Advanced User Interfaces: Interaction (5 CFU)

Lesson 1 (overview)

Master Program in Computer Engineering
http://hoc13.elet.polimi.it/aui_interaction/

Prof. Franca Garzotto

Teaching assistants/Project Tutors:
Francesco Clasadonte, Mirko Gelsomini, Antonella Di Rienzo, Luigi Oliveto, Matteo Valoriani

Premise on course
Advanced User Interfaces (AUI) (10 CFU)

Master Program in Computer Engineering

Proff. Paolo Cremonesi and Franca Garzotto

Lesson 1: Course Overview
AUI (integrated course 10 CFU) at a glance

2 modules: AUI: Technology (Cremonesi) + AUI: Interaction (Garzotto)

• AUI: Technology - Main focus (see Prof. Cremonesi’s presentation)
  • personalization (ability of the interface to understand user’s needs and to adapt to the particular context)
  • recommender systems

• AUI: Interaction – Main focus
  • Interfaces & interaction paradigms “beyond the desktop”: mobile, touchless motion-based (MS Kinect, Leap, Intel Perceptual Computing), (multi-)touch, tangible, robot-based)
  • development process of interactive applications (requirements elicitation, scenario based design, prototyping, heuristics and empirical methods for UX Quality assessment
  • UX quality evaluation: research methods for empirical studies

AUI at a glance

Each module can be taken separately
For organizational reasons it is suggested to enroll in each individual module rather than to enroll for the 10 CFU course

Exam: 2 parts
1. AUI: technology (see prof. Cremonesi’s presentation)
2. AUI: Interaction
   • Project based (project activity starts at week 3)
   • Extra points for optional activities

Limited number of joint projects accounting for both modules are available
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Rationale_1

• Todays’ Interfaces: beyond conventional devices (keyboards, mice, or monitors)

• novel equipment and apps constantly carried on by people, embedded within appliances, vehicles, walls, furniture, and pervasively used in most human activities

• new interaction paradigms, e.g., based on touch or touchless gestures, ambient interaction, tangible interaction with smart objects

• new services that introduce “social innovation”
Rationale_2

ICT Innovation → Thinking out of the box

ICT Innovation → Understanding users’ needs

ICT Innovation → Quality of the User Experience (UX)
Demos

1. Touchless Interaction with large displays: Tourism
   
   https://www.dropbox.com/s/eu0wiz6w6hmvys3/Fil
tatoStreetsmartPolimiTelecomV2.mp4?dl=0

2. Touchless Interaction with large displays (+ mobile): Fashion

3. Touchless Interaction with large displays: Health & Education

4. Touchless Interaction + Robots: Health & Education

Game-set for therapy and education
UX (User Experience)

Key factor for success of any modern application is the quality of the User eXperience (UX)

- how well the user interacts with a system and how happy and rewarded s/he is in doing so

“A good user experience is like an electric light: when it works, nobody notices it; when it does not work well, everybody is disturbed.”

“A good user experience seems obvious, but what is not obvious is how to design, prototype and implement it. Nor it is trivial how to systematically assess such quality, during and at the end of the development process”

AUI and HCI (Human Computer Interaction)

HCI is concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.  

(ACM SIGCHI, 1992)

ACM = Association for Computing Machinery  
SIGCHI = Special Interest Group for Human Computer Interaction

the end user at the center of the design and development process

This is what HCI (Human Computer Interaction) is all about

HCI – a switch of perspective

TRADITIONAL PERSPECTIVE
OF A COMPUTER ENGINEER:
TECHNOLOGY AS AN END

HCI PERSPECTIVE: TECHNOLOGY AS A MEANS TO AN END

The end: satisfying users’ needs, attitudes, and expectations
### What is required by a good computer engineer working in the arena of interactive apps?

- high-level technical competence
- capability of mastering new paradigms for interaction (e.g., mobile, tangible, touch and touchless)
- understanding all the ingredients that make a user experience "good"
  - technical quality
  - fitness to functional requirements
  - usability (how easy is to use an interface)
  - natural and intuitive interaction, especially in contexts where gestures, touch, or other means of dialoguing with a system are involved.

