A Travel Aid for the Blind

Introduction to engineering design
GE105

Presented by

Supervised by

Presentation Planning

- Introduction.
- Definition the problem.
- Need analysis.
- Primary objectives.
- Secondary object.
- Constraints.
- Criteria.
- Available material.
- Consumers.
- Gathered information.
- Morphological analysis.
- Designs.
- Comparing table.
- Discussion.
- Conclusion.
- References.

introduction

- **Cane** is used by many people who are handicapped or have a difficulty walking around

- Cane helps blind or visually impaired, to move easily from place to place without guide from others.

Problem Statement

- 3% of people (around 60000) in Saudi Arabia are visually impaired. They are getting hurt every time they walk or move around. And they need help in their daily life.
- It is required to design a device to help visually impaired people to walk around.

- Ref: King Fahd Medical City

Statistical report of the blind and visually impaired in the world

Every minute a child turns in the world blind -

Estimated number of the blind in 2020 to 75 million people -

The number of the blind in the world is currently estimated at 45 million people. -

More than half of blind and visually impaired live in India (nine million), Africa (seven million), China (six million), the Arab world (seven million). -

Representing Proportion blind from the proportion of Disabled Every five seconds a person turns in the world to blindin general is 0.1% -

Need analysis

- Blind people want to walk around without a guide.
- They want to feel safe while walking around.
- Blind people cannot activate complicated devices.
- Cane design should be simple, made from over-the-shelf components (sensors), easy to use, light weight
- Length adjustability may be considered
- Cost should not exceed SR 800 for marketing competition
- Human factors should be considered in the design

Primary objective

- Design a cane that helps blind and visually impaired people walking around (outside door)

Secondary objective

- Safe, easy to use, adjustable size

Constraints

- This devise must be safe for the sake of blind and visually impaired people.
- It should not cost more than SR 800 .
- Must be rigid and can absorb the shocks
- Weight should not exceed 10 N

Criteria

- High Safety level and comfort .
- Easy to assemble and disassemble .
- Reasonable normal size .
- Portable and light weight .
- Easy to use and maintain.
  - Compact
  - Fits well in hand
- ….
- ….

Available materials

- Wood , steel , aluminum , plastic
- Cables , batteries , solar plates
- Sensors

Consumers

- Blind people
- Visually impaired people

Markets

- Companies .
- Colleges.
- Houses .
- Medical stores ,hospitals and pharmacy.
- And in many other places.

Brainstorming – Initiation of Ideas

1- **Stick with sensor to sense the street &traffic light.**
2- **Robot guide for blind people.**
3- **Special city for blind people.**
4- **Training dogs to guide blind people.**
5- **Make devices to alarm blind people when they cross the street.**
6- **Build bridges & tunnel for blind people to cross the street.**
7- **Traffic light that include device to make Crossing Street easier.**
8- **Design the special traffic signal for blind people to deal with street.**
9- **Sensor is able to known the traffic light & finds the cars.**
10- **Devices are attended with traffic light to deal with blind people.**
11- **Enlighten the people to help blind people.**

Gathered information

Gathered information (types)

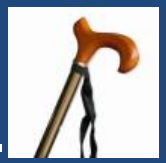
- White cane: common used by blind people, light comfort and tall to give good results.
- Weight less than 800g
- Cost over $400

Gathered information (types)

- Handle cane: used by injured and elderly people to support weight its at normal size and weight. It have many functions.
- Weight less than 1100g

- Cost over $80

Morphological analysis

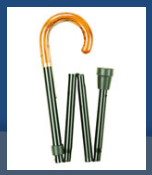
Feature	Concepts
Power	 Electrical batteries
Adjustability	..  Rigid  foldable,
Shape of handle	Curve  round  straight 
Accessories	 Sensor , …
Operator method	Automatically when turn (on)

Design (1)

Aluminum Adjustable Cane , weight (800g) ,ground support is made from rubber. It has a fiber glass handle and a rubber loop attached to it

Design (2)

Aluminum foldable white Cane , weight (600g) ,ground support is made from rubber. It has a rubber golf handle and a rubber loop attached to it



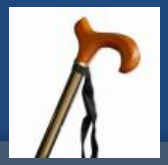
Design (3)

Aluminum Adjustable Cane , weight (1100g) , four ground supports are made from rubber. It has a slight curve rubber handle

Design (4)

Aluminum foldable Cane , weight (800g) ,ground support is made from rubber. It has a wooden handle

Design (5)



Summary

- Weight (1000g),120cm long.
- Ground support (rubber wheel).
- Rechargeable batteries (12v).
- Handle is isolated from electric shock.
- Handle fits comfortably with the hand
- Vibration device inside the rubber handle, it alerts the user when he gets close to an object.
- Sensor can detect solid objects up to the range of 75 cm.

