Today's Agenda

- Project examples
- Human abilities Auditory systems

Announcement

Exam 1 is scheduled on Tuesday, Sep. 24, 1:15pm -2:30 pm in class through Blackboard

Cover materials until Sep. 19 Most of materials from class lecture notes

Open-book and open-notes

Make-up exams are not allowed except excusable absences with appropriate documentation and advanced notice.

Literature Review Proposal (Graduate Only)

- A literature review on your selected HCI research topic
- A proposal including
 - The topic
 - A brief background introduction
 - A list of papers (tentative) you can add more papers later
 - You are expected to include 15+ papers in your final list
 - Proposal due 11:59pm EST, Sunday, Sep. 15, 2024

Top HCI Journals/Conference Proceedings

Journals: (USC has subscriptions to these journals)

- ACM Transactions on Computer-Human Interaction
- Computer in Human Behavior
- International Journal of Human-Computer Studies
- AIS Transactions on Human-Computer Interaction

Conferences

- ACM CHI: Conference on Human Factors in Computing Systems (free proceedings available)
- ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW)

Task Timelines (Gantt Charts)

- Temporal view of the entire lifetime of the project
- Show when <u>tasks</u> <u>take place</u> and <u>complete</u>
- Useful for tracking progress: How does the actual progress compare with the planned schedule?
 - The timeline can show graphically how much of each task has been completed at a given time
 - Revisit the timeline as the project progresses

Gantt Chart (example 1)

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ID	Task Name	Duration	F	S	S	Μ	Т	W	/ T	F		s s	; N	4	Т	W	Т	F	S	S	N	1 1	Т	W	Т	F	S
1	Establish the need	2d																									
2	Set target date	1d																									
3	Establish leadtimes	1d																									
4	Book venue	1d																									
5	Choose advert location	1d																									
6	Agree format	2d																									
7	Devise tests	5d											÷														
8	Job description	2d																									
9	Set criteria	1d																									
10	Write advert	2d																									
11	Place advert	1d																									
12	Shortlist	3d																	1								
13	Invite candidates	1d																									
14	Conduct interviews	3d																									
15	Take decision	1d	1																								
16			1																								
17																											

Gantt Chart (example 2)



https://www.projectmanager.com/gantt-chart

What Dr. Tong expects to see

Gantt Chart

Refer to this EVERY TIME YOU MEET WITH YOUR GROUP

Note taking - Document Responsibilities, due dates, goals

- I expect you to do this....
 - Who does What
 - Person, task, dependencies, who impacted
- Example
 - "Georgette will interview 5 subject matter experts by this upcoming Friday and send the materials to Stephanie, who will transcribe the data. Transcription is planned to be done on the following Tuesday. Coding with the group is set for Wednesday."

Document everything

Examples of Projects (Ideas)



LiveFREE

live free from chemicals and allergens



Our Mission

We connect people who strive to live free of harmful chemicals and allergens. We make dining less stressful, finding safe products easier, and create a network of individuals who all want to live free.



The Problem

- 15 million Americans
- 1 in every 13 children
- food prepared outside of the home = ½ fatal reactions
- Trace amounts of allergens can trigger a severe reaction
 - "May contain" or "processed in a facility that also processes" labeling not required

Food Allergy Symptoms

MildSevereHivesSwelling of lips, tongue, throatEczemaShortness of breathVomitingLoss of consciousnessDiarrheaChest painRunny noseDeath

(Asthma and Allergy Foundation of

Food & Personal Product Additives

America, 2005)

Additive	Reported Reactions	Purpose	Found in
Sulfites	Chest tightness, hives, stomach cramps, diarrhea, breathing problems, anaphylaxis	Preservative	Wine, dried fruits, white grape juice, frozen potatoes, maraschino cherries, fresh shrimp, and certain jams and jellies
Aspartame	Hives, headaches, swelling of the eyelids, lips or hands	Sweetener	Diet foods
Parabens	Severe contact dermatitis (redness, swelling, itching and pain)	Preservative	Sunscreens, shampoos, foods, medications
Tatrazine	Hives, swelling, asthma attacks	Dye	Beverages, candy, ice cream, desserts, cheese, canned vegetables, hot dogs, salad dressings, seasoning salts, catsup
MSG	Hives, headache, burning sensation on back of neck, chest tightness, nausea, diarrhea, sweating, more severe asthma attacks	Enhance flavors	Oriental foods, manufactured meat, poultry.

Food & Personal Product Additives

Additive	Reported Reactions	Purpose	Found in
Nitrates and nitrites	Headaches and hives	Preservative, prevent botulism, enhance flavors, color foods	Hot dogs, bologna, salami and other processed meats and fish.
BHT and BHA	Chronic hives and other skin reactions	Prevent color, odor, & flavor changes	Breakfast cereals and other grain products
Benzoates & preservatives	Hyperactivity, hives, itching, pain, headaches, more severe asthma attacks. May be carcinogenic.	Preservative	Soft drinks, cakes, cereals, salad dressings, candy, margarine, oils, dry yeast



"a wireframe is a visual illustration of a web page... to show you where each item should be placed on a page." <u>Usability.gov</u>

Evaluation Methods

- 1. Card Sorting
 - 1.1 Main Menu
 - 1.2 Restaurant Page
 - 1.3 My Allergies
 - 1.4 Menu Categories
- 2. Questionnaire
- 3. Heuristic Evaluation



1. Card Sort Trends 1.2 Restaurant

1

2

3

Restaurant name and rating first Search Menu and Browse Menu together Review related items together and last

Restaurant Rating **Restaurant Photos** Restaurant Name Restaurant Restaurant Name Restaurant Name Browse Restaurant Photos Search Menu Browse Menu Search Menu Add a Review or Log My Reviews Other U Browse Menu Search Menu Revie My Reviews Other User's **Restaurant Rating** Reviews Restaurant Photos Other User's Reviews My Reviews Add a Review or Log Add a Review or Log

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Jenay's 424 Asser Columbia	Café nbly St. , SC 29208	****
Browse	Menu	
Search	Menu Item(s)	Q
Review	Highlights	
Review	Highlights "Best food I've every had.	
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1
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2. Questionnaire



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9:41 PM

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My Allergies

Settings

Logout

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2. Questionnaire 1 listanrouts ([PMcDond d's: >McDonald's * * * * V Browse Menulo O Search Menu Hem Photos-My reviewsyno's Uno's was stupid. Pizza Itcm gluten distion Username * The waiter didn't Know what FA's are. ADD REVIEW/LOG

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3. Heuristic Evaluation

1. Visibility of system status

- **My Allergens**: the buttons of each allergen remain highlighted in a toggle functionality
- 2. Match between system and the real world
 - Users didn't always know what Connect was
 - Term "Community" used more than connect to represent social interaction between users
 - Renamed Connect to Community

3. User control and freedom

- "Back" functionality on each page. "<" is a common convention
- Review/Log pop up: features a "Cancel" button.

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Rate it: Review:	****	
Tasted gre	eat!	
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High Fidelity Prototype Demo





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	Breakfast	
	Appetizers	
	Entrées	
	Sides	
	Kids Menu	
	Desserts	
	Beverages	



Future Content: Anaphylaxis Emergency

Action Plan

- Provide Symptoms
- Provide Epinephrine Demonstrations
 - <u>Epi-Pen</u>
 - Adrenaclick
 - Auvi-Q
 - EpiPen Jr
- Instructions to call 911
- Store doctor contact info

Area	Symptom
MOUTH	itching, swelling of lips and/or tongue
THROAT*	itching, tightness/closure, hoarseness
SKIN	itching, hives, redness, swelling
GUT	vomiting, diarrhea, cramps
LUNG*	shortness of breath, cough, wheeze
HEART*	weak pulse, dizziness, passing out

How to give EpiPen® or EpiPen® Jr





Form fist around EpiPen[®] and PULL OFF GREY SAFETY CAP. PLACE BLACK END against outer mid-thigh (with or without clothing).





REMOVE EpiPen[®] and DO NOT touch needle. Massage injection site for 10 seconds.

PUSH DOWN HARD until a click is heard or felt and hold in place for 10 seconds.

Future Content



Customization

- Color Scheme
- Font size



Improvements

Include "Add menu item"

References

- FARE Medical Advisory Board. "Food Allergy Facts and Statistics for 1. the U.S." Food Allergy Research & Education. 2013. http://www.foodallergy.org/document.doc?id=194.
- 2. Fenton, Nancy Elizabeth, Cicutto, Lisa, Clarke, Ann E., Elliott, Susan J., Harada, Laurie and McPhee, Elizabeth. "Illustrating Risk: Anaphylaxis Through the Eyes of the Food-Allergic Child." Society for Risk Analysis, 10.1111/j.1539-6924.2010.01488.x. 2010.
- Morris, M. "Food Allergies, Sensitivities & Intolerances." The Root 3. of Health. 2011. http://www.therootofhealth.com/food-allergiesintolerances/
- AAFA Editorial Board. "Food Additives." Asthma and Allergy 4. Foundation of America. 2005.

http://www.aafa.org/display.cfm?id=9&sub=20&cont=285.

The Registration Kiosk

by The Triage Musketeers

What is the Problem?

- Mean wait time in US emergency departments has increased 25% from 2003-2009, from 46.5 - 58.1 minutes [1]
- Mean number of visits to EDs increased by 32% from 1999-2009, from 102.8 136.1 million [1]
- SC has many areas in emergency care which can be improved (disaster preparedness, access to emergency care, and public health and injury prevention) [2]



Prototype - Version 1.0



Usability Considerations

Large buttons

Dropdowns

Progress indicator





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Evaluation Methods

Once prototype was created, we moved into evaluating it using:

- Heuristic Evaluation
- Cognitive Walkthrough
- User Testing

Heuristic Evaluation





After

Slide #	Problem	Heuristic Violated	Severity
10	Allergies page needs instructions	10 Help and documentation	3

Cognitive Walkthrough Findings



After

Before

User Testing Findings



<u>After</u>

Before

Future Plans

Continue prototyping





http://www.drugs.com/symptom-checker/

Hardware

Implementation

- System usability
- Universal Design
- Accessibility
 - Visual impairment
 - Motor and dexterity impairments
 - Hearing impairment



http://www.dee	pcreekdigital.com/	<u>/products/</u>
		-

Providence Hospital Personal Information	?
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Street Address:	Zip:
Apt. #: City:	State: V
Primary Doctor:	
ahi Imaging, LLC	PATIENT REGISTRATION FORM Please print all information
TODAY'S DATE:	
PATIENT NAME:	DATE OF BIRTH: SEX: Male Female
PATIENT NAME: REFERRING PHYSI	DATE OF BIRTH: SEX: Male Female
PATIENT NAME: REFERRING PHYSI RESPONSIBLE PARTY (IF OTHER THAN SELF):	DATE OF BIRTH: SEX: Male Female CIAN: RELATIONSHIP TO PATIENT:

http://afterhoursimaging.com/patient-information/patient-registration-form

References

- [1] Hing, E., & Bhuiya, F. A. (2012). Wait Time for Treatment in Hospital Emergency Departments, 2009. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics.
- [2] Hirshon, J. et al (2014, January 16). State Rank by Category. Retrieved October 1, 2015, from <u>http://www.emreportcard.org/default.aspx</u>.
- [3] Taylor, C., & Benger, J. (2004). Patient satisfaction in emergency medicine. *Emergency Medicine Journal, 21*(5), 528-532. doi:10.1136/emj.2002.003723
- [4] Wright, G., Causey, S., Dienemann, J., Guiton, P., Coleman, F., & Nussbaum, M. (2013). Patient Satisfaction With Nursing Care in an Urban and Suburban Emergency Department. *JONA: The Journal of Nursing Administration*, 43(10), 502-508. doi:10.1097/NNA.0b013e3182a3e821

Image References

- Slide 12:
 - Process Cycle: Slide 29 (2 What is HCI and design cycle_2015)
 - Improved models: <u>http://www.drugs.com/symptom-checker/</u>
- Slide 13
 - paper hospital record: http://afterhoursimaging.com/patient-information/patient-registration-form/
 - man in wheelchair beside two kiosks: <u>http://www.deepcreekdigital.com/products/</u>

Potential Issues in Topic Definition and Understanding of the Problem

- Project title is missing or not informative
 - Need a specific title related to your project topic
- Missing a discussion of the system's requirements and constraints
 - Who are the users
 - What are the system's major functions
 - What are the environmental conditions and constraints

Potential Issues in Topic Definition and Understanding of the Problem

- Project management plan
 - Tasks are too general
 - Lack of details in tasks
 - Unclear roles of team members
 - Not cover the whole project period

Tips for Topic Definition and Understanding of the Problem

- Organize your report in sections
 - Introduction of the problem & the project objectives
 - System requirements & constraints
 - Project management plan
 - Reference
- Figures are always helpful to demonstrate the problem

Human Abilities

- Auditory system
- Vision system
- Cognition

HUMAN ABILITIES - THