MMI 2: Mobile Human-Computer Interaction
Mobile Applications

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<td>19.10.2011</td>
<td>Introduction to Mobile Interaction, Mobile Device Platforms</td>
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<td>Visualization and Interaction Techniques for Small Displays</td>
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<td>Mobile Devices and Interactive Surfaces</td>
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<td>Camera-Based Mobile Interaction</td>
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<td>Application Areas</td>
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<td>Exam</td>
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Klausur

• Organisatorisches
  – Datum: 8.2.2012
  – Zeit: 10:00 Uhr
  – Dauer: 90 Minuten
  – Ort: in diesem Raum

• Vorbereitung
  – Folien durchgehen
  – Review-Fragen beantworten können
  – Übungen durchgehen, wesentliche Aspekte klarmachen
  – Durchatmen und entspannen

• Fragen?
Review

• Examples of sensors in mobile devices?
• What sensor characteristics important for mobile interaction?
• What does DTW do?
• Why is DTW useful for gesture recognition?
• Use of distance sensors?
• Use of force/pressure sensors?
• Use of microphones?
Preview

- Persuasive computing
- Current and future application areas
PERSUASIVE TECHNOLOGY
Persuasive Technology

- Change attitudes and behaviors
- Motivating users to do something
- Raising awareness of a particular issue
- Change bad habits

Persuasive Technology Defined

- **Persuasive technology**: Interactive computing systems designed to change people’s attitudes or behaviors (through persuasion and social influence, not through coercion or deception)
- **Persuasion**: An attempt to change attitudes or behaviors or both (without using coercion or deception)
- Difference between persuasion and
  - Coercion?
  - Deception?
  - Propaganda?
- Chances, but also ethical issues

History of Persuasion

• Rhetoric, Aristotle: the art of discourse, determining how to inform, persuade, or motivate in any given situation
  – Giving public speeches to influence listeners
  – Change moods, influence opinions, motivate to action
• Social psychology: Formal study of attitudes and behavior
  – Marketers and advertisers applied these findings
• Rhetoric needs ethical foundation
  – Politics
Examples of Persuasive Technology

- **Amazon.com** offers suggestions to persuade people to buy more products
- **Shareware** often tries to persuade users to register and get a license
- **Wikipedia** tries to persuade its users to support the Wikimedia foundation
- **StackOverflow** tries to motivate programmers to share knowledge through a reputation system (and persuades other programmers to trust your answers)
- **FourSquare** tries to motivate people to share information about locations through a reward system (badges, mayorship, points)
Offline Examples of Persuasive Technology

- Posters
- Signs
- Packaging
Other Forms of Persuasive Technology

• Advertising and marketing
• Smart toothbrushes that indicate duration & correctness
• Encourage kids to develop better study habits
• Persuade teams to set goals and meet deadlines
• Persuade people to vote
• Raise awareness on environmental concerns
• Preventive healthcare, e.g., quit smoking
• Fitness, motivate to exercise
• Community involvement
Captology (B.J. Fogg)

Captology: “focuses on the design, research, and analysis of interactive computing products created for the purpose of changing people’s attitudes or behaviors.” (B.J. Fogg)
Computers as Persuasive Technology

• Interactivity
  – Adapt to user input, needs, context, observed behavior

• Persistence
  – Repeatedly (over time) trying to persuade

• Anonymity
  – Less embarrassing in sensitive areas of behavior change

• Access to huge volumes of data
  – Statistics inferred from behavior, recommendations

• Many modalities
  – Text, graphics, audio, video, animation, simulation

• Scale

• Ubiquity
  – Bathroom, bedroom, clothing, cars, toothbrush
**Functional Triad (B.J. Fogg)**

Persuasion depends on functional role

**Tool**
- increases capability
  - Persuades by
    - making target behavior easier
    - lead through process
    - perform calculations / measurements that motivate

**Social actor**
- creates relationship
  - Persuades by
    - reward with positive feedback
    - “play” a target behavior
    - provide social support

**Medium**
- provides experience
  - Persuades by
    - allow to explore cause-and-effect relationships
    - provide motivating experiences
    - help to rehearse a behavior
Persuasive Tools

• Reduction, simplification
  – Increase cost/benefit-ratio of behavior
  – Amazon “one-click buy”
  – Letter writing: Provide stamped envelope with new address
  – Simplify community participation, urban informatics
    • E.g., take pictures of broken objects in public space, submit to system

• Tailoring, customization
  – Healthcare: Match user’s educational level, stage of disease, etc.
  – Vocabulary learning: Graph to compare your level to that of others
  – Fitness: Inform me about air quality where I jog
Persuasive Tools

• Timing is critical
  – Use opportune moment to be most effective
  – Example: Show “why-not-car-pool” to car drivers in traffic jam
  – Suggestion technologies: “now would be a good time to…”

