

>> **Cell phone (Communicator) Design For Elderly Executives**

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Approval Sheet

The project entitled “Cell phone (Communicator) for Elderly executives” by Deepak Saini is approved for the partial fulfillment of the requirement for the degree of ‘Master of Design’ in Industrial Design

Guide.....

Chairperson.....

Internal Examiner.....

External examiner.....

Date

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Acknowledgement

First and foremost I would like to thanks my Guide Prof. Ravi Hazra for all help and support. Valuable discussion with him gave me the true Insight and Grip of the project.

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Sanket
Pradhan sir
Rajan sir
and ...**all@idc.iitb.ac.in**

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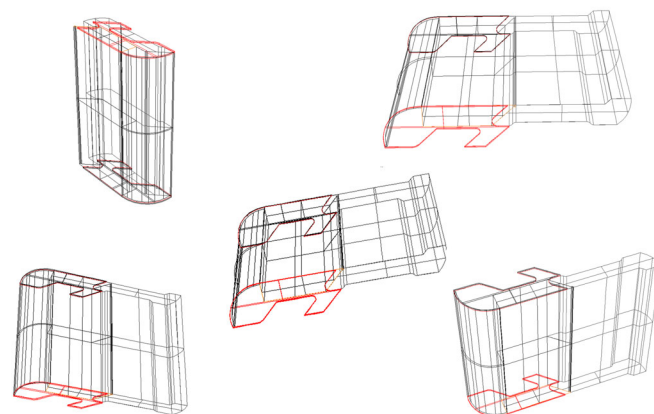
Abstract

Cell phone has become the vital part of modern accessories and there is a distinct need of organizing oneself in this fast life.

The age group of 50 and above is at the apex of their career, they are one of the busiest age groups and at thus communication and organizing (scheduling, appointment management, reminders etc.) become extremely important. The product is primarily dedicated to this age group but designed on the lines of **Universal Design**, so that it does not get contained to this age group but could be used by others too.

I have explored the possibilities of combining the two things (Cell phone & PDA) so that they combine in the most functional and efficient way to generate the interest and user delight.

The resulting design has a unique combination of the PDA and a Cell phone with all the accessories like QWERTY keyboard, stylus integrated with the form. All the elements have been functionally integrated to generate the desired freshness and create a distinct identity of the product.



Introduction

Communication is the need of the times today. One cannot imagine a world without communication and Cell phone is one of the most widely used electronic devices in the modern times.

This device has now transcended the limits of mere utilitarian object and has become as an icon of personal expression.

Cell phone is generally considered as a gadget of youngsters. Trends in cell phone are following the aspirations and ambitions of this user segment and the segment that is broadly comprised of people at the age of 50 plus (so called elderly) has been neglected for quite a long time. There has been so attempts to cater to the needs and aspirations of this age group though recently products like Nokia Communicator, Nokia 6800 are coming in the market though some advance products like **Blackberry** and **Treo 600** are still not widely available in the Indian market till date.



Aims and Objectives

The objective is to design a **Communication and Digital Assistance** device for Elderly Executives (age group 50 and above) keeping in account the physiological and psychological needs and aspirations of the age specified age group.

The idea is to effectively combine the facilities of a **Cell phone** and a **PDA** (Personal Digital Assistant).

The intention was to design a device to which my user need not adapt in spite the device should accommodate the needs of the user.

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Understanding a Cell phone

Cell phone is essentially a personal telephony device while on move some of the other features that normally a cell phone has are

- Store contact information
- Clock
- Make task or to-do lists
- Keep track of appointments and set reminders
- Use the built-in calculator
- Get information (news, entertainment, stock quotes) from the internet
- Play simple games

Some of the added functions are

- Send or receive email
- Listening Music (mp3 player)
- Built-in Camera

Details Scheduling and Appointment management (PDA)

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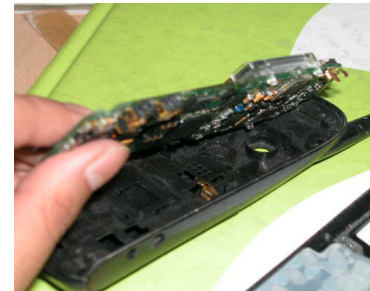
Internal Architecture of a Cell phone

A cell phone is a simple gadget with very little components. The main components of a cell phone are-

- An circuit board (generally containing 3 chips- the Microprocessor, Analog to Digital and Digital to Analog chips)
- A liquid crystal display (LCD)
- A keyboard
 - A microphone
- A speaker
- A battery

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The width of a cell phone has already reached to 15mm – 17mm in Sony Erricson T100 (width changes along the contours and I see no reason that it could be further reduced.



Internal Architecture of a Cell phone

The thickness of the digital diary I opened up was only 10mm (external dimension). Fundamentally if we remove battery the interiors of a cell phone and a digital diary is almost same.

The battery size is also reducing rapidly. It has reduced from 7mm in Nokia 3310 to 5mm in Nokia 2300 and 4mm in Sony Erricson T100.

I looked into the internal architecture of a digital diary also to find out how is it different from a cell phone and found that its only a speaker that is absent and it has comparatively smaller battery.

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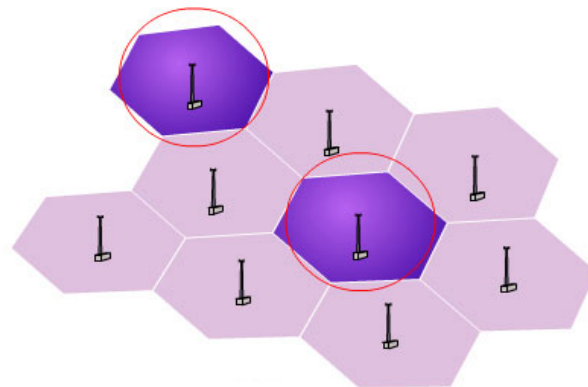
Components of a Digital diary

How does a Cell phone works

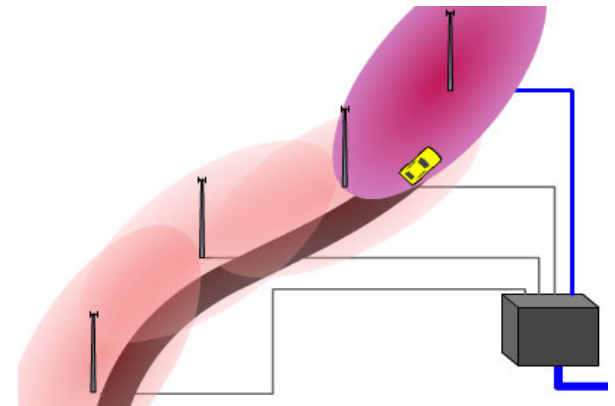
The cell phone technology is actually the combination of the radio and telephone technology. Cell phones generally work at 824-849 MHz fm

Each hexagonal unit is called as cell that contains base stations. A cell phone is a duplex device one uses a frequency for talking and second for listening.

