work
- Saw feeding to and forward on work piece
- Cylindrical plate attach to saw for moving
- Time Saving
- Reliable for use
- Faster operations can be done
- Motors
- Connecting rod
- Nuts and Bolts
- Gears
- Wooden base
- Blades

5.4 Discussion on product experience

- Excellent
- Very Useful

5.5 Customer Revalidation

- Less costly
- Faster on operation
- Highly accurate
- Less maintenance

5.6 Discussion of Reject, Redesign and Retain Parameters

- Using affordable material
- More time is required to built
- Maintenance in every two years
- High cost

Product Development Canvas		Team/Date/Version :
① Purpose What is the purpose of this concept you're developing? Does it solve a problem, or it enhance a current experience? Is it solving a need or it is trying to create a new need or tap an untapped need? 27 83 USED FOR CRAFTSMAN MULTIPLE OPERATION CAN BE DONE ALSO IN MASS PRODUCTION	Product Experience Define what your customer should feel like when he uses your product/service? What emotions, feelings would define his experience? Feeling of comfort, convenience, or feeling of buying more with less (cost conscious) or feeling of greater security, safety etc. EXCELLENT VERY USEFUL	Customer Revalidation Once you're finished with your features set, test with the customer / user if the features, functions are useful. Speak to the customer / user. LESS COSTLY FASTER ON OPERATION
	Product Functions Functions are a products answer to user problems/needs. They do something that user wants. They are often verbs in nature. Every function is powered by many features. Multitasking is a function. Browser tabs is a feature that powers the multitasking feature. A function can have one or more features powering it. Functions are very generic in nature, features are often more specific. Functions can be similar to product experience. Safety (product function) provides a feeling of safety (product experience). REQUIRE EFFICIENCY TO WORK SAW FEEDING TO AND CAD IN WORK PIECE CYLINDRICAL PLATE ATTACH TO SAW FOR MOVEMENT	Product Features Product features are specific. One or more features will power a function. Antilock Brakes, Airbags are features that power the safety function. Browser tabs, Apple's home button to multitask between apps are features powering the multitasking function. Each feature will have many component/sub components powering it. Sometimes a very particular component becomes a feature itself. Like car seats is a major components and a feature at the same time powering the in car entertainment function powering entertainment as a product experience. TIME SAVING RELIABLE FOR USE FASTER OPERATIONS CAN BE DONE
People Who is the key customer segment who will use this product/service or the end product of the concept you're pursuing? Write here about them, describe them a little. CARPENTER BUSINESS MAN ENGINEERS HEAD OF WORKSHOP	Components Components build up the features. For a car you will comprise a list of component like bags, triggers etc. that go into making it. For a tabbed browser it will comprise of various chunks of code that will make the tabs work. In cases where the feature is a major component, you could list here the auxiliary components that are required to make the major component work. You can also list new adjustments and innovations you're planning here at the component level. MOTORS CONNECTOR ROD NUTS AND BOLTS Gears WOODEN BASE BLADES	MINTIMUM IN EVERY TWO YEARS HIGH COST

f. Cantu

PRODUCT DEVELOPMENT SHEET

Chapter 6. Learning need matrix

6.1 Introduction to learning need matrix

Matrix is a format that helps to clear out the all requirements and functions of device. It is necessary to obtain all the details of components and systems that are going to be used in the device to get maximum benefits from it . It makes the process easy to understand and quite more realistic to the researchers.

6.2 Description of Learning need matrix

Matrix makes understanding easier and effective to the reader or researcher. The 4 boxes in matrix are defined differently by skills/software required, tools/methods involved, design standards, component materials and strength criteria.

Tools/Methods/ Theories Involved:

- It can cut two metal at one time.
- Use in carpentary workshops.

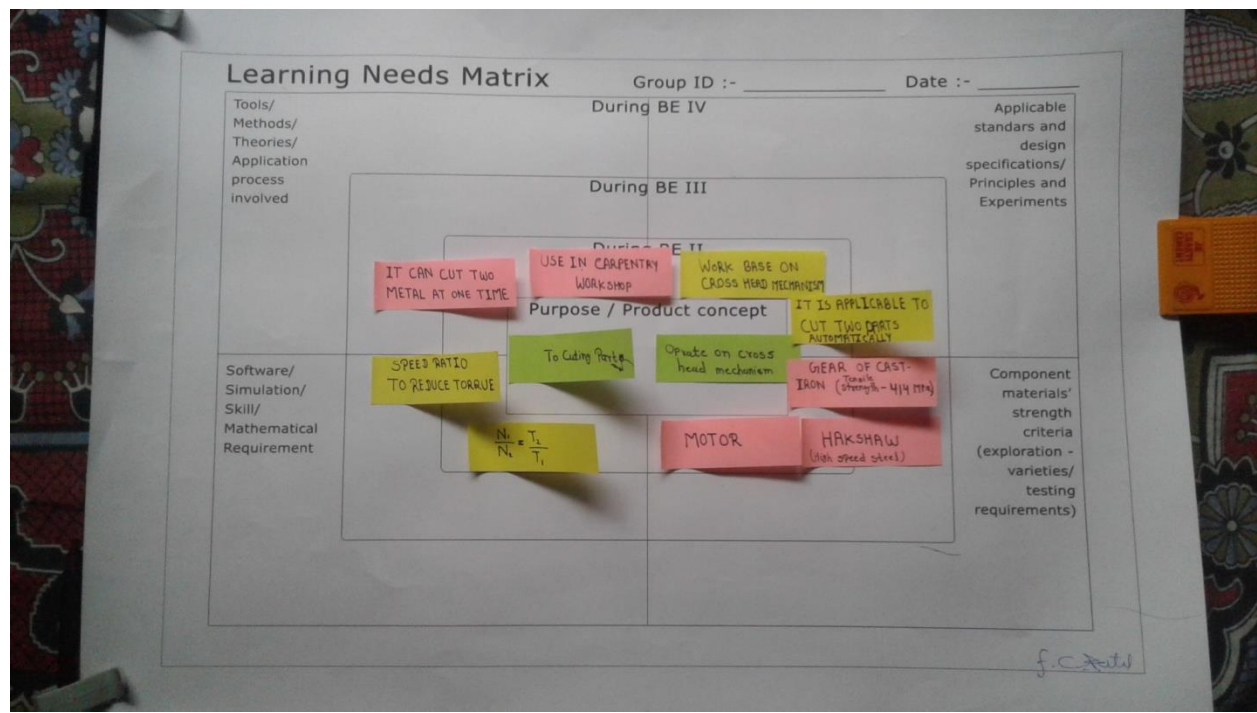
Software/Skill Requirement:

- Use of speed ratio formula to reduce torque.
- $N_1/N_2 = T_2/T_1$.

Applicable Standards and Design:

- Work based on cross head mechanism.
- It is applicable to cut two parts at one time.

6.3 Snapshot of Learning need matrix



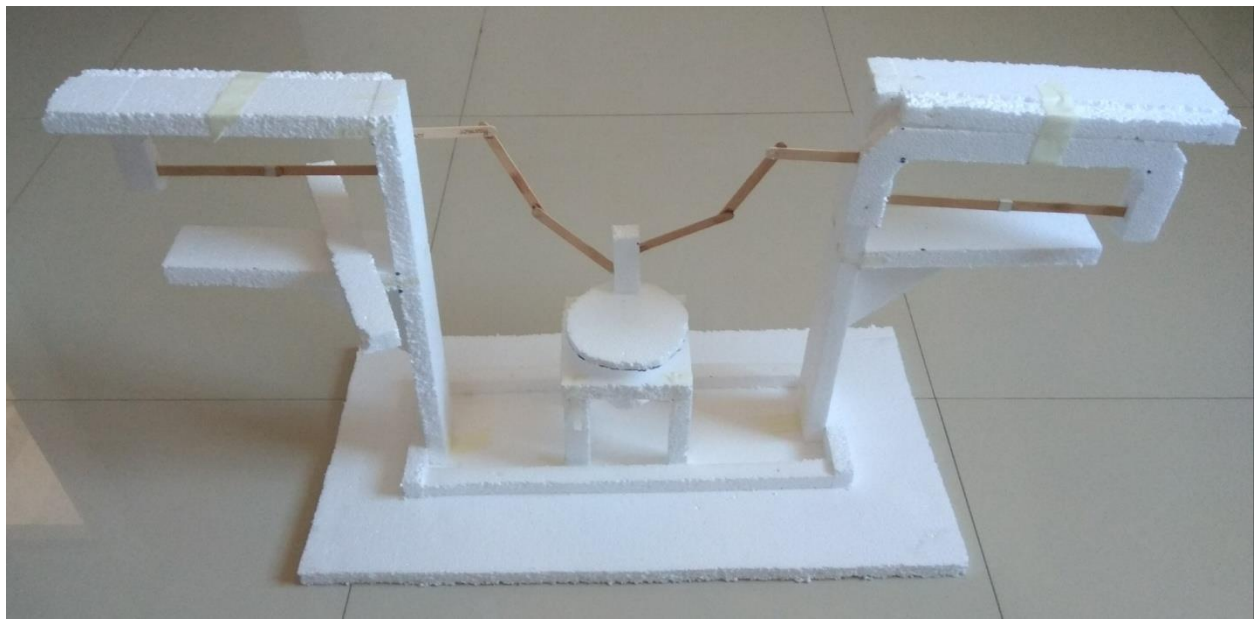
Chapter 7. PROTOTYPE DESIGN

7.1 Basic design Calculations

$$N1/N2 = T2/T1$$

This can be used to reduce the torque.

7.2 Snapshot of Prototype



7.3 Snapshot of Mind Mapping canvas

