

Course title: Interactivity for All: Universal Design for Exhibits and Public Information Systems

Catalog number: H79.2682

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Office Hours: anytime at my office, or by appointment at ITP

Schedule: Monday 6:00 to 8:55 PM (no class on February 18 or March 17)

« January 2008 »						
S	M	T	W	T	F	S
23	24	25	26	27	28	29
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« February 2008 »						
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« March 2008 »						
S	M	T	W	T	F	S
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« April 2008 »						
S	M	T	W	T	F	S
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Locations

- ITP
- Touch Graphics, Inc. 330 West 38 Street Suite 1204 (between 8th and 9th)
- Other locations (site visits) as listed here

Requirements contributing to grade

- Attendance: 10%
 - Assignments: 10%
 - Presentations: 15%
 - Participation in discussions: 25%
 - Final project: 40%. Projects can be done independently or in groups of 1 to 4 people. Projects may include:
 - A Working prototype of a museum exhibit element or public information kiosk that demonstrates Universal Design principles...
- OR-
- A Usability study of an existing exhibit element or information kiosk to evaluate adherence to the principles of Universal Design.

Site visits

- Touch Graphics, Inc.
- New York Hall of Science/ Queens Museum
- Staten Island Ferry St. George Terminal/ Penn Station
- Metropolitan Museum of Art

Guest speakers (confirmed)

- Eric Siegal, Director, New York Hall of Science, Corona Park, NY
- Ellen Rubin, Museum Access Consultant and Touch Graphics, NY
- Alan Friedman, Emeritus Director, New York Hall of Science, NY
- Rebecca McGinnis, Access Coordinator, Metropolitan Museum of Art, NY
- Edward Steinfeld, Director, Rehabilitation Engineering Research Center, University at Buffalo, NY
- Annette Gourgey, Statistics Professor, Baruch College and Borough of Manhattan Community College and Touch Graphics, NY

- Bernat Franquesa, Tactile Cartographer, Touch Graphics, Inc. NY and Barcelona, Spain
- Michael May, President and Founder, Sendero Group, Davis, CA
- Jeff Tancil, Information and Web Services Director, Lower Eastside Tenement Museum, NY

Guest speakers (unconfirmed)

- Anindya Bhattacharyya, Helen Keller National Center, Sands Point, NY
- Joshua Miele, Associate Scientist, Smith-Kettlewell Eye Research Institute, San Francisco
- Archana Sangole, Biomechanics Researcher, Department of Mechanical Engineering, École Polytechnique de Montreal
- Zach Eveland, ITP Instructor, Wearables Studio
- Danielle Linzer, Education Coordinator, Lower Eastside Tenement Museum, NY
- Denise Bressler, Exhibit Developer, Liberty Science Center, Jersey City, NJ

Web resources

Web: Materials related to this class will be made available at www.touchgraphics.com/itp. This is a password protected section of the touchgraphics.com site.

- User name: "itp-student".
- Password: "landau"

FTP: Assignments are to be uploaded via ftp.

Settings for your ftp client:

- Host: touchgraphics.com
- Servertype: FTP
- Port: 21
- Log on type: normal
- User name: itp-student
- Password: landau

Statement of Principles

Principle 1. Multi-sensory display and pointing

Use of **multi-sensory input and output** methods in public access interactive devices ensures that a wide a range of user preferences and capabilities are accommodated. Information should be displayed simultaneously through multiple sense channels, beginning with vision, sound and touch. In addition to the “five senses”, other less familiar sense channels can also be exploited, such as proprioception and balance. **Purposeful redundancy** helps to ensure that materials are appealing and intuitive for many user populations.

Principle 2. No instructions

Users of museum interactives and public information kiosks cannot be expected to know or learn anything special when they begin working with an unfamiliar system. Skills required for more advanced use can be accumulated by the user if learning opportunities are embedded in naturally occurring interactive experiences. In other words, **instructions for use are not tolerated by museum visitors** and others confronted with information retrieval devices, but users will become more sophisticated and fluent in the course of a single session (or across multiple exposures), if their interest can be sustained long enough.

Principle 3. Anticipate and tolerate user errors

Respect the principles of Universal Design. This is especially important when **you don't know who your audience will be**, usually the case in public access interactive exhibits and kiosks. Relentless user testing is the only reliable way to ensure that you have considered the full range of errors that users are likely to make. You should **perform multiple, unbiased formative and summative studies** to evaluate usage patterns and behaviors, and invite people with a range of abilities and preferences to participate.

Schedule and session overview

Class 1

- *Date and Time:* Monday, January 28, 6:00 to 8:55 PM
- *Location:* ITP
- *Theme:* Introductions and course overview
- *Group discussion:* Overview of course goals, requirements, schedule and methods. Online review of class participants' previous work that is relevant to this class. 6:00 to 7:00 PM.
- *Instructor presentation:* The Work of Touch Graphics, Inc. in Multi-sensory Museum Exhibits, Public Information Kiosks, and other interactive systems and products. 7:10 to 8:00 PM.
- *Instructor presentation:* Case Study No. 1, The Lower Eastside Tenement Museum as a laboratory for Universal Design interactives. 8:10 to 8:55 PM.
- *Assignment for next class:* develop an idea for a multi-sensory or otherwise universally usable interactive piece for the Lower Eastside Tenement Museum. Create a proposal documenting your envisioned exhibit element. Discuss your design concept through written description, sketches, models, website, etc. Be ready to present your ideas at Class 3 on February 11. Staff from the Tenement Museum will evaluate your proposals, which should include:
 - Problem statement or need to which you are responding
 - Description of proposed interactive piece
 - Evaluation plan
 - Cost-benefit analysis

Class 2

- *Date and Time:* Monday, February 4, 6:00 to 8:55 PM
- *Location:* Touch Graphics (330 West 38 Street Suite 1204, btwn 8th and 9th)
- *Theme:* User-centered design and exhibit evaluation.
- *Roundtable Discussion:* The role of usability testing in the development of the Talking Tactile Tablet and accessory products. 6:00 – 7:00 PM.
- *Guests:*
 - Ellen Rubin, Museum Consultant and Testing Coordinator, Touch Graphics, Inc.

- Annette Gourgey, Statistics Professor and Project Evaluator, Touch Graphics, Inc.
- Bernat Franquesa, Tactile Cartographer, Touch Graphics, Inc.
- *Simulation*: students carry out test protocols on each other and then review video for sequence and timing data. 7:10 – 8:00 PM.
- *Required Reading for this class*:
 - Schneiderman, B. & Plaisant, C. **Designing the User Interface**, 4th edition (2005). Chapter 1, Universal Usability, pages 24-38 and Chapter 4, Usability Testing, pages 141-162 (handout).
 - Caulton, T. **Hands-on Exhibitions: Managing Interactive Museums and Science Centers**. Taylor & Francis, 2007. Selected readings
- Group Discussion: Designing evaluation programs for student exhibit proposals at the Lower Eastside Tenement Museum. 8:10 – 8:55 PM.

Class 3

- *Date and Time*: Monday, February 11, 6:00 to 8:55 PM
- *Location*: ITP
- *Theme*: Principles of Universal Design and Their Application in Interactive Exhibits and Kiosks.
- *Instructor presentation*: Projects being carried out now around the world that address themes of this course. 6:30 – 8:00 PM.
- *Guest speaker (via phone link)*: Edward Steinfeld, Director, Rehabilitation Engineering Research Center on Universal Design. 7:10 – 8:00 PM.
- *Student presentations*: Proposals for Lower Eastside Tenement Museum. 8:10 to 8:55 PM. LETM staff members will be present to respond to your proposals:
 - Jeff Tancil, Information and Web Services Director, Lower Eastside Tenement Museum.
 - Danielle Linzer, Education Coordinator, Lower Eastside Tenement Museum.
- *Required reading and listening for this class* :
 - Steinfeld, et al., (2000). Universal Design and the Palm Beach Ballot. <http://www.touchgraphics.com/itp/steinfeldBallotArticle.pdf>
 - The Disability Lobby and Voting. New York Times, June 11, 2004. <http://query.nytimes.com/gst/fullpage.html?res=9C06E4DB1530F932A25755C0A9629C8B63&scp=1&sq=the+disability+lobby+and+voting&st=nyt>

note: the following podcasts, created by Dr. Steinfeld, are available at <http://web.mac.com/arced/iweb/ARC563/Podcasts/Podcasts.html>