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The two dark coloured cells can reuse the same frequencies.



Picture shows the changing cells of a car on move

User Study

Understanding the user – The targeted primary user group is Elderly Executives of age 50 and above. The secondary user group is of the young professions.

The idea is to design for the mature age and affordability group and establish a trend and thus allowing it to infiltrate down to the other age groups.

People at this age group are generally at the apex of their career, they are the ones with the ones with the busiest profiles and thus communication and organizing (scheduling, appointment management, reminders etc.) become extremely important for them.

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The product is primarily dedicated to this age group but consideration for its universal use and acceptance has been made.

Qualitative interviews and Image boards has been used as the major tools for the user study.

6 formal interviews were conducted along with a regular interaction with users without any formal appointments.



Image boards

Two image boards of the most commonly used products were prepared namely- Pen, Cell phones, Watches to develop a general understanding of the user psyche.

Most of the users preferred p2, p4 and p10 over others. The general comment about p3 was that looks good but not for me.

The insight here was that there was liking for p3 but it didn't gel with their personality. It was too young for them.

IMAGE BOARD 01



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The second image board was of watches, here user preferred W 10(omega), W 4 and W 3 over others.

Here user did not relate to W 9, W 2 at all.

The insight here was brand image does matter to them. They like to possess rich looking sophisticated objects.

* A4 size printout of Image boards attached as Appendix

Image boards

Key observations and Insights-

- Image making or Life style is an important to my users.
- People generally tag them as seasoned and thus expect them to like only straight forwarded, unarticulated and simplistic things though they have a completely different angle of looking at the world.
- There definition of simplicity and maturity is not simplistic.
- They do like to use and posses things that are fresh and aggressive but with a matured treatment.

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Image boards

The process of user study was iterative. Two more image boards were made one of direct products that included Cell phones and Communicators (Cell phone cum PDA)

Users were asked to choose from each segment and discuss the basis of choice.

Among cell phones two different categories one was of cell phone cum PDA (communicators) and other was of cell phones with distinct forms.

C 4 (Treo 600) attracted maximum users in communicator category. The sliding mechanism (keyboard is hidden under the screen) of C 3 was appreciated for its element of surprise though the concern was about the portability.

The open able keyboard option of C6 (Nokia6800) was appreciated the handling was questioned.

In the second category M7 and M2 were rejected being too experimental and alien to the current imagery of a cell phone.

M6 was rejected being over done.

The preferred models were M6, M4 and M3.

The last strip of images were some forms with different treatments. Here the choice was not for function but only form. Most preferred form F4, a glassy elegant clean form.



* A4 size printout of Image boards attached as Appendix

Image boards

Insights and key observations-

- Demand of a freshness in products is always there.
- User associate all the electronic products like Digital Camera, Digital Notebook, Cell phone with Hi-Tech and thus the buying criteria is different then buying criterion of non electronic products.
- Users always look forward for latest and fresh in market but are unable to relate to the products that are highly experimental. Users are ready for a slow transition and generally decline to undertake rapid change.
- The first reason to buy a cell phone is the form then comes the ergonomics and interface.
- Users are attracted by the WOW factor.

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* A4 size printout of Image boards attached as Appendix

Image boards

The other image board had the images of theme sculptures (by Photographer Donald.E.Cole), where he represents the attribute (like maturity, contentedness) through sculpture. Users got a bit confused here and made a random choice but there was a liking for N 3.

The other set was of Solar eclipse images. The intention was to study the how people react to a thing they have hardly paid attention to and thus I was expecting unbiased reactions.

The choice here was E1 and E3. Users related with E1 perhaps because they could relate to it to the new moon. The explanation for E3 was its aesthetic appeal.

shoes and some mixed products. Users were asked to choose from each segment and discuss the basis of choice. S4 and S5 were the choices among all others.

The choices showed that a better presentation draws the attention because all first four shoes were from same scheme with hardly any difference in styling.

Insights and key observations-

- The clean form with matured treatment is preferred.
- Users tend to associate to a familiar object.
- A better presentation draws the attention.



* A4 size printout of Image boards attached as Appendix

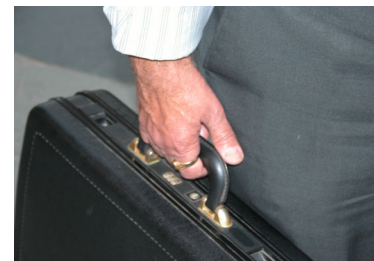
Artifact Study

The study of the artifacts(products and objects) was also done to get the clues of their taste. This study included the study of the objects directly related like the Cell phones, digital diaries, physical diaries and others like the purse, pen, bag and suitcase etc.

The study of their working style and environment gave me the clue about the practical expectations from the gadget.

Insights and key observations-

- Users are possessive about their belongings especially things like Music Player, Camera, Diaries, Digital Notebook and Cell phones etc.
- User associates products like Watches, Cigarette case, Lighter, Pen, Glasses, Cell phones with Life Style and thus is sensitive towards these.
- User associate all the electronic products like Digital Camera, Digital Notebook, Cell phone with Hi-Tech and thus the buying criteria is different then buying criterion of non electronic products.

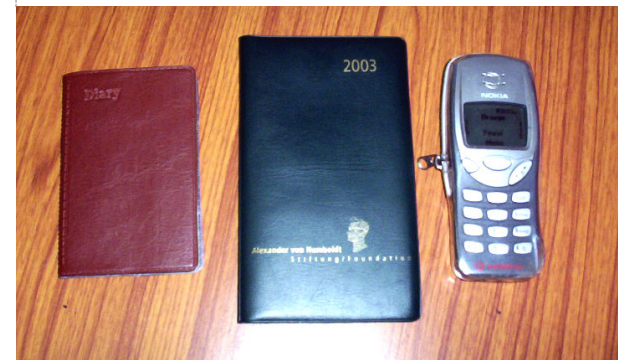


Artifact Study

Other Insights and Key observations-

- Most of the user used physical diaries to maintain records (appointments, meetings etc.). Generally they maintain more than one diary.
- Out of these diaries, one pocket diary they always carried along with them along with the cell phone.
- Most of the users were quite comfortable with the digital diaries especially because of full QWERTY keyboard and portability. The problem was of a small screen.

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Artifact Study

Conclusions-

- The pocket diary and a cell phone can be clubbed together to reduce the no. of objects on body while on move.
- Users do like to use and posses things that are Fresh and Aggressive but with a matured treatment.
- The product should have a strong identity but should not appear completely alien to the user.
- The product should have a High-Tech imagery.
- They should be an element of pleasant surprise to make a product more appealing and acceptable.
- The product should provide full QWERTY keyboard, a big screen (to type emails, spread sheets, SMS, MMS and big enough keys.**

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Product Positioning

Based on the insights and observations it was decided to explore the possibilities of combining the Cell phone & PDA in the most functional and efficient way that could generate the interest and user delight.



