
Natural Interface Exploration

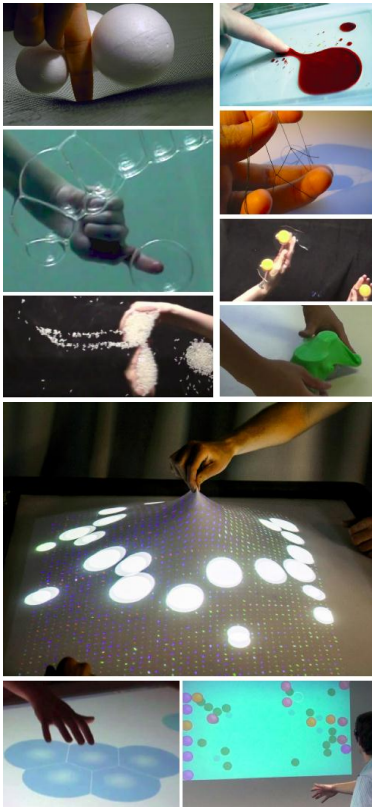


Figure 1: Impressions from previous student workshops

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Abstract

Finding new and compelling approaches to interaction design for natural user interfaces, is challenging. The *Natural Interface Exploration* studio will offer participants the opportunity to explore interaction design for natural user interfaces based on physical substances that are used in everyday life. Studio organizers will present an overview of their methodology, providing examples of their experience [1, 2] and comparing it to other approaches. They will demonstrate how they analyze natural substances regarding the aspects of visualization and interaction and what kind of interfaces resulted [3, 4, 5] from these findings in initial workshops (see Figure 3 and 4).

Following the demonstration, participants will form teams and collaboratively decide which substances or materials they would like to analyze. After examining and charting relevant aspects, the teams will chose a certain task to be solved with a new kind of interface. Example tasks will be provided by the studio organizers. The next step will be to decompose the tasks into required interaction and information needs. Finally participants will develop their own interface mock-up using stop motion or paper prototyping. Finally, studio organizers will facilitate a group critique session and offer closing thoughts on employing this methodology in one's creative TEI practice.

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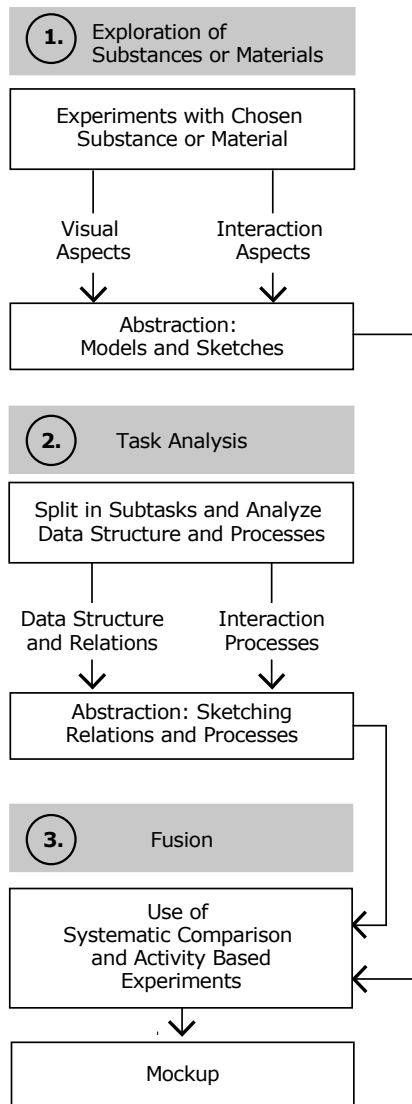


Figure 2: *Natural Interface Exploration Method*

Keywords

Inspiration, interaction design, interface design, tangible user interface, physical materials.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

Accustomed to traditional user experiences with mouse and keyboard, designers are often challenged to break free and find new and compelling approaches to interaction design for natural user interfaces. This studio named *Natural Interface Exploration* serves to inspire and provoke critical reflection on interaction design for natural user interfaces based on physical substances that are used in everyday life [1, 2].

Studio Proposal

No prior skills are required to take part in this studio. It consists of three phases (see Figure 2) described in the following section.

