

# Design Portfolio

*By Nupura Kulkarni*

# Hi, I am Nupura.

An aspiring product designer equipped with abilities of design research, innovative thinking, graphic design and a strong grasp on fundamentals of electronics.

Design is where science and art break even. With my technical knowledge and creative mind, I am willing to contribute to the research and innovation in product design.

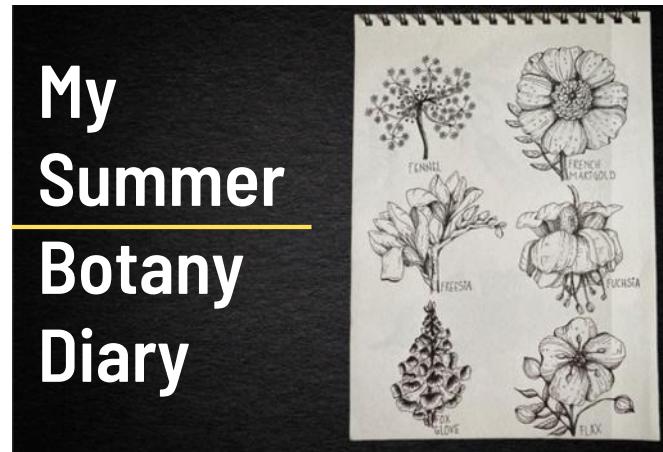
As a designer, I have a responsibility to make people's life better. I have designed some products that would showcase my creative as well as technical abilities.

I believe that

dreams   
don't work  
unless you do...



# Contents



**Let's Go!**

# Blindle

## Kindle for the Blind

**Design Part: Personal project**

**Technical Part: Group project**

CSR INITIATIVE  
BY  
ESURANCE COMPANY LTD.

### Design Challenge

“

I want all the blind people to be able to read any and every book they wish because blind people have a tough time finding good reading material in braille. There is a huge time gap between books being published in standard print and braille print. Many eBooks don't have an audiobook equivalent.

”

### Solution

Blindle is a refreshable full page braille display device that can capture a photo of any text and instantly display the braille text on the screen. It can also convert PDFs or text documents in the braille format and store them.



I can read in the dark, can you?

# Research

## Current Braille Displays



## Problems with current Braille Displays



Mostly single line displays (Imagine reading a book with a single line on each page!)



Bulky and heavy due to electro-mechanical components and its wiring.



Very costly (\$1000 - \$4000).



Should be connected to a computer/laptop for reading books. No internal memory.

"I love to read books. I have read almost all books printed in braille and some audiobooks too. I feel that listening to the whole book is very tedious and the speed is not adjustable which is very time consuming. Listening to audiobooks doesn't give the joy of reading!"

