

HealthScreening Device

*Designing of a primary health check up
kiosk for HealthATM group.*



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HealthATM[®] About HealthATM

Health ATM is a self-sustaining walk-in telemedicine kiosk aimed at providing quick and affordable primary care services at convenient locations.

The Cause

- *Well being -primary concern*
- *The changing lifestyle, growth in modernization- an unhealthy diet- various health issues.*
- *Affect both genders equally , early ages*
- *Initial discomfort –usually ignored.*
- *People respond only when symptoms are visible*
- *Visible symptoms appear too late- leads to chronic condition*
- *Detection and prevention? Technology not easily accessible*

the Cause Diabetes

- *Excess sugar through urine*
- *Pancreas do-not produce enough insulin*
- *Body cannot effectively utilize insulin*
- *Damage to vital organs- eyes, kidneys etc.*
- *No known cure- only regulation*

the Cause

Heart Diseases

- *How ? Cholesterol, smoking, BP, hereditary, obesity*
- *Most vital part of body*
- *Cholesterol deposits in arteries*
- *Rupture, blood clot, blocked flow*
- *Hypertensive heart diseases – High Blood pressure*
- *Inflammation*
- *Symptoms – chest pain, breathlessness, sweating, pain in abdomen, shoulder, back, nausea, indigestion etc*
- *Detection and prevention is best*

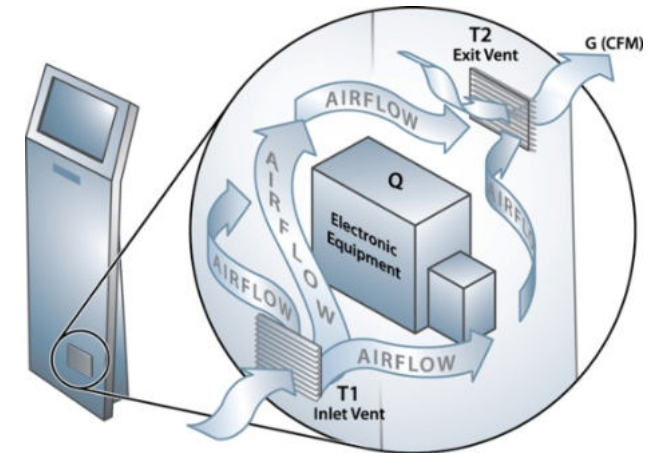
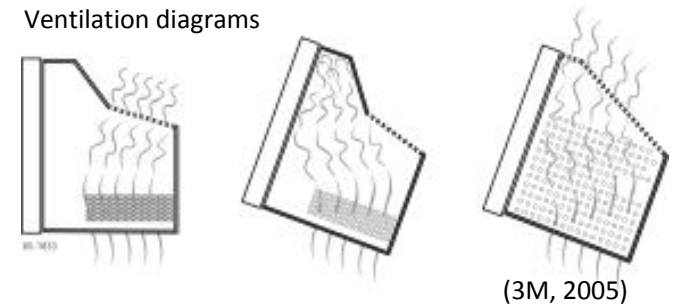
The Context

- *People wait till symptoms get severe*
- *Expenditure for a check is high and is an issue*
- *Time and expense involved in getting a check done*
- *Don't want to visit a doctor for checkups*
- *Diagnostic centres – fraud*
- *Invasive procedures- scary*
- *Don't want public to know about one's condition.*

The Context Kiosk Design

- Size, appearance
- Cost
- Location
- Maintenance
- Usability for the target group
- Ergonomics
- Ambience
- Security for components and parts
- Visibility of the interactive medium
- Ventilation
- Vandal
- Electro Magnetic Interference.

Ventilation diagrams



(John Jedrzejewski, 2006)

The Context Equipment study

Personal medical devices have become common

- *Glucometer*
- *BP measuring device*
- *Pedometer*
- *Weighing scale*
- *Body fat analyzer*
- *ECG measurement*
- *Easy to use*
- *Connectivity with smart phones*
- *Need proper maintenance*

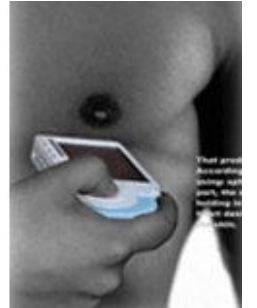


<http://suntechmed.web4.hubspot.com>

<http://www.infobarrel.com>



<http://www.rdsm.be>



The Context

Equipment study

- *The device performs much more*
- *than what is expected, powerhouse performance.*
- *Too much pre-information needed*
- *Instructions to the patient need to be*
- *delivered very clearly*

- *The common perception - ECG is hospital environment diagnostic test*
- *Machine ensures fairly good results*

- *One of the most common and fairly*
- *accepted diagnostic devices*
- *Very useful for BP patients and post-operative home care*

The Context

Synchronic

Analysis

- Similar products exist in nature*
- *Pharma-Smart Model PS-2000 measures blood pressure and pulse rate*
 - *Uses smart card*
 - *Claims Clinical accuracy*
 - *convenient results in terms of sms and other digital medium*
 - *lack of privacy*
 - *Visibly sophisticated*



<http://www.pharma-smart.com/>

The

Comprehension

Diagnostic clinic or

Invest in purchasing all the equipments

Diagnostic centre –

Results available ONLY after 5-6 hours or

A day or two

Need prescription

If buying - minimum of 5500 INR for the cheapest products

Thus there is a scope for such a monitoring kiosk which can save both time and money and provide the user with accurate results.

The

Expert's Opinion

Mobile phone interference

Atmospheric effects affect

The invasive tests will not be affected by the extraneous interference.

Needs to be calibrated once in a while

A relaxed resting position will lead to better results

The Check

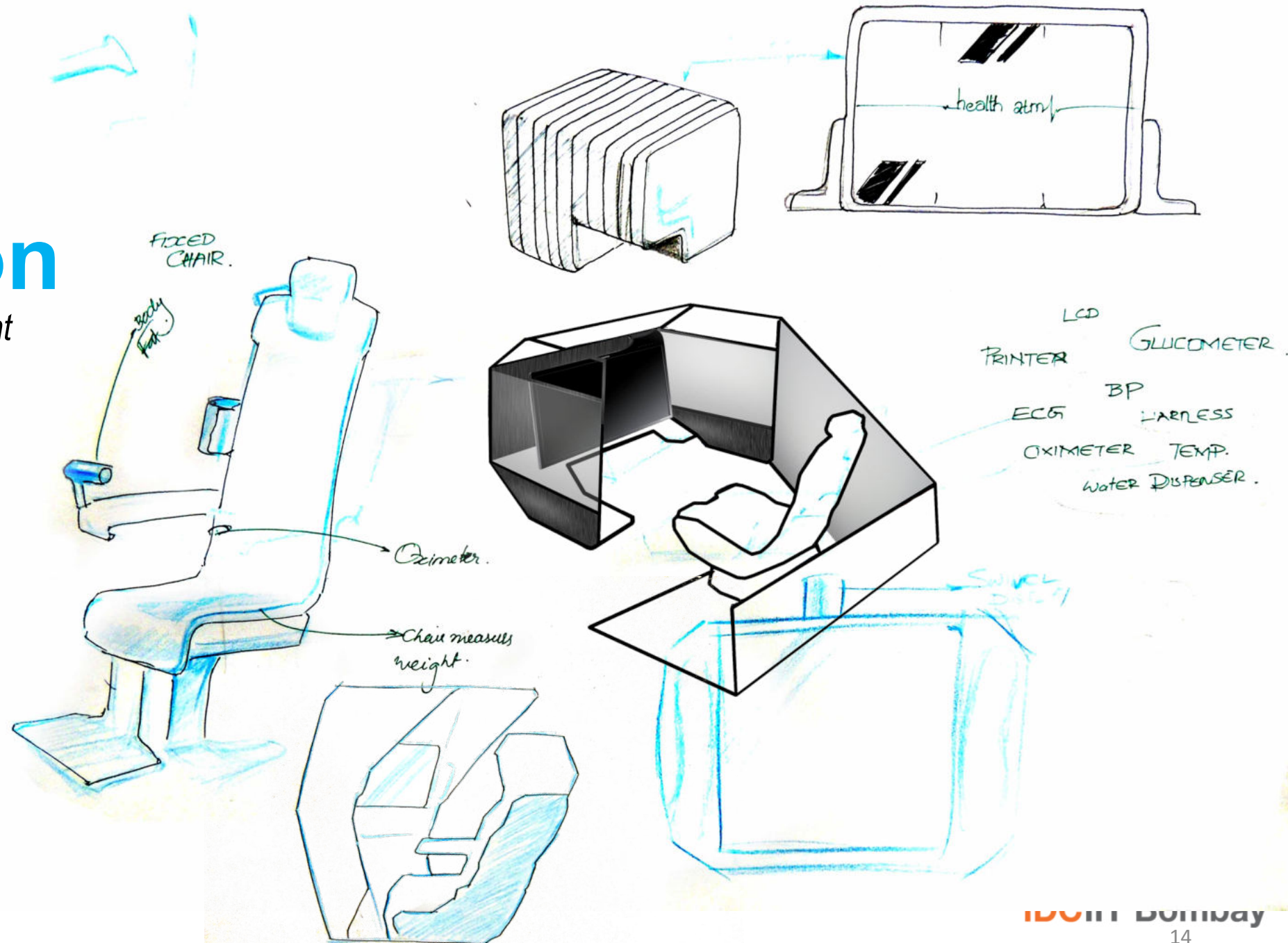
The aim of the project is to create an automated self operated health kiosk which can facilitate quick access to primary and preventive health care and provide the user with a primary health report. The kiosk is proposed to have components such as:

- Height measuring device*
- Weight measurement device*
- Full body Sensor*
- ECG Monitoring device*
- Blood pressure monitoring device*
- Blood Glucose level monitor*
- Oximeter*

These units will be integrated using a Raspberry-Pi unit and would provide the user with primary health information.

The Ideation

Initial ideations for different
configuration



The Ideation

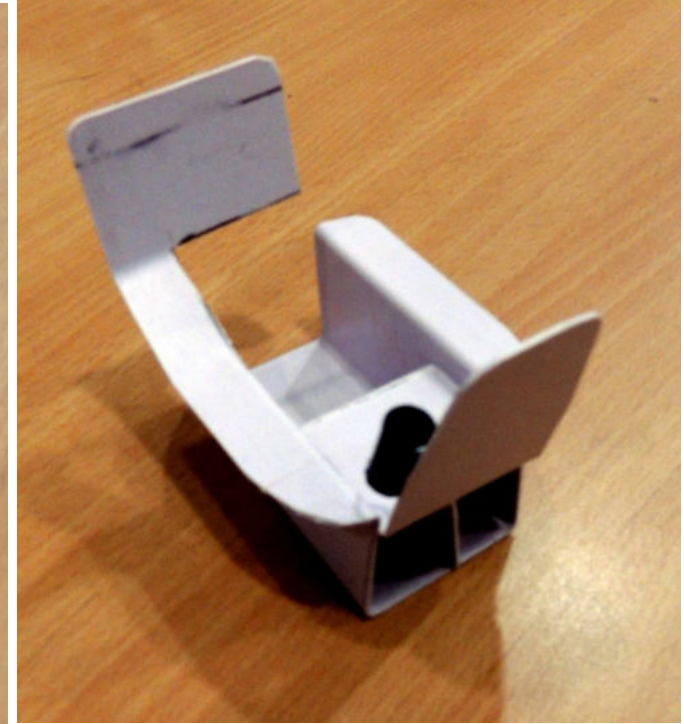
Initial ideations : Direction 1

Advantages:

- Smaller unit
- Less expenses
- Easy to transport
- Easy to setup
- Upper arm BP measurement – better accuracy

Disadvantages

- No privacy for user
- No privacy for information
- Difficult to maintain sanity
- If chair mechanism fails, the whole unit has to be shut down
- Noise from surroundings could lead to inaccurate results



The Conception

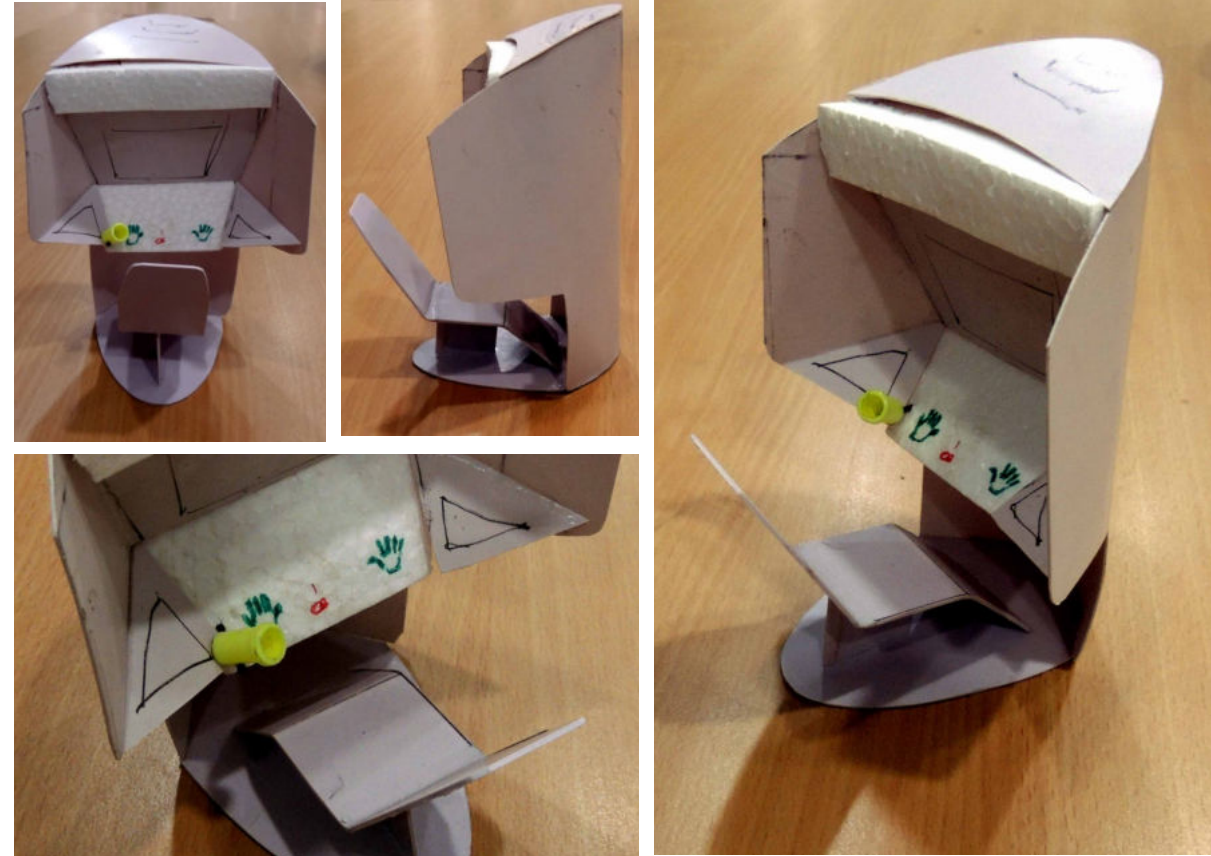
Initial ideations : Direction 2

Advantages:

- No need to stand up or change position
- Chair has minimal function – only weight
- Provides a dashboard for various purposes
- Better and accurate position for BMI calculation

Disadvantages

- No privacy for user
- Difficult to enter and exit
- BP measurement- wrist, not the most advisable position
- Hanging ECG electrodes
- Noise from surroundings could lead to inaccurate results



The Conception

Initial ideations : Direction 3

Advantages:

- *Isolation from ambient conditions*
- *Chair has minimal function – only weight*
- *Could facilitate a trained assistant also*
- *Privacy for user and information*
- *Recommended by the doctor*
- *Better and accurate position for BMI calculation*
- *Easy to maintain clean because of closed environment*

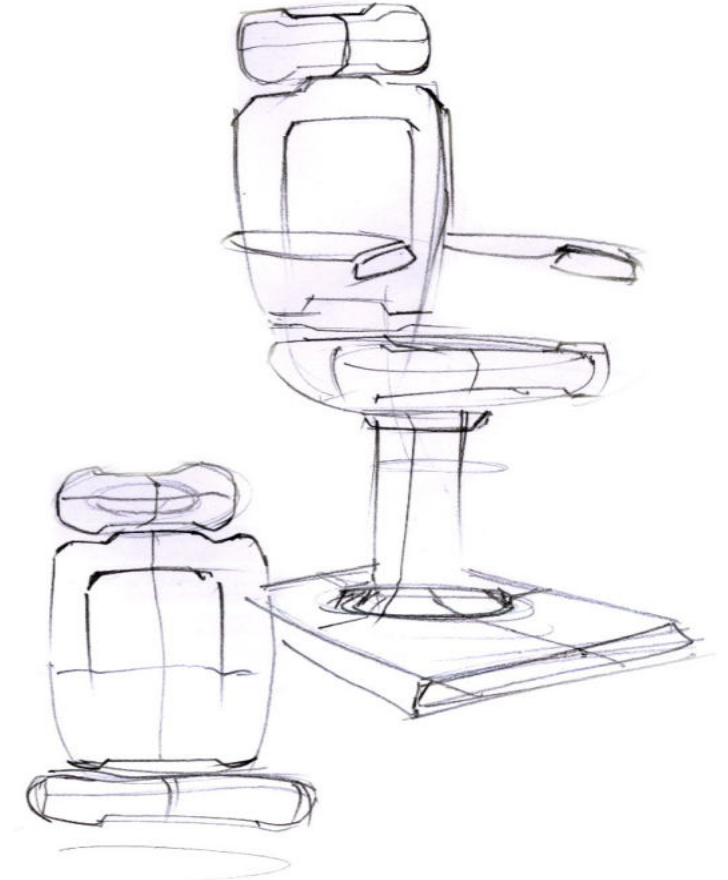
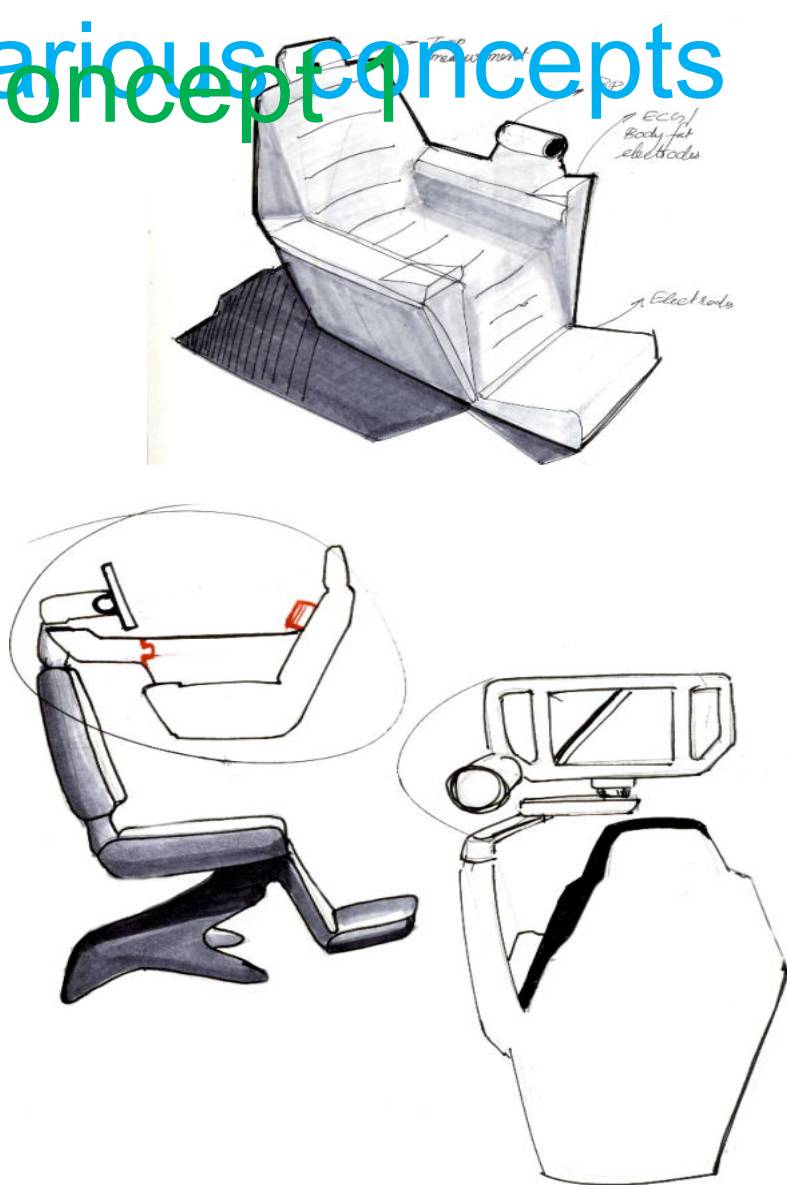
Disadvantages

- *Cost would be higher than earlier models*
- *Transport and setup would be difficult*