• Self-monitoring
  – Heart rate monitor
  – Observe progress
Persuasive Media

• Simulated experiences
• Cause-and-effect simulations
  – Less threatening to try out new behaviors
  – Compress time to understand long-term processes
• Example: “Rocket’s New School”
  – Game for learning social skills
  – A character placed in social situations
  – Player has to decide how to act
  – Player immediately sees effects
  – Accuracy of simulation?
  – Designer bias?

www.youtube.com/watch?v=UGeApdTQJxY
Persuasive Social Actors

- Trigger social responses in humans
- Example: Tamagotchi (1996)
  - Handheld digital pet
  - Egg-shaped device, LCD screen, 3 buttons
  - Play with a virtual pet as though it was alive: play with, feed, bath it; life stages
- Example: Nintendo Pocket Pikachu
  - Digital pet and exercise toy
  - Pedometer measures user’s activity
  - The more active the user the fitter the pet
  - Trade “watts” for game items
- Breakaway: Sculpture lumps over if no break, desk setting

## Social Cues

Aspects that lead us to infer social presence

<table>
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<tr>
<th>Cue</th>
<th>Examples</th>
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<tbody>
<tr>
<td>Physical</td>
<td>Face, eyes, body, movement, attractiveness</td>
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<tr>
<td>Psychological</td>
<td>Preferences, humor, personality, feelings, empathy, apology, similarity</td>
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<tr>
<td>Language</td>
<td>Interactive language use, spoken language, language recognition</td>
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<tr>
<td>Social dynamics</td>
<td>Turn taking, cooperation, praise for good work, answering questions, reciprocity</td>
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<td>Social roles</td>
<td>Doctor, teammate, opponent, teacher, pet, guide</td>
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Oscilloscopes with Personality?

• Company usability research (Fogg): How do engineers feel about oscilloscopes they use?
• Existing text and error messages somewhat harsh and unfriendly
  – Designers did not expect users to infer a “personality”
• Controlled study: original messages vs. improved ones (new “personality” = helpful senior engineer)
  – Test users judged new design as more accurate, more knowledgeable

Persuading by Adopting Social Roles

- Joseph Weizenbaum’s ELIZA (1966)
  - Simulated psychiatrist
  - Simple natural language processing, pattern matching, response generation
  - Example:
    User: “My head hurts”
    Eliza: “Why do you say your head hurts?”
  - Weizenbaum was surprised that system was believable to users

  woman: Men are all alike.
  eliza: In what way?
  woman: They're always bugging us about something specific or other.
  eliza: Can you think of a specific example?
  woman: Well, my boyfriend made me come here.
  eliza: Your boyfriend made you come here?
  woman: He says I'm depressed much of the time.
  eliza: I am sorry to hear you are depressed.

  ...

Source: http://www.stanford.edu/group/SHR/4-2/text/dialogues.html
Mobile Persuasive Computing

• With the user most of the time
  – Intervene at the right time and place

• Example scenario: “Study Buddy”
  – Pamela sits in college library, starts phone app “Study Buddy”, congratulates her for studying the 3rd time today, shows term’s goals, suggests vocabulary review, then reading assigned chapters, shows shapes of classmates who are also studying; Jean (Pamela’s mentor) can send tactile cues to encourage her

• Example scenario: “HydroTech”
  – Phil trains for NYC marathon, Phil gets tiny device implanted under skin of forearm to measure hydration level, sends data to watch, watch tracks position and communicates with “HydroTech” backend system, recommends hydration level

Opportunities for Mobile Persuasion

• Strategies: Tracking, analysis, reference material
• Support real-world tasks
• Intervene at the “opportune moment”
  – Location, routine, time of day, task
• Fill idle times
  – Device always available, instantly on, convenient
  – Example: simple game to train how to sort recyclables
• Be “companion” over longer time spans
  – Example: Device to help quit smoking, 1st week: press button every time smoking, 2nd to 6th week: only smoke when signal
  – Example: Pedometers, count steps over the day, report to Web
Application Areas of Mobile Persuasion

• Healthcare
• Safety
• Community involvement
• Personal improvement
• Education
• Raising awareness of a particular issue
Persuasion through Connected Technology

• Exchange date with remote devices and people
• More up-to-date information
• Virtual presence
• Social influence
  – Competition, cooperation, recognition
  – Compare to others
  – Compare to “in-group” (classmates, team, family, work group, etc.)
  – Example: reporting physical activity (e.g. jogging paths) to the world
  – Fish’n’Steps: Pedometer linked to virtual fish, displayed with fishes of other users

Lin et al. Fish’n’Steps: Encouraging Physical Activity with an Interactive Computer Game. UbiComp’06.
The UbiFit Garden System

• Support behavior change towards physical activity
  – Difficult to maintain new behavior long-term

• Design strategies
  – Abstract & Reflective
  – Unobtrusive
  – Public
  – Aesthetic
  – Positive
  – Controllable
  – Trending / Historical
  – Comprehensive