- Vedika Phadke

Pursuing career as a CA (Chartered Accountant)  
Kolhapur, Maharashtra, India



## Visit to a blind school



Meeting the Principal



The School



Braille charts & 3D photos



3D art in the hallway



3D Map with braille labels



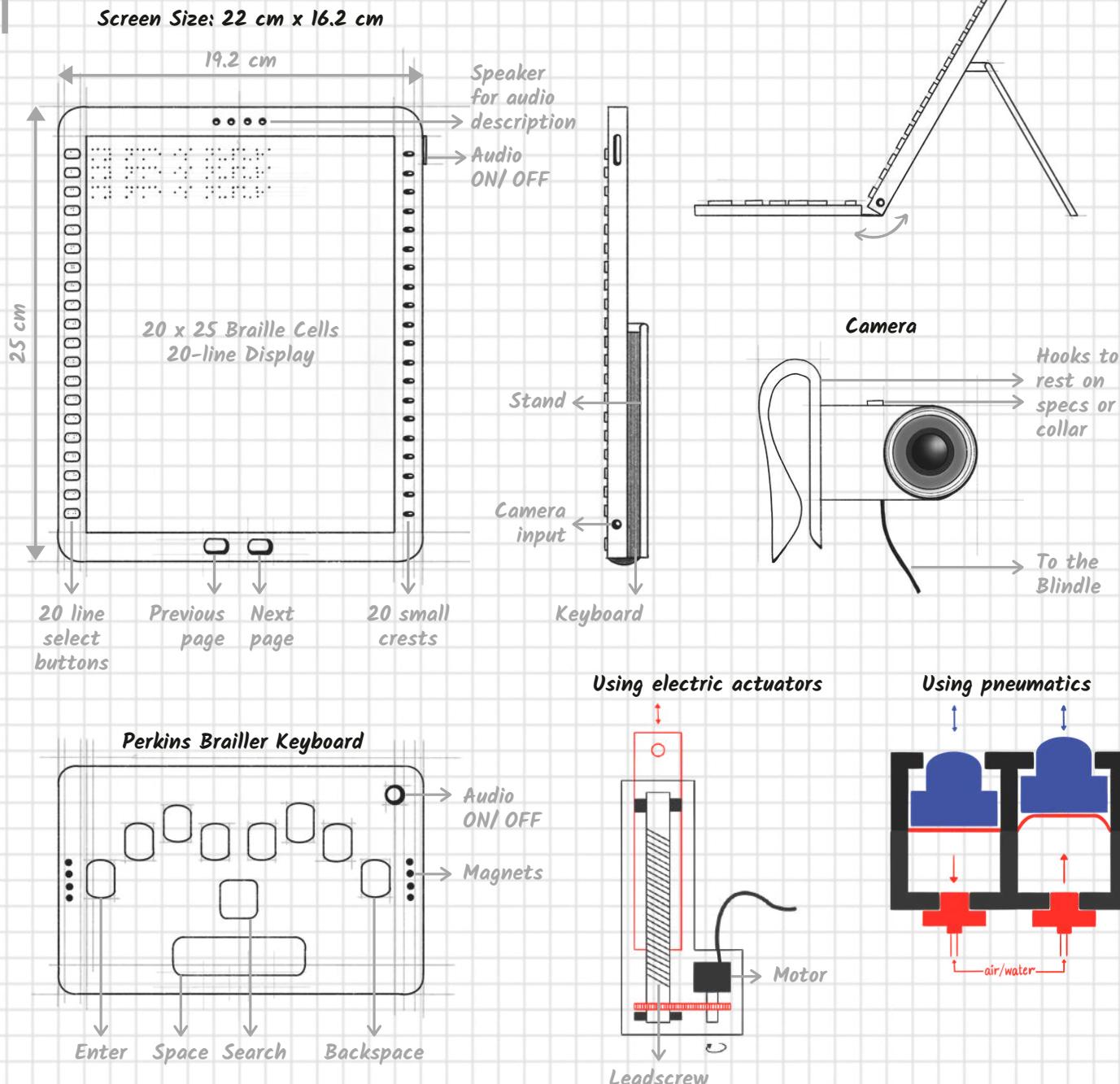
Braille textbooks

"There is no substitute for the ability to read, that's why no digital alternative can replace braille completely. But it takes minimum 5 to 6 months to get the latest braille books after they are published. We cannot provide an electronic braille computer or a reader to every student because it is very costly."

- Mr. Rajaram Jagtap

Headmaster, The Poona School & Home for the Blind Girls  
Pune, Maharashtra, India

# Design Details



# Technical Details

**Text detection using Image Processing:**  
The image captured undergoes some pre-processing like noise removal, binarization, thresholding and segmentation.

**Text recognition using LUT (Look-up Tables):**  
LUT is used to compare the segmented image with the letters in LUT to identify the letter.

Text detection and recognition can also be done using algorithms like OCR (Optical character Recognition). Software like BrailleBlaster can be used to convert the English text into the braille text file.

## The Hardware Challenge!

The number of braille cells are 500 and 1 cell consists of 6 dots which makes total of 3000 dots on the braille display. There are two ways of displaying the crests and troughs in the cell; Pneumatics and Electric linear actuators. If electric actuators are used then it increases the wiring, bulkiness and cost. If pneumatics is used then the cost can be easily reduced but the piping for each cell can be complicated hence increasing the thickness of the device.