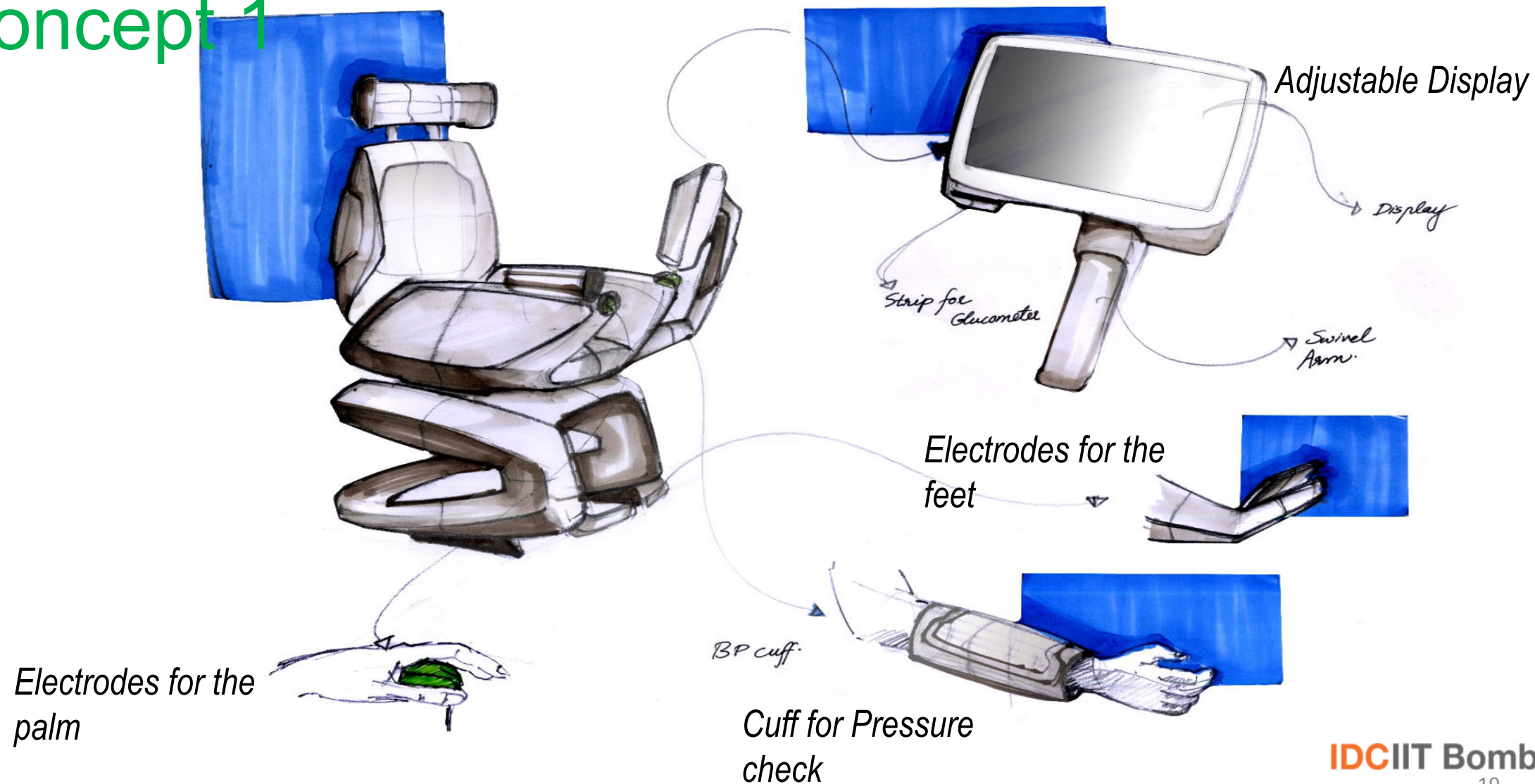
Sketches and Iterations for various concepts

Concept 1

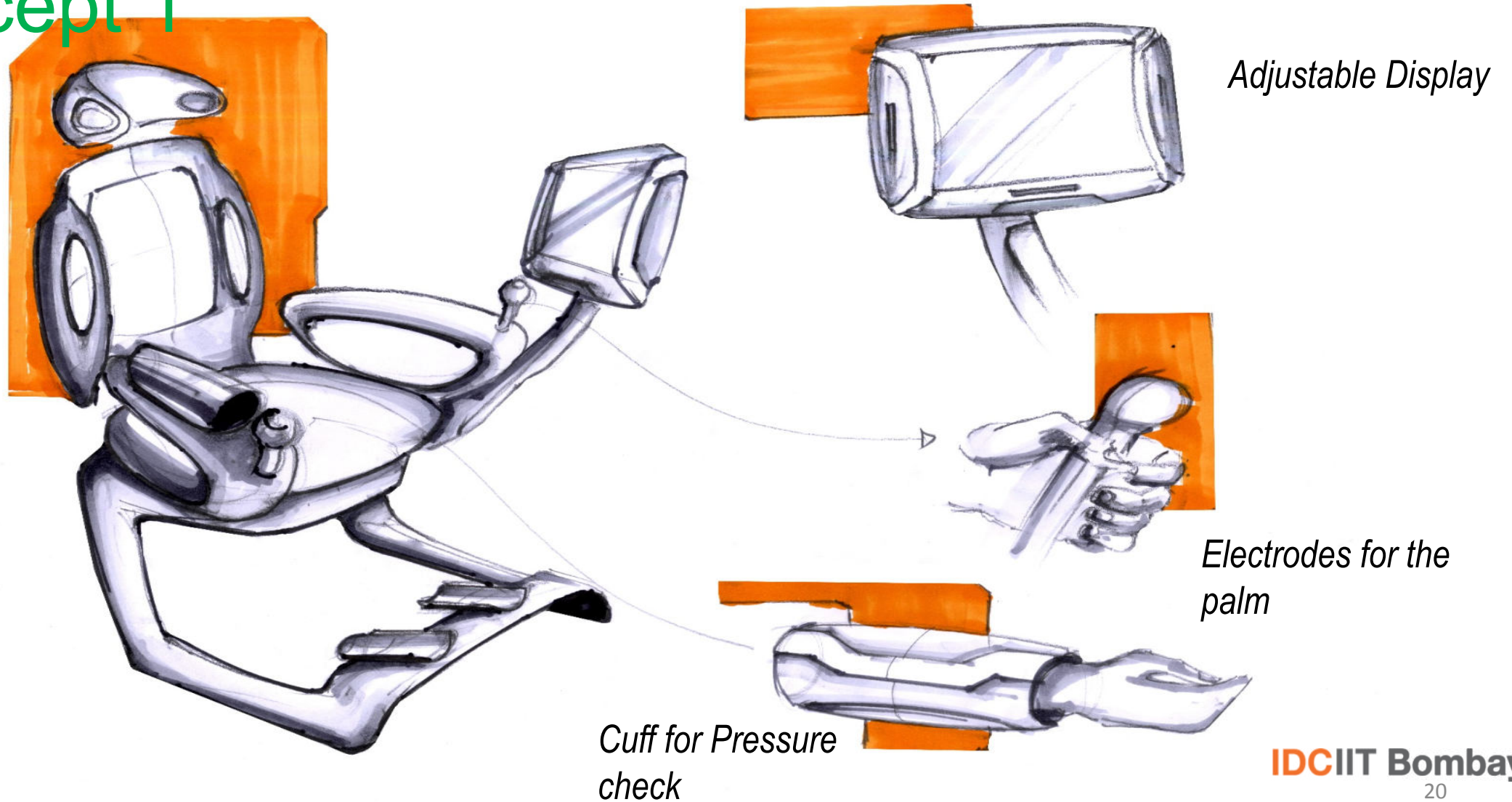


Inspired by a modern all-in-one reclining chair. the strong form is meant to re-assure a patient. the arm-rest itself couples up as a multi-parameter diagnostic device. some form explorations are done in direction to make it more futuristic.

