

**INFORMATION SOCIETY TECHNOLOGIES
(IST)
PROGRAMME**



SmartSketches 

***Product Design and foam models of calligraphic
3D input***

Project acronym: **SmartSketches**

Project full title: **SmartSketches: A Multimodal Approach to Improve Usability in the Early States of Product Design**

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WORKPACKAGE: WP4

TECHNICAL REPORT

TITLE: WP 4 – D 9 Product Design and foam models of calligraphic 3 D input devices

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WP4 – Product Design and foam models of calligraphic 3 D input devices

Product Design is a multidisciplinary working field which allows to create and develop innovative solutions under specific and different aspects. These aspects could be cultural, commercial, technical, aesthetically, functionally and ergonomically.

In the SmartSketches project we have to understand and define the different point of views.

- › the target group
who is the user, who will work with the new devices within the Augmented Reality System
- › the functions
buttons, the focus on main functions,
- › the ergonomics
how should the devices be handled by the user
easy to understand, self-explaining,
- › construction and production
simple in production and assembling
concept of a modular design-system
- › the market
comercial aspects; how to sell it; shop; as a part of the whole system;
how big is the market; europe, world-wide
- › the aesthetical appearance, attractive

The design process is divided into four design development stages:

First project stage

- Understanding the world of electronic tools and VR instruments.
- Trends, target groups, uses, scenario.
- Functionality and ergonomic aspects of the existing tools at IGD.
- Evaluation of the requirements from a design point of view
- Formulation and definition of product ideas.
- Definition of basic technical and design requirements.

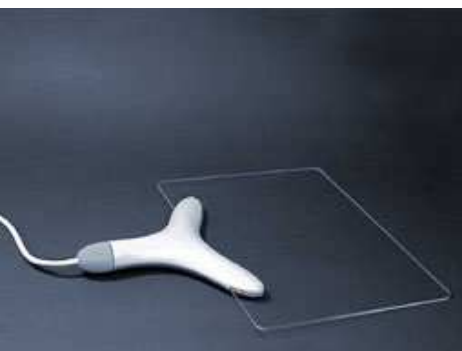


Second project stage (conceptual and creative phase):

- Development of concepts for the design of the 3 D tools including the pen and the tableau, its dimensions, proportions, type and geometric structure.
- Investigation of different ergonomic possibilities.
- Technical viewpoint incl. types of construction, functions, assembly.
- Provisionally integration of technical elements, location of switches and magnet tracker, the silver balls, plugs and cable management.
- Development with regard to economic viability and manufacturing
- Illustration of various concepts using sketches, diagrams of different principles and simple conceptual and working models.
- Internal selection and development of various different design concepts.
- Technical drawing in 2 D for templates and model building
- Model building.
- Initial presentation in Darmstadt:
Presentation of different design concepts using 1:1 foam models.
Group discussion and selection of three alternative types of design to be pursued further.



During an informal user test at IGD we discussed which functions and which instruments are still necessary and which are to be optimized from our point of view. We figured out that a coordination device/cube for a defined orientation in the x-, y-, z-axis will help us for an easier orientation in the 3 D space



The tableau has to be transparent, reversible from top to backside and the approx. size of an US letter format. We need a structured zone for right and left handed people. And we have to look how to handle an artists palette.

Electronic 3 D tools must unite different functions from various creative fields: sketching with a pencil, painting with an art brush or sculpturing with a spatula. We have to understand the topic of left and right handed designer which means that the tools must be created in a reversible way. We learned that working and sketching with a 3 D pen is almost analogous with holding a big pencil between forefinger and thumb. A highly transparent material of the drawing point optimise orientation. The design models were built with different shapes and cross-sections. The main aspect was a comfortable balance and a minimum of effort while sketching.



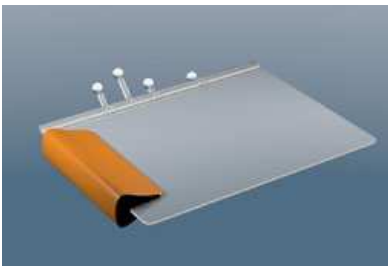
Third project stage (detailed development):

- Detailed development of the chosen design concepts for 3 D pen and tableau
- Specification of size, volume, joints incl. integration and layout of technical components and user elements.
- Refinement of design with a view to clarity, ergonomic requirements, aesthetic appearance and emotional appeal.
- Production of technical drawings in 3 D for model building.
- Discussion of progress in Darmstadt

We worked out the product design of the pen. We were building ergonomic, coloured model in 1:1 scale without functionality but with the original weight and balance for testing at Fraunhofer IGD, Darmstadt. The pen became cordless and we used to integrate the new technology with the minimum of 4 reflecting silver balls. First results of the cordless tableau with 4 silver balls were presented at the September 9th workshop in Lisbon by Fraunhofer IGD.