# Key Features

Unlimited access to all the eBooks, PDFs, newspapers, magazines in Braille



20-line refreshable full page display for the best user experience



No external device required.  
In-built storage for books like Kindle



20 buttons with line number printed in braille to select a specific line



20 small crests on the right panel helps to ensure the completion of a line



Camera to click images of the text. It can rest on a spectacles or shirt collar

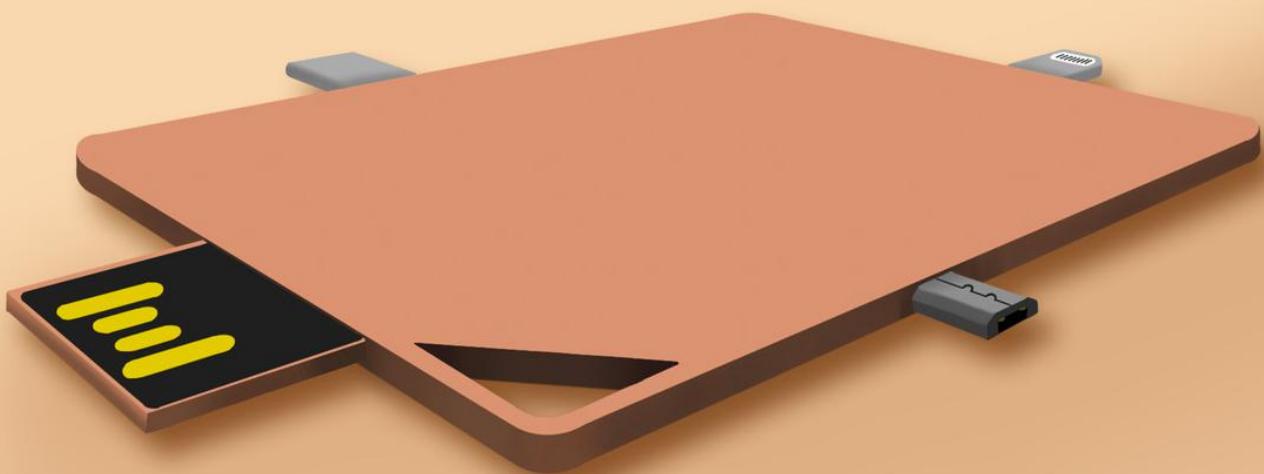


A small prototype of a single braille cell was made using image processing and Arduino UNO as my minor group project in the third year of engineering. At that time we only focused on the technical part of the project. Later, I tried to design the product in detail.

# FiO

## 4-in-1 Pendrive

Personal project



### Design Challenge

“ I want the tech-savvy people to be able to use a pendrive for multiple purposes because

they may have variety of devices of different companies like Apple, Samsung, OnePlus and many more; all of which require different pendrive connectors. Hence, they have to buy multiple OTG pendrives or cables.

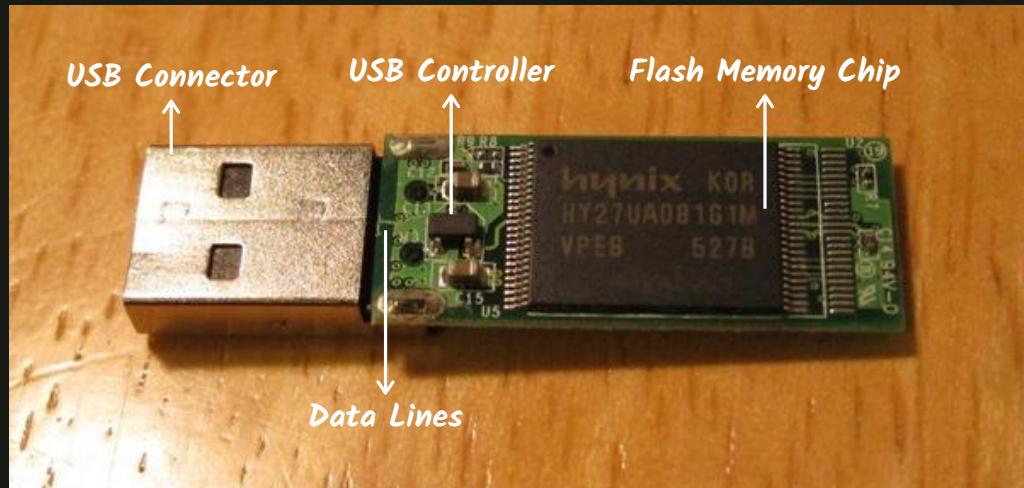
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### Solution

FiO is a four-in-one pendrive which allows you to store and transfer data from any device having USB type-A port, micro-USB port, USB type-C port and a lightning port (Apple devices).

FiO can also be used as a visiting card for branding purposes.

# Basic Components of a Pendrive



## Current Pendrive Designs



# Research

In many business events, the host company gives a business card printed on a pendrive. Such gifts are appreciated because of it's utility & the branding style.

Pendrives are extensively used in the professional sector for easy data transfer, storage and presenting PPTs.

Business

Professional

Use of  
Pendrive

Academic

Personal

Students can easily transfer data from the computers in the college to their personal laptops for later reference using pendrives.

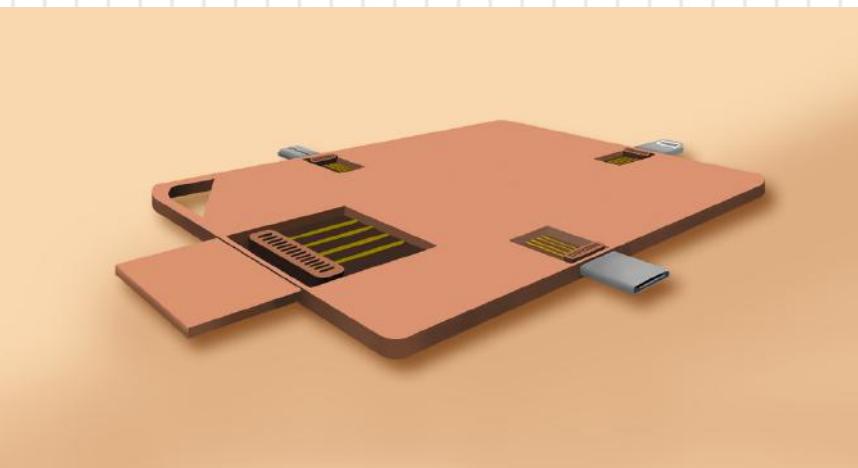
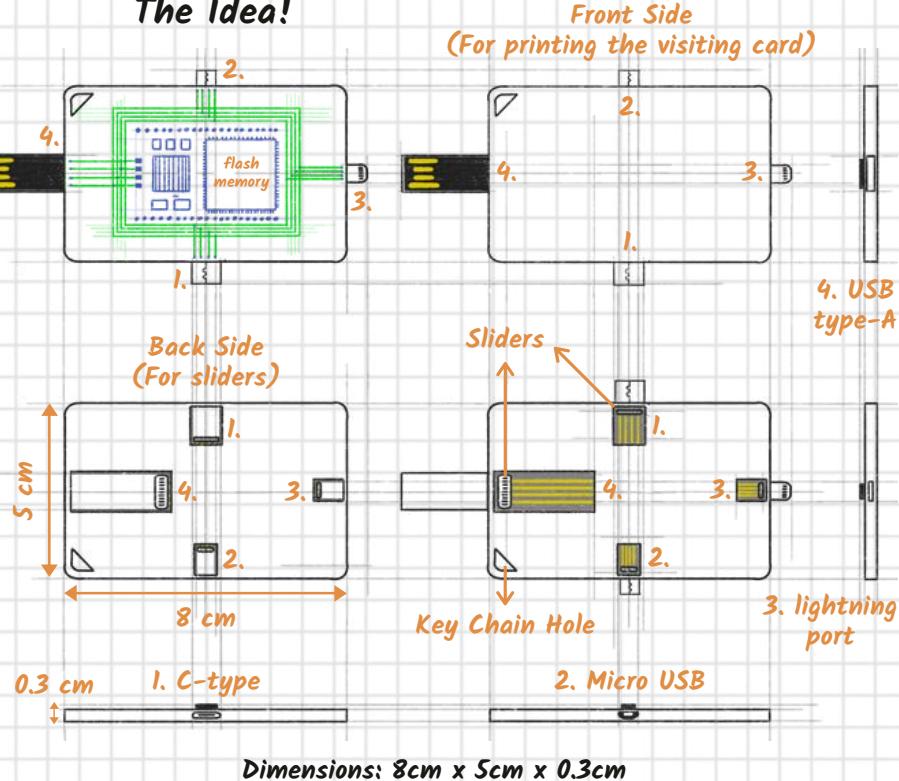
On a personal level pendrives can be useful in watching movies on TV, storing data, printing documents or photos.

# Design Details

## Prototype trial



## The Idea!



## Key Features

Can be used to store and transfer data from any device with these ports.



Can be used as a business card for branding.



It can easily fit in your wallet and hence less chance of forgetting it.



It can also be used as a key chain.



Can be very useful for people using devices of multiple brands like Apple and Andriod Devices.



# Salher

Grow salad and herbs  
at your home!

Personal project



## Design Challenge

“ I want any and every person to be able to grow salads and herbs at home on their own because most of the vegetables nowadays are generally GMO- Genetically Modified Organic Foods which are not good for our health in a long run. ”

## Solution

Salher is a very simple and elegant looking indoor garden which has a self-watering system. In India, since there is plenty of sunlight all day long, there is no need of smart feature in the indoor garden.

Salher can be used to grow small salad plants like lettuce, cherry tomatoes, wheat grass which require soil, as well as microgreens and sprouts which require a humid surrounding.

