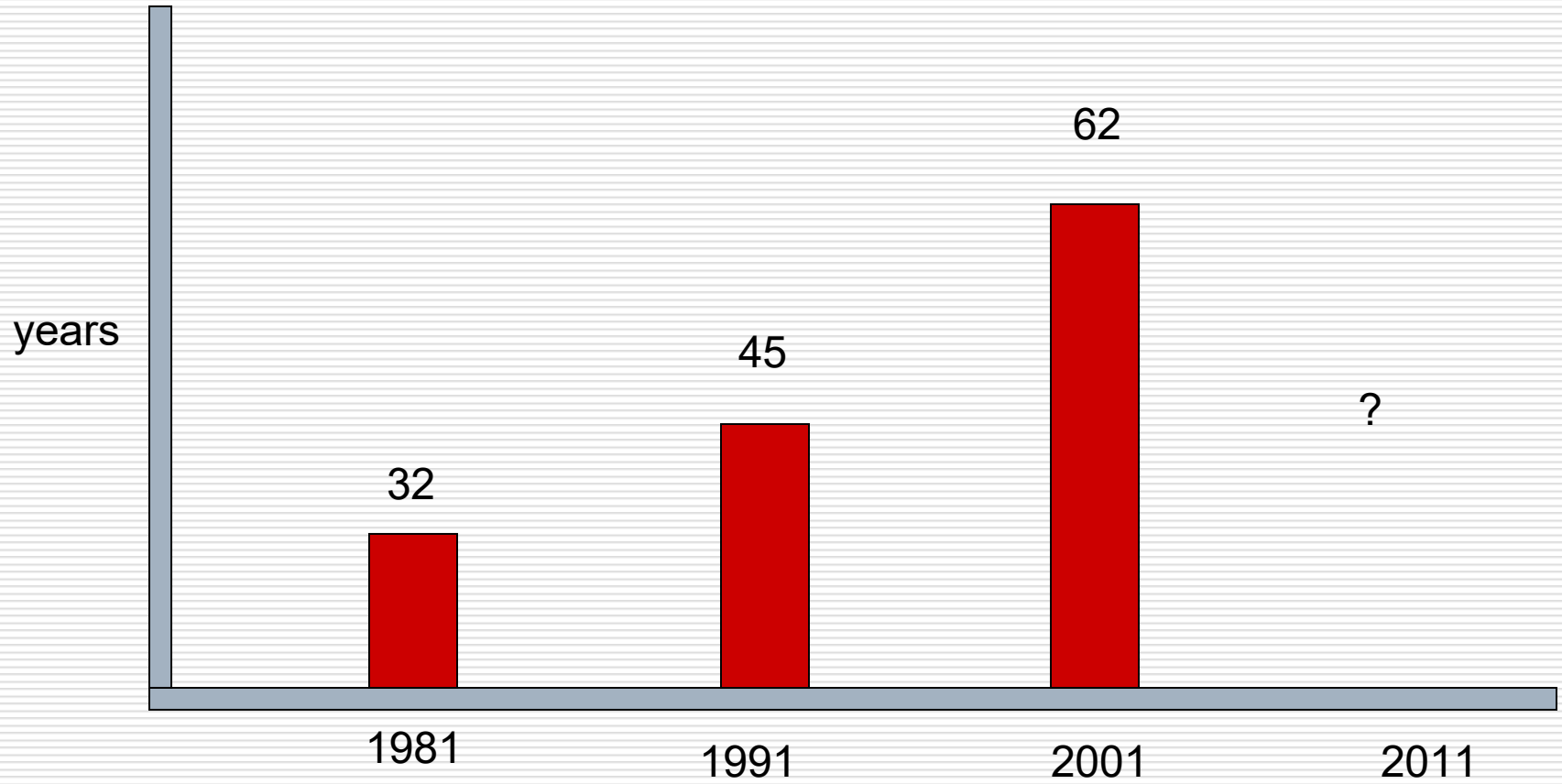


Digital care taker for elderly

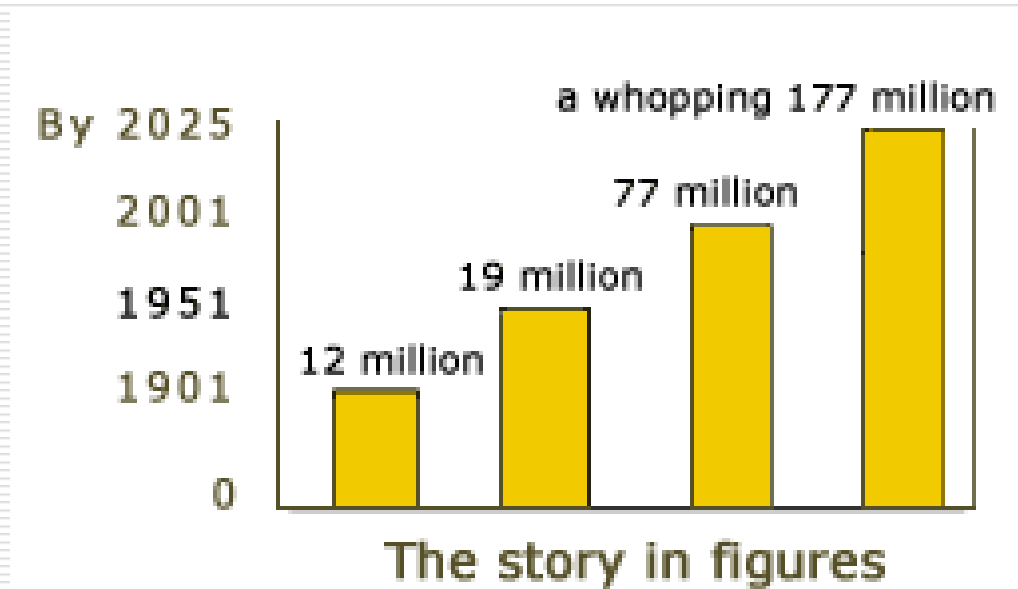
Guide: Prof.V.P. Bapat
Co guide: Anirudha Joshi

Dhananjay Wagh
01613009

Human average life span



The Indian Scenario



In India life expectancy has gone up from 20 years in the beginning of the 20th century to 62 years today. Better medical care and low fertility have made the elderly the fastest growing section of society.

Aim of the project

The project deals with conceptualizing & designing an electronic product to take care of elderly people's health related problems.

Data collection

Changes in human body

Changes in physiological function

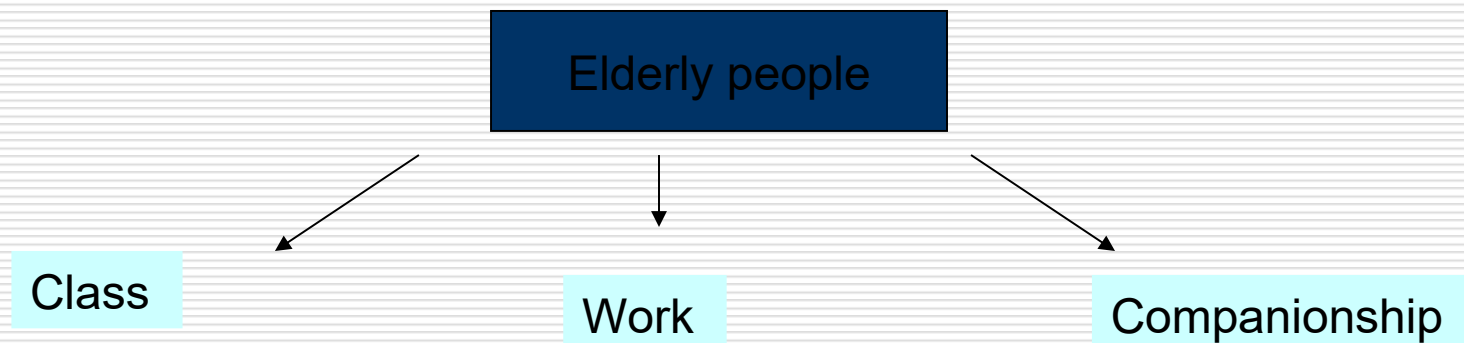
Changes in sensory functioning

Change in motor ability

Mental change in old age

User survey

Categorizations of elderly people

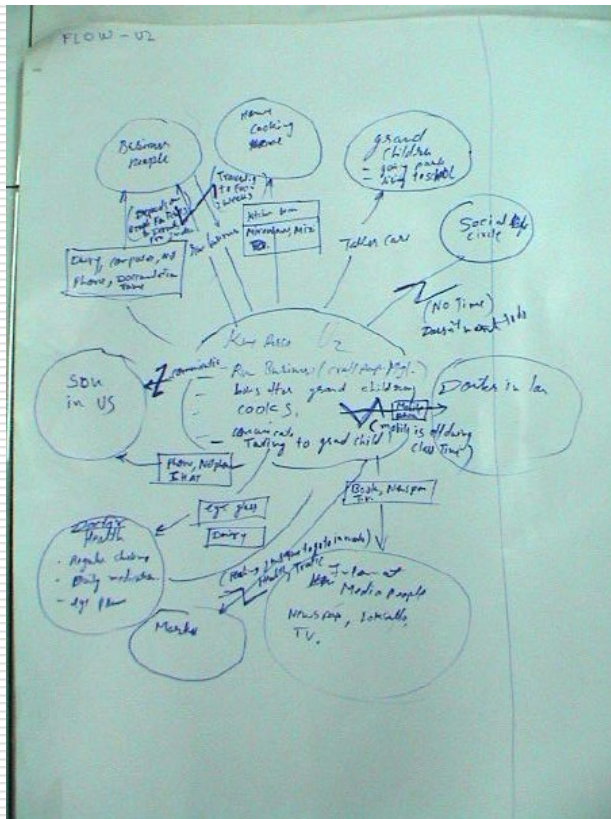


Contextual & non contextual inquiry

Focus:

Every day's life (what an elderly person does through out a day)
How elderly person performs his tasks

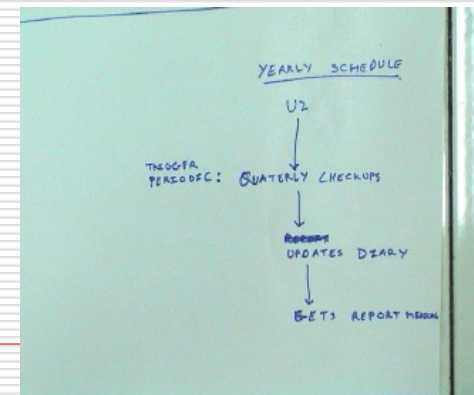
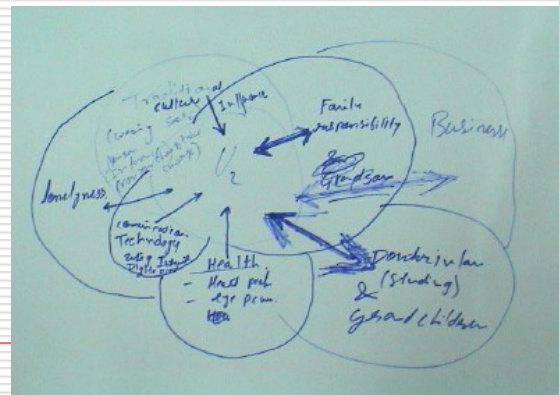
Affinity Diagrams



Flow model

Culture model

Sequence model



Over all Old age problems

- Health
- Communication
- Memory
- Entertainment
- Relationship
- Economical
- Time management

Health problems is more prior to the elderly people so the project direction is towards health related problems

communication & memory is also related with the health

Second user survey for health problems

Second survey was done by 23 new users & 15 caretaker

Data analysis of second user survey

Health problems identified with 23 users
the most common health problems of elderly are

Health problems	% Quantity
•cardiac problems	75%
•sleep disorder	72%
•blood pressure	68%
•Diabetes	45%
•Arthritis	28%
•asthma	10%

According to the priority the importance is given to

1. Communication
 2. memory
 3. cardiac problems
 4. sleep disorder
 5. blood pressure
 6. diabetes
-

physical problems

- Poor hand grip
 - Muscular fatigue
 - Shaking hands
 - Poor hearing ability
 - Poor eye site
-

Other problems

- Limited communication (family/relatives/ friends/doctors)
 - Do not like to talk more on phone
 - Weak memory to remember medicine timing & other things
 - Discontinue in thoughts & behaviors
 - Doesn't like to learn new complicated things
 - Doesn't know medical terminology & related statistical things
 - Does 't like to know that they are ill
 - Avoiding regular health checkup & meeting with doctor
-

Sound wave therapy

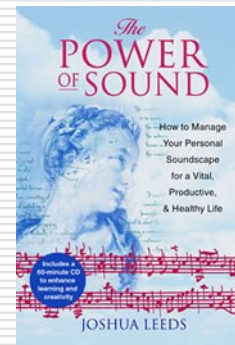
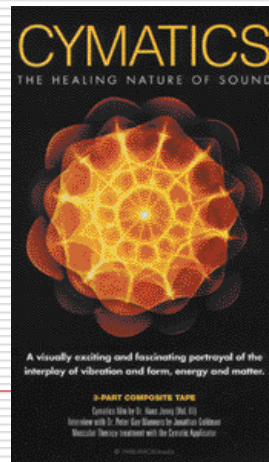
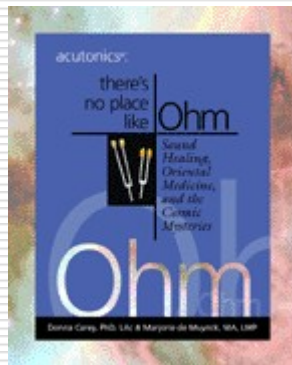
Dr. Jeffrey Thompson

delta: 0.1-3 Hz deep sleep, lucid dreaming, increased immune functions.

Theta: 3-8 Hz deep relaxation, meditation, increased memory, focus.

Alpha: 8-12 Hz light relaxation, “super learning”, positive thinking

Low Beta: 12-15 Hz relaxed focus, improved attentive abilities



Available products



Heart rate



BP



Blood factors

Regular health checkup timing

Sr. no.	Health problems	Health checkup	normal health elderly person	critical health elderly person	
1	cardiac problems	Pulse / heart rate	Whenever feel uncomfortable	Whenever feel uncomfortable	
		Cholesterol , HDL cholesterol	15 day - 3 months	15 days	
2	blood pressure	blood pressure	Once in a day – week	Thrice a day	
		Blood sugar	Once a week		
3	diabetes	Blood ketone triglycerides	15 day-2 months 15day-2 months		



Continues task



(Every day 24 hours)

- Communication
- memory
- Heart rate measurement
- Emergency

Intermediate task



(Once in a day -3 months)

- blood pressure checking
- Blood test

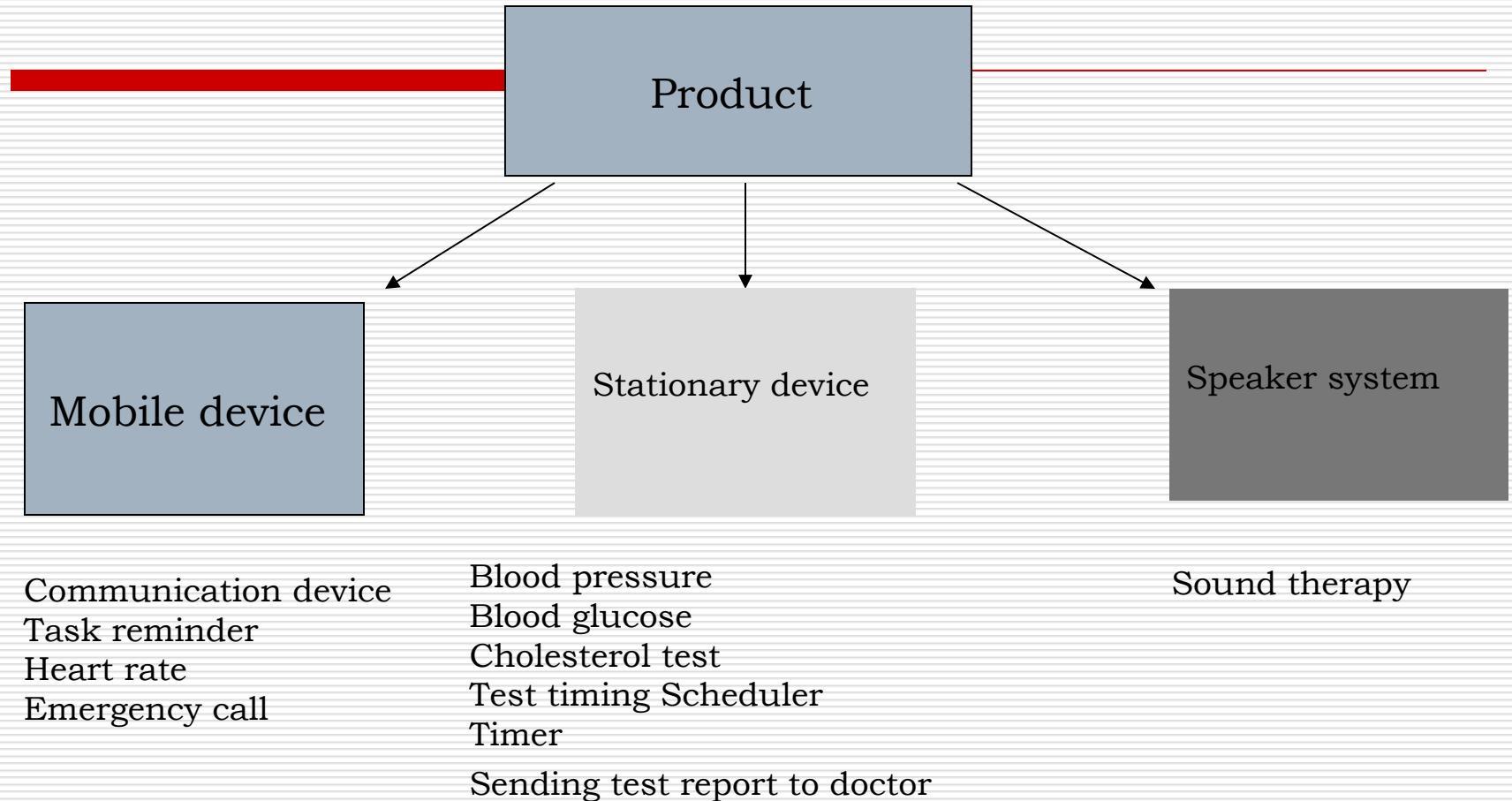
Regular intermediate task



(every day at bed time)