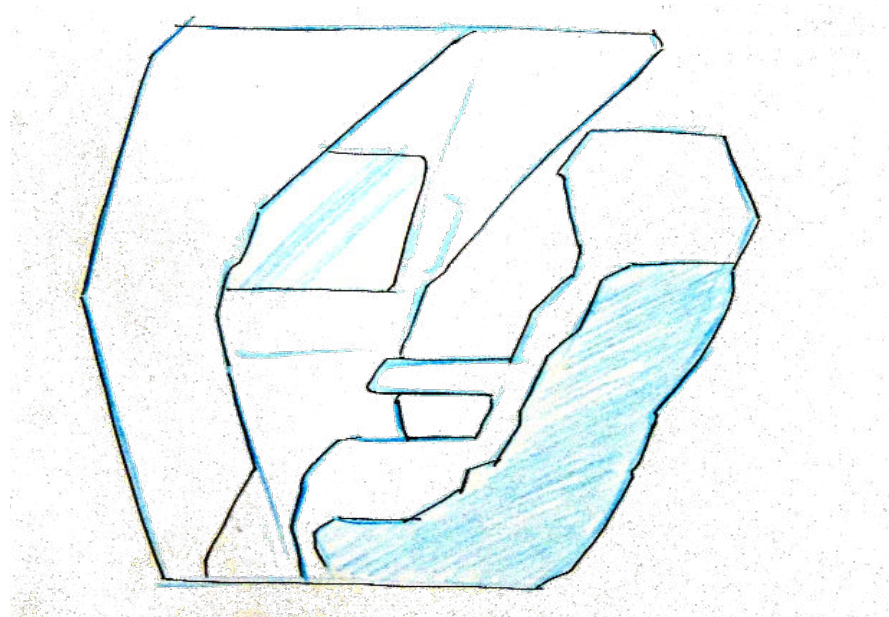
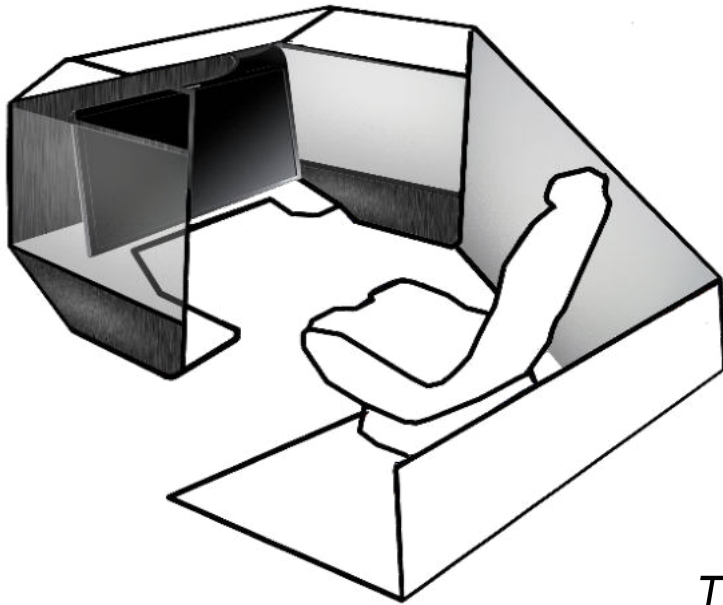
Concept 1



Concept 1

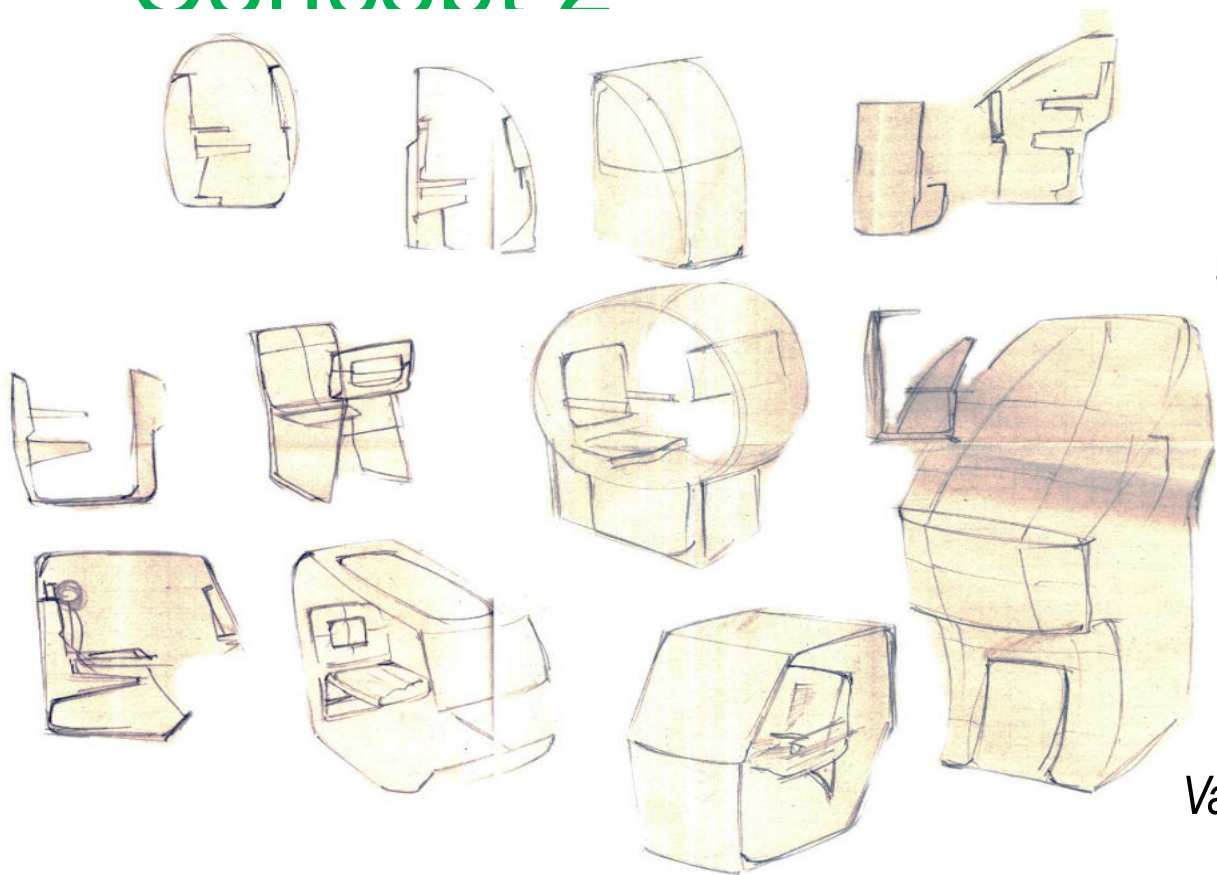


Concept 2



This is more like a cabin. the design offers better readability and ensures privacy of results to the user. a nice faceted theme runs throughout the product.

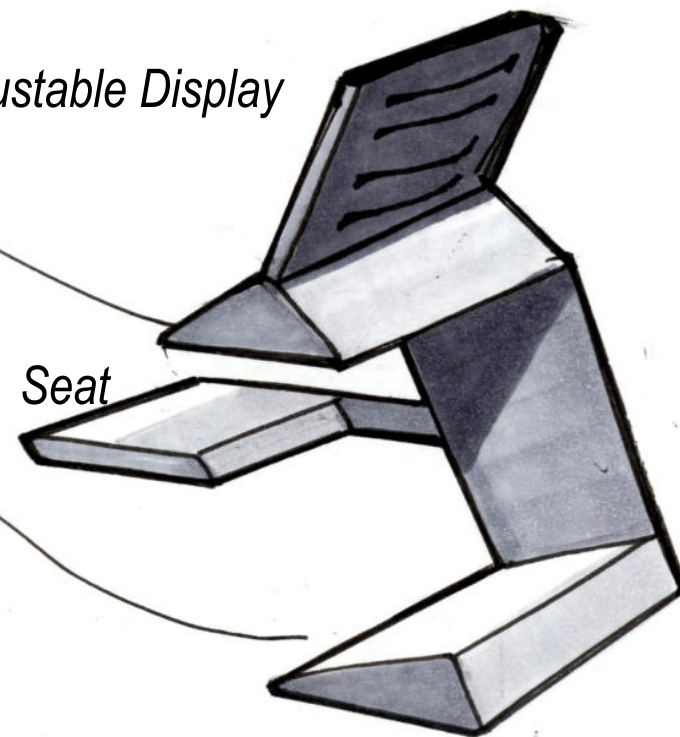
Concent 2



*ECG &
Body fat
Electrodes*

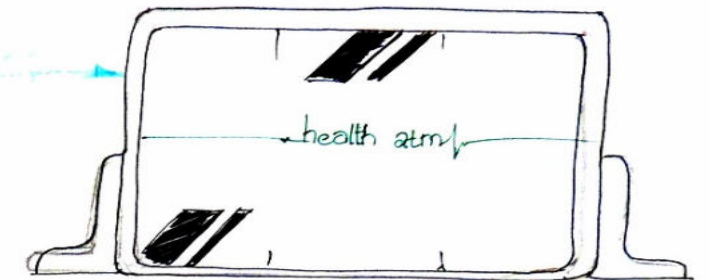
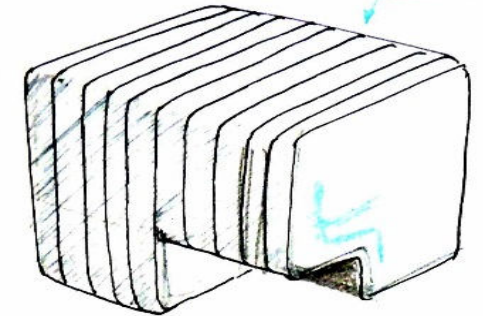
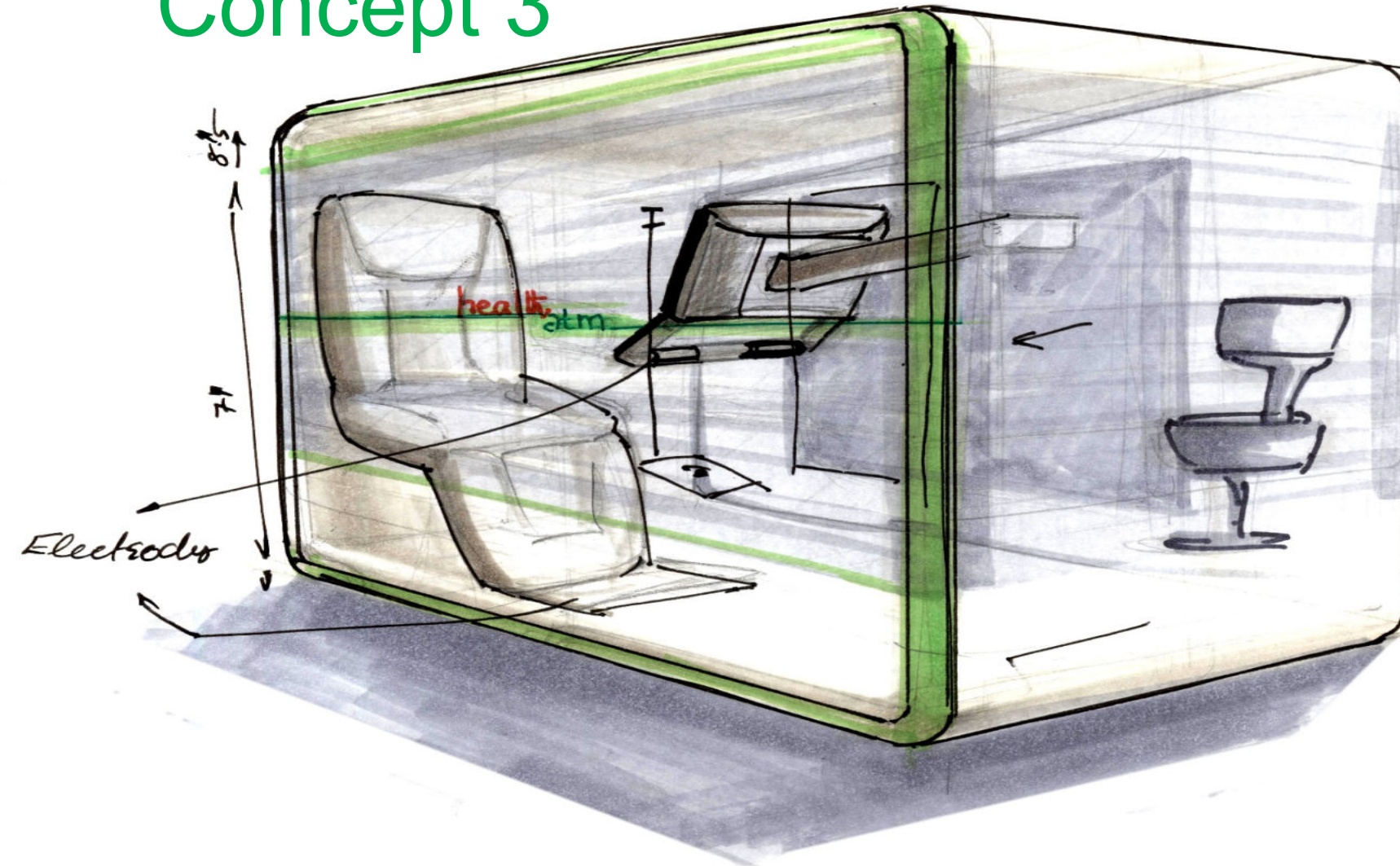
Adjustable Display

Seat



Variations in form for the same concept.

Concept 3



this is like a full-fledged cabin with the seat comfortably placed at its heart. explorations can be done in terms of materials as one-sided glass walls etc.

Concept Evaluation

Features	Concept 1	Concept 2	Concept 3
•Height measuring device	0	0.4	0.6
•Weight measurement device	0.33	0.33	0.33
•Full body Sensor	0.33	0.33	0.33
•ECG Monitoring device	0.33	0.33	0.33
•Blood pressure monitoring device	0.33	0.33	0.33
•Blood Glucose level monitor	0.33	0.33	0.33
•Oximeter	0.33	0.33	0.33
•Digital Thermometer	0.25	0.25	0.5
Privacy for patient	0	0.3	0.7
Privacy of information	0	0.5	0.5
equipment safety	0.2	0.2	0.6
Cost of Manufacture	0.5	0.4	0.1
Isolation from environment	0	0.2	0.8
Waste Disposal	0.1	0.3	0.6
Water Dispenser	0	0	1
Portability	0.9	0.1	0
Assembling/Disassembling	0.5	0.25	0.25
Floor space required	0.5	0.3	0.2
Assistant	0	0	1
Ease of access	0.45	0.35	0.2
Ease of use	0.3	0.3	0.3
Place for branding and value addition	0	0.4	0.6
Modularity	0.3	0.3	0.4

The three concepts were evaluated keeping in mind various priorities.

- Factors in green contain highest priority
- Factors in yellow are basic equipments of the setup which should be present
- Factors in blue are value added features which can/ may be neglected