# Microgreens experiment using a sieve



Day 2



Day 4



Day 6



Day 7



Day 8



*Our Garden*



## Research

Which plants can be grown indoors?



Herbs



Celery



Lettuce

and other greens like  
spinach, kale, swiss chard



Microgreens  
from variety of seeds  
like kale, beet, basil



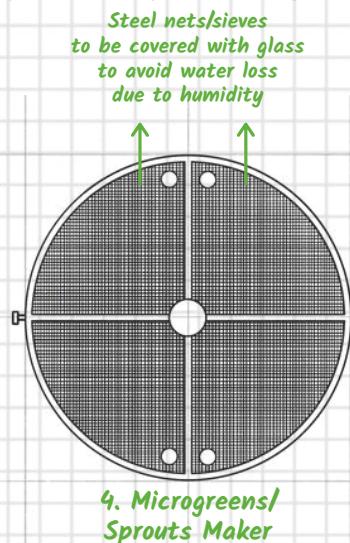
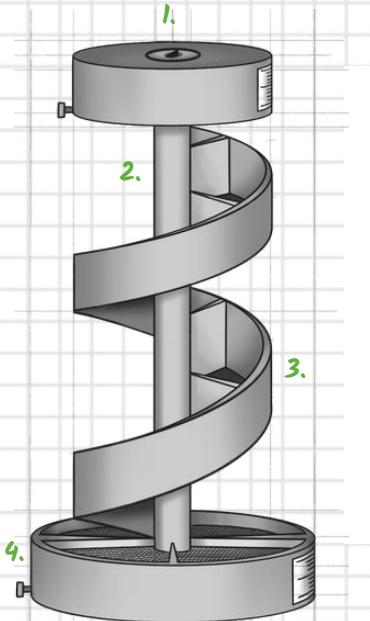
Peppers



Cherry Tomatoes

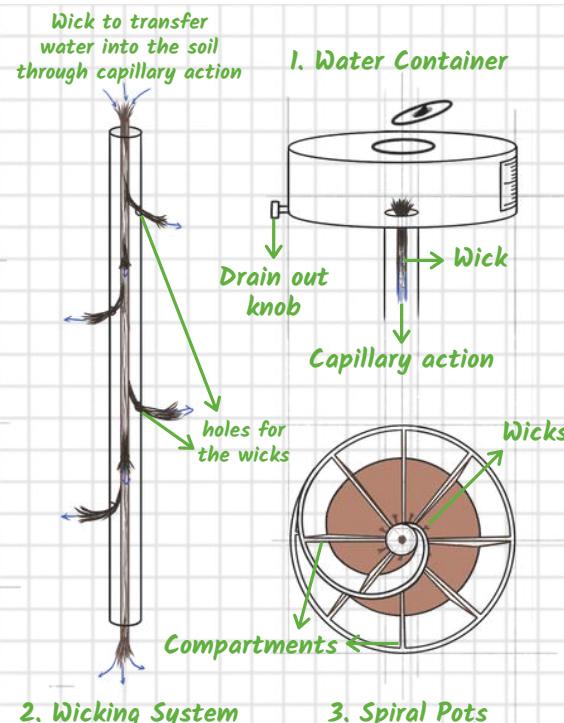
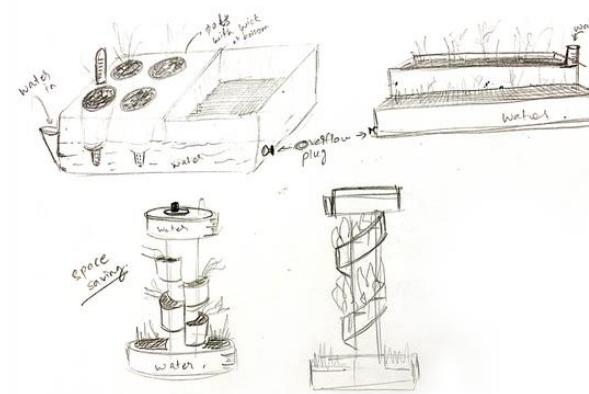
# Design Details

## Structure trial



Estimated dimensions of the final product:  
30 cm x 30 cm x 45 cm

## Ideation



\*Sketches done in Procreate

# Key Features

Self-watering system using a wick. This method keeps the plants healthy.



Plants that require soil and plants which don't require soil, both can be grown.

No need to buy packed vegetables.

Compact and elegant design which can easily fit at any corner in the kitchen



No electric components. Hence, low cost and low maintainence.