- Taking Sound therapy





Total measurement tasks

- 1) BP
- 2) heart rate
- 3) Blood factors

Emergency tasks

- 1) Medicine
- 2) Call to emergency service
- 3) instruction

Audio tasks

- 1) Music therapy
- 2) Wakeup call

Other tasks

- 1) Test timing Scheduler
 - 2) Timer
 - 3) Sending test report to doctor
-

Product brief

- ❑ The aim of this project is to conceptualize an electronic device to take care health related problems of elderly parson.
- ❑ The product should solve basic communication problems
- ❑ The product should contain minimum keys to avoid fatigue
- ❑ The product should be design by considering elderly problems like
 - Poor hand grip
 - Shaking hands
 - Poor hearing ability
 - Poor eye site
- ❑ The product should contain of regular health checkup kit for
 - Everyday check up: Heart rate, Blood pressure
 - Weekly to monthly check up: Cholesterol, Blood glucose.
- ❑ The product or a part of product should be able to give sound therapy for good& stress free sleep to elderly person.
- ❑ The interface of product should be design by considering his visual ability(color/ contras/ readability)
- ❑ The interface of product should be design by considering his metal state to avoid mental fatigue.
- ❑ The product should have a personal touch in interaction

DESIGN IDEAS

- Muscular fatigue
 1. Provide minimum key for minimum figure movements
 2. Voice activated to avoid hand movement
 3. Give touch screen
 - Poor hand grip
 1. Ergonomically design grip
 2. Device should be hang in neck
 3. Provide shock proof pads inside the device
 4. Other good place to keep device safe like (hand mounted /wrist mounted/ body mounted/ pocket/ belt
 - Shaking hands
 1. Provide bigger keys
 2. Difficult to locate key, give some distance between two keys
 3. Give minimum keys
 4. The key should have finger grip
 5. The device should hold by two hands
-

DESIGN IDEAS

- Poor eye site
 1. Give bigger screen
 2. Make text bigger (or at least adjustable)
 3. use only very high contrast colors.
 4. Avoid script, decorative or other fonts with fine lines and detail.
 5. Use fluorescent screen
 6. Avoid abrupt luminance transitions.

 - Poor hearing ability
 1. Provide earphones & microphone for interaction with device
 2. Provide audio & visual information
-

House environment



Artifacts



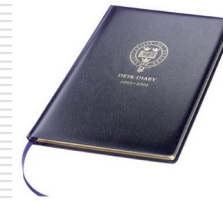
Cupboard



Diary



Table top calendar



Television

Cell phone

Telephone

Leather purse

Leather bag

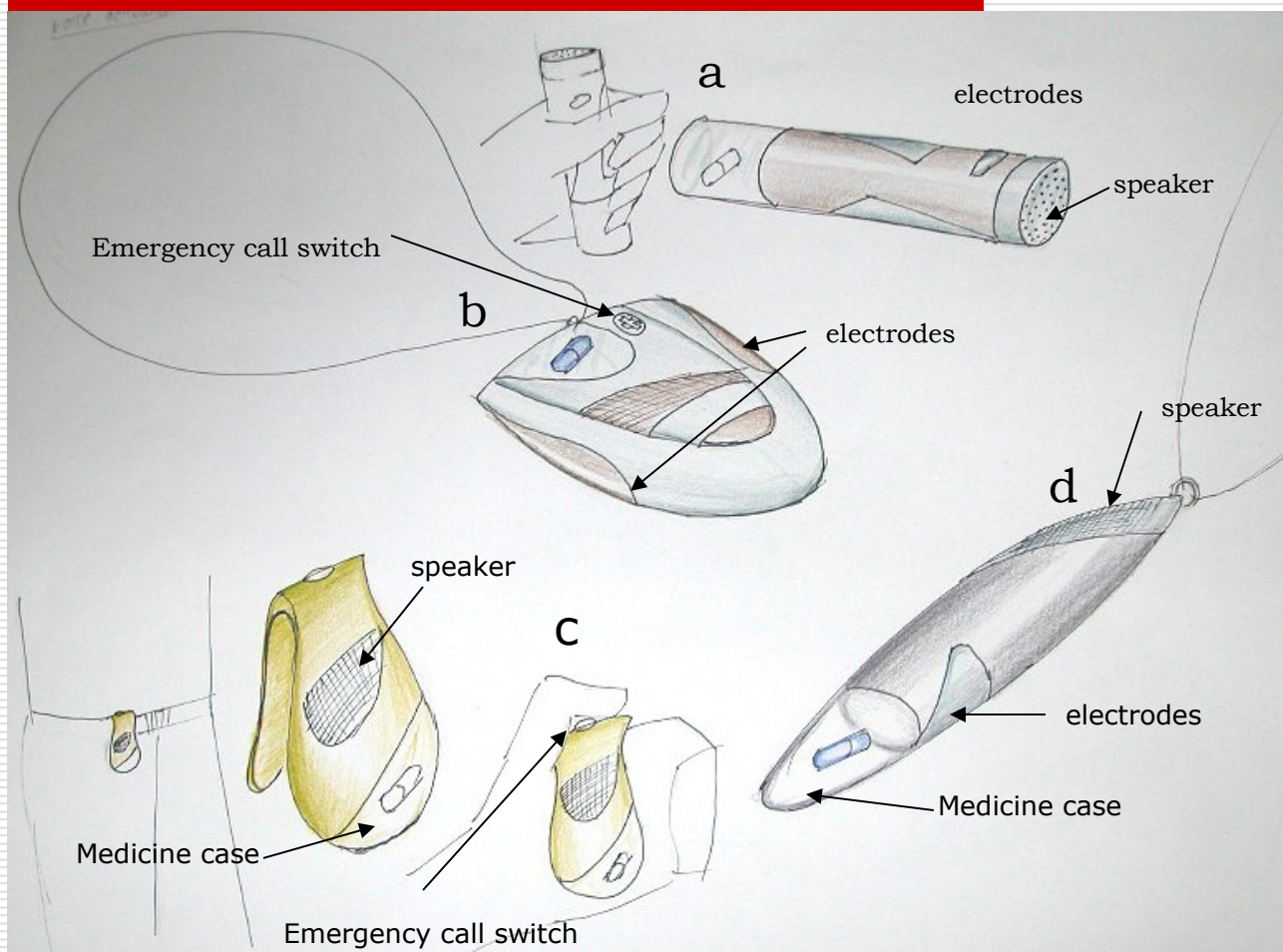
Wrist watch



Concept 1.1)

This concept is based on the minimizing keys

Voice activated Mobile device

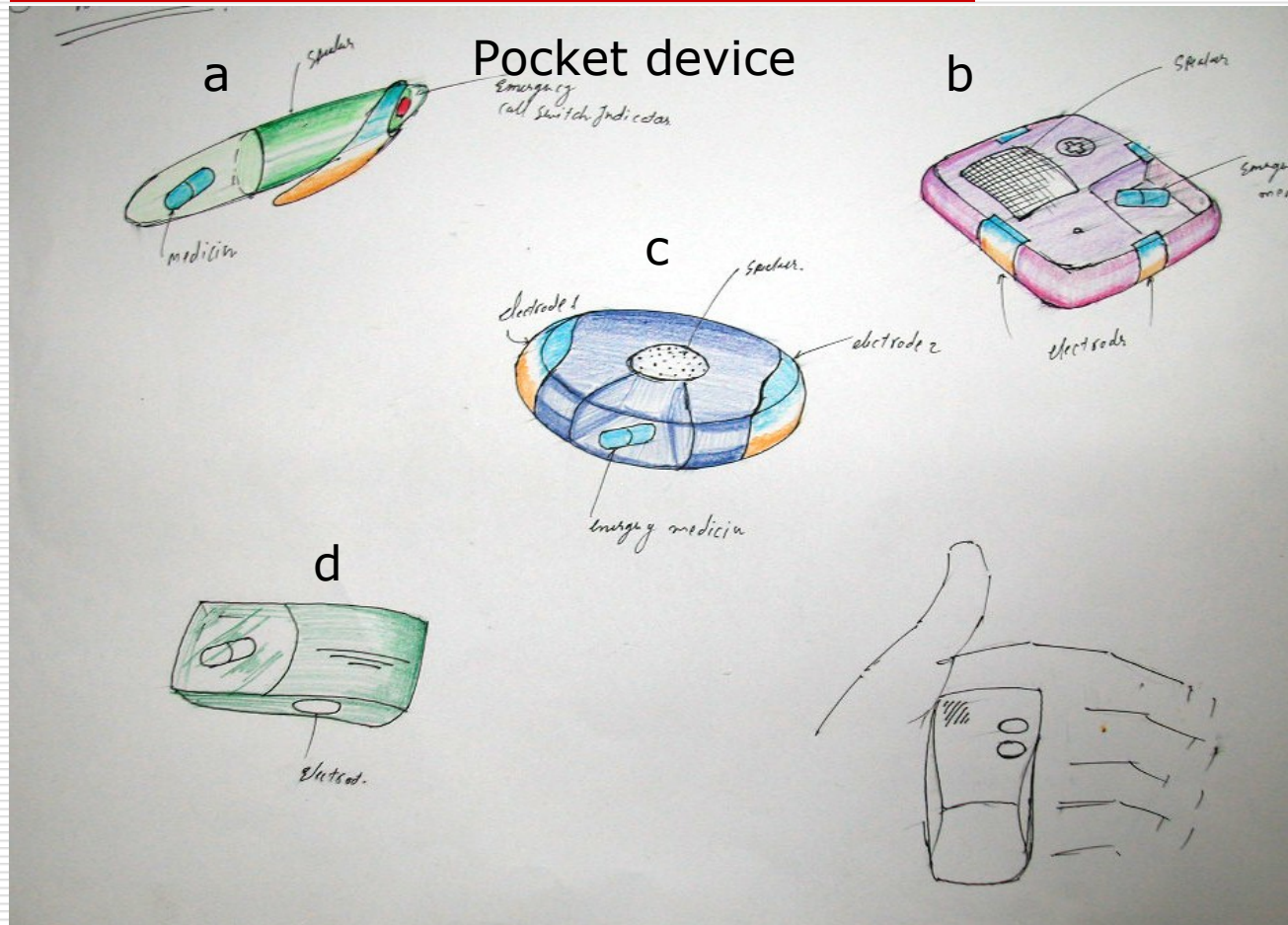


Features

- 1 Total audio interaction
- Single key to avoid hand & finger fatigue
- 2 No screen
- 3 Voice activated
- 4 good hand grip

Concept 1.1)

Voice activated Mobile device

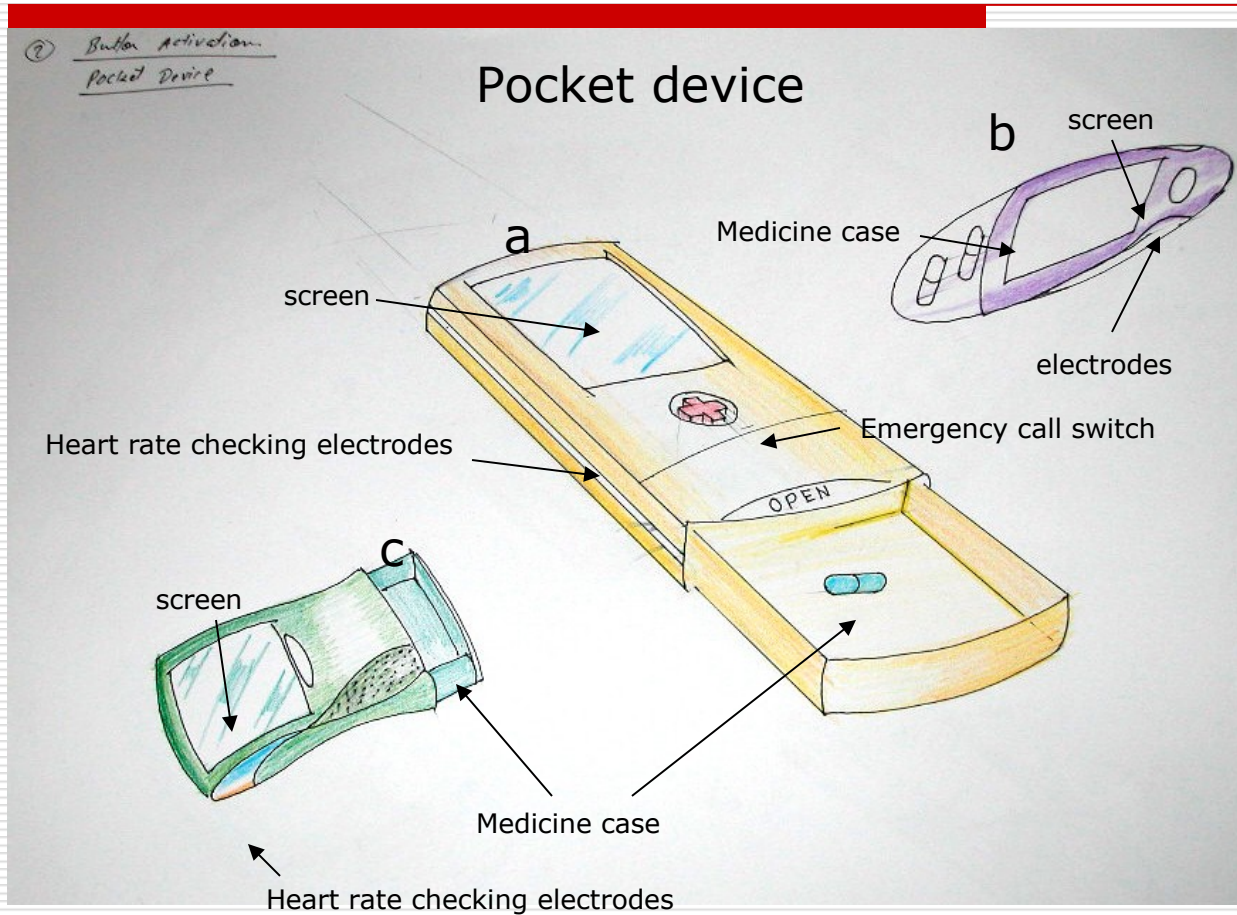


Features

- 1 Total audio interaction
Single key to avoid hand & finger fatigue
- 2 No screen
- 3 Voice activated
- 4 good hand grip

Concept 1.2)

Voice activated Mobile device



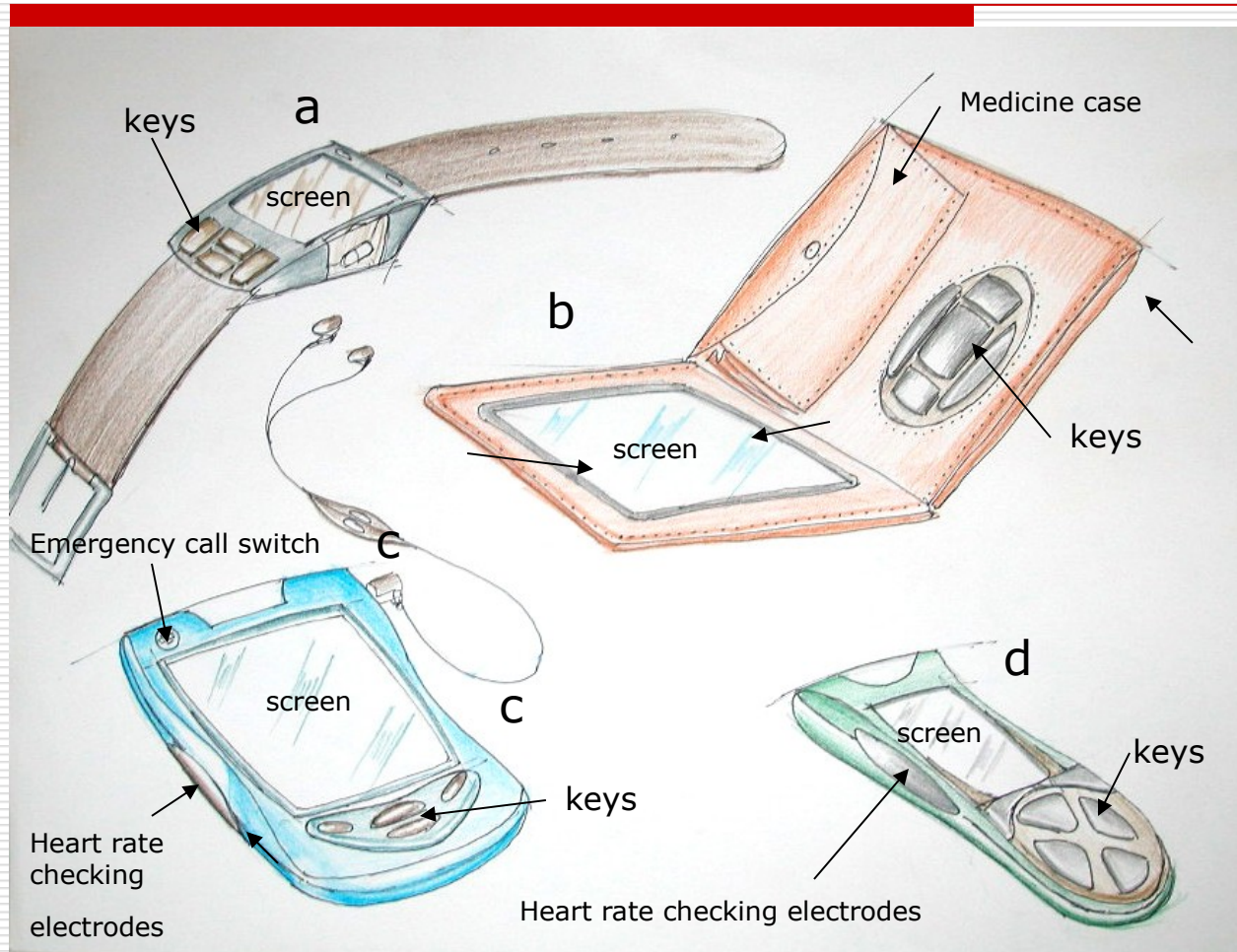
Features

- 1 Total audio interaction
- 2 Single key to avoid hand & finger fatigue
- 2 Voice activated
- 3 display screen
- 4 good hand grip

This concept is based on the minimizing keys

Concept 2.1

Voice + **key activated** Mobile device



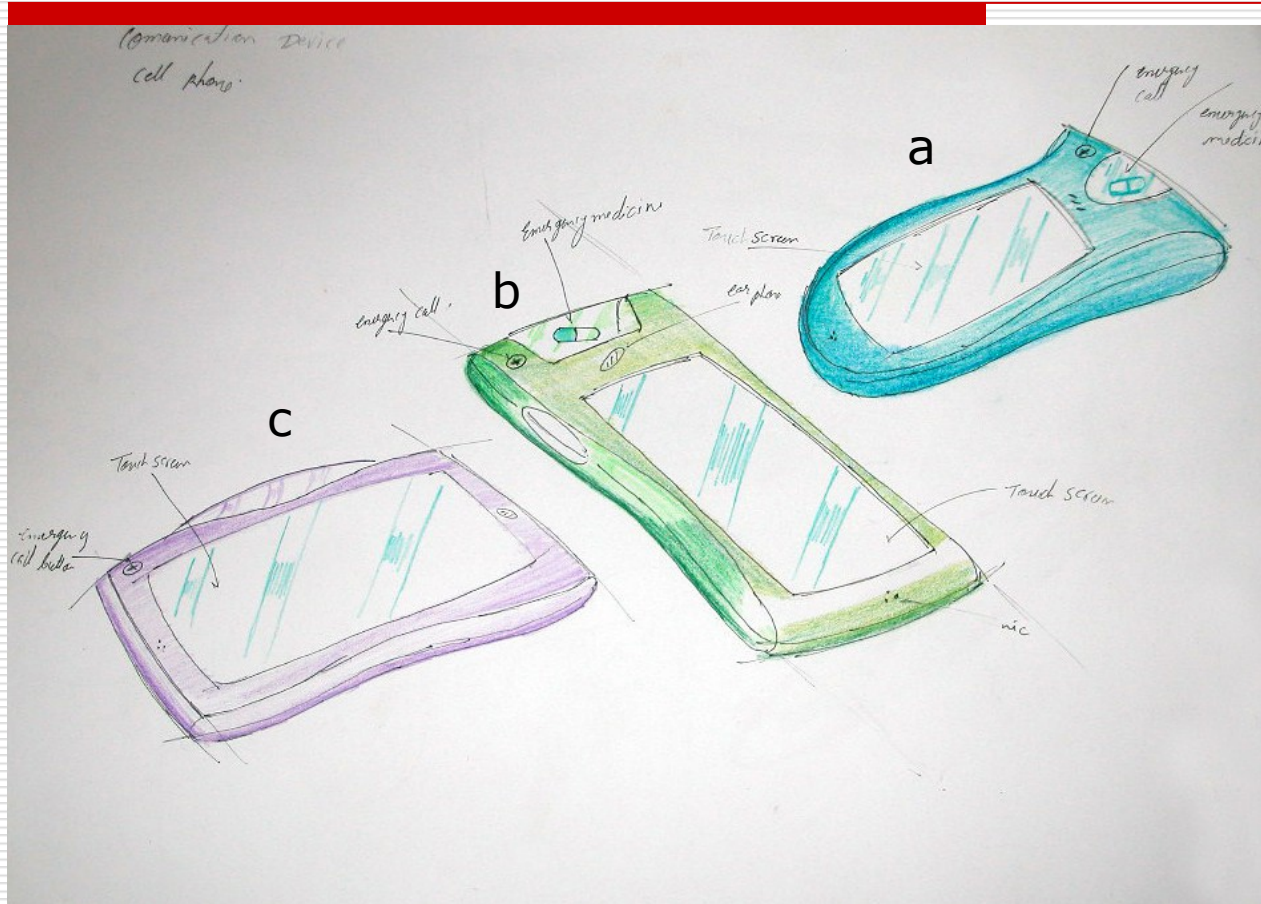
Features

- 1 audio + visual interaction
- 2 min key to avoid hand & finger fatigue
- 3 big keys
- 4 big screen
- 5 Voice + key activated

This concept is based on the minimizing keys

Concept 2.2

Voice + touch screen Mobile device



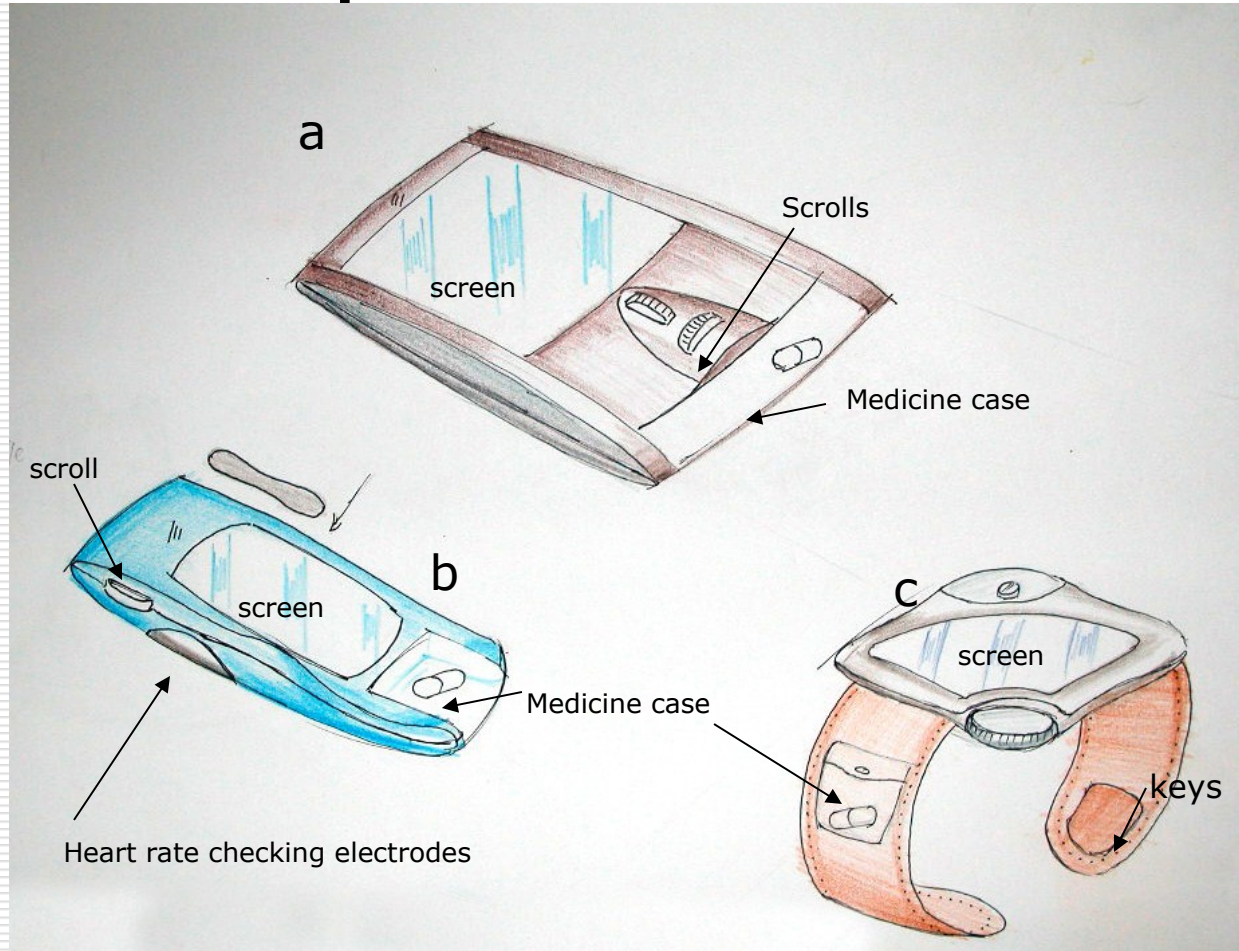
Features

- 1 audio + visual interaction
- Touch screen
- 2 big screen
- 3 Voice + touch activated

This concept is based on the minimizing keys

Concept 2.3

Voice + scroll operated Mobile device



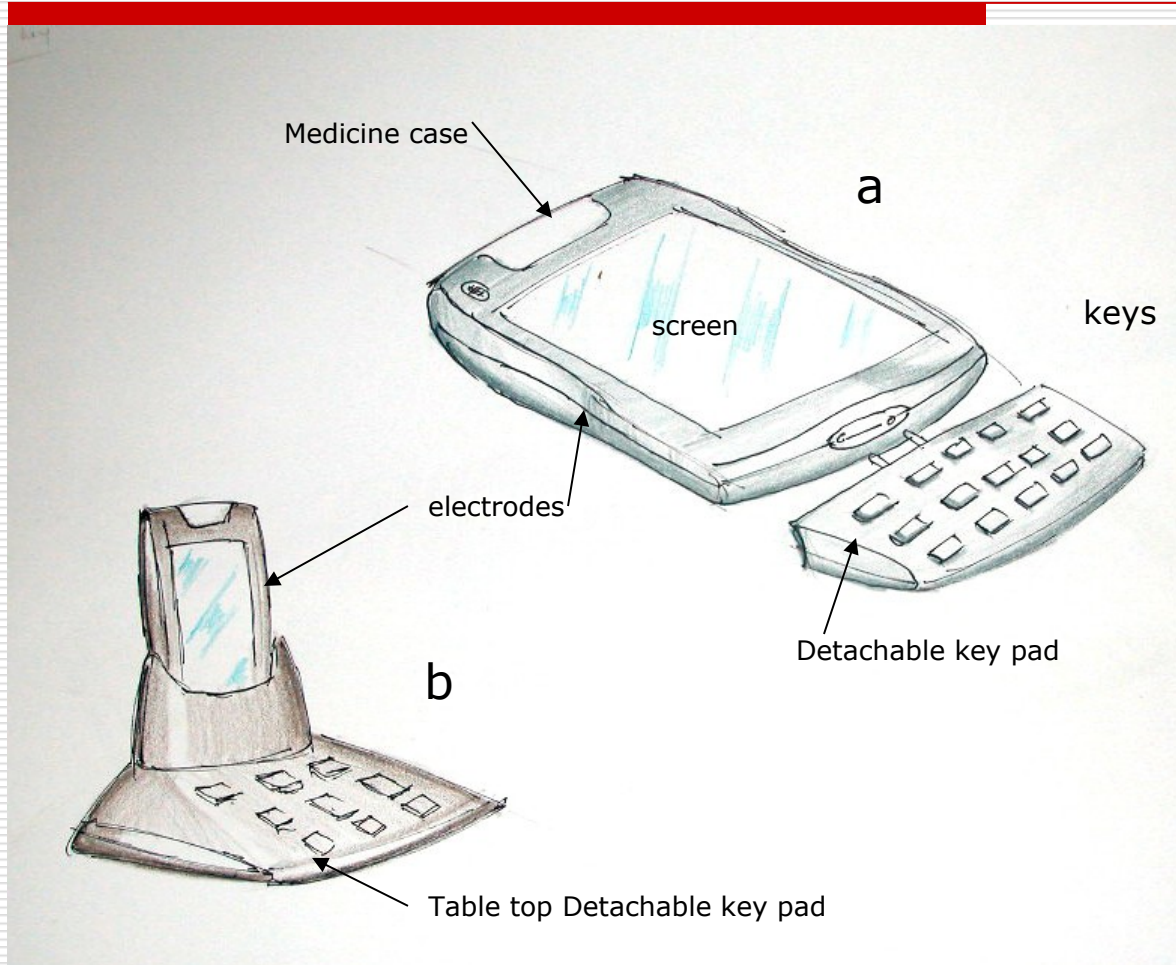
Features

- 1 audio + visual interaction
- 2 scroll
- 3 big screen
- 4 Voice + scroll activated

This concept is based on the minimizing keys

Concept 3.1

key operated Mobile device



Features

1 keys

2 big screen

3 keys activated

first stage Evaluation (qualitative test)

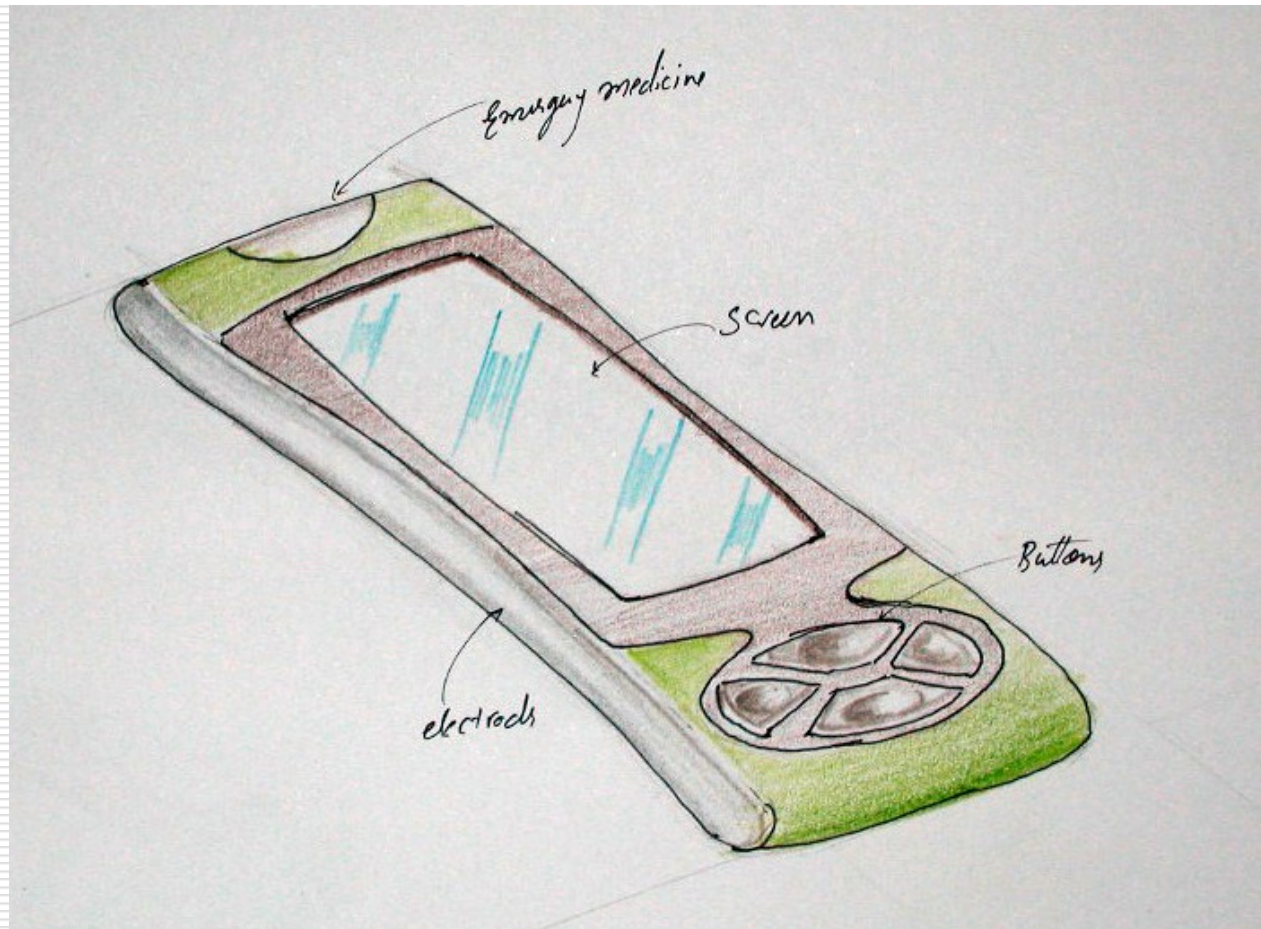
7 grades method by 10 users

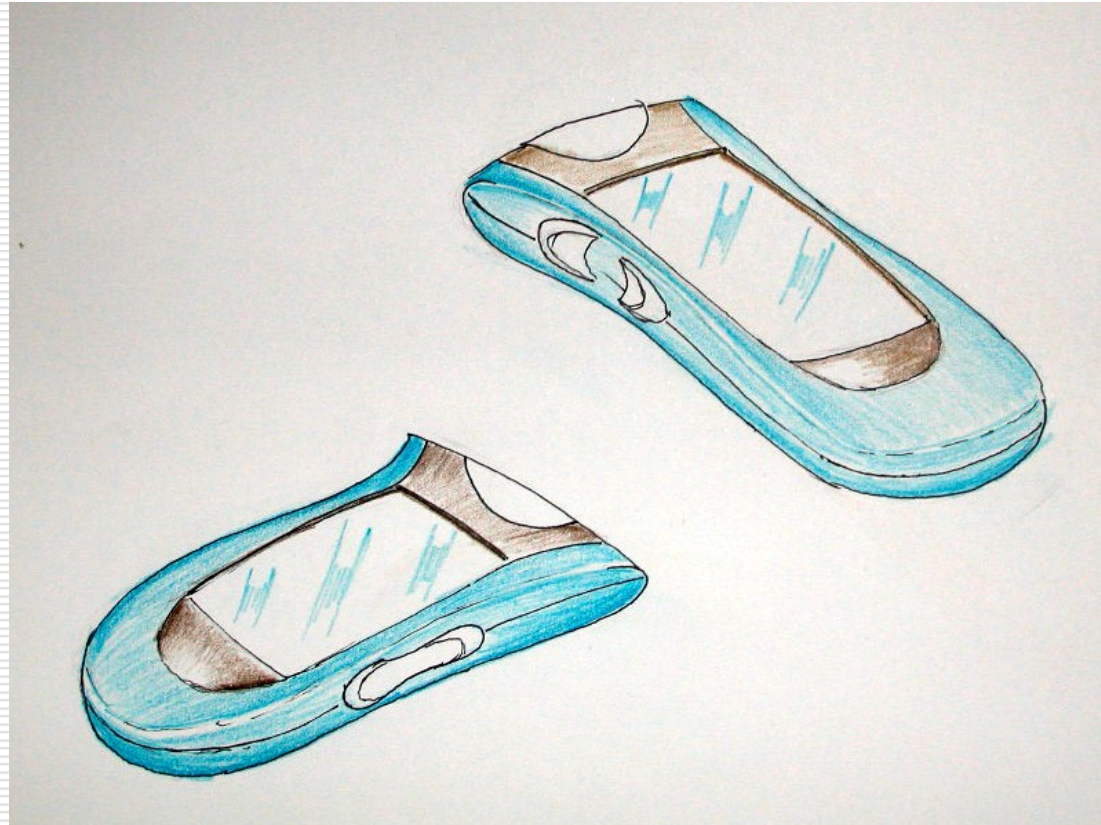
		C1.1	C1.2	C2.1	C2.2	C2.3	C3	
	Easy to operate	7	7	6	6	5	5	C1.1, C1.2
	Poor hearing condition	1	1	5	5	5	5	C2.1-C3
	Emergency situation	0	3	7	7	7	4	C2.1-C2.3
	Shacking hands	6	6	6	1	4	2	C1.1-C2.1
	Visual Interaction with device	0	3	5	2	5	3	C2.1,C2.3
	Activation feed back of device	1	6	7	6	6	7	C2.1,C3
	Addition	15	26	36	27	32	26	C2.1 key+ voice activated

first stage Evaluation of product placement ([quantitative test](#))

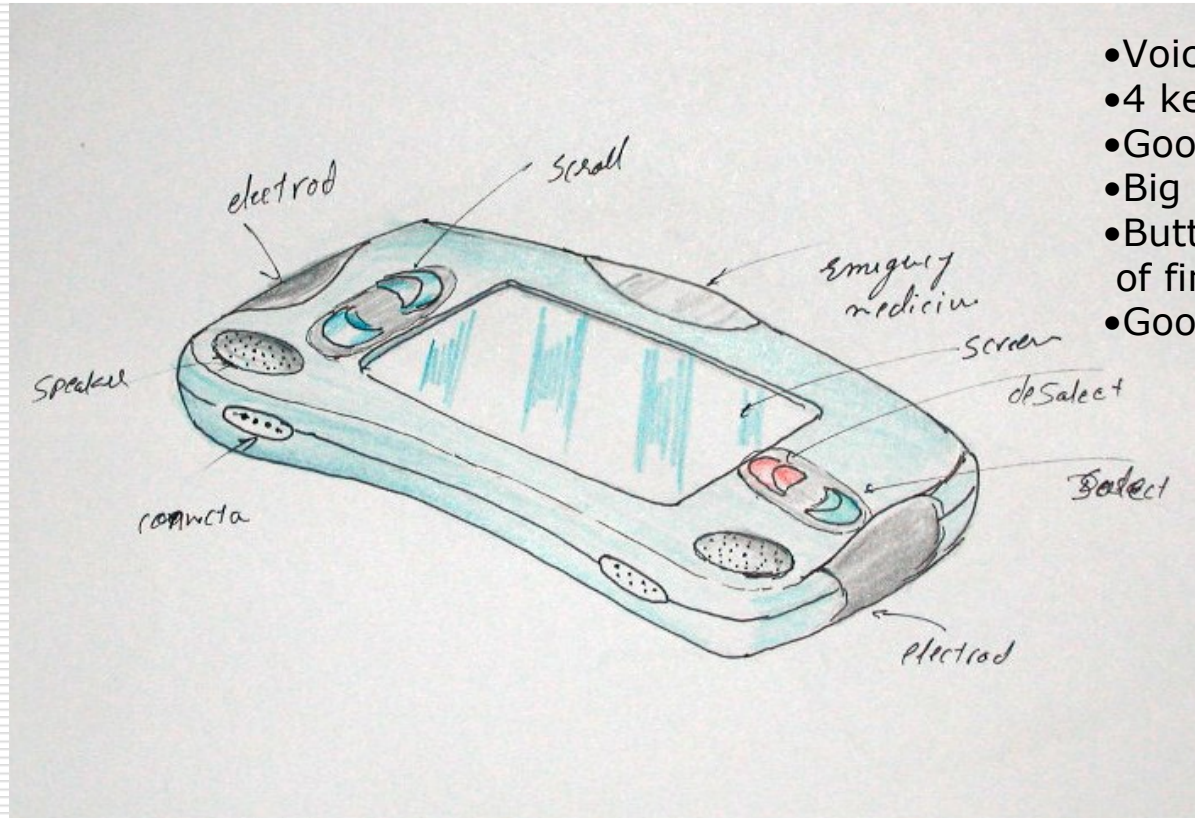
	Wrist mounted	In pocket	Hanging around neck	Belt mounted
User comfort 40%	20	30	30	35
Accessibility 30%	25	20	23	19
Safety of device 30%	25	15	24	28
Average	70	65	77	82

Second stage concept generation





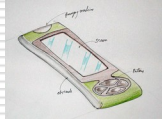
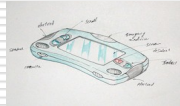
- Voice + key activated
 - 4 key operation easy to operate
 - Good grip of one hand
 - Big screen
 - Buttons location at natural position of fingers as you grip on device
 - Good grip of fingers on buttons
-



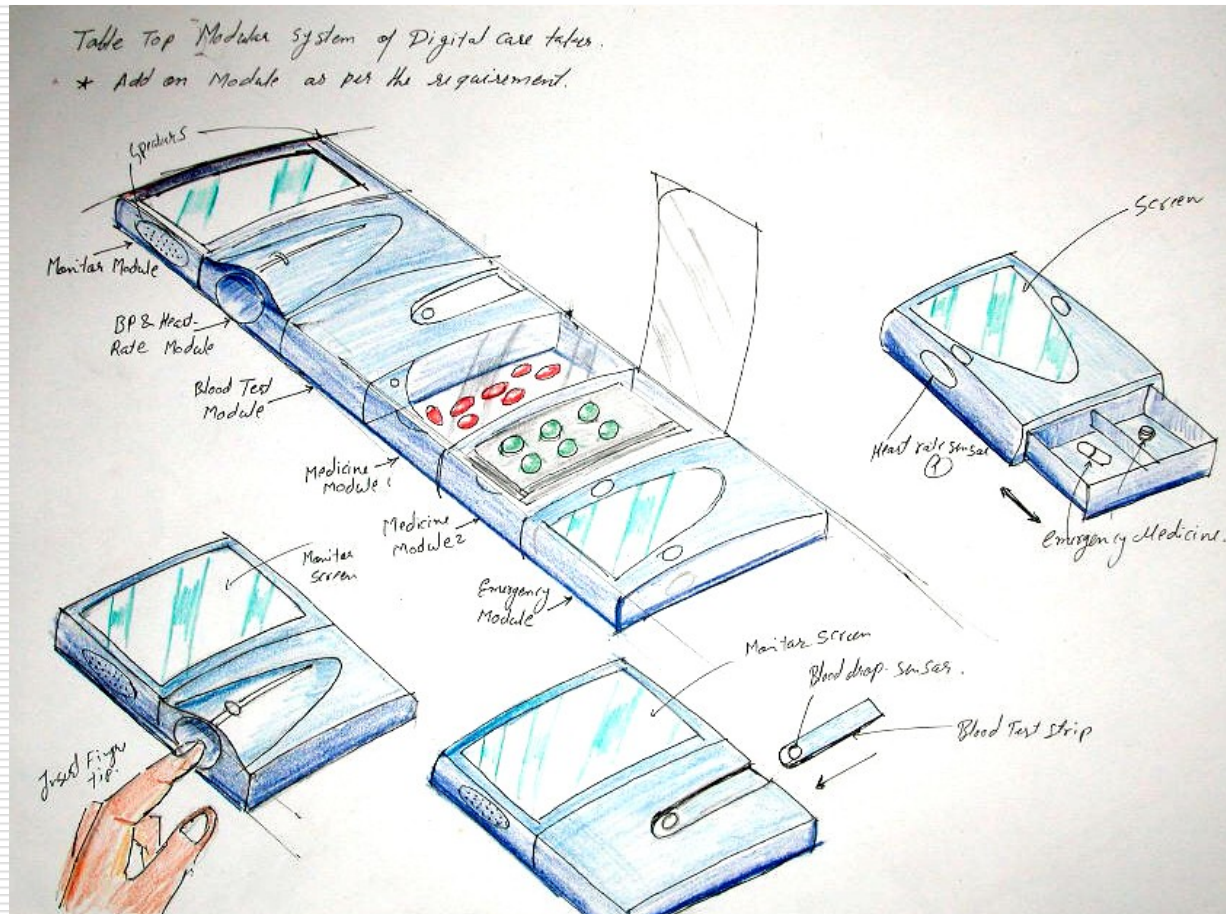
- Voice + key activated
- 4 key operation easy to operate
- Good grip by two hands
- Big screen
- Buttons location at natural position of fingers as you grip on device
- Good grip of fingers on buttons

Second stage Evaluation (qualitative test)

7 grades method by 10 users

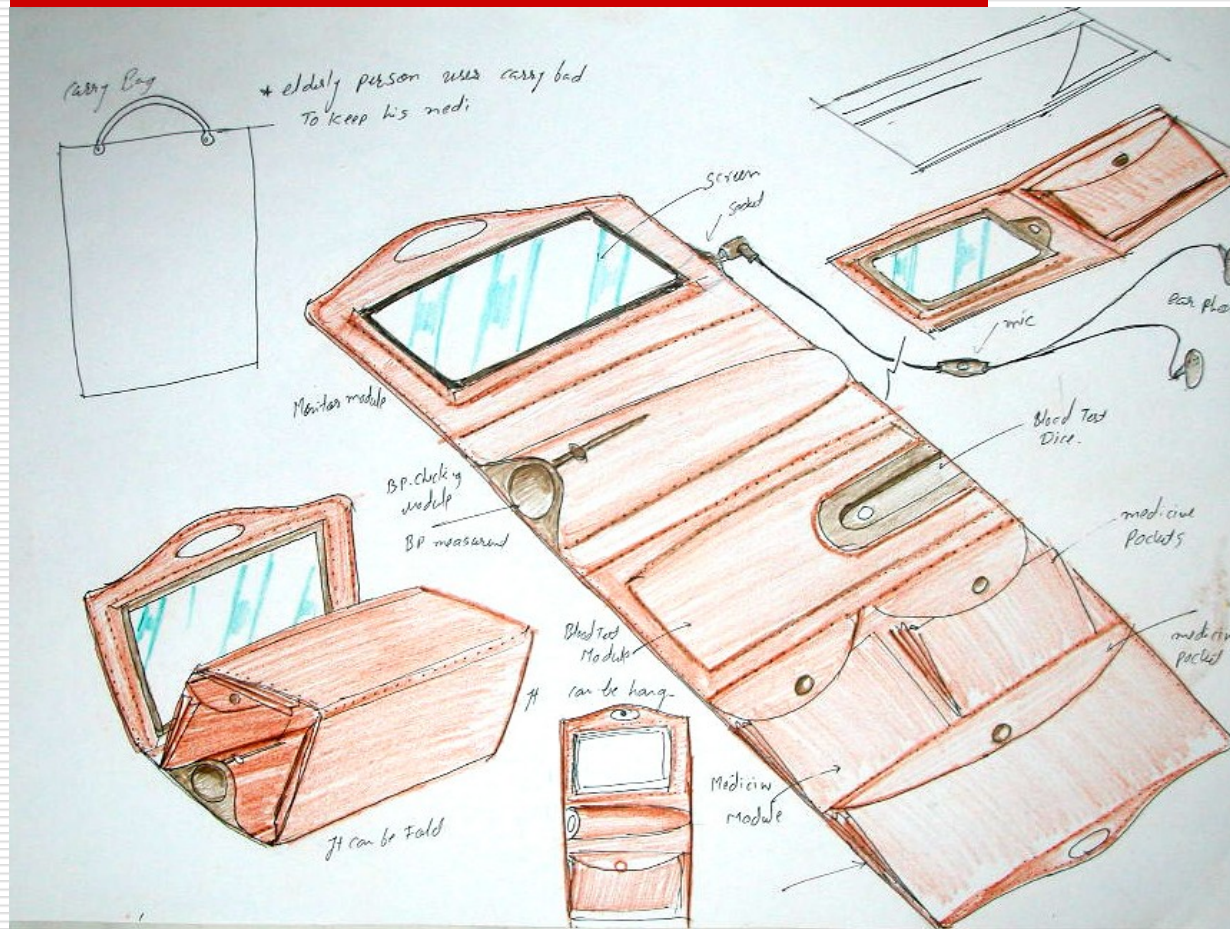
				
	Ergo grip	6	6	7
	Shaking hand	3	3	7
	Finger fatigue	5	3	6
	Visibility	4	4	7

Second part of device concept 1.1



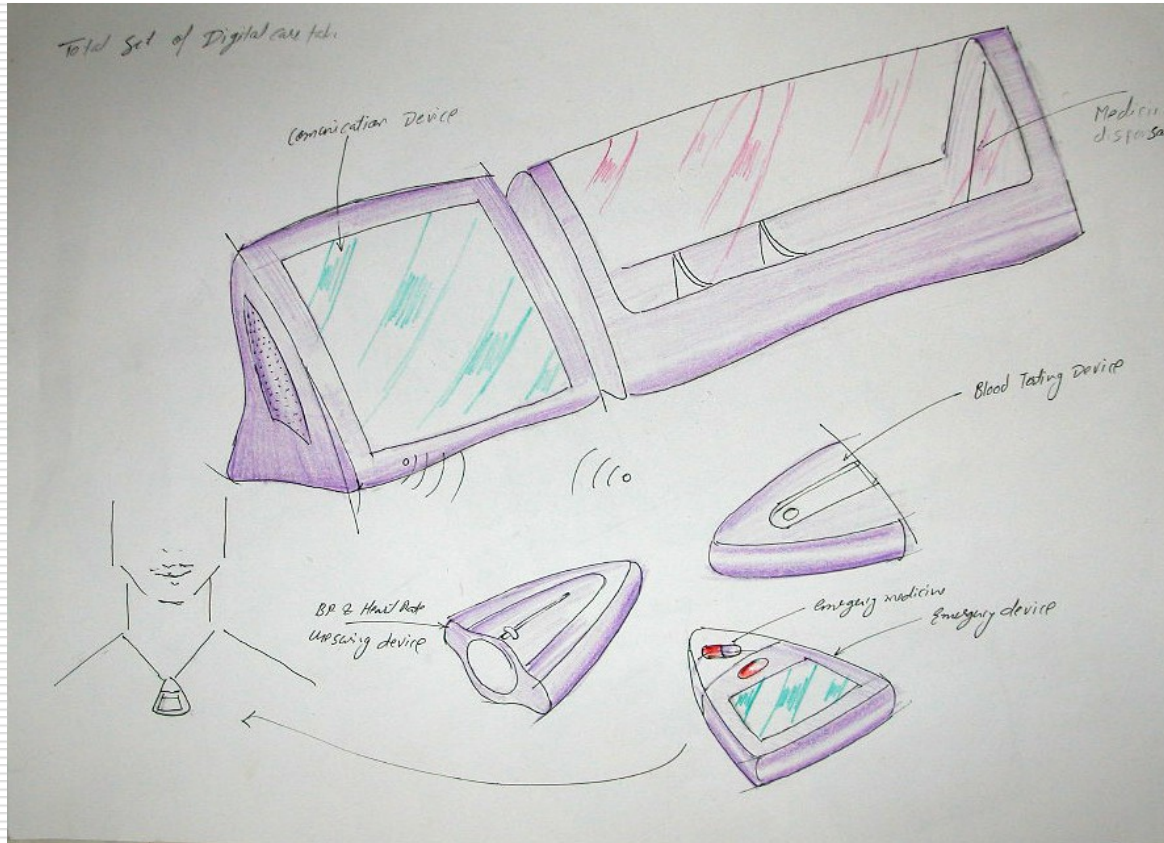
Modular system gives flexibility of add on as per the requirement

concept 1.2



Modular system
By using leather material
This modular components is
staying together with single
case

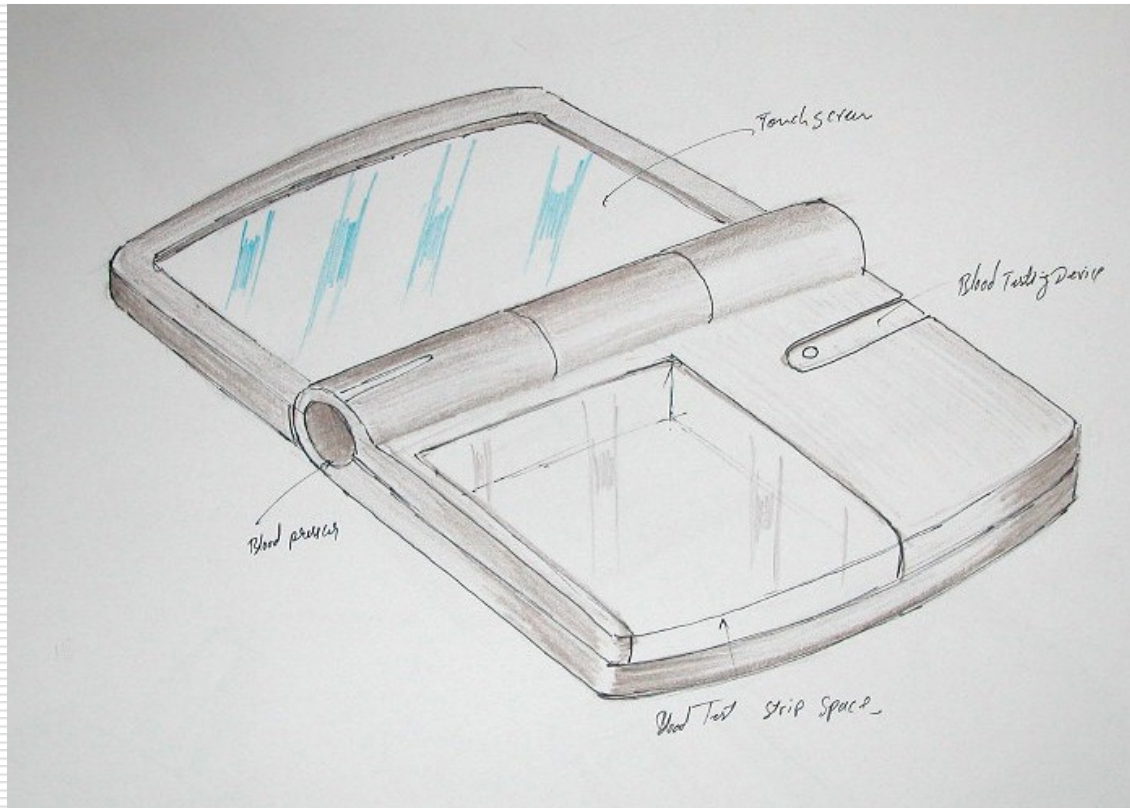
concept 1.3



Modular system as a
Table top

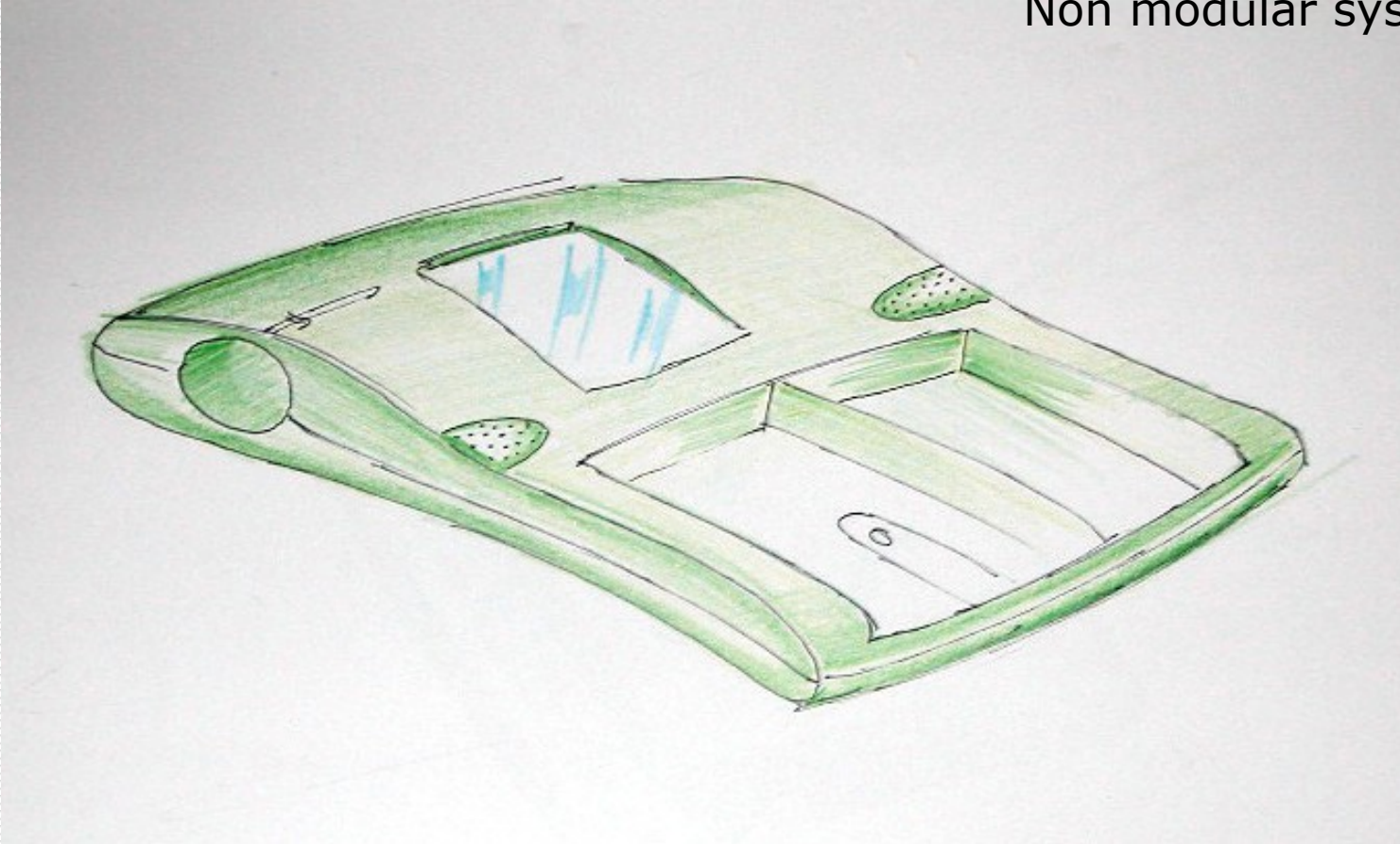
concept 2.1

Non modular system system



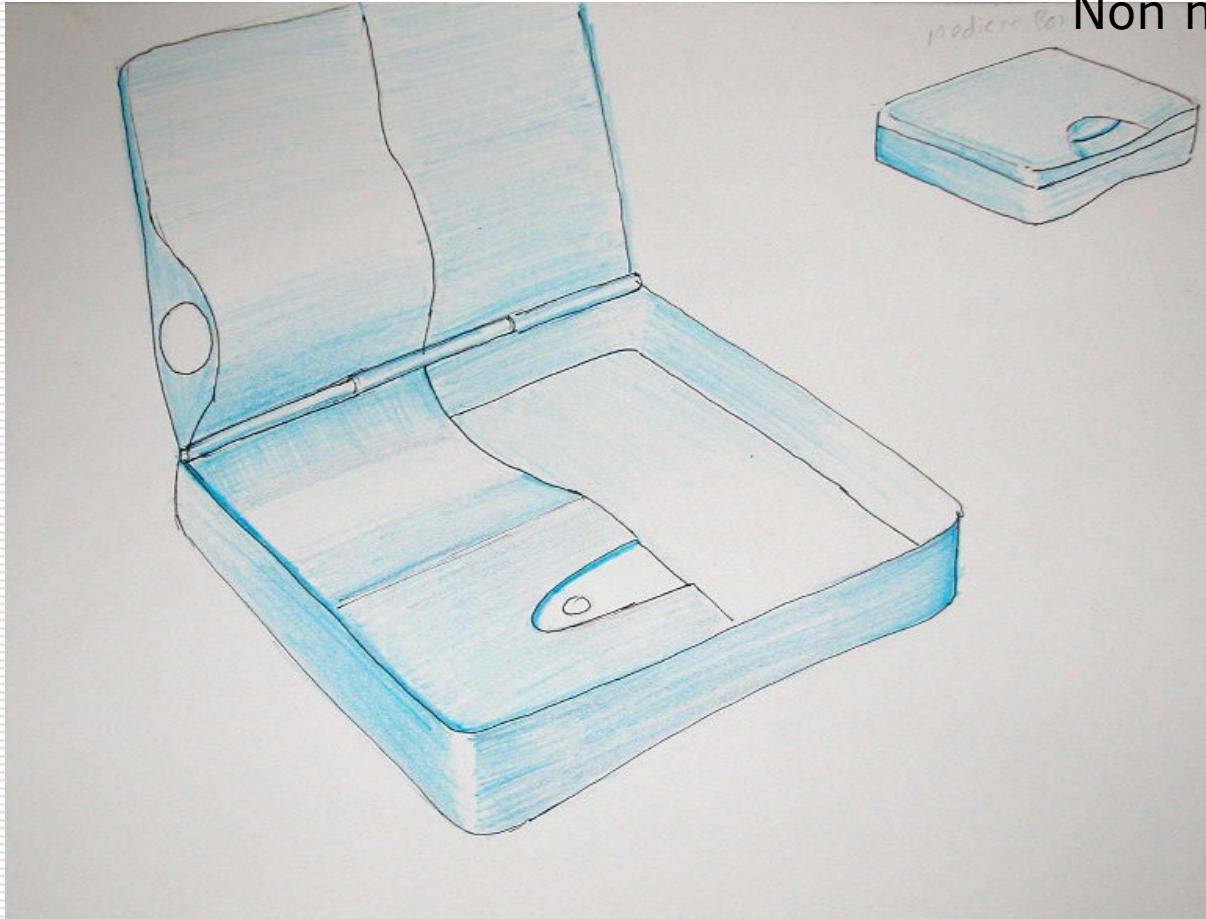
concept 2.2

Non modular system system

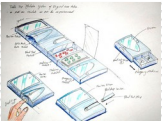
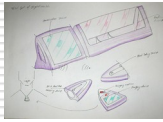
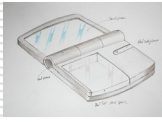
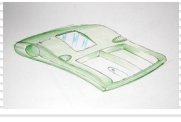


concept 2.3

Non modular system system

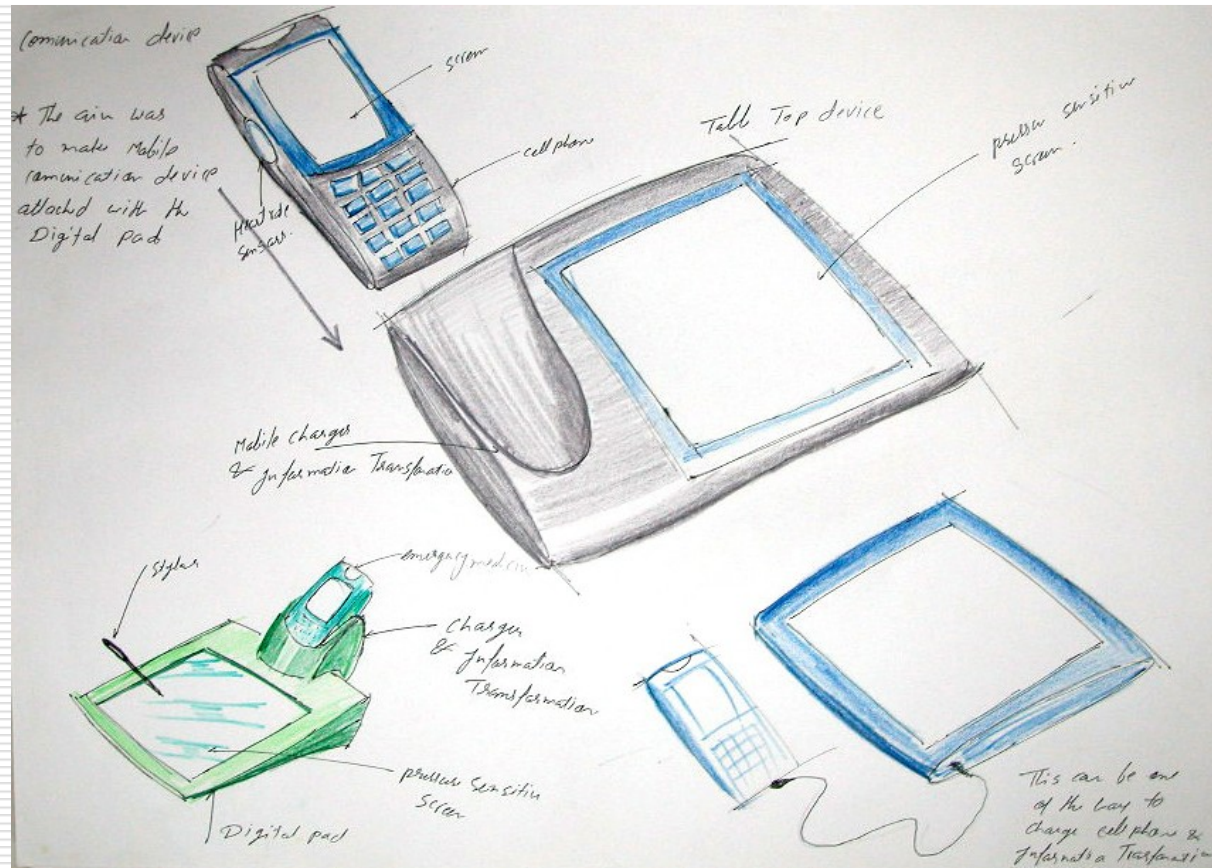


First stage evaluation of modularity (quantitative test)

