

User-System-Interaction Design Program: an Overview

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Abstract: In 1998 the Stan Ackermans Institute at the Technical University Eindhoven (TU/e), the Netherlands, founded the User System Interaction (USI) Design Program. This program is a two-year post-master program leading to the degree of 'Master of Technological Design' (MTD). The USI design program requires an internationally recognized master degree or equivalent professional qualification. The content of the curriculum is regulated by staff of the TU/e from different faculties working in the field of USI and Human-Computer Interaction (HCI), and is presented by nationally and internationally well-known experts from academia and industry.

Keywords: User-System Interaction, HCI, teaching, education, quality assessment

1 Background

The Stan Ackermans Institute (SAI) at the Technical University Eindhoven (TU/e) has offered for the last 20 years ten two-year full-time Technological Designer programs throughout the Netherlands. These programs have arisen out of the needs of industry for graduates who are capable of working in the multidisciplinary world of designing and who are aware of the latest design methods. In addition to existing programs for research oriented PhD students, these SAI programs are the second part of the two-tiered structure of engineering education in the Netherlands. All selected participants of any of these programs obtain a temporary employment contract as a research assistant, and are therefore paid by the university. The USI Program started in 1998. These design programs are funded by the Dutch Government and industry.

2 Scope of the Program

USI in general, and HCI in particular is a discipline concerned with the design, evaluation and implementation of interactive systems. Considering the dramatic growth of complexity and functionality of electronic devices and the fact that most of these have become mass consumer products, qualified experts are needed. These experts and system developers are forced to deliver products and services that satisfy needs and capabilities of users. Many of these users cannot be trained, thus systems have to be designed so that they can walk up to the device and use it successfully for the first time.

HCI is concerned with the performance of tasks by both humans and machines, the structure of communication between human and machine, human capabilities to use machines (including the learn-ability of interfaces), algorithms and programming of the interface, engineering concerns in designing and building interfaces, the process of specification, design and implementation of interfaces, and design trade-offs. Thus, HCI is concerned equally with science, engineering, and design aspects. Rauterberg (2000) describes some challenges and possible solutions.

3 Educational Program

Learning Objectives: The USI program aims to qualify experts in scientific methods of design and evaluation of user interfaces of products, systems and services. The participants get to know the entire design cycle by working on various applications, from innovative shopping aids for elderly people to consumer electronics, to modern usable web sites. The main educational focus of the program is on: (1) Knowledge of perception, cognition and action as a foundation for human capabilities and limitations; (2) Knowledge of information and communication technologies; (3) Skills in specifying and formalizing product features that conform to work efficiency and effectiveness, user's satisfaction, fun and ease of use; (4) Skills in recognizing and realizing economic, technical, political, social etc. trade-offs of a design; (5) Skills in the design of user interfaces; (6) Ability to work in a

multidisciplinary team; (7) Knowledge and skills for optimizing the development process; (8) Skills for the critical evaluation of product designs and prototypes with regard to learnability, ease and fun of use, user capabilities and limitations.

Program Structure: This two-year program is divided into two parts: (1) the study period (14 months) and (2) practical work for an industrial or governmental organization (9 months). The study period is divided into one- or two-week modules, during which students receive lectures from TU/e or visiting professors and are given design assignments (either spread over the two weeks or during the second week only, depending on the lecture organization). The participants work in multidisciplinary, multi-national teams of three or four people.

The regular curriculum includes interactive workshops, working lectures, practical training, individual and group assignments, self-study, experiment set-ups and laboratory work for design and evaluation. Students have unlimited access to modern laboratory equipment and relevant software applications. The second part of the program is reserved exclusively for the large assignment in the industry. These assignments are carried out upon the request of and paid by companies or institutions. For each of these industrial projects, professional supervision from both the company and academia is provided.

4 Curriculum

Cluster Structure: The study program has several components, called clusters (one study credit corresponds to forty study hours, or approximately one work week): (1) Homologation phase (4 credits); (2) Obligatory courses (36 credits); (3) Design assignments and electives (10 credits); (4) Industrial Project (35 credits); (5) Professional Development (10 credits).

The homologation phase is meant to synchronize various educational backgrounds of the participants to create a common frame of reference for various specializations. Engineers are given an introduction to Perception and Cognition Theory. Graduates from non-technical sciences receive an introduction to Software Engineering. After the homologation phase, there are obligatory courses grouped in five main clusters, each consisting of several modules (one or two week courses): (1) Cognition & Perception (3 credits); (2) Interaction Technology (8 credits); (3) User Interface System Technology (10 credits); (4) User Centered Design Process & Methodology (11 credits); (5) Organization & Work

Environment (4 credits). In addition, Professional Development (PD) includes language and presentation skills, personal presentation, multicultural management, technical writing & editing and project based management.

Module Structure: Each of the above-mentioned clusters consists of several modules; each module is dedicated to a specific topic according to the scope of the cluster. Modules run for one or two weeks.

Industrial Projects: Since 1999 project examples were implemented at the following companies (in alphabetic order, location in the Netherlands by default): Baan, Bova, BrainLab (Germany), DaimlerChrysler (Germany), Ericsson, Informaat, iRv, KPN, Lucent, Microsoft (USA), Océ Technologies, Philips Consumer Electronics, Philips Medical Systems, Philips Research, PriceWaterHouse (Switzerland), Shure Inc. (USA), Siemens AG (Germany), Trilogy (USA).

5 Participants

Marketing: The USI program started recruiting participants via relationships with other universities. Today, the main marketing channel is the website <http://usi.ip0.tue.nl>.

Applications: All applicants that fulfill the following requirements are eligible for consideration: (1) Graduate degree (M.Sc. or equivalent) in engineering, behavioral science or design; (2) High motivation for work in the USI field; (3) Professional qualifications or practical experience. Applications originate from all over the world: 80% from Europe and 20% from the rest of the world.

Selection of Participants: Based on the qualifications of the applicant, a selection is made to achieve the following mix: 50% Dutch, 50% rest of the world, 50% technical and 50% non-technical background. Overall acceptance rate is about 30%.

6 Summary

Overall, the USI Design Program seems to be a successful case study for teaching USI and HCI design skills. So far, about 80 MTD certificates have been acquired by all participants.

7 Reference

Rauterberg, M. (2000). How to characterize a research line for user-system interaction. *IPO Annual Progress Report*, no. 35, pp. 66-86