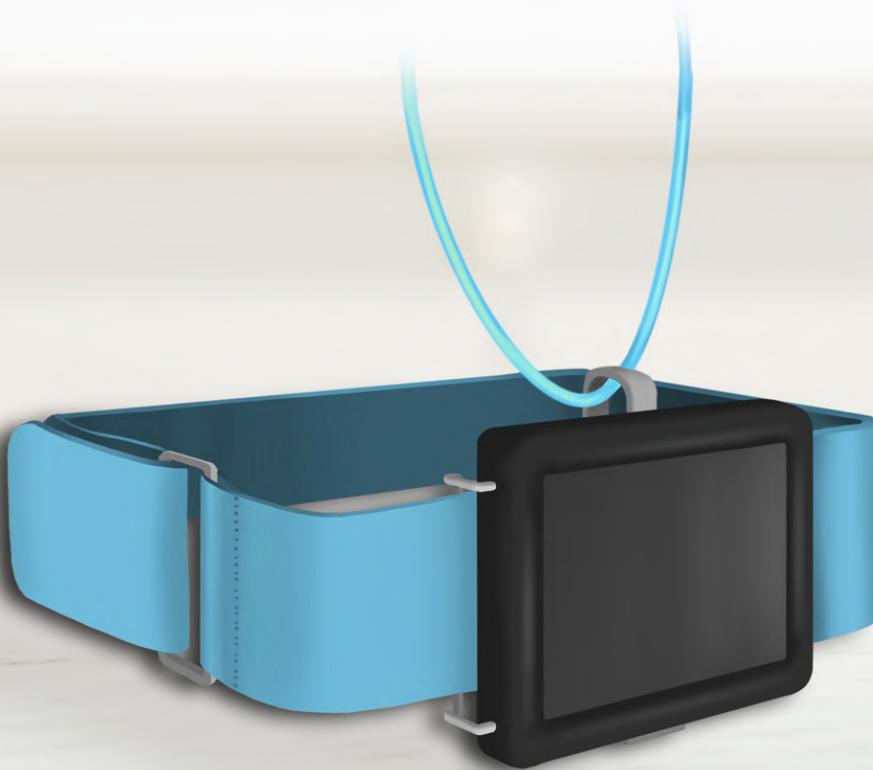


Salher gives you the joy of growing your own plants.

# Chores Partner

Your companion while doing  
your daily chores

**Personal project**



## Design Challenge

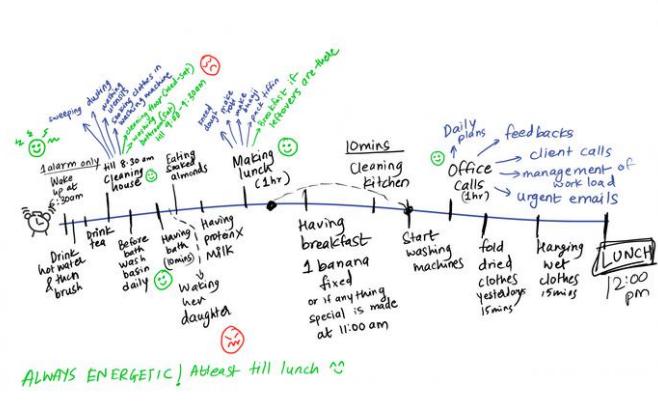
“ I want all the 'Household Workers' to take care of their health along with doing all the necessary daily work because they often ignore themselves while doing all the work by saying that they feel energetic while doing their morning rituals when actually they are stressed and tired after it's completion. ”

”

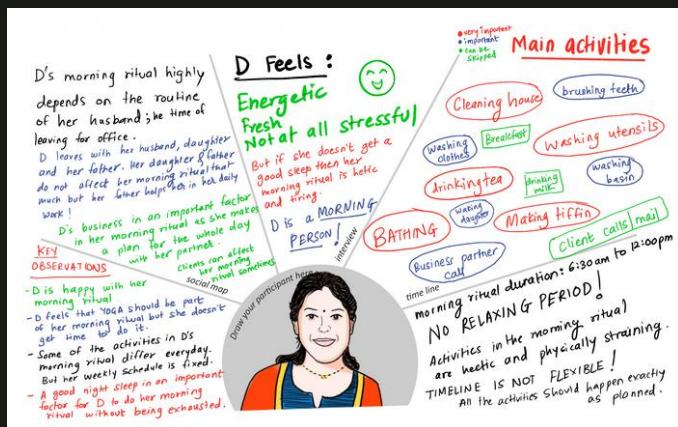
## Solution

Chores Partner will be like a person who is always there for the hardworking household workers. It can help in relaxing by playing music, meditation tracks and also help in managing the reminders. It will also remind the user to take frequent breaks.