- *Unit 6: Biomechanics and Universal Design*
- *Unit 7: Perception and Universal Design*
- *Unit 8: Cognition and Universal Design*

Class 4:

- *Field Trip.* Date and Time TBA
- *Location:* New York Hall of Science and The Queen Museum, Flushing Meadows Park, Queens.
- *Theme:* Universal Access in Science Museums
- *Guest Speaker:* Daniel Bartolini, Exhibit Technician, New York Hall of Science and recent ITP graduate.
- *Required Reading for this session:*
 - Friedman, Alan (2007). The Extraordinary Growth of the Science-Technology Museum. In *Curator: The Museum Journal*. January, 2007. pp. 63-76. <http://www.noycefdn.org/documents/Curator012007.pdf>
 - Join ExhibitFiles and read about recent projects <http://www.exhibitfiles.org/ASTC>
- *Independent site visit in preparation for next class:* The Talking Kiosk at Staten Island Ferry, St. George Terminal. Please try out the Kiosk, which can be found adjacent to the news stand, near the ramps that go to the bus loading areas. Pay particular attention to the ways this project succeeds or fails to meet the criteria for universal design that has been developed so far in the class. Try closing your eyes as you use the system, or do other things to help you better understand the challenges faced by various user populations. Would a little kid be able to use this system? How about a person experiencing dementia? There are lots of tourists who ride the Ferry, many of whom do not speak English. Is it possible for these people to get information? What would you have done differently?

Class 5:

- *Date and Time:* Monday, March 3, 6:00 to 8:55 PM
- *Location:* ITP
- *Theme:* Practical Matters

- *Group Discussion:* Impressions from the Staten Island Ferry Talking Kiosk site visit.
- *Instructor presentation:* Intellectual property considerations and grantsmanship.
- *Guest speaker:* Alan Friedman, Emeritus Director, New York Hall of Science. 8:10 to 8:55 PM. Topic: Building museum audiences through Universal Design.
- *Required reading for this class:*
 - Friedman, A. (2000, July/August). Expanding audiences: The audio tour access project at the New York Hall of Science. *ASTC Dimensions* (Journal of the Association of Science and Technology Centers), 7–8. <http://www.touchgraphics.com/downloads/Audio%20Tour%20Access%20Project%20ASTC.pdf>
 - Landau, S (2004) Grant proposal for NSF SBIR Phase 2 Project entitled, “Ping!: Creating Accessible Science Museums with User Activated Audio Beacons” <http://www.touchgraphics.com/downloads/ping%20final%20report.pdf>
 - Landau, S. (2006). Final report for NSF SBIR Phase 2 project. <http://www.touchgraphics.com/downloads/ping%20final%20report.pdf>

Class 6

- *Date and Time:* Monday, March 10, 6:00 to 8:55 PM
- *Location:* ITP
- *Theme:* Cell phones as universal control devices for public exhibit spaces
- *Guest speaker:* Denise Bressler, Exhibit Designer, Liberty Science Center. 6:00 – 7:20 PM. Denise will be discussing a range of recent projects that use cell phones in the exhibit context. In a sense, any museum application for cell phones is, by default, an example of UD, because phones can be used in so many ways, and by so many visitor populations (little kids, older people, people with disabilities, and people who don't understand local languages)
- *Required reading:*
 - Bressler, D. (2005) *SCIENCE NOW, SCIENCE EVERYWHERE: Liberty Science Center's Mobile Learning Companion* http://snse.lsc.org/pdf/SNSE_WhitePaper_Dec05.pdf
 - Fruchterman, J. (2003). In the palm of your hand: A vision of the future of technology for people with visual impairments. *Journal of Visual Impairment and Blindness*, 97, 585–591. (handout)

- Landau, (2006). US Patent No. 7,039,522. “System for guiding visually impaired pedestrians using auditory cues”
http://www.google.com/patents?id=zR54AAAAEBAJ&dq=7,039,522
- Landau, S. *Creating Accessible Science Museums with User-Activated Audio Beacons (Ping!)* in *Assistive Technology*, Journal of the Rehabilitation Engineering Society of North America. Fall, 2005.
http://www.touchgraphics.com/publications/resna-paper.pdf
- *Group Discussion:* Final group or individual project requirements. 7:40 – 8:55.

Class 7

- *Date and Time:* Monday, March 24, 6:00 to 8:55 PM
- *Location:* ITP
- *Theme:* GPS Applications in Outdoor Exhibit Spaces
- *Instructor presentation:* Case studies of GPS application in outdoor exhibit environments. 6:00 – 7:00 PM.
- Guest speaker: Mike May, President, Sendero Group (by video conference). 7:10 – 8:00 PM. Topic: Sendero Group’s navigation products.
- Required reading:
 - Ponchillia, P. et al. Accessible GPS: Reorientation and Target Location Among Users with Visual Impairments, July 2007 (handout).
 - May, M. (2003). Accessible GPS for the blind: What are the current and future frontiers? Proceedings of the 2003 CSUN Conference. Northridge: California State University Northridge.
 - Mike May bio: <http://www.senderogroup.com/mike.htm>
 - Talmy, L. (1983). How language structures space. In H. L. Pick, Jr. & L. P. Acredolo (Eds.), *Spatial orientation: Theory, research and application*. Pp. 225-282. N. Y.: Plenum. (handout)
 - Tversky, B., . Three Spaces of Spatial Cognition. *Professional Geographer*, 51(4) 1999, pages 516–524.
http://www.psych.stanford.edu/~bt/space/papers/professionalgeographerpaper.pdf
- *Student presentations:* Storyboards, mock-ups, schematic designs for final individual or group projects. 8:10 – 8:55 PM.

Class 8

- *Date and Time:* Monday, March 31, 6:00 to 8:55 PM

Syllabus

- *Location:* ITP
- *Theme:* Non-standard pointing devices
 - Instructor presentation: *Force feedback systems; capacitive touch sensing; vision systems; pen interfaces; and sensors for tracking movement and position, in museum exhibits and kiosks.*
- *Guest speaker:* Zach Eveland, ITP Instructor and Touch Graphics collaborator. Topic: The Touch Graphics touch sensing device. 7:10 – 8:00 PM.
- *Required reading:*
 - Talmy, L. (1988). Force dynamics in language and cognition. *Cognitive Science*, 12, 49-100. (handout)
 - Burdea, G. **Force and Touch Feedback for Virtual Reality**. John Wiley and Sons, 1996. (handout)
 - Baxter, L. *Capacitive Sensors: Design and Applications*. IEEE Press, 1997. (handout)
 - Wii Homebrew open source projects
 - Darwiin (<http://sourceforge.net/projects/darwiin-remote/>)
 - WiiFlash (<http://wiiflash.bytearray.org/>)
 - Topics in motion analysis (http://wiibrew.org/index.php?title=Motion_analysis)
 - Lee, J. (2004). Haptic pen: a tactile feedback stylus for touch screens. Proceedings of the 17th annual ACM symposium on User interface software and technology, Wacky Hardware session. Pp. 291-293 (handout)
 - Provisional patent: MARGGRAFF, J. et al. SYSTEM AND METHOD FOR RECALLING MEDIA
<http://www.wipo.int/pctdb/en/wo.jsp?wo=2007141204&IA=WO2007141204&DISPLAY=DESC>
- *Student presentations:* Storyboards, mock-ups, schematic designs for final group projects. 8:10 – 8:55 PM.

Class 9:

- *Date and Time:* Monday, April 21, 6:00 to 8:55 PM
- *Location:* ITP
- *Theme:* Psychoacoustics and spatial audio in the exhibit and kiosk context

- *Guest speaker:* Joshua Miele, Research Scientist, Smith Kettlewell Eye Research Institute. Topic: *Physics of sound and human perception*. 7:10 – 8:00 PM.
- *Required reading / listening:*
 - The Virtual Barbershop
<http://ccgi.bluerabbit.plus.com/virtualbarbershop/>
 - Wightman, F. & Kistler, D. Resolution of front-back ambiguity in spatial hearing by listener and source movement. *Journal of the Acoustical Society of America*, 105, 2841-2853, 1999.
 - Wightman, F. L. & Jenison, R. (1995). Auditory Spatial Layout. In W. Epstein & S. J. Rogers (Eds.), *Handbook of Perception and Cognition*, Volume 5: Perception of Space and Motion, (pp. 365-399). New York: Academic Press.
- Required independent site visit in preparation for next session: The Metropolitan Museum of Art. Please visit the museum in pairs, and carry out the following exercise: one person “verbally images” a painting to a blindfolded partner. Then, reverse roles and do the same thing with a different painting. Take notes about the degree of accuracy with which you were able to imagine the painting described to you. Speculate on how mental image could have been improved by some change in the way that the image was described to you. Upload reports to the ftp site, and be prepared to discuss your experiences next session.

Class 10

- *Date and Time:* Monday, April 14, 6:00 to 8:55 PM
- *Location:* ITP
- *Theme:* The overlooked senses: proprioception and balance
- *Group discussion:* Results of the verbal imaging experiment. 6:00 – 7:00 PM.
- *Guest speaker:* Rebecca McGinnis, Access Coordinator, Metropolitan Museum of Art. 7:10 – 8:00 PM.
- *Required reading:*
 - Sacks, O. The Man Who Mistook His Wife for His Hat. Chapter 3: The Disembodied Lady (handout)
 - *Radio Lab episode: “Where am I?”*
<http://www.wnyc.org/shows/radiolab/episodes/2006/05/05>
 - Pinker, Steven (2008). *The Moral Instinct*. *New York Times Magazine*, January 13, 2008.
<http://www.nytimes.com/2008/01/13/magazine/13Psychology-t.html#>

- Wiener, W., & Lawson, G. (1997). Audition for the traveler who is visually impaired. In B. Blasch, W. Wiener, & R. Welsh (Eds.), *Foundations of orientation and mobility* (2nd ed., pp. 104–169). New York: American Foundation for the Blind. (handout)
- *Group discussion:* progress reports on final projects. 8:10 – 8:55 PM.

Class 11

- *Date and Time:* Monday, April 7, 6:00 to 8:55 PM
- *Location:* ITP
- *Theme:* Unusual display technologies and their potential use in exhibits and kiosks
- *Instructor presentation:* Signing avatars, tongue mounted displays, computer peripherals for generating odors, and other unusual display technologies. 6:00 – 7:00 PM
- *Required reading:*
 - Weiss, P. The Seeing Tongue: In-the-mouth electrodes give blind people a feel for vision. In *ScienceNews Online*. Sept. 1, 2001. <http://www.sciencenews.org/articles/20010901/bob14.asp>
 - Rasoul, Arastoopour & Oskouie (1999). US Patent No. 6,004,516. “Apparatus for generating odor upon electronic signal demand”.
 - Demonstration of V-Com’s Signing Avatar product. <http://www.vcom3d.com/index.php?id=vault>
- *Student Presentations:* Dry runs for final presentations. 7:10 – 8:55 PM.

Class 12:

- *Date and Time:* Monday, April 28, 6:00 to 8:55 PM
- *Location:* ITP
- *Theme:* Final project presentations (full session).
- *Guest critics:*
 - Ellen Rubin, Museum Access Consultant
 - Annette Gougey, Professor, Baruch College
 - Daniel Bartolini, Exhibit Technician, New York Hall of Science
 - Zach Eveland, ITP Instructor
 - Rebecca McGinnis, Access Coordinator, Metropolitan Museum of Art

- Note: refreshments will be served!