Communicators



Experimental phones

The intention was clear to design a Communicator with an experimental approach to generate the desired identity and freshness.

Freshness primarily in terms of Form, user comfort (ergonomics) and interaction.

Product position

Strategy

Three process approach was adopted. Though the process went sequentially yet all of them were borne in mind all the time to avoid any mismatches and complications at the later stages.

The processes were-

- **Ideation for Cell phone PDA combination to incorporate a full QWERTY keyboard and big screen.**

- **Ergonomics and Interaction**

- **Formal treatment**

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Study of parallel products in market

Before ideating for PDA, Cell phone combinations a study of existing products in the chosen domain was made.



Mad About Writing?

Nokia 6800

Study of parallel products in market

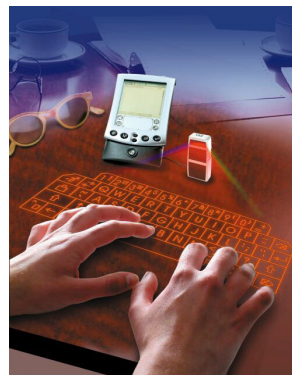
Alternate ways of providing a full QWERTY keyboard.

Sierra wireless concept



Nokia Communicator

Virtual(infrared) keyboard



zaurus

Oqo pocket computer

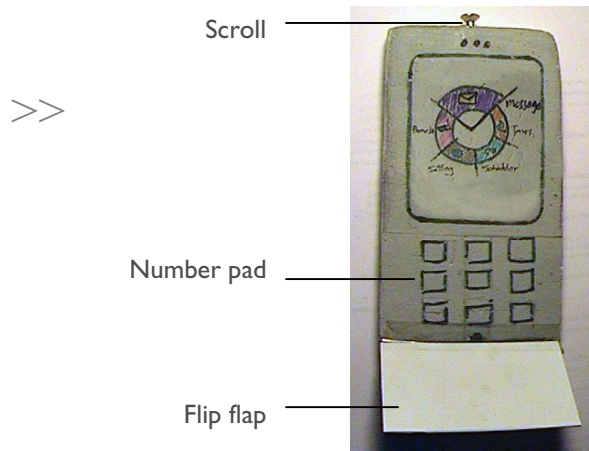


Ideation for a Cell phone PDA combination

This concept was very generic and the first response to the problem.

It uses two screens one for using the Cell phone (in vertical position) and the same screen becomes horizontal when the keyboard is pulled down.

This uses one screen for both Cell phone and PDA functions unlike Nokia Communicator which uses two screens one for Cell phone and the other one for PDA.

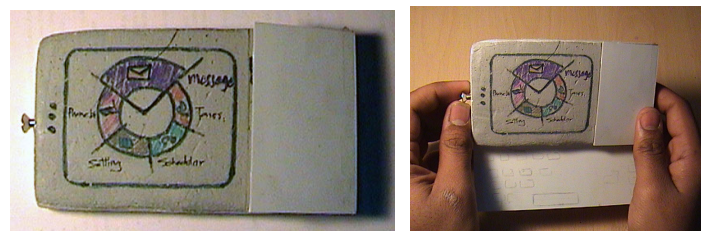


Concept I



Nokia Communicator

Nokia Communicator uses two screens while the concept user single screen for both purposes



Key board slides out of the main body and screen becomes horizontal

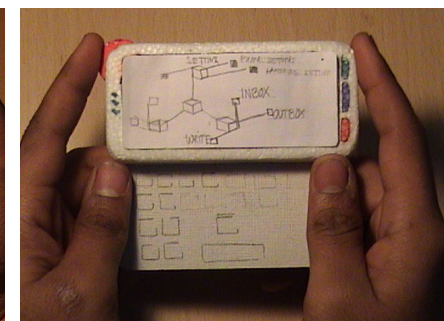
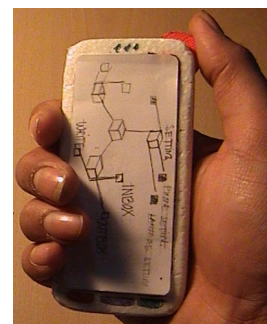
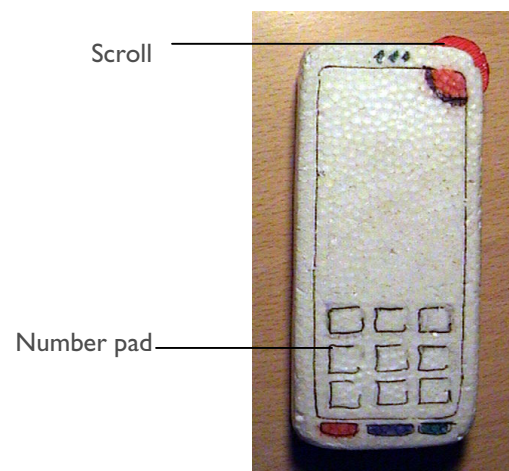
Ideation for a Cell phone PDA combination

The idea remained same but the intention here was to put the num pad on screen and as soon as one draws the keyboard the screen becomes horizontal and keyboard vanishes to increase the screen area.

Meanwhile a parallel working on interaction in terms of navigation was started.

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Concept I (2nd option)



Key board slides out of the main body and screen becomes horizontal

Ideation for a Cell phone PDA combination

A detailed iteration of the user study and artifact study gave a insight that a **pocket diary** is the most common thing that is carried by users (along with cell phone).

This concept explores the possibility of combing the pocket diary and cell phone.

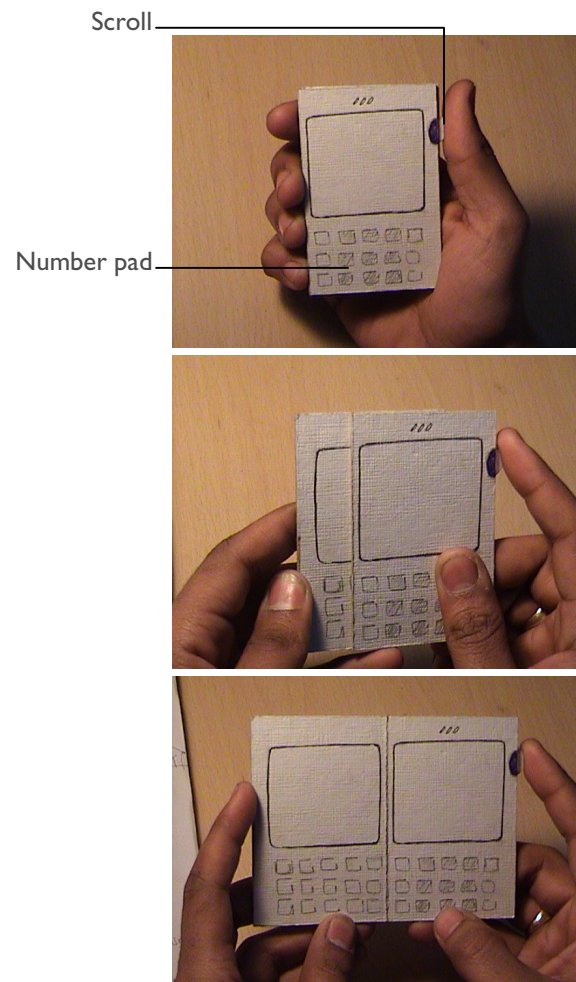
The front part is a cell phone and the second part is hidden at the back of the first one. The device looks like a normal cell phone when closed but as soon as one pulls the second part out, both the screens combine

The two screens combines to form a bigger screen and keyboard is also divided into 2 parts one goes with the upper one and the other with the lower.