# The Meet Up



## User's morning ritual and timeline



## Overall notes after the interview



## User's workplace of daily chores

# Research

### Who has the problem?

The person who have many daily unavoidable household activities. Generally, house-wives or a working women who doesn't have a helper at home. Basically, a person who looks after all household chores in a house where a family /many people live together.

"HOUSE HOLD WORK-ERS"

### What is the problem?

Even though the user thinks she's motivated & energetic during her morning ritual, actually it's after her morning ritual when she is tired by doing it. But since all her morning activities are unavoidable, she doesn't think that that's the reason she's tired in the afternoon & she continues with the same routine everyday.

### What are relevant context factors?

Since all the activities are done at home, the most important factor to consider is that the product will be mostly used at home. Also, during the research, since the user was the only one doing all the chores, mostly the product will be used by only the user. Another important factor to consider is that the user is

very busy and less flexible about his/her morning ritual.

Which actions are admissible?  
What are the constraints that you need to work within?

- All the actions like cleaning the house, making lunch, bathing, etc cannot be avoided.
- The main constraint to work with is the fixed chores and the time required for its completion.
- The user will always look for ways to complete as many chores as possible without thinking about physical strain.

### What side effects need to be avoided?

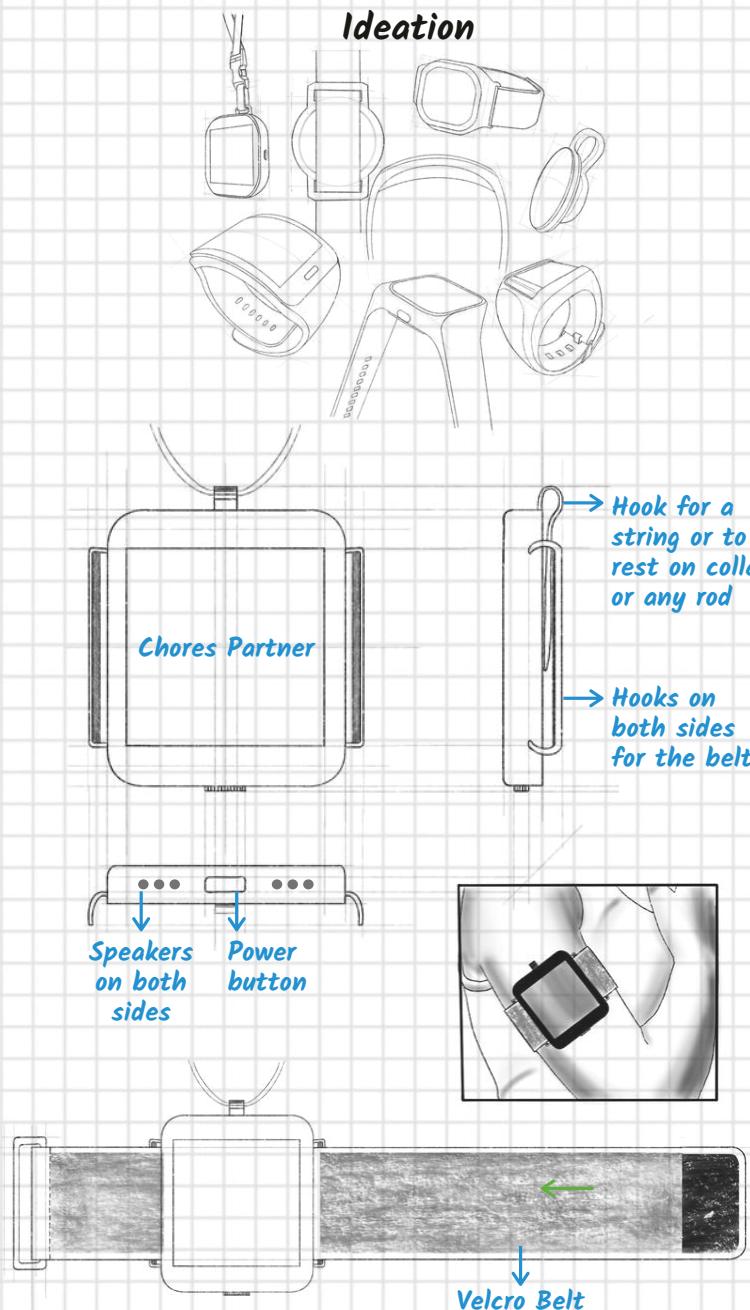
- Any change in the morning ritual since all the activities are necessary
- Loss in physical strength due to whatever is product is design
- Something more complicated or difficult to understand regarding the product.
- Any side-effects on the users health or the hygiene of their house.