Comparing between the designs

Criteria/ Design	Safety 30	Easy to Use 30	Cost 10	Materials Quality10	Power 20	Score
Design (1)	9	9	6	5	0	650
	270	270	60	50	0	
Design (2)	7	9	2	6	0	560
	210	270	20	60	0	
Design (3)	8	4	4	4	0	440
	240	120	40	40	0	
Design (4)	6	4	6	6	0	420
	180	120	60	60	0	
Design (5)	9	9	5	5	5	740
	270	270	50	50	100	

Discussion.

- From the comparison table we chose design (5) because it got the highest points .
- Design (5) is more safe and rigid, easy to use, with less required maintenance and cost.

Conclusion.

- We choose a design depending on the advantages for blind people.
- The chosen design is easy to use, comfortable, safe, marketable, and cheap.

References

- By internet
  - Yahoo search (www.yahoo.com).
  - Google search (www.google.com).
  - Wikipedia (http://en.wikipedia.org)
  - Rehab market (www.rehabmart.com)

- Thanks

Upper Body Bicycle

Students names and ID:

Professor name :

Problem Statement

"Electric wheelchair lacks manual control"

Problem definition

The disabled people who used the electric wheelchair and they want to improve there fitness or hands muscles and transport any where at the same time

Need analysis

- Increasing the fitness
- Easy and fast to transport
- Recharge the battery ~~by generator~~
- Ability to ~~conversion~~ switch from ~~the~~ electronic ~~control~~ to manual control and vice versa

.....

Objectives

Main objective:

To modify ~~the~~ an existing electric wheelchair to ~~be~~ add manually ~~controlled~~ control capability

Secondary objective:

Charge the battery ~~by physically motion~~ .

constraints

- Quality
- Easy to use
- Less than 5000SR
- Easy to setup
- Cannot use less than 12 years old
- Time

criteria

- Fantasy decoration
- Safety
- Grantee the bicycle 1 year

Gathering Information

- The Fitness of disabled people.
- Physical motion (How bicycle works).
- How the generator works.
- The expected cost.

The Fitness of disabled people.

- improving muscles of hands
- Some disabled people like many sports
- In the ~~electronic~~ electirc chair they have no~~ne~~ possibility to exercise ~~them~~ their muscles.

??????????

- On the other hands, our product Possibility to exercise the muscles is 100% from the electronic chair.

Physical motion (How bicycle works).

- Main problem in this part is how we can make the bicycle move by using manual ~~moving~~ force

Research until now

??????????????

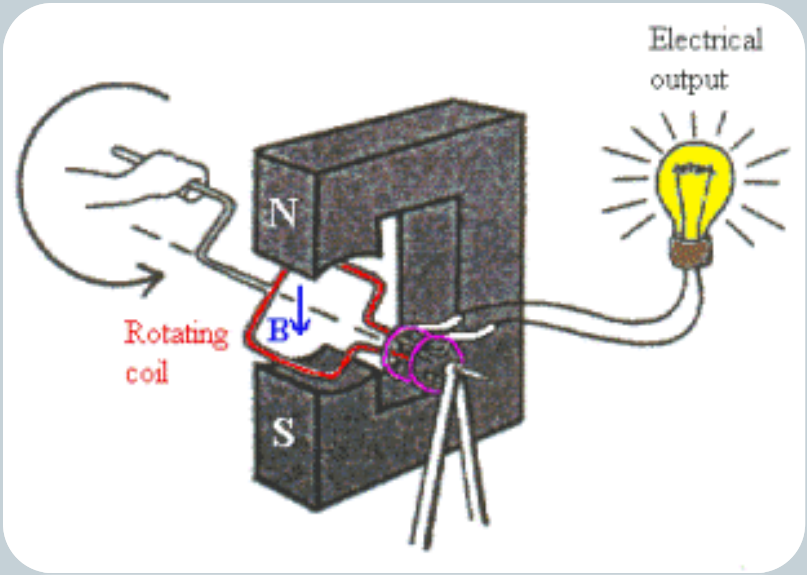
- bicycle shifting gears

How the generator works.