c1	2.23	0.7	3.05	9.61
c2	2.63	1.6	2.3	12.36
c3	3.08	2.7	4.55	18.81

Devices and instruments

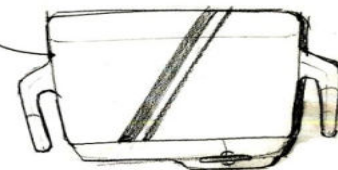
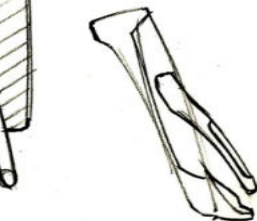
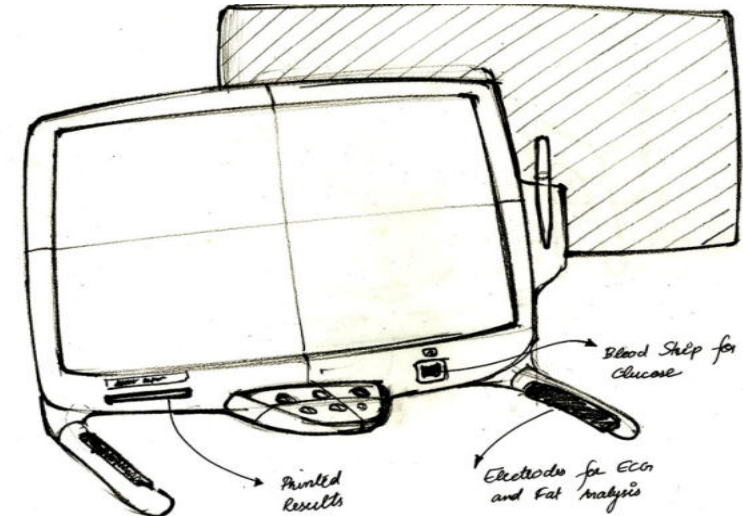
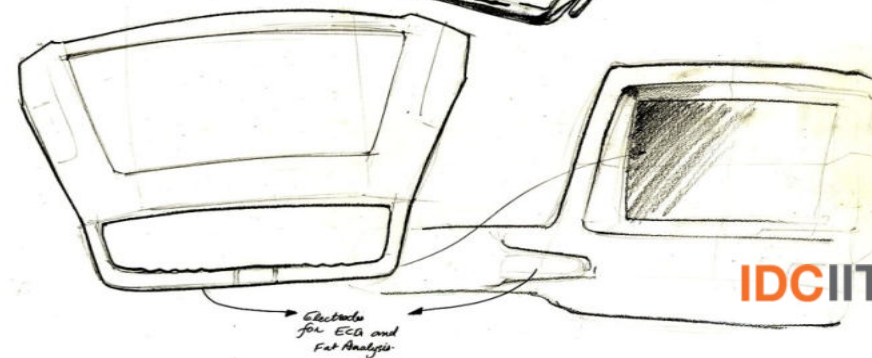
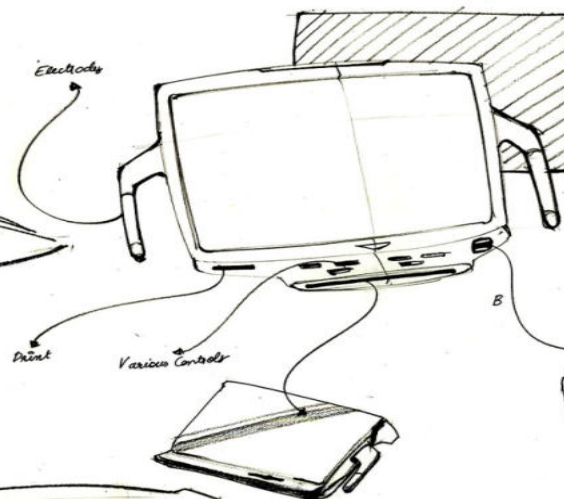
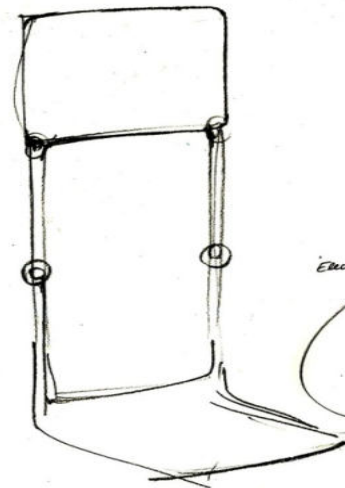
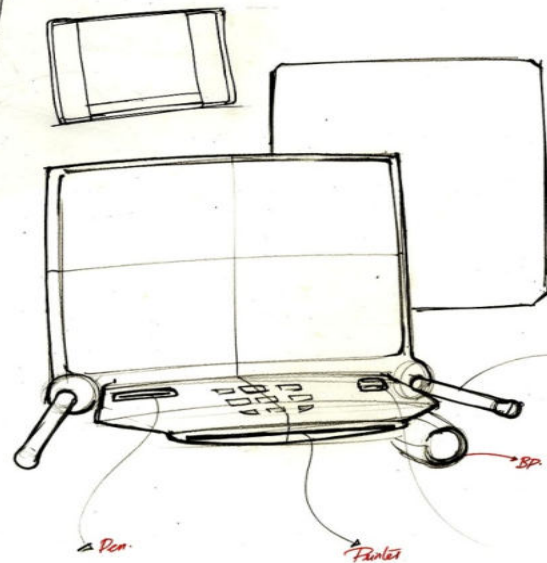
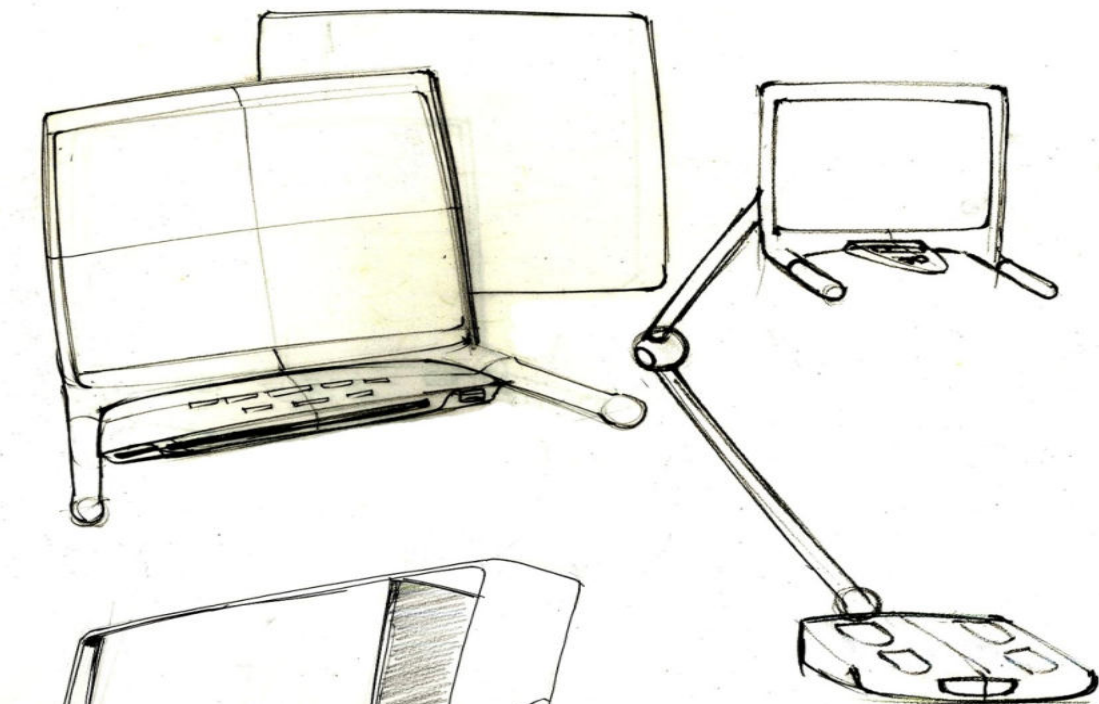
Highest priority featurers

Secondary Features

The Final evaluation was done using formula
 $\text{Sum} = 2 \times \text{yellow} + 3 \times \text{Green} + \text{Blue}$

Concept 3 came out as the highest scoring one.

Crafting





Crafting

Concept and Ideation —

Test with Sketch for concepts

Evaluation

+ why modular unit?