# Design Details

## Prototype for the basic idea



## Ideation



\*Sketches done in Procreate

# Key Features



Wake up calls to the people at home with just one click



Meditation and relaxing music tracks can be played with in-built speakers



Break time reminders for the user to rest



Daily chores easily editable checklist



Comfortable velcro belt to wear on the arm



Can be worn around the neck or can be easily hooked to a handle/rod

# Sculpture



Every year in Ganpati festival I make eco-friendly Ganpati idol at home. The idol in the first photo is made from 'Natural (grey) clay' or commonly known as 'Shadu Maati' in India. The idol in the second photo is made from 'Brown soil' which generally used for gardening. This idol is known as 'Tree Ganpati'.

# Wire Art



I like making rings and pendants using different types of wires. Mostly I use copper wires, silver-plated copper wires and bronze wires of 30 gauge, 24 gauge and 19 gauge. The basic tools used to make the wire art are round-nose pliers, flat nose-pliers and a wire cutter.

# T-Shirt Designing

## Impressions'19 T-shirt Design



Impressions is a cultural fest of COEP college. Our theme in 2019 was "Into the Artverse". The t-shirt design is an attempt to show that there is a whole different artistic world in Impressions fest just like there is in the magical Genie lamp.

# Logo Designing

IAS training institute



Task management website



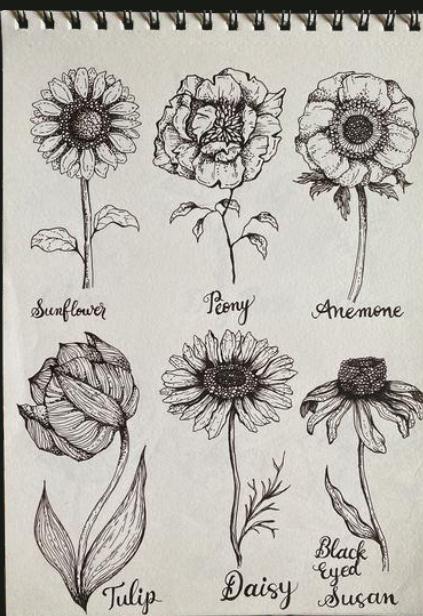
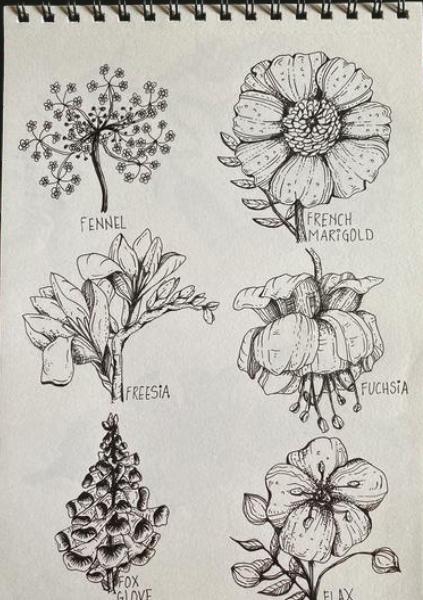
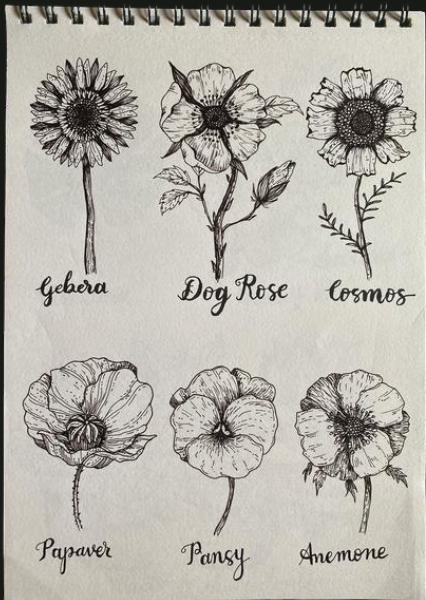
Content writing company



College cultural club



# My Summer Botany Diary



Pencil



Charcoal



Colour Pencils



Water Colours



Soft Pastels



Thank  
You