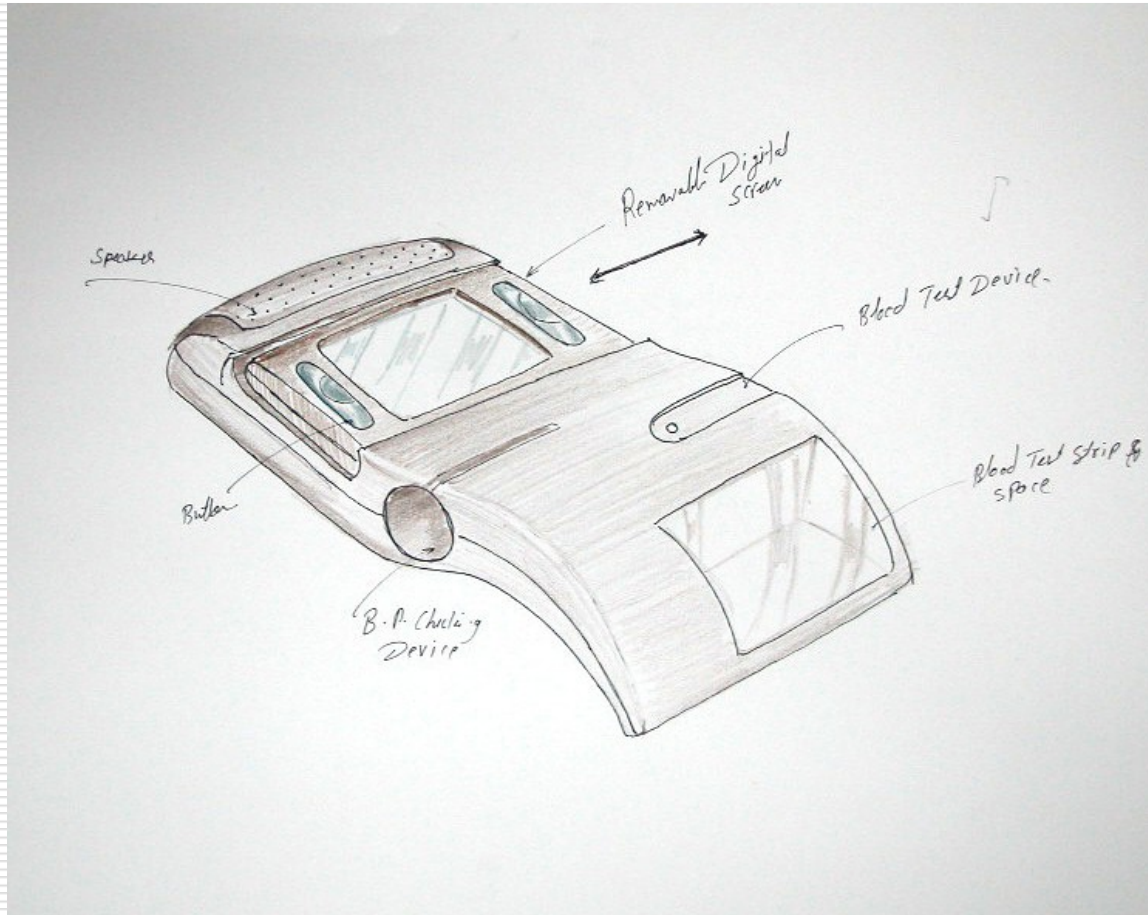
	C1.1 	C1.2 	C1.3 	C2.1 	C2.2 	C2.3 
Poor memory of an elderly person 10%	2	4	3	7	7	7
Shacking hands 10%	5	5	5	8	8	10
Easy to operate20%	10	15	12	15	15	15
Power supply 30%	5	25	10	30	30	30
Changeability As per requirement 30%	30	25	30	0	0	0
	52	74	60	60	60	62

The system must be modular but, all modules must be in single case

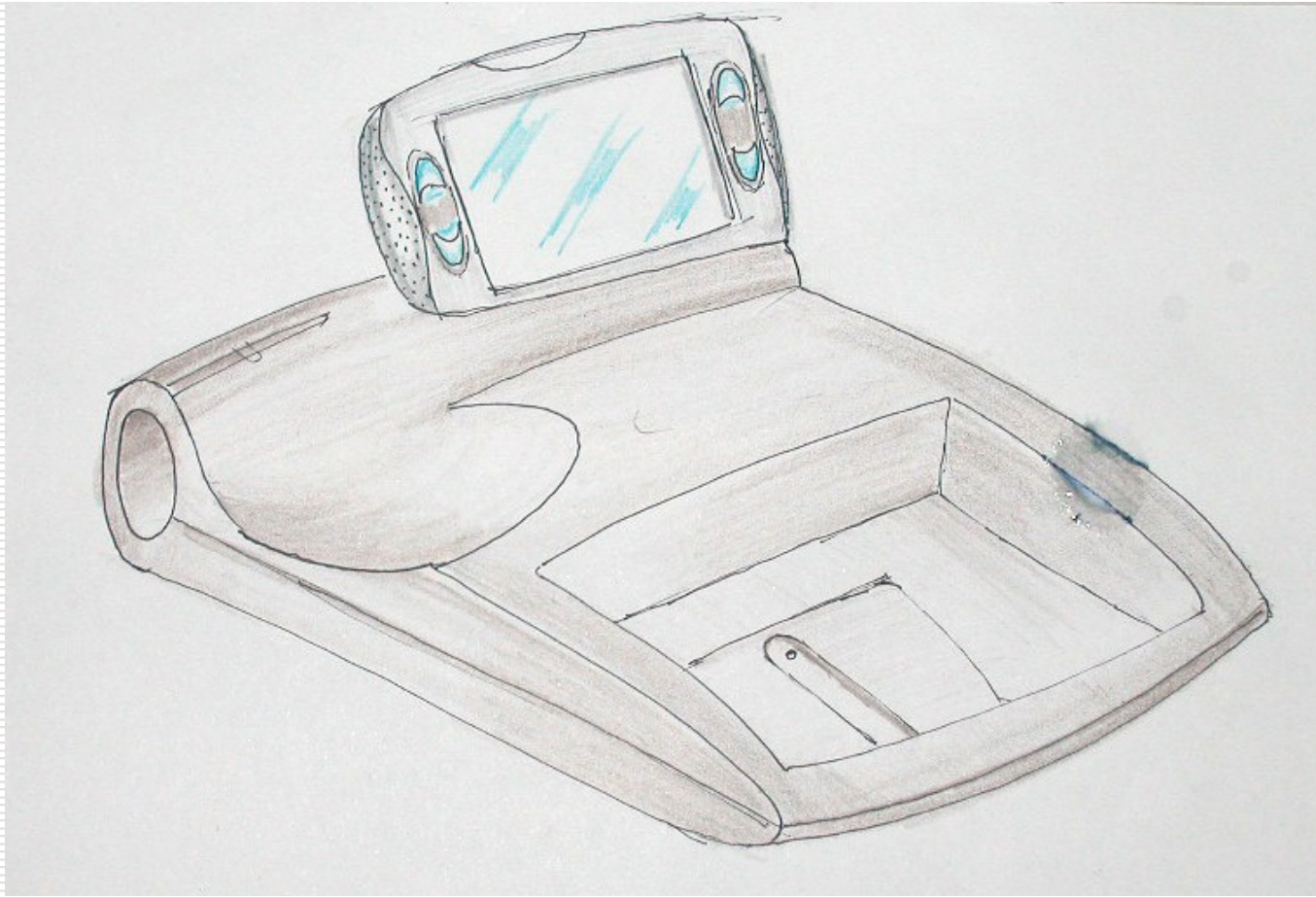
Mobile & stationary device relationship



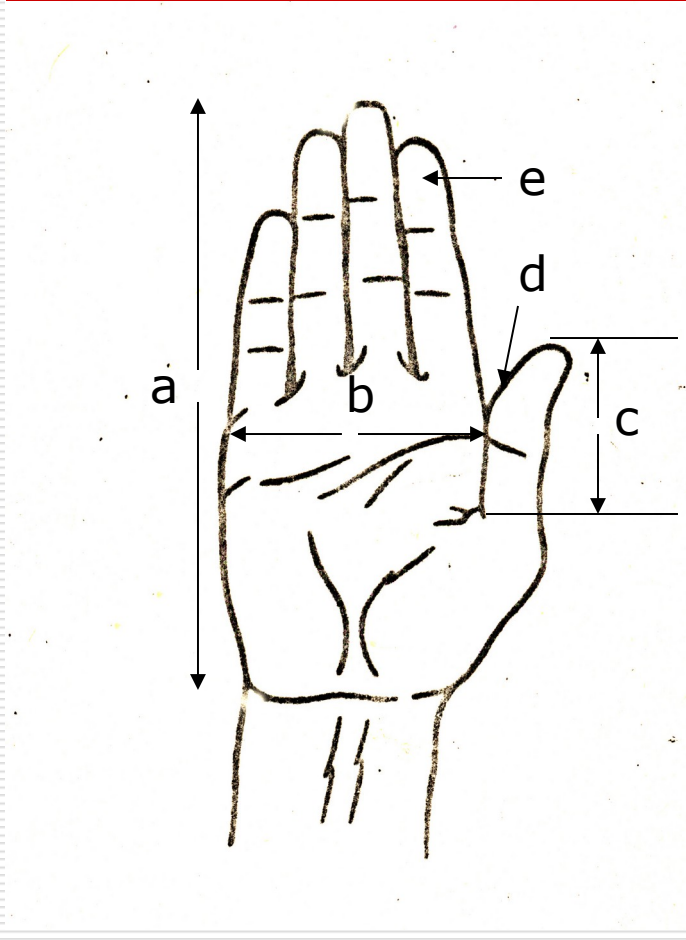
Mobile & stationary device relationship



Mobile & stationary device relationship



ERGO GRIP



- a) Height of palm 160-200mm
- b) Breadth of hand 55-80 mm
- c) Height of thumb 55-70mm
- d) Breadth of thumb 18-25mm
- e) Breadth of finger 15-20mm

Thermocol models



Third stage evaluation of product (quantitative test)
Mobile device



a



b



c

grip	form
4	5
6	4
6	6

9

10

12

Thermocol models



Third stage evaluation of product (quantitative test)
stationary device

Table top device



a



b



c

usability	form
3	5
6	7
5	6

8

13

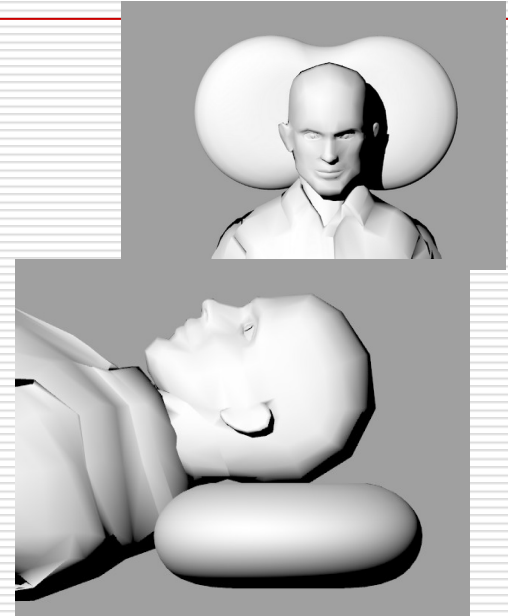
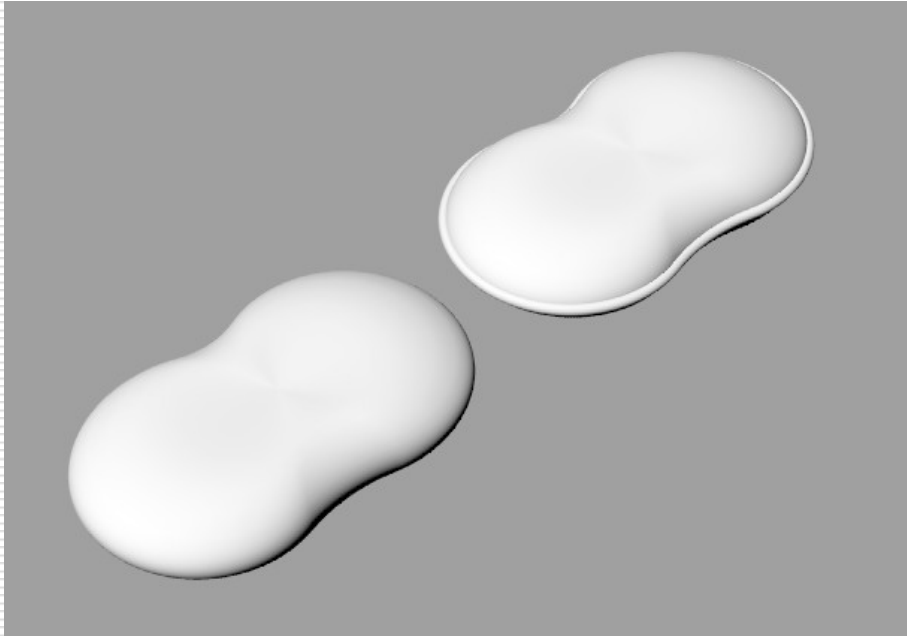
11

Problem with B.P. checking



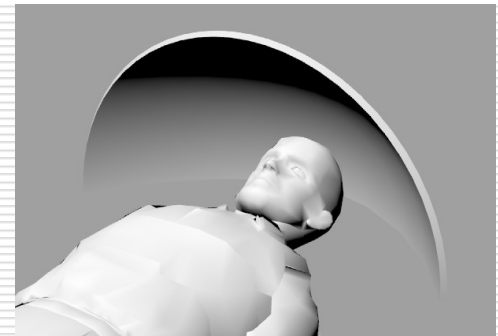
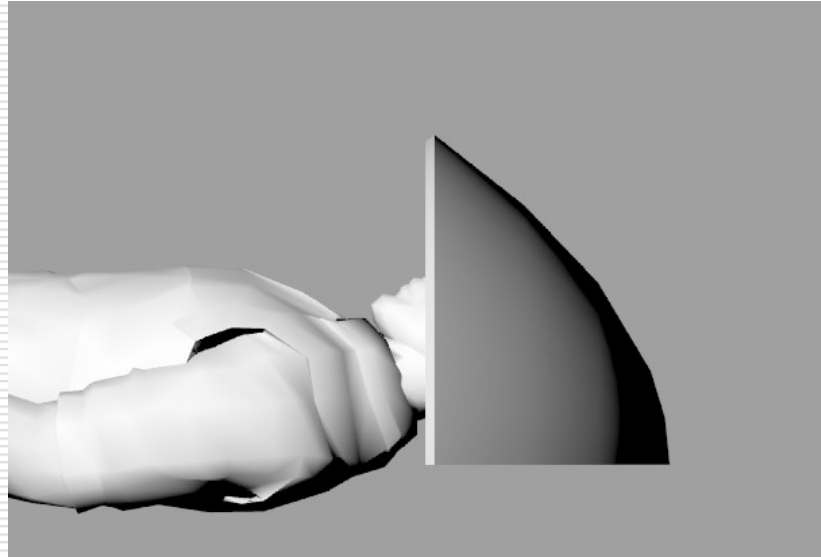
It is difficult to insert finger from side,
difficult to create sufficient hand space

Speaker system concept 1

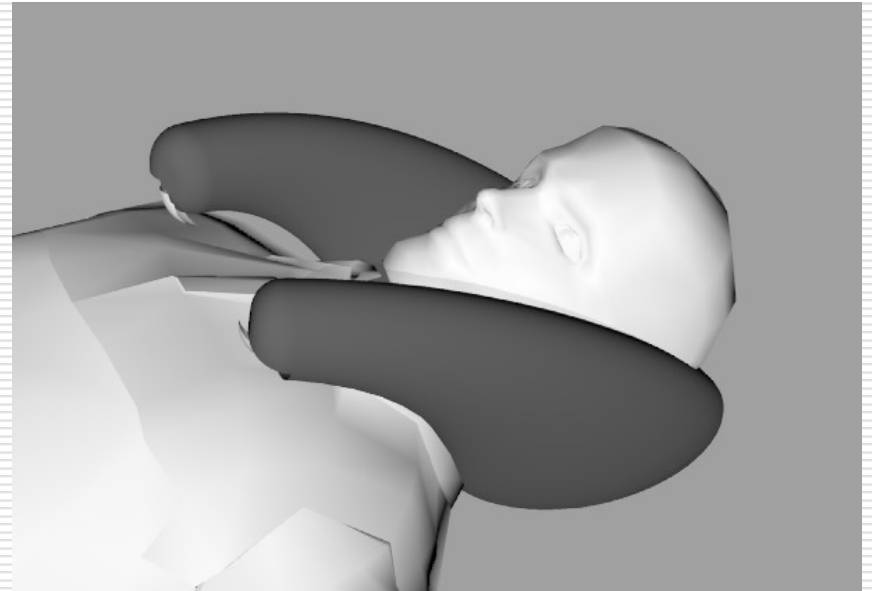
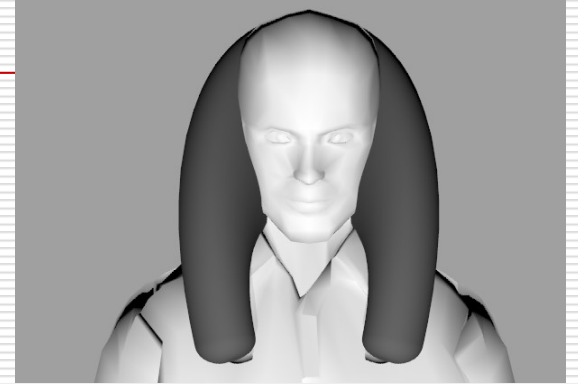