### Some wrong opinions on HCI

1. HCI is a light and soft matter (easy to learn)
2. HCI is just about users (technology is not an issue)
3. HCI is just about building nice interfaces to interactive services
4. HCI does not offer strong business opportunities
**HCI is NOT a light, soft matter**

- Strong **theories** rooted on:
  - sw engineering principles
  - cognitive-psychological theories

- Strong **methods** of analysis, design, testing & evaluation

**HCI is NOT just about users: Remember**

- Key attributes for an interactive technology to be successful – again:
  - Usefull, accomplish what is required
  - Usable, robust + do it easily and naturally
  - Used, make people want to use it, be attractive, engaging, fun
**HCI is NOT just about users...**

- **Technology** for users in specific contexts of use
- Creating the **right design**
- Building the **right technology**
- **Demonstrating** their effectiveness
  - **User studies** are an important branch of HCI
    - Understanding the needs for all stakeholders
    - Analysing their behaviour with technology
    - Understanding how design solution affect users’ perceptions, attitude, and judgements

**HCI and Interfaces**

- Interface is the **surface** of a product – it must be nice, attractive, fun

BUT HCI is also

- Integrating a nice interface with the sw architecture behind

- **Addressing technological challenges**
  - Constant search for NEW INNOVATIVE technical solutions
    - As new user needs emerge, existing technology must be adapted and new technology must be developed
HCI does offer business opportunities...

- See start-ups presenting at the course
- See Facebook and Mark Elliot Zuckerberg's story

But even if you are not Zuckerberg, here is a success story closer to us...

- Emanuele Vulcano («software artisan – engineer»)
  - A Politecnico alumnus (and my former thesis student)
  - Developer of Mover (>2,700,000 downloads from Apple Store) [http://infinite-labs.net/mover/](http://infinite-labs.net/mover/)
  - Now at Coupertino (S. Francisco- CA) as «front end engineer» at APPLE (permanent position)
  - «.... e' grazie al lavoro di tesi che abbiamo realizzato (più che altro per le implicazioni in ambito di usabilità/user experience) che hanno deciso di assumermi.»

Contents and Organization
Educational goals of this course

• to have students learn skills that are crucial today for building successful applications:
  • how to design, develop, and evaluate interactive systems that ensure a positive, successful UX

• to stimulate "thinking out of the box"
  • conceiving innovative solutions that involve non traditional interaction and may become successful in the real world.

Contents of the course

• Interaction Design Process in the Sw Development Process
• Requirements (= Understanding users’ needs)
• Usability and Quality of the User Experience
  • Empirical and inspection methods
• Scenarios
• Prototyping (methods and tools)
• Beyond the desktop: designing non conventional Interaction Paradigms
  • mobile interaction
  • multitouch (large & small) interaction
  • touchless gesture-based interaction
  • tangible interaction/interaction with smart objects
• Programming “beyond the desktop” interfaces
Teaching/learning approach

- Learning by-doing/Learning by-examples

- Mainly project-based
  - Few ex-cathedra lessons
  - Hands-on on technology via supervised project activities starting after 3 weeks
  - Use of “novel” technologies (touchless, e.g. Kinect/Leap/Intel Perceptual Computing, Arduino, Internet of Things, smart objects)

- Exposure to the “real world”
  - Representatives from start-ups and large companies as testimonials
  - Industrial Seminars (Smart & Beyond Series)
  - Projects anchored to real-world problems and contexts
    - Health & Education
    - Commerce and retail
    - Culture and tourism

FORMAT

- A set of ex-cathedra lectures by course teachers about theories, concepts, methods, and technologies
- Live Demos
- Classroom & Home Exercises
- Industrial seminars (see next slides)
- Supervised project work

Timing issues:
- 3 hours on Monday
- 2 hours on Thursday (seminar lunch in the classroom)
Organization

• Weeks 1:
  • HCI concepts and methods (today)
  • Testimonials: small start-ups and a large company (Deloitte Consulting Ing. Sara Negro)

• Week 2:
  • HCI concepts and methods (continuation)
  • Projects: general specifications
  • Industry Testimonials (t.b.c.)