Phase 1: Exploration of substances/materials

Participants, working in teams of two, will decide which substances or materials they would like to analyze. The goal is to have a closer look at substances and materials used in daily life from an interaction and visualization point of view. Regarding visualization, relevant aspects contain the analysis of shape, silhouette, part-whole aspects, visual effects related to movement and color. Regarding interaction, aspects to be examined are direct or indirect manipulations, behavior when touching and position in space in respect to the user or other objects as well as handling. Beyond this, also emotional aspects and kinesthetic feelings will

be taken into account. The given list is just an overview, because relevant aspects to be analyzed may differ between substances. Participants, especially when new to the subject, will be guided through this process by the organizers. A handout will help to find relevant questions and aspects regarding the observation.

Phase 2: Task Analysis

In this phase participants will choose a certain interaction task to be coupled with the findings from the first phase to create a new natural interface mock-up in phase 3. Participants can use own tasks if they like, but a set of example tasks will be provided by the organizers to be analyzed. Example tasks will include organizing and structuring information, dealing with complexity in data sets, information search, prioritizing and planning.

To analyze a task, participants will be provided with guiding questions like: Which data structure is inherent? What kind of strategy would be appropriate to solve the task? To transform the findings from the first phase into sufficient interaction patterns the chosen task has to be analyzed again concerning visualization and interaction. Visual aspects include data structure, relations, order and sequence. Regarding aspects related to interaction, participants will have to identify organizational schemes and activities which form necessary relations and needed structures.

Phase 3: Fusion and Mock-Up

The goal of this phase is to merge the findings from the preceding phases to create a mock-up of a new interface solution.

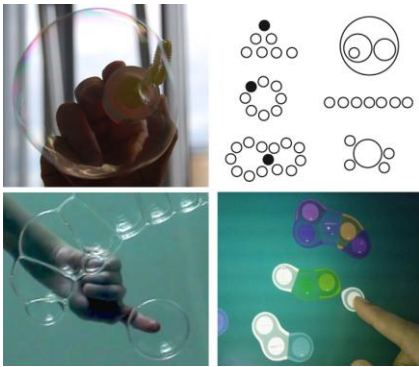


Figure 3: Exploration of soap bubbles and resulting prototype *BrainDump* [3].

This is acquired by systematic comparison of found aspects regarding visualization, interaction and task based activities. Guiding questions like: “does the substance provide certain constraints for interaction?” (e.g. for using a substance under water hand movements will be followed by waves) will help participants to create concepts. This can be realized as a 2D or 3D mock-up using paper or substances and a camera for video or stop motion documentation.

Studio Topics to be Covered

Topics covered in the studio are

- Exploration of physical materials and their characteristics regarding interaction tasks
- Analysis of these materials in terms of visual and interaction aspects
- Generalization of interaction tasks to find mappings between real-world characteristics and desired effects
- Fusion of observed behaviors and characteristics of interaction tasks to form an innovative and intuitive interaction technique
- Documentation of results using simple visualization methods

Expected Outcomes

One learning objective is to present an approach of using natural substances and materials in our daily life to find inspiration for interaction and interface design. We expect participants to explore this mindset and discover new possibilities for natural interaction, thus creating a shift in perspective.

New skills attendees will develop include methods for analyzing daily substances and materials they

encounter concerning affordances to interact with them. These are important for tangible interaction because they inhabit physical and tangible aspects and people learn how to interact with them since childhood. This approach reflects the proposal of Reality-Based Interaction by Jacob et al. who state, that knowledge regarding the natural environment can be easily transferred to human-computer interfaces by the user and therefore enhances usability [6]. Thus it can be expected, that there is a huge potential in using this knowledge for tangible interaction design. As a result, exciting new interfaces can be designed. This meets the demand expressed by Johnny Chung Lee: “Natural interaction is achieved through clever designs that constrain the problem in ways that are transparent to the user” [7].

Studio Supporting Web Documents

Online materials regarding the workshop are provided as webpage¹. Further documentations of initial experiments are available as short videos [2, 8].

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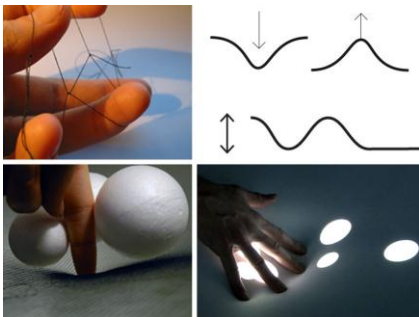


Figure 4: Exploration of threads, textiles and resulting prototype *DepthTouch* [5].

¹ <http://wwwpub.zih.tu-dresden.de/~brade/natural-interface-exploration>

Citations

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