- **Electric generator**

  is a device that converts mechanical energy to electrical energy **(Dynamo)**

- **The structure of dynamo in general.**



??????????????

- **Human powered electrical generators:**
- ~~**What is it ?**~~

- The average for an adult work out for one hour is between 50 and 150 watts

??????????????

http://www.phys4arab.net/uploood/naser/Dynamo3.swf

The expected cost.

- We will use electric generator and hand generator. So the cost will be high compared to existing devices. In addition we ~~want~~ need iron, aluminum and rubber. Also the cost of ~~manufacture~~ manufacturing.

- The ~~proposed~~ target cost:

  5000 SR

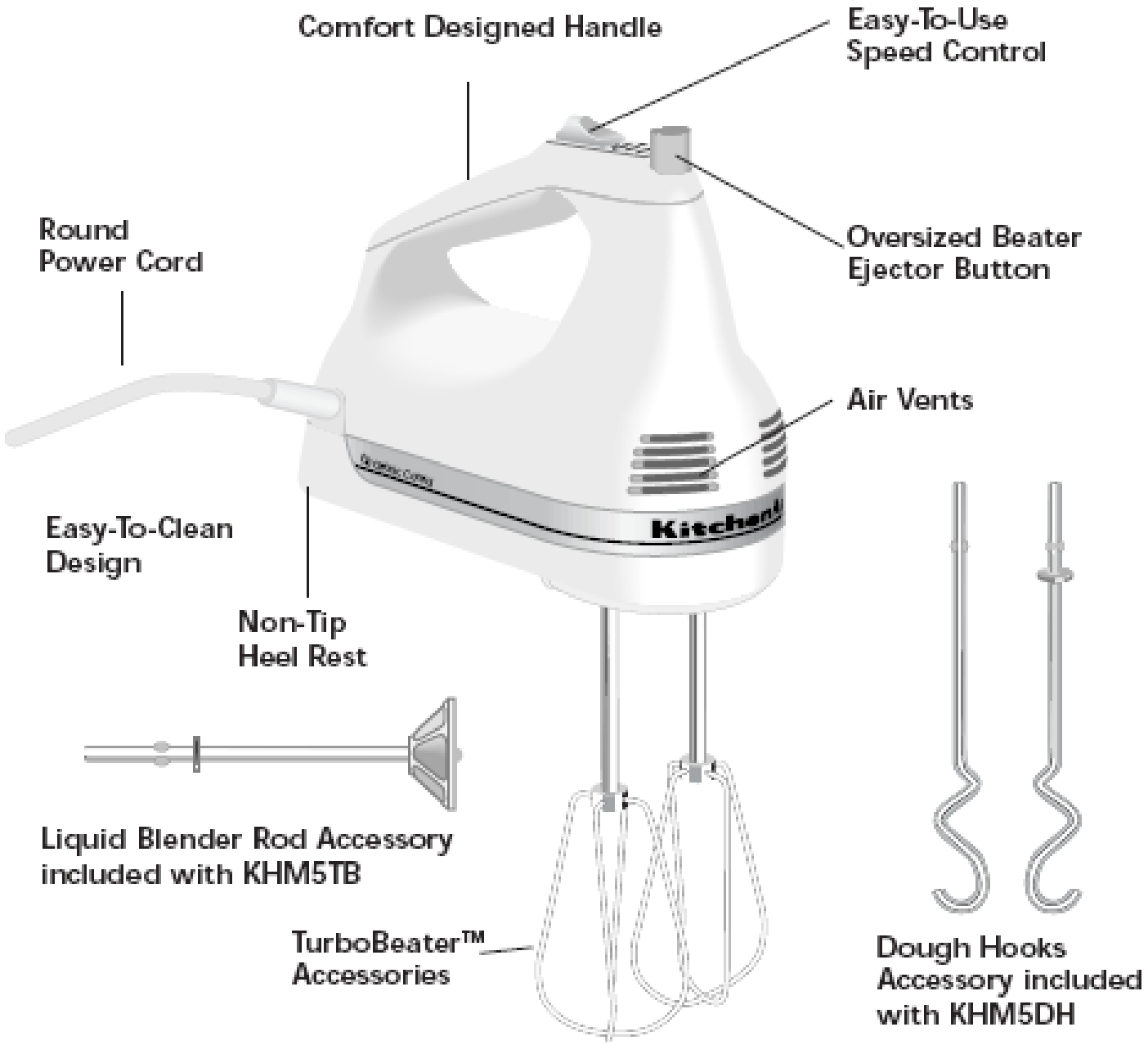
Thank You For Listening

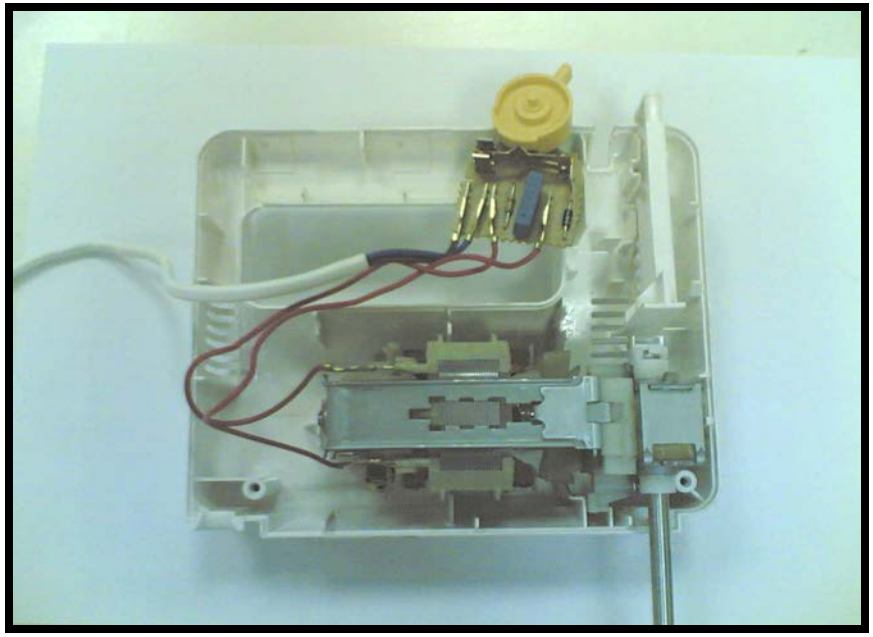
Design of a hand mixer

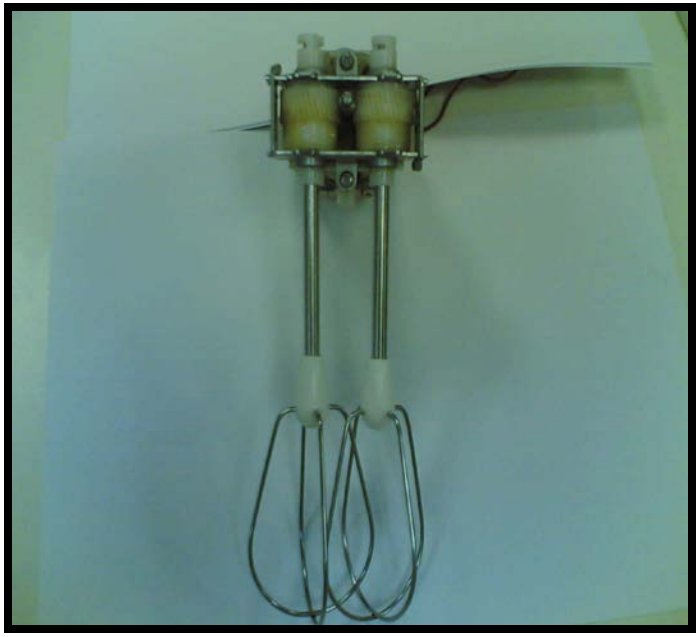
By

Introduction

Hand mixer is a home device used in kitchen for mixing the flower and milk with eggs to make sweets.