The advantages here were the screen being used for a cell phone could be used while it acts like a PDA.

The solution was compact. It had a fresh concept to combine the two devices Cell phone and PDA.

Concept 2



Ideation for a Cell phone PDA combination

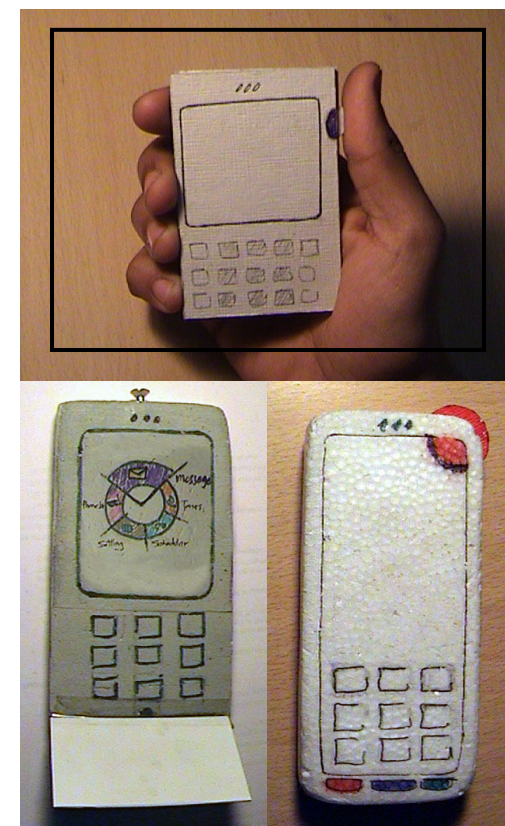
Concept 2 was selected because

- It has the most optimized PDA cell phone combination.
- The sliding of a control panel and adding to the other one will make form more dynamic and fresh.
- All other combinations have been tried in one or the other form this sliding concept has the required freshness.

Challenges-

- The form has to look integrated when it is closed (cell phone) and when it is open (PDA).
- The form demands rethinking in the navigation.

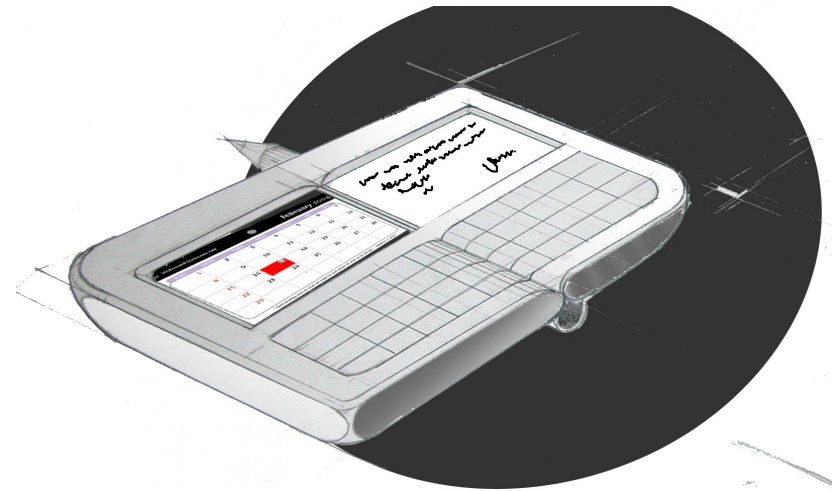
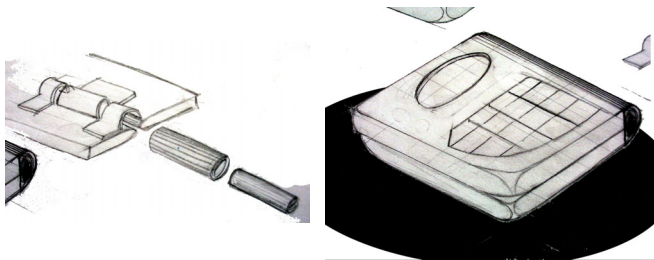
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Ideation for a Cell phone PDA combination

Keeping in mind the Pocket Diary some more concept were generated which were non-sliding. These concepts provided me the grounds of judging and improvising the initial sliding concepts.

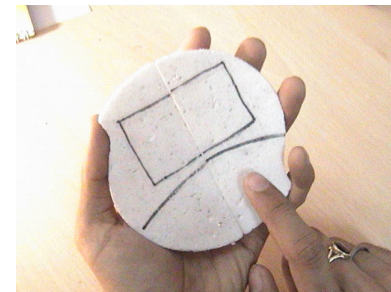
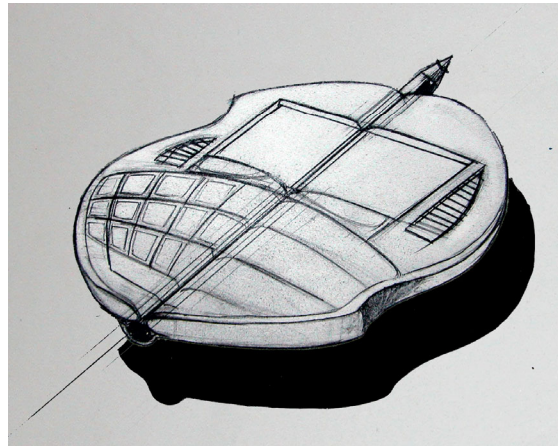
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Ideation for a Cell phone PDA combination

This concept is also based on folding type pocket diary. The form here looks interesting dynamic when closed(Cell phone) and gets completed when it opens up.