Inbuilt speaker system

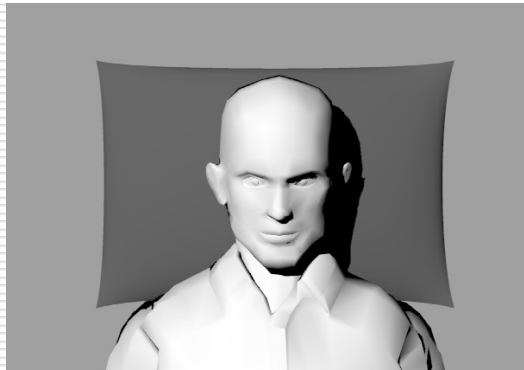
Speaker system concept 2



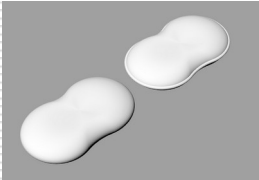
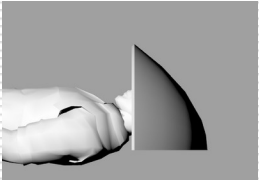
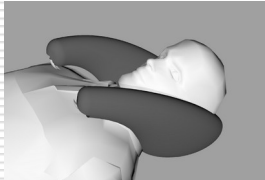
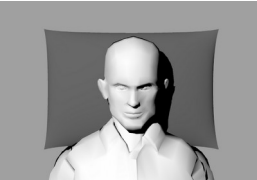
Speaker system concept 3



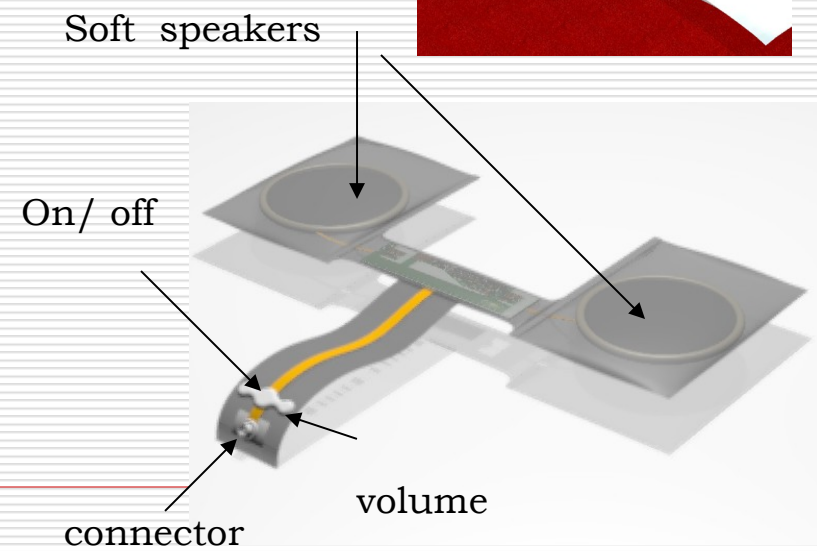
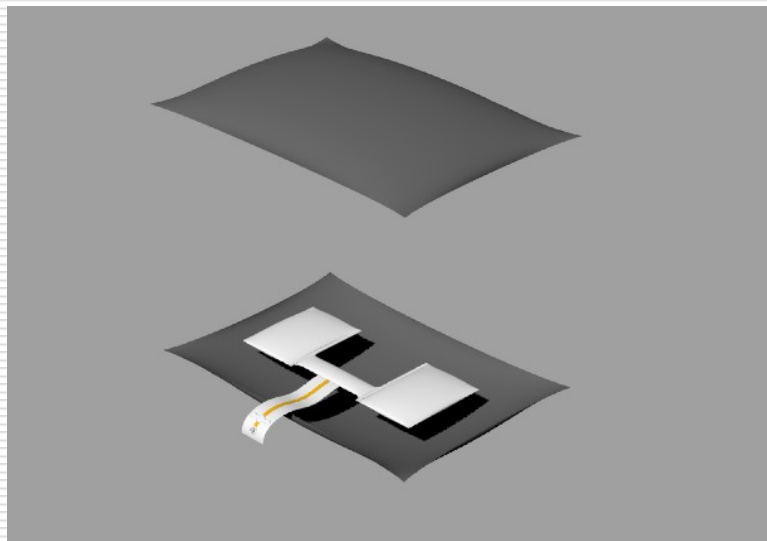
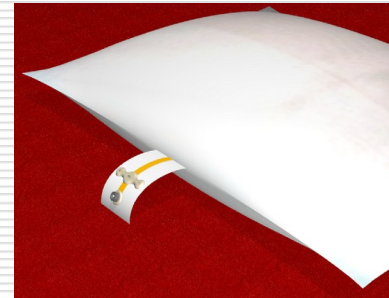
Speaker system concept 4



Evaluation of concepts

					
Comfort	5	2	1	7	
Familiarity	5	0	4	7	
	10	2	5	14	

Final speaker system



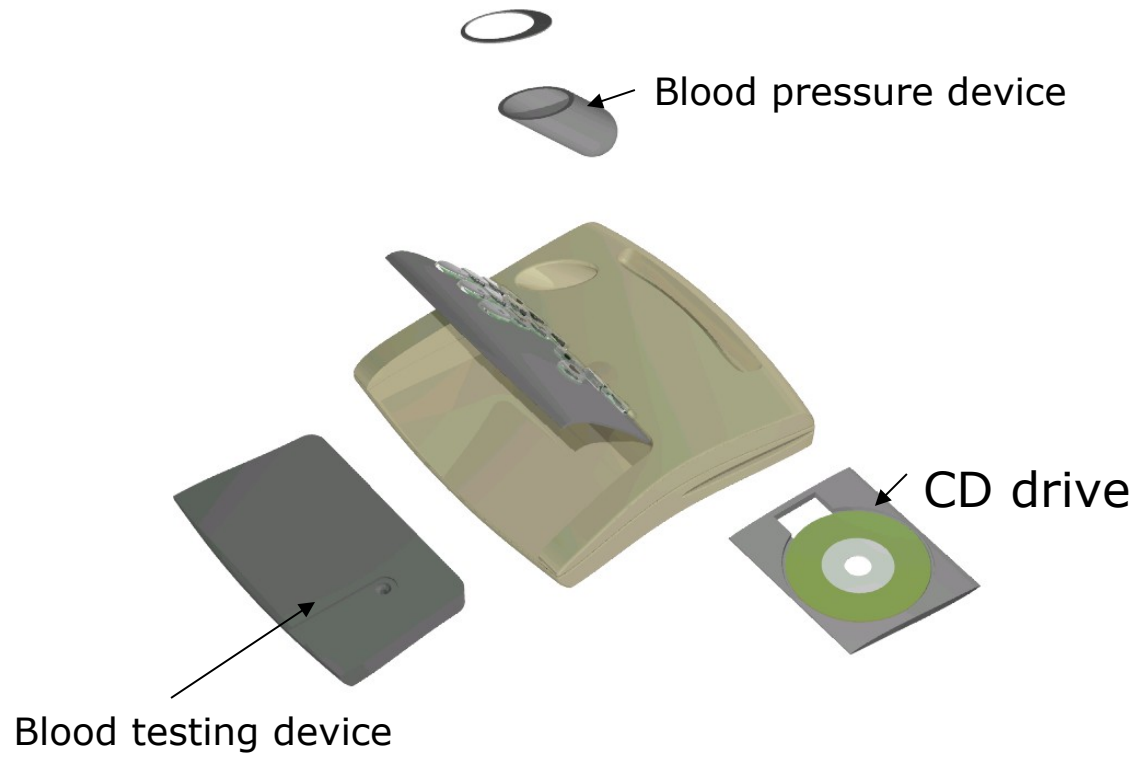
Final product



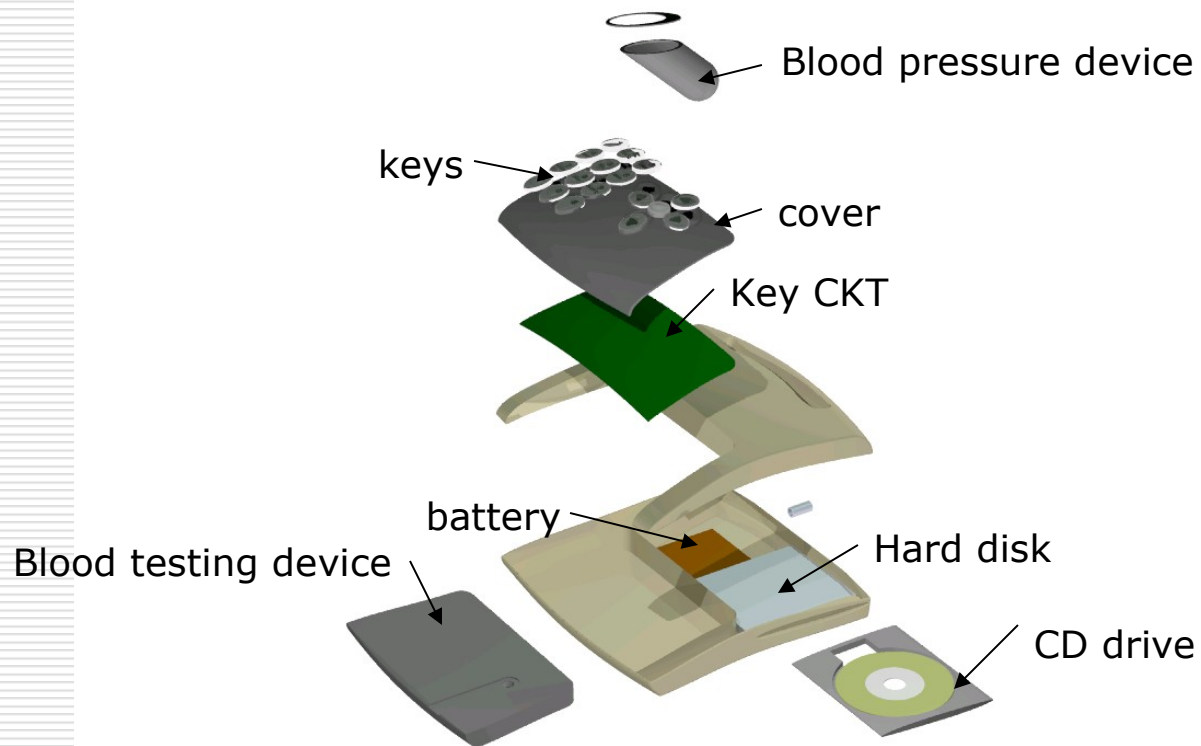
Final product view



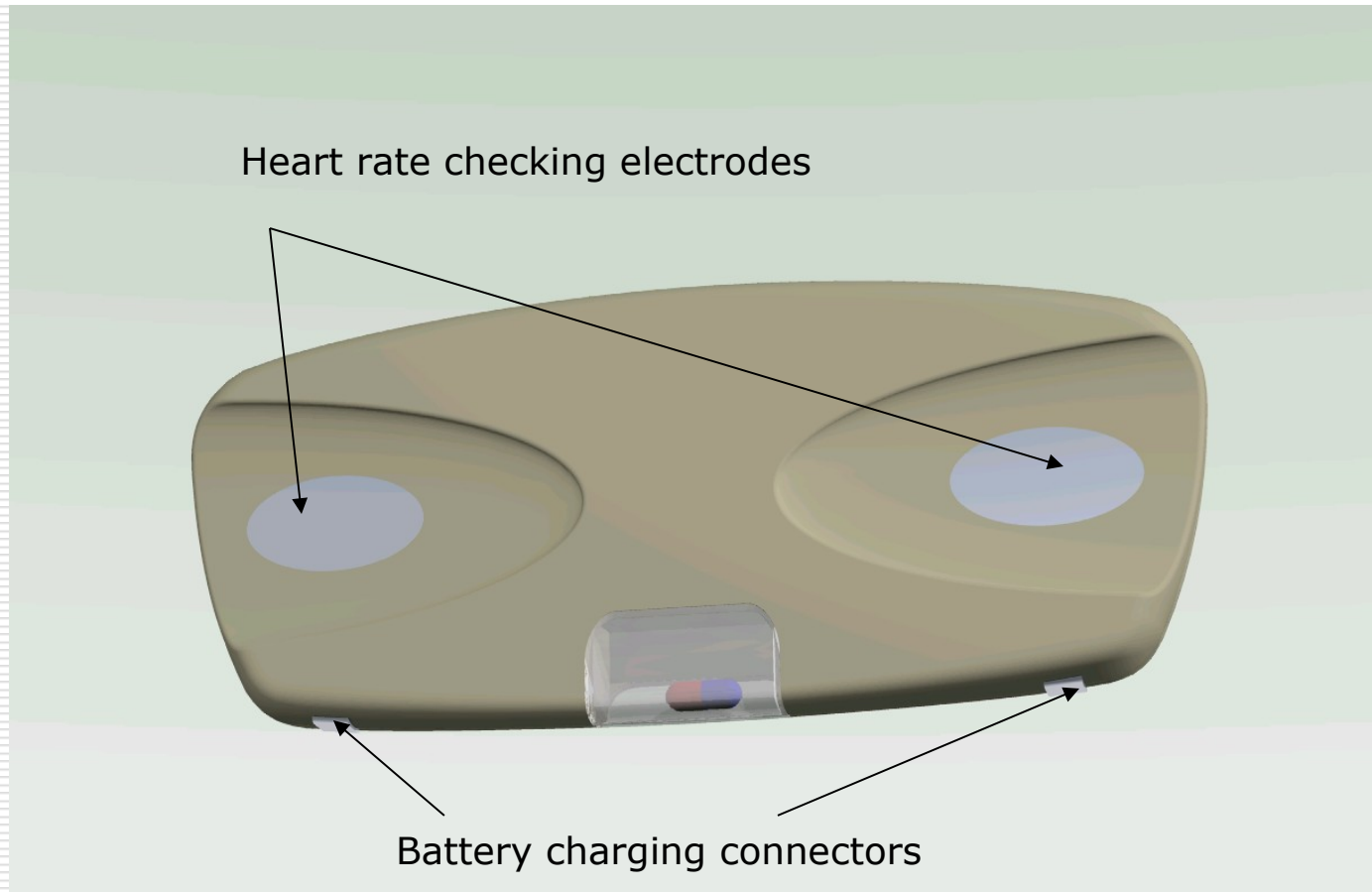
Modularity



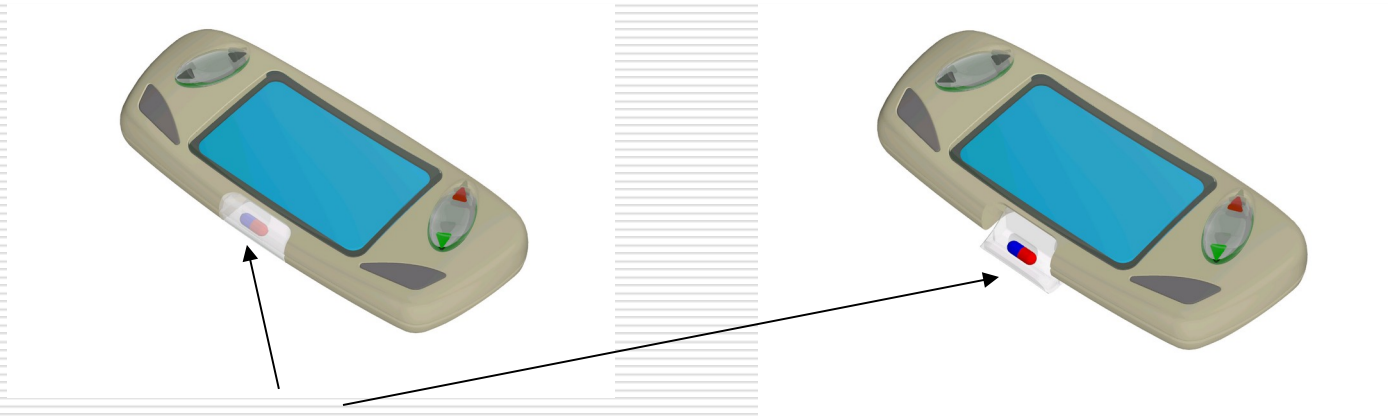
Internals of table top device



connections

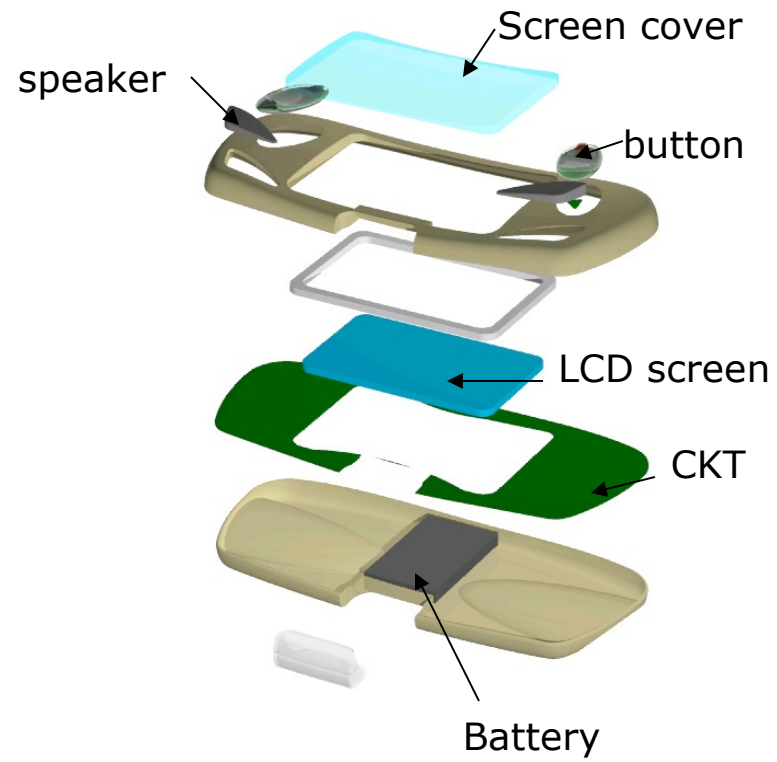


Emergency medicine

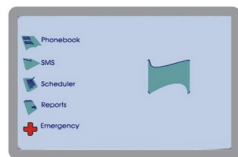


Emergency medicine

Internals of mobile device



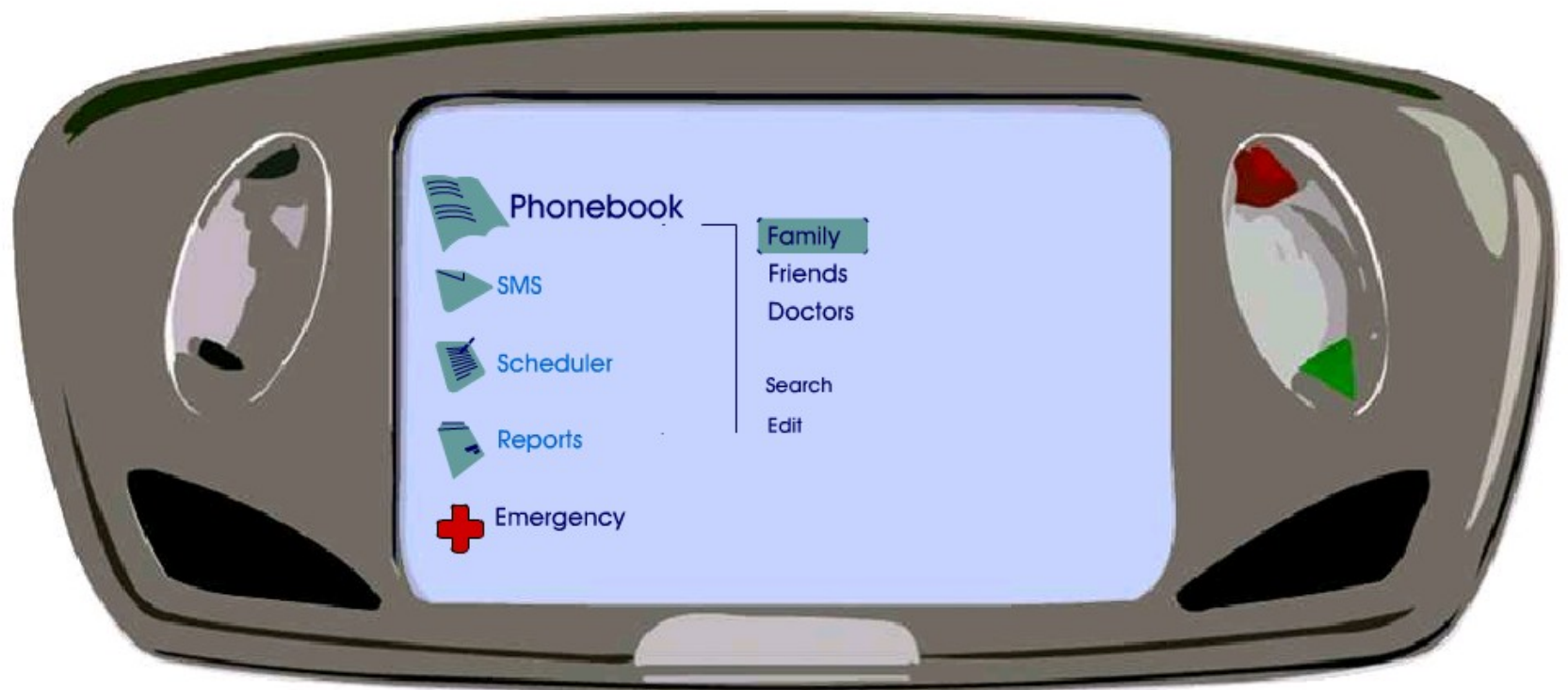
Buttons

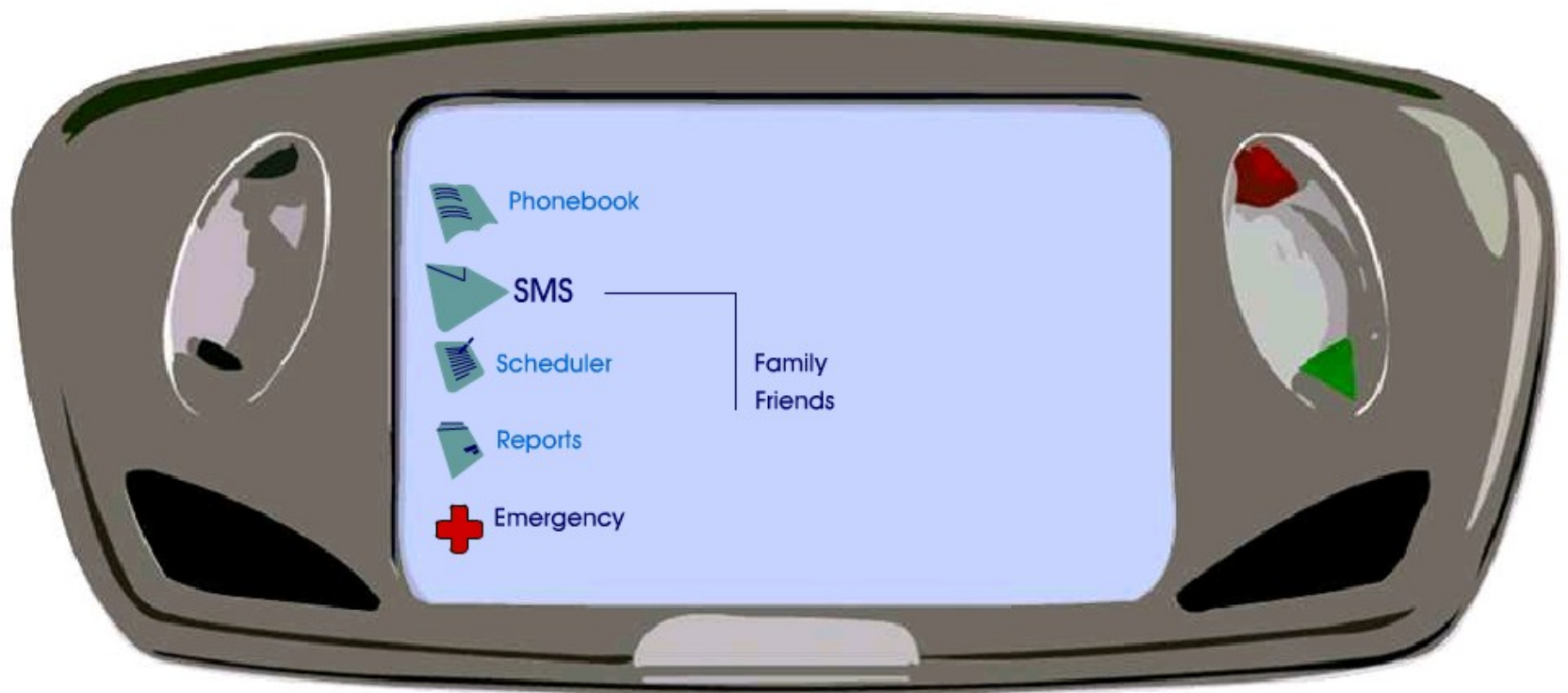


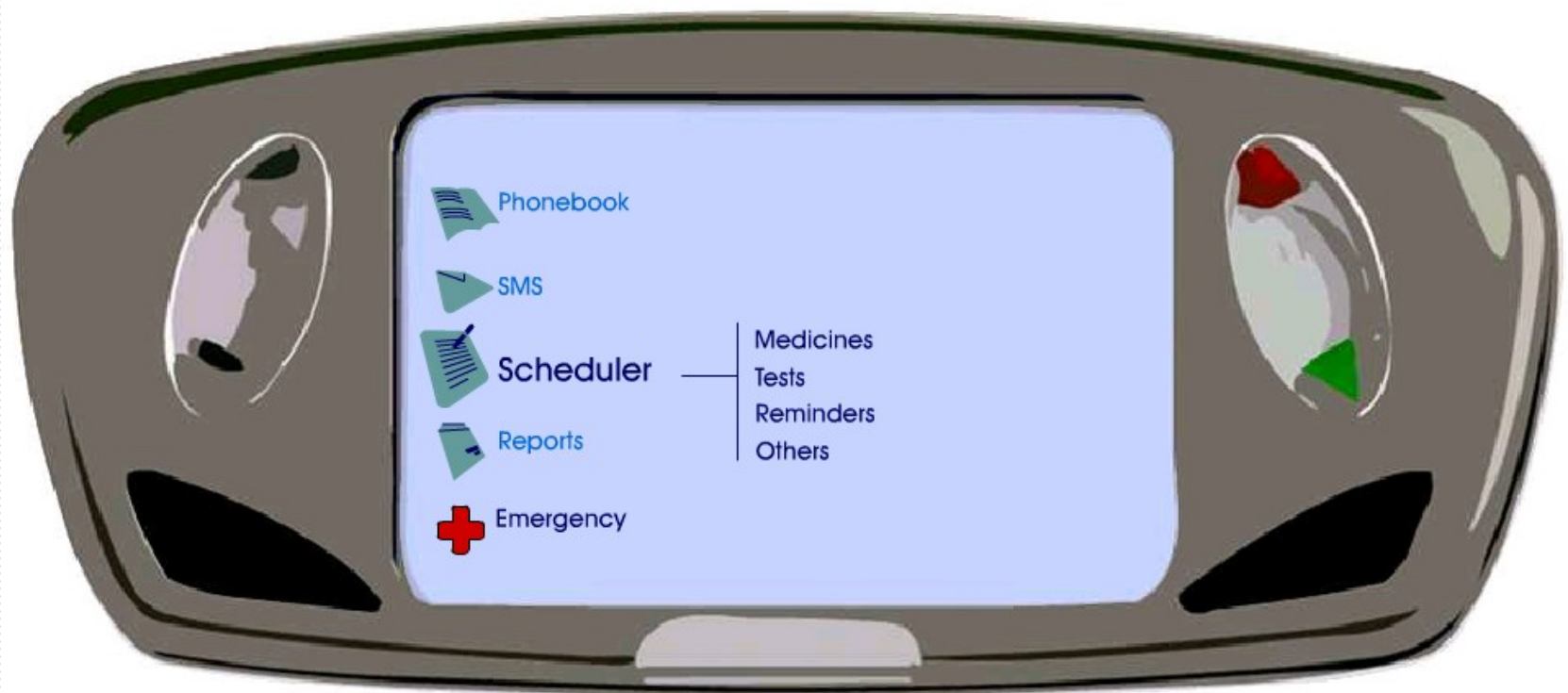
Scenario generated to solve Memory problem

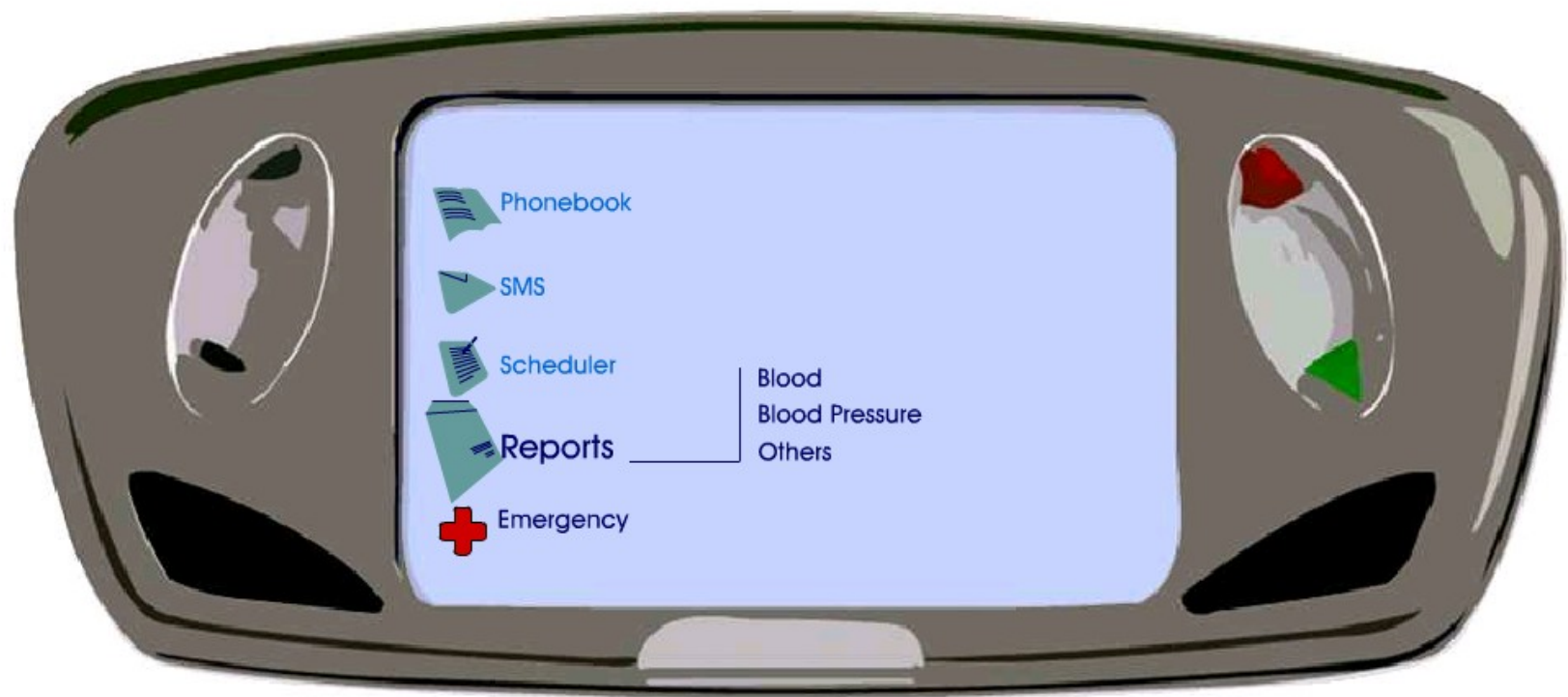
- Morning wakeup call
 - Weak up call with religious song/favorite music/ grand son voice recording There must be feel
 - Today's schedule & task over view
 - At the time of task
 - medicine timing
 - A special day
-













Material

- 1) ABS (Acrylonitrile Butadiene Styrene)
 - 2) polyphenylene oxide
-

Suggested material



polyphenylene oxide (PPO) It exhibits

- 1) low moisture absorption
- 2) Good electrical insulation properties
- 3) wide temperature range
- 4) humidity range
- 5) It has superior impact strength
- 6) long-term dimensional stability

it is used in business equipment, appliances, electronics and electrical applications.

Thank you