Application Areas of Mobile Systems
Emerging Application Areas

- Social web, mobile communities, and friend finders
  - Mobile messaging, mobile presence
- Location-based and context-aware gaming
- Mobile and context-aware advertising
- Mobile learning and educational applications
- Mobile health and mobile fitness

- Generic mobile devices as application platform
  - Apple’s iPhone App Store
  - Android Market
Emerging Interaction Qualities

• Shift away from utilitarian interaction
  – Towards more playful forms of interaction
  – Towards more socially relevant forms of interaction

• Mobile interactions performed in leisure time and in the presence of others
  – Mobile interactions understood as a form of self expression
  – Aspects like the joy of doing, pleasure of interaction, emphasis on the contextual, as well as the social setting become important

• Characteristics of interaction with personal devices
  – Direct manipulation
  – Physically metaphors
  – Affective dimension
Mobile Social Networks

- Social networking was surprise growth area
- Facebook, Twitter, MySpace
- More people mobile so…
Foursquare

• “Make lists of your favorite things to do and let you share them with friends.”
  – Points: foursquare check-in (+1), finding a new place (+5), dragging friends along with you (+1)
  – Badges: discovering new places, traveling to far-away places
  – Mayor: been to a place more than anyone else
Mobile Gaming

• Rolando (iPhone)
  – Tilt-controlled game
  – Physics simulation
  – http://www.youtube.com/watch?v=Sd1tfTwWZtU

• Fieldrunner (iPhone)
  – Touch-controlled game
  – http://www.youtube.com/watch?v=4p_WhzB24ZU
Mobile Learning

- Mobile devices for ubiquitous media access
  - Streaming lectures
  - YouTube on iPhone
  - PodCasts
- Contextual learning
  - E.g. outdoor biology class
  - Connection to other learners
- Capturing data
  - Location, camera, sensors
- Lifelong learning
  - Using waiting situations for learning
**ShareYourBoard**

- Rapid sharing of whiteboard sketches
- Computer vision to help find border of whiteboards
Mobile Health & Fitness

• Mobile applications
  – Absolute Fitness

• Mobile technology
  – Nike + iPod

• Persuasive technology
Mobile Info Guides

- Mobile content guides (museums, city tours)
- Deliver live, matched and interactive content to locative settings
- Incorporate information, interaction, entertainment, guidance

- http://hci.rwth-aachen.de/REXplorer
Ecorio – Track Carbon Footprint

• Make users aware of environmental impact

• Transit planner with a twist
  • Records trips you take
  • Suggests alternative transit models
  • Calculates carbon emission & fuel cost
  • Estimates gains/losses from alternatives
Layar “Reality Browser”

- Position + orientation
  - GPS, accelerometer, magnetometer
- Show POIs as overlays on viewfinder image
- Platform allows inserting new layers and POIs
- Layers
  - Real estate
  - Transportation
  - Tours / Guides
  - Eating & Drinking
- http://layar.com/
Layar Architecture
Mobile Media Sharing

- Web based media sharing
- Upload data from mobile device
- Web service for storage and distribution
Live Video Streaming

- Stream video from mobile devices for live use
- 12SecondsTV, QIK, iReport (CNN)
- User-created content
- “Live” YouTube
  - http://12seconds.tv/
  - http://qik.com/
  - http://www.ireport.com/index.jspa
Mobile Commerce (m-Commerce)

- Two types of commerce
- Mobile apps as marketplace
  - Apple’s iPhone App Store
  - Google’s Android Market
  - Nokia’s Download Store

- Mobile devices as carriers of commercial exchange
  - Credit card, wallet, cash replacement
  - Wireless transaction
  - Billing via mobile phone bill
Application Genres

- Games
- Entertainment
- Services
- Social Networks
- Music
- Productivity
- Lifestyle
- References (Lexicons etc)
- Travel
- Sport
- Navigation
- Health & Fitness
- News
- Photography
- Finances
- Business
- Education
- Weather
- Books
- Medicine
Apple App Store

• Opened July 10, 2008
  – January 2012:
    – 550000+ apps
    – 10 billion total downloads

• Third-party applications
  – 70% to developers
  – 30% to Apple
  – Annual fee: US$99
  – Approval by Apple
    (e.g., no duplication of built-in apps)

• iOS apps exclusively through App Store
Approval by Apple

• No duplication of built-in functionality
  – No email clients, SMS client, etc.
• No offensive content

“The red icon on your iPhone or iPod touch always reminds you (and others when you show it to them) that you were rich enough to afford this. It's a work of art with no hidden function at all.”
Android Market

- Operated by Google
- Opened 22 October 2008
  - Paid apps started February/March 2009
  - 400,000+ apps (January 2012)
  - 10 billion downloads
- Third-party applications
  - 70% to developers
  - 30% distributed between carriers
  - Registration fee: US$25
  - Purchase refund: 15 minutes (was 24h)
- Android apps also through other sources
The End