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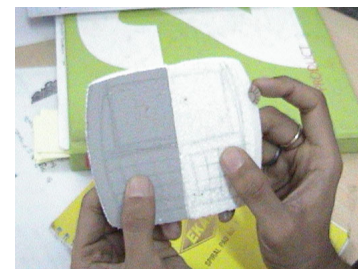
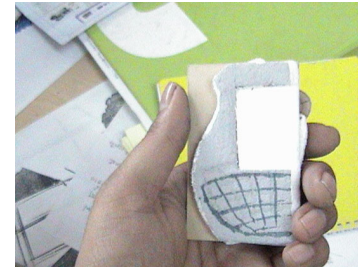
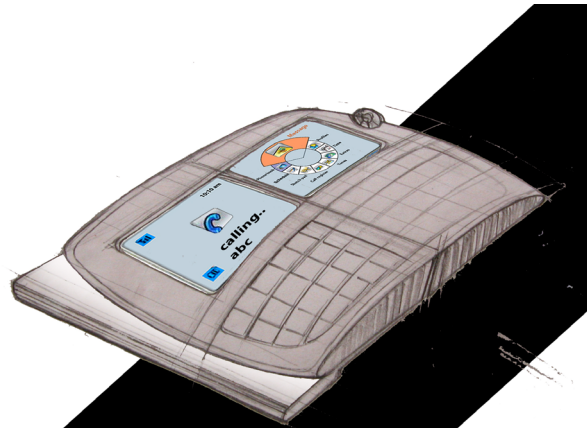
Ideation for a Cell phone PDA combination

Some more iterations done on the same sliding concept.

The idea of sliding one part into the other was chosen to be final concept for refining.

Study of Navigation system and Ergonomic was done to resolve the design

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Ergonomic study

The various possibilities in key sizes and shapes were studied that exists in market

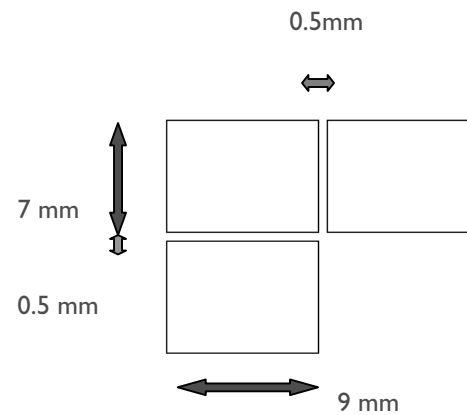
Nokia communicator

size : 148 x 57 x 25mm (LxWxD)

Key size: 9 x 7 mm

Key spacing: 0.5 mm (horizontal)

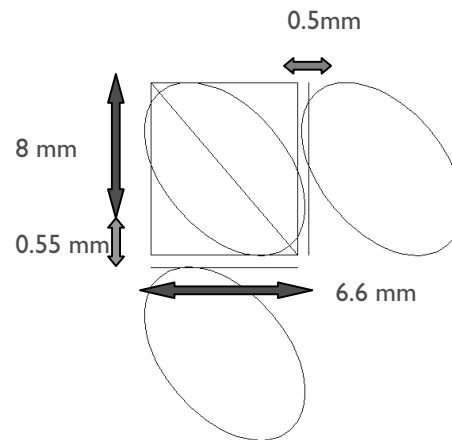
0.5 mm (vertical)



Ergonomic study

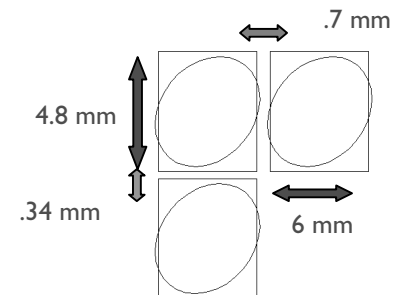
Blackberry-

size : 114 x 75 x 26mm (LxWxD)
 Key size: 8 x 6.6 mm
 Key spacing: 0.5mm(horizontal)
 0.55 mm(vertical)



Treo 600-

size : 112 x 60 x 22mm (LxWxD)
 Key size: 4.8 x 6 mm
 Key spacing: 0.7mm(horizontal)
 0.34 mm(vertical)



Ergonomic study

Several thermocol were made to find out the comfortable dimensions and good and bad locations for control keys (navigation and on-off)

Right hand movement



Left hand movement



Ergonomic study

Thermocol model study of finger movement while the device is in open form (PDA).



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Left handed



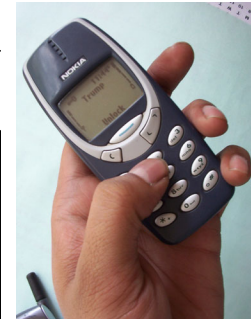
-  Desirable position of **Control keys-** navigation and On-Off (Yes- No) keys
-  Undesirable position

Right handed

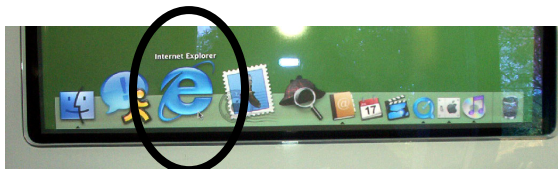
Navigation system

Existing navigation methods-

- Key pad
- Jog dial
- Joystick
- Touch screen and Stylus



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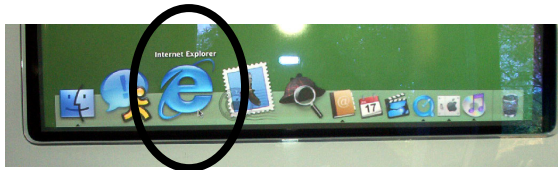
Fish eye navigation in mac

Navigation system

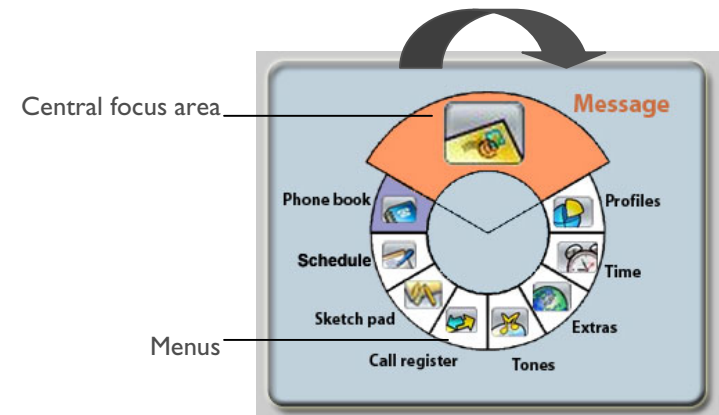
After the exploration of all the existing navigation methods it was found that mac's fish eye navigation system to be efficient and attractive. As compared to other tree structures. Sony jog dial has also attempted for the type of navigation system.

A fish eye navigation system for the Communicator was conceptualized. It also gave a strong formal element in design that could give an identity to the new product. The image on right represents the navigation system which is in form of a watch dial with central area as zoom area. With the help of a scroll button or key one can navigate the whole menu structure. The menu in the zoom area can be entered by pressing enter. To come out of a menu one has to press escape or cancel key.

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Fish eye navigation in mac



The new navigation

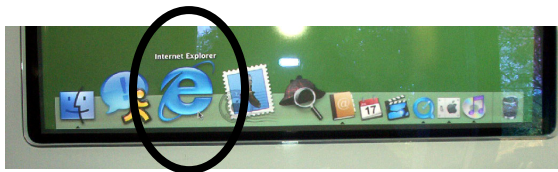
Navigation system

These images shows a sequence of an activity of sending a SMS.