In parallel we designed another new tableau as a design system with more integrated possibilities for individual adjustment. We tried to work out our new design proposals in 3D/CAD (Rhino) for the next step of prototyping. That means that we have to design and integrate specific technical components in the new shape.

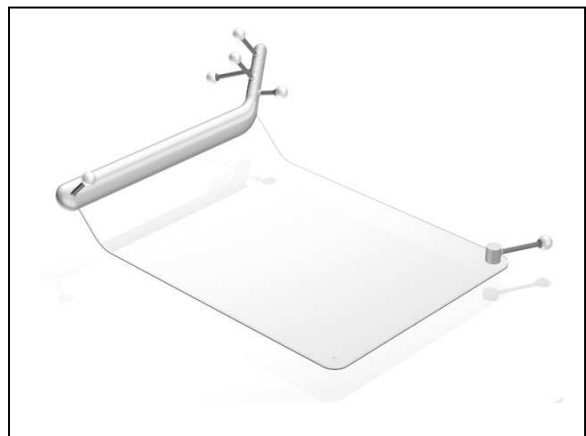
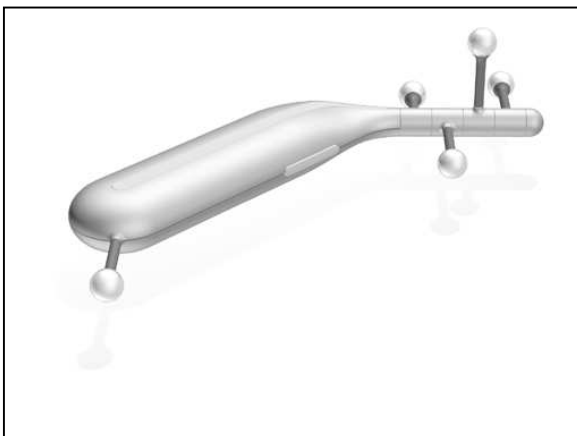
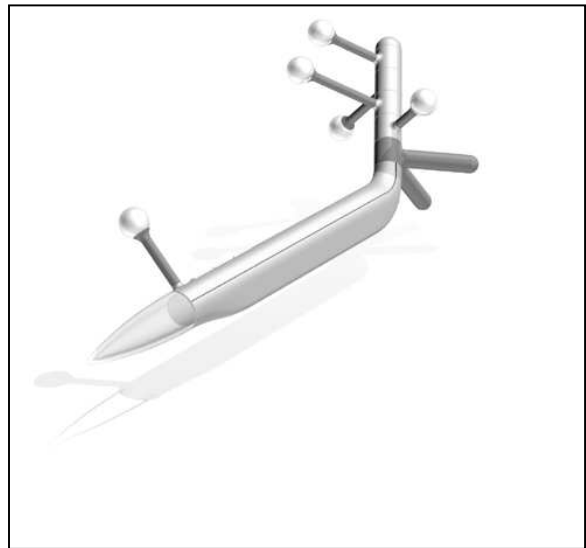
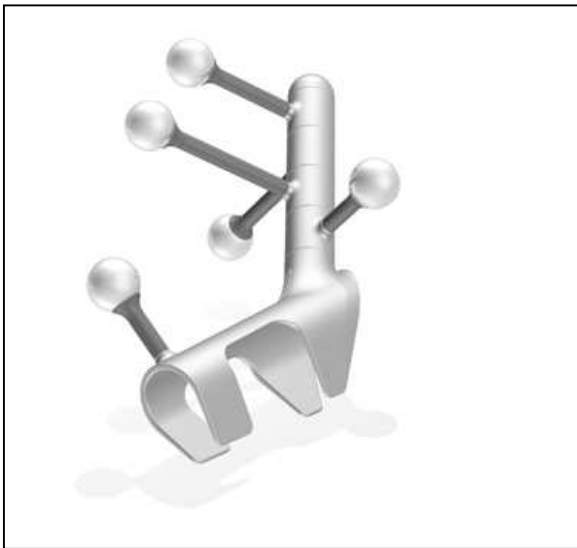


For a professional situation or rather for a VR working place eg. at IGD, Darmstadt we started to develop first design proposals for the virtual table display and a special 2-level bench for 2 persons.