• Week 3:
  • project work start (group organization)
  • Project specs discussion
  • Technologies for «beyond the desktop» interfaces

• Week 3-…:
  • Technologies for beyond the desktop interfaces
  • Supervised Project work
  • Industry Testimonials

Industrial Seminars (6)

Involving representatives of major worldwide players in the field of interactive technologies:

- technological solutions in the arena of new devices - smartphone, tablet, and interactive tv;
- programming techniques and development toolkits for the different platforms;
- business perspectives

Some seminars might take place outside the course hours and will be located in conference rooms other than the course classrooms

See detailed schedule on the course web site (t.b.a)
EXAM

- Project (max 30 points)

- Optional activities (max 3-4 points)
  - Reading and public presentation of scientific papers
  - Evaluation activities

Project (max 30 points)

Individual or group activity (max 3 persons – 2 persons is the ideal size)
Designing and prototyping beyond the desktop interfaces and key functionalities of an interactive applications
Deliverables: design documentation, prototype, presentation, video (optional)
Projects can be completed and evaluated by the end of the course
Requirements provided by teachers, in the domains:

- e-culture
- e-tourism
- e-learning
- e-health
- e-commerce/retail/fashion

Project specs proposed by students are subject to evaluation by teachers
### Optional Activities (max 4 points)

- **Evaluation**
  - empirical study: evaluating the quality of the user experience on an assigned application
  - testing with samples of real users, data collection and analysis of results
    - Deliverables: collected data, data analysis

- **Readings**
  - Readings and presenting scientific papers

### Further activities

- **3cixty app challenge**
  - [http://appchallenge.3cixty.com/](http://appchallenge.3cixty.com/)

- Consider participation to Microsoft Imagine Cup “the world's premier student technology competition”:
  - [http://www.imaginecraft.com](http://www.imaginecraft.com)
    - Technical support by MS and teacher’s mentoring available
EXAM: note for NON ATTENDING STUDENTS

• All deliverables must be delivered at official appello dates

Evaluation Criteria

• Active participation during course activities/project tutoring

• Investment in the course

• Project
  • Technical & Methodological Quality
  • UX Quality
  • Originality
  • Quality of Documentation and Presentation
Reference HCI Books


A. Dix et al., "Human-Computer Interaction", 3rd edition, Perason-Prentice Hall, 2004 (some contents are also online: http://www.hcibook.com)

Jennifer Preece et al., "Interaction Design", 2nd ed. Wiley, 2007 (most contents are also online http://www.id-book.com/)

Further Resources

R. Polillo “Facile da usare” Apolgeo 2010
Full version online: http://www.rpolillo.it/index.php/libri/facile-da-usare/

M. Kuniavsky, “Observing the user experience”, Morgan- Kaufmann 2003


SLIDES, SCIENTIFIC PAPERS, TECHNICAL REPORTS, WEB RESOURCES
The online platform

Beep
http://beep.metid.polimi.it/

Here course registered students
- will find all teaching material and course announcements
- will post their deliverables

Web course public page
http://hoc13.elet.polimi.it/aui_interaction/

Q&A
Some videos

Videos about our own work

- The interactive oven
- Touchless interaction for disabled children
Further videos: From history to present
(a tribute to Steve Jobs)

• Apple Lisa (1983): the ancestor of Apple Mac
  http://www.youtube.com/watch?v=5DQDZG5iNZk&feature=channel
  http://www.youtube.com/watch?v=a4BlmsN4qZl6'39"

• Few weeks later...Steve Jobs demos Apple Macintosh (Jan. 1984)
  http://www.youtube.com/watch?v=G0FtqZNOd44&feature=related

• Many years later, Steve Jobs demos iPad (Jan 2010)
  http://www.youtube.com/watch?v=4_zI21XEo0Q

• October 7th, 2011 - the sad new:
  http://www.cbsnews.com/stories/2011/10/05/scitech/main20116338.shtml

Further videos: Perspectives on Interaction Design

• Tim Brown, Ideo - http://www.youtube.com/watch?v=UAinLaT42xY About Tim Brown:
  http://www.ideo.com/work/clients

• Bill Buxton, Chief Designer at Microsoft - http://videos.visitmix.com/MIX09/KEY01
  Gustav Project - http://www.youtube.com/watch?v=WET3jaecH68
  Sketching and Experience Design (lecture at Stanford University) -
  http://www.youtube.com/watch?v=xx1WveKV7aE

• Don Norman: The Design of Future Things (lecture at Stanford University)
  http://www.youtube.com/watch?v=wQmwEjI.6K1U&feature=channel
Further videos: Vision of the future

- Further videos: Perspectives on Interaction Design - http://www.youtube.com/watch?v=i5AuzQXBsG4
- Nokia future vision - http://www.youtube.com/watch?v=A4pDf7m2UPE
- Productivity Future Vision - http://www.youtube.com/watch?v=a6cNdhOKwi0
- Tour Microsoft's Home of the Future - http://www.youtube.com/watch?v=WofRuuwoPI
- Google Glasses Project - http://www.youtube.com/watch?v=JSnB06um5r4