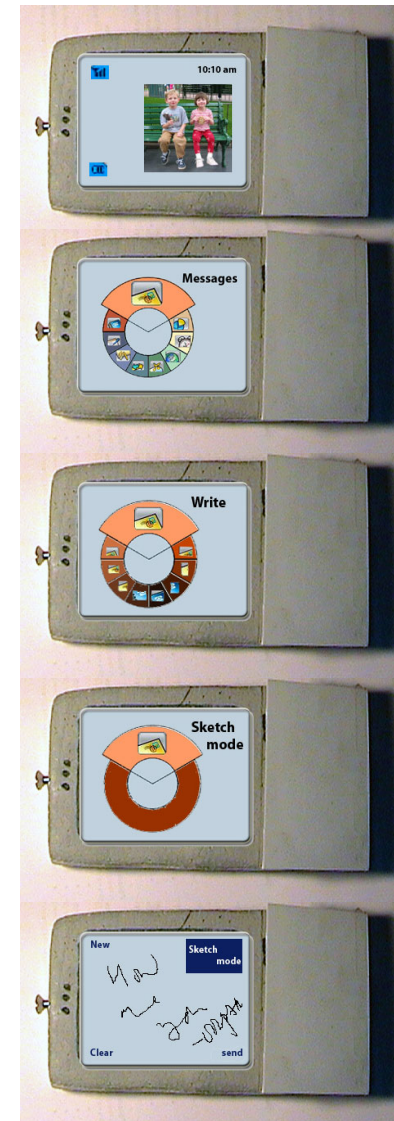
The list of activities is-

- Main screen** <touch the scroll button to enable the menu mode>
- Message menu**<scroll and select Write Message>
- Write Message**< scroll and select Sketch mode>
- Sketch mode** <Sketch on the touch screen and press send>

>>

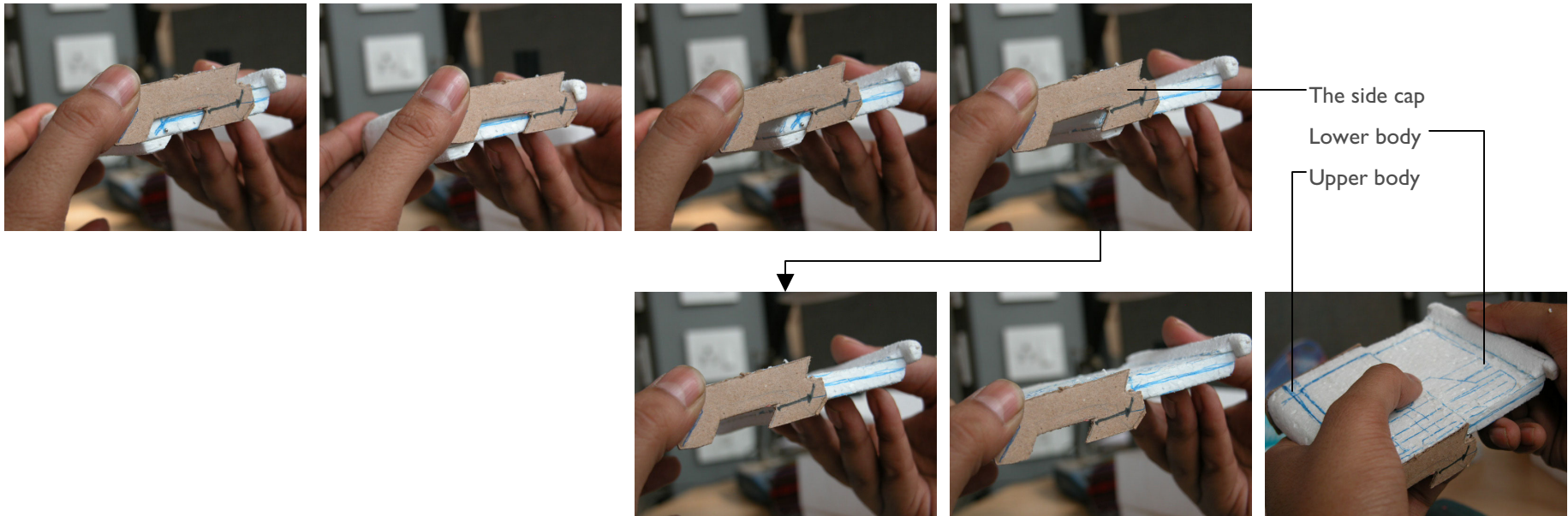


The paper prototype has been made assuming the touch screen and has optional navigation methods by key(scroll) and stylus



Mechanism

The sliding mechanism was designed that had the upper and the lower body with a capping element at the side of the upper body.



Form Exploration

The effort was to functionally integrate all elements to generate the desired freshness and create a distinct identity of the product. The process was iterative and involved many rounds of user surveys, mechanism rethinking and adjustments of dimensions.

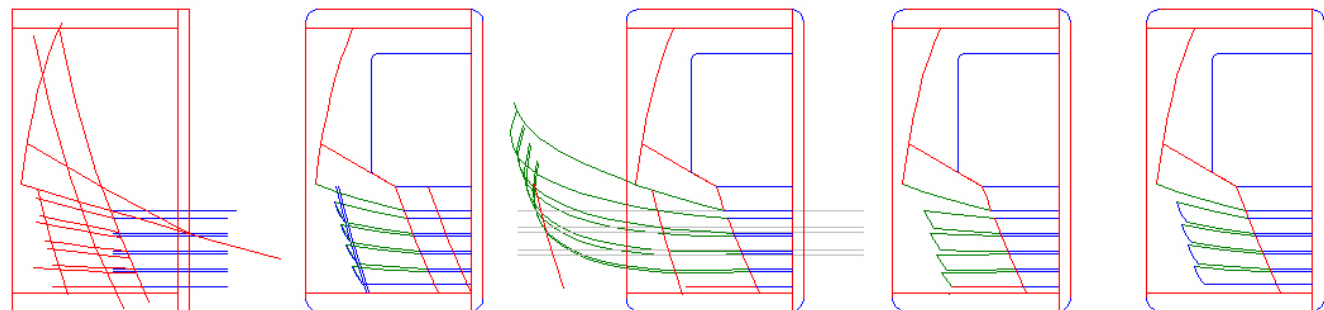
The intention was to generate the interest and integrity in the form using the interlocking of forceful lines.

The major challenge was to make the look interesting and integrated while it is closed and open.

But the form appeared boxy and all other elements looked superficial



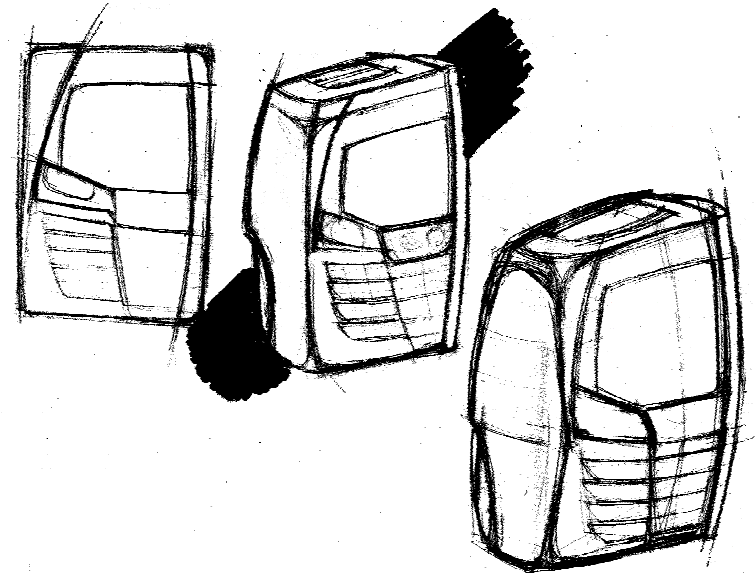
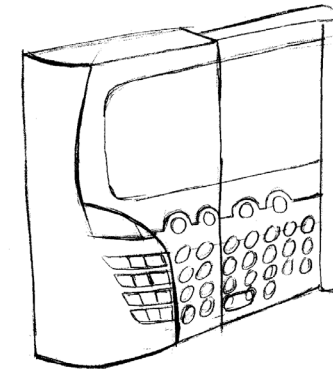
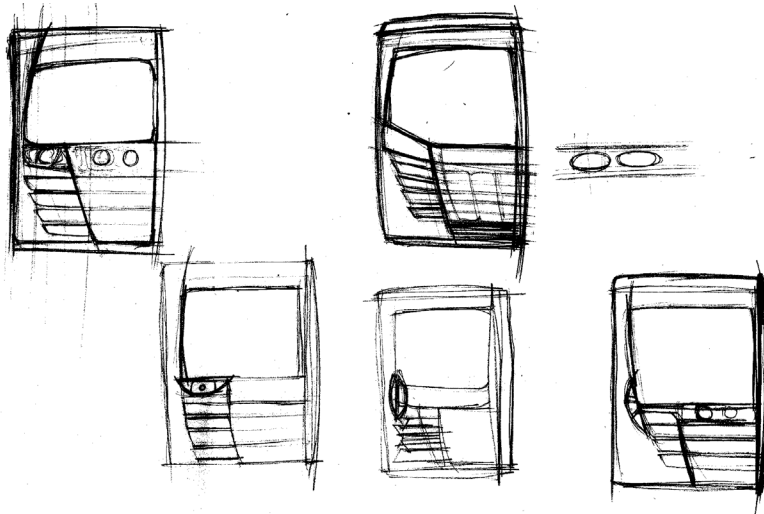
Initial POP models and drawings



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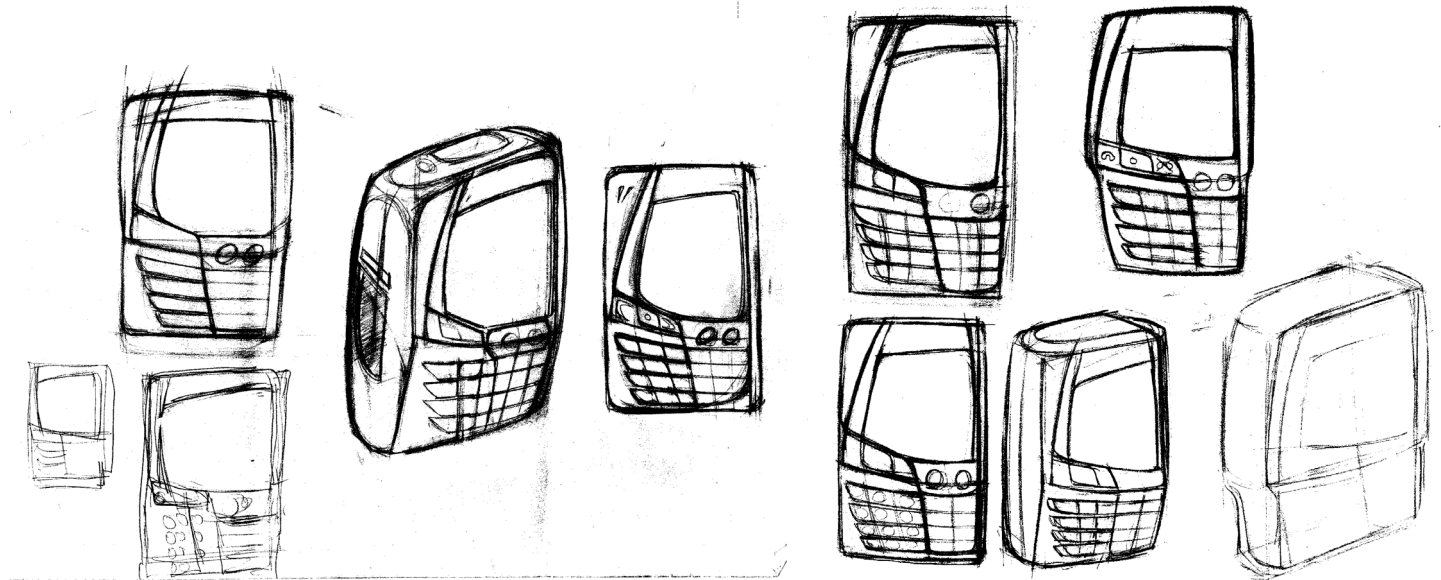
Form Exploration