Learning for kiosk study

Inference from activity analysis

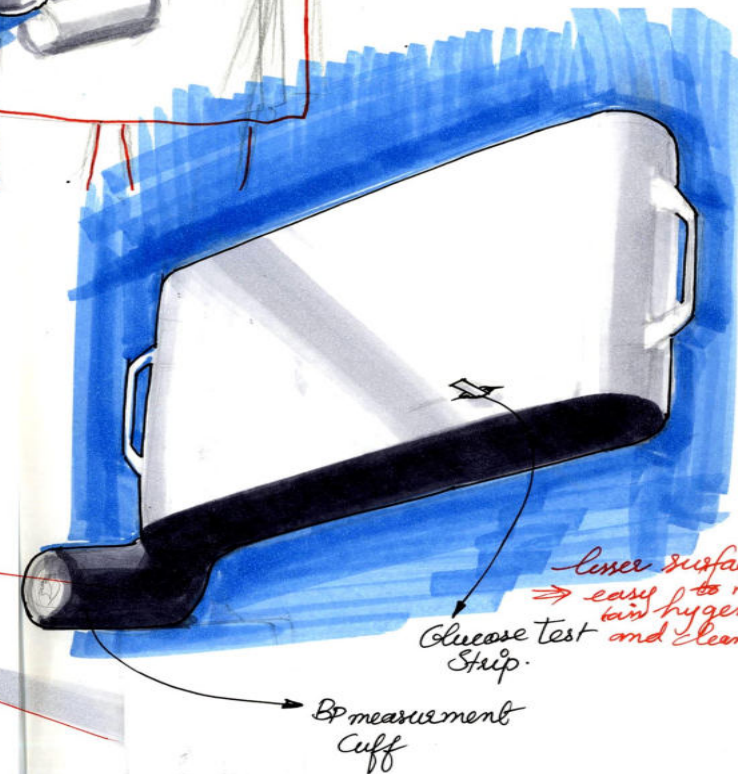
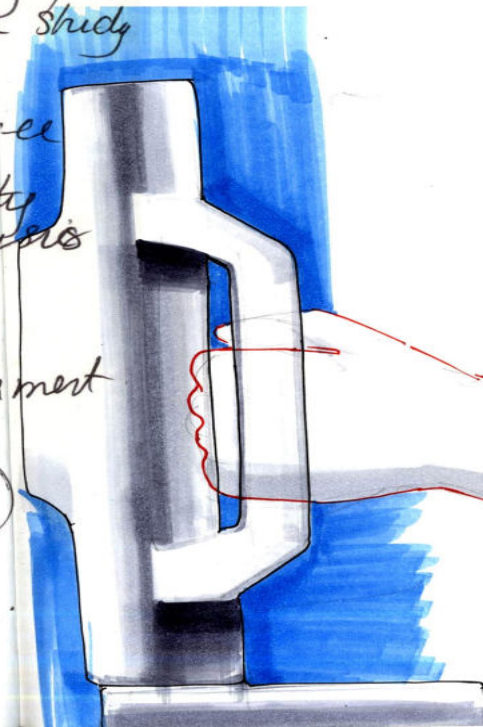
height measurement

Tray

Description



Big - character for Big Partition lines
White Blue Green
Simple.



Lower surface.
=> easy p to maintain hygiene and cleaning.

BP measurement Cuff



Final Concept



Final Concept



Final Concept



Final Concept

Final Concept

- *Cabin excluded*
- *multi-task activity that has been simplified*
- *the retractable*
- *wall mounted device*
- *connected to an intelligent database*

The advantage

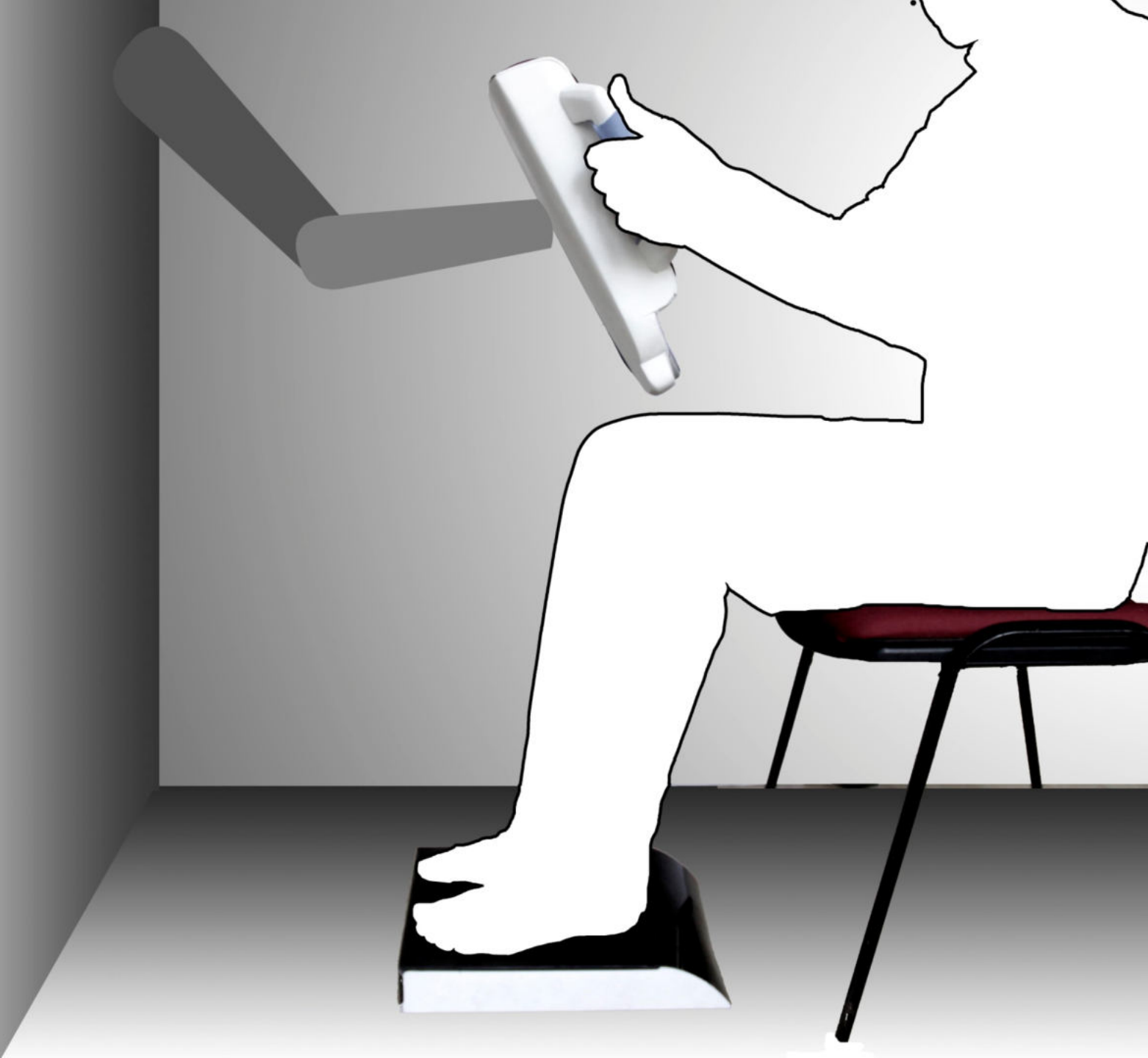
- *Modularity*
- *easy maintenance*
- *Easy installation*

full body sensor, height monitor using ultrasonic sensor, BP monitoring and ECG among others. there is also a facility for instant blood glucose monitoring with the help of the assistant who sits outside the cabin.



Activity at this kiosk includes:

The user walks in – checks in - the assistant pricks at the entry point - provides test strip - The height of the user is measured by an IR/ultrasonic sensor mounted on the ceiling - retracts the device - thus activating the full body sensor - follow instructions - n asked to sit down – strip in glucometer - finger in Pulse oximeter sensor – hand in BP cuff - measure the BP – hand on the handle/foot on electrode - ECG test



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Thank you

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