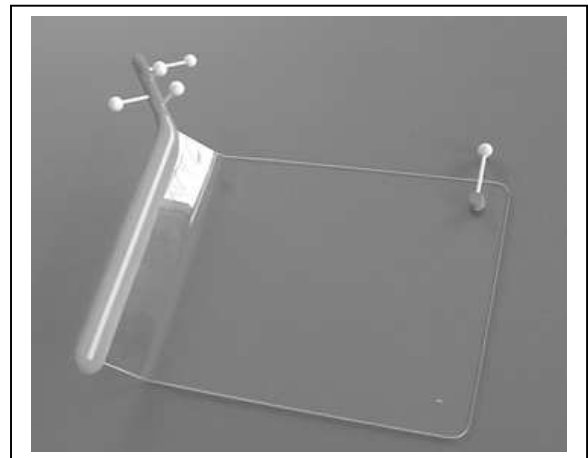
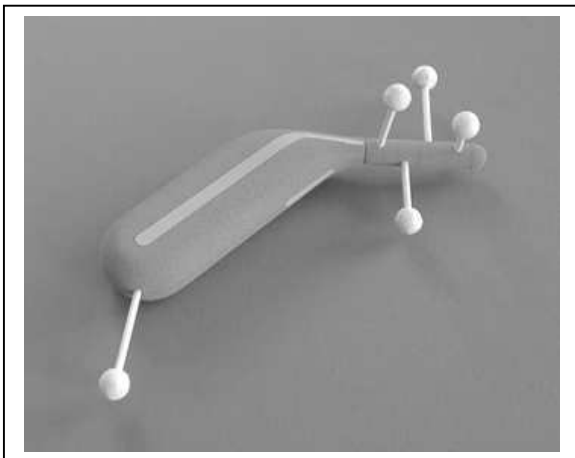
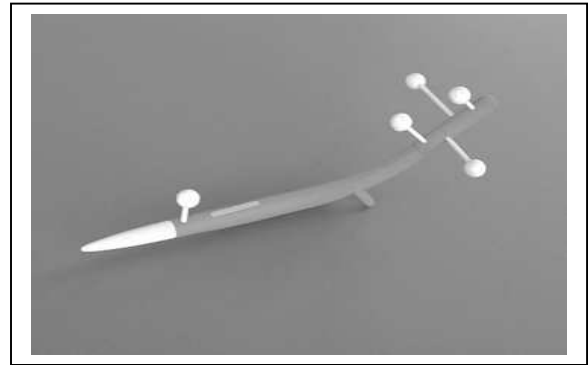
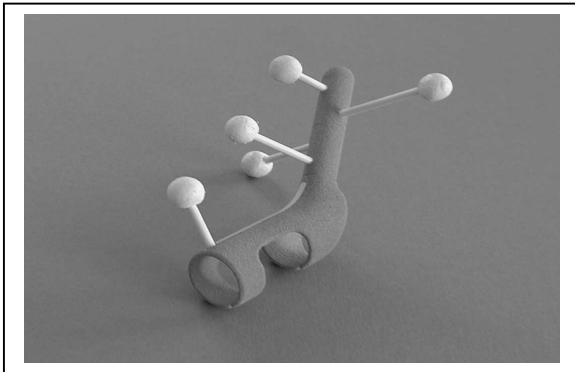
After the analysis of all design proposals we decided to concentrate our designwork more to a design concept under economical and production aspects. We know that we will not have a big number of clients in the future using 3 D input tools.

In January and February 2003 further technical planning have been carried out with Fraunhofer IGD in Darmstadt, specifying the modular design system and the design-direction of the 3 D input tools. So we worked out a system with less different parts and with a specific family design character. We were developing the exact data of CyberStone, PIP (Personal Interactive Panel), TapeFinger and 3 D Pen in 3 D (RHINOCEROS) for the prototyping process.



For testing ergonomic handling we were building 1:1 foam models

All designconcepts were announced and registered as design patents at the patent department in Munich, Germany, March 11th, 2003, Reg. No. 403 02 068.9.



The prototype of the CyberStone was tested internally by Fraunhofer IGD. This model is to check ergonomical data such as sizes, proportions, weight, balance, position of the buttons

The first public presentation took place at the CEBIT fair in Hanover, March 2003.