Comfort Designed Handle
Easy-To-Use
Speed Control
Round
Power Cord
Oversized Beater
Ejector Button
Air Vents
Easy-To-Clean
Design
Non-Tip
Heel Rest
Liquid Blender Rod Accessory
included with KHM5TB
TurboBeater™
Accessories
Dough Hooks
Accessory included
with KHM5DH





Components of hand mixer

identification of the problem

- maintenance problems,
- safety,
- high noise,
- low speed ,
- human factors (conformability)

Limitations :

Can not be used for very high speed.
Can not be used for large quantities.

Objective

Primary objective :

Improvement of hand mixer by carefully studying more than one sample and analyze the advantage and disadvantages then we can put details of comparison between the samples

Secondary objective:

- Easy to use
- More Safe
- Easy to maintain
- Higher Speed of operation
- Lower cost
- Less noise

comparison

MANFACTURE	MOULINEX	TEFAL	ARIETE
MODEL	M814	8143	ROLL-MIX
FEATURE	(1=poor, 5=excl)	(1=poor, 5=excl)	(1=poor, 5=excl)
AESTHETICS	Rounded edge, vent in side	Rounded edge, oval shape, vent in front	Square shape Vent in front
BALANCE	excl	good	good
BEATERS	2	2	2
CLEANING	easy	easy	easy
CONTROL LOCATION	front	front	front
CORD LOCATION	side	side	side
CORD STORGE	-	-	-
COST	155 SR	143 SR	155 SR

EASE OF CONTROL	**easy**	**easy**	**easy**
EJECT ABILITY	**Button , easy**	**Button , easy**	**Button , easy**
HANDLE	**Good wide handle, oval handle**	**Oval handle**	**Square handle**
EASE OF ASSEMBLY	**excl**	**excl**	**good**
NOISE	**low**	**Reasonably quite**	**fan quite**
OPEATING TIME	**5-10 min**	**5-10 min**	**5-10 min**
POWER	**110 V**	**220 V**	**220 V**
QUALITY	**excellent**	**good**	**excellent**
SAFTY	**Power in button**	**Power in button**	**Power in button**
SPEED CONTROL	**4 speed**	**5 speed**	**5 speed**
TIP OFER STABILITY	**Yes ,in wide, skid base**	**skid base**	**skid base**
ATTACHMENT	**Hand blender**	**No attachments**	**No attachments**
WEIGHT	**medium**	**heavy**	**heavy**

Solutions

- maintenance

To make the spare parts more available

Advantages:

• Do not need another new product

Disadvantages:

• the cost

- **Safety**

To fix the fuse in the switch

Advantages:

- protect the device from burning

Disadvantages:

- short life

- Noise

Changing the gear system to belt drive system

Advantages:

- it is inexpensive

Disadvantages:

- the high temperature produced at high speeds

- speed

- Changing type of the motor

Advantages:

- Less noise
- Higher speed
- High quality
- Long life

Disadvantages:

- sizes of high quality motors are large

- Put variable resistance

Advantages:

- Variable speeds

Disadvantages:

- It takes more space , then size will be bigger

- comfortability

•Put rubber for handle to be more comfortable

Advantages:

•more comfortable hand

Disadvantages:

• it can not changeable

Attributes:

1-style

2- maintenance

3- safety

4- easy to use

5- no noise

	1	2	3	4	5
1		1/2	1	1	
2	1/2		1	1	1
3					1/2
4			1		1/2
5	1		1/2	1/2	
Σ	$1_{1/2}$	1/2	$3_{1/2}$	$2_{1/2}$	2

- safety 10
- easy to use 8
- no noise 5
- style 3
- maintenance 1

5-point scale

	performance		
Attributes	Moulinex	Tefal	Ariete
Safety	Good	Good	Good
Easy to use	Good	Good	Good
No noise	Good	v. Good	Excellent
style	v. Good	Excellent	Good
maintenance	Excellent	Good	Good

Discussion & Conclusions

Many samples of product have been compared and the advantages and disadvantages of each product have been identified. Some solutions of the given problems have been suggested.

Thank You