Some more experimentation was done to break the boxy ness of the form



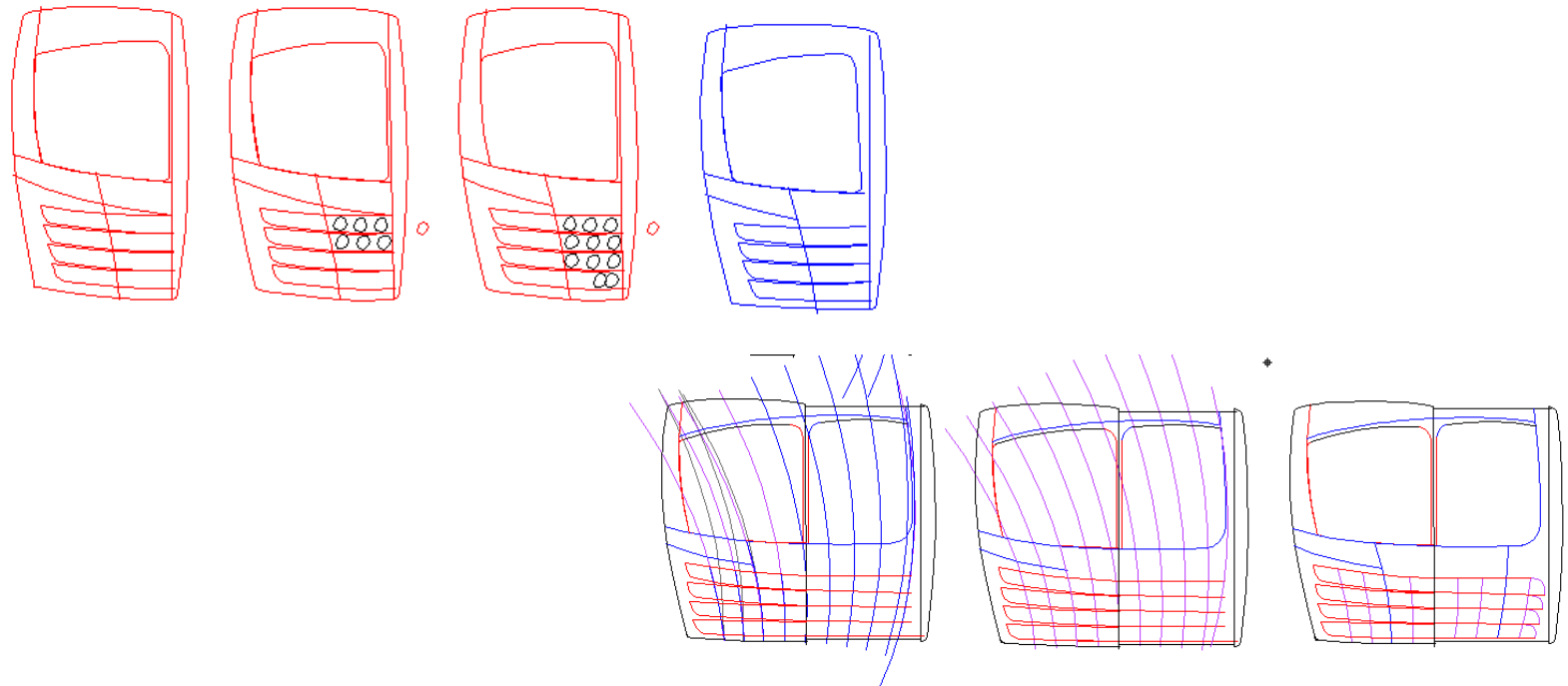
Form Exploration

Some more experimentation was done to break the boxy ness of the form



Form Exploration

An attempt was made to break the boxy ness of the form by experimenting with the outer profile of the product.

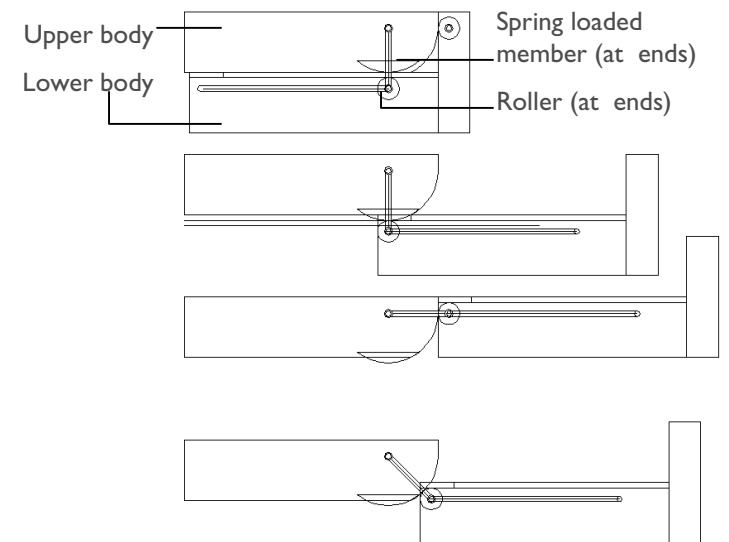
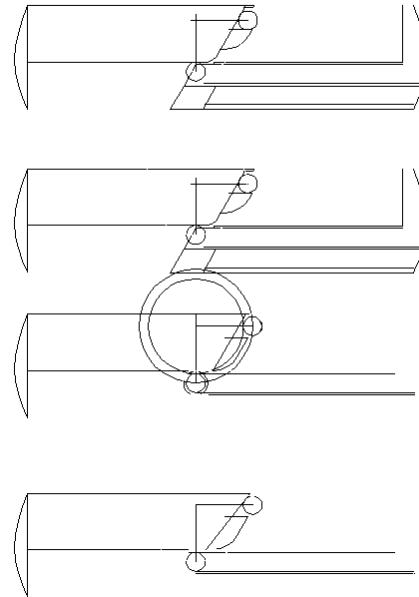


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2d- Exploration of the keyboard layout

Rethinking Mechanism

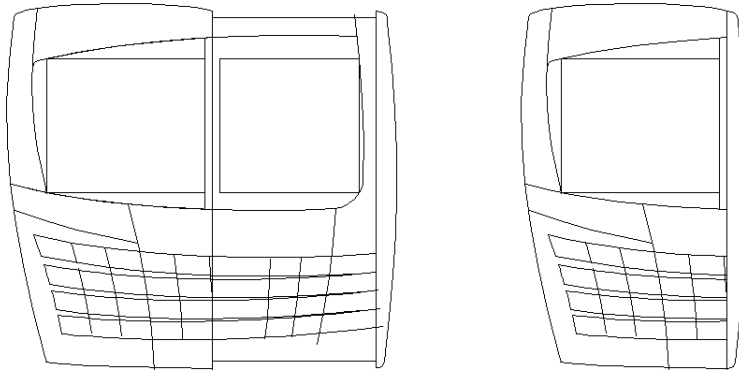
To adapt to the new skewed form changes were made in the mechanism also.



Final Mechanism

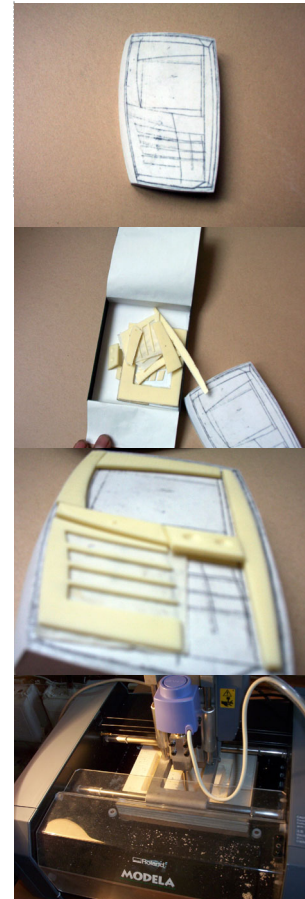
Drawings, Renderings and Model

The images shows the drawings of the final concept and process of model making.



Final top panels (open and closed)

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The model making

Drawings, Renderings and Model

>>

renderings



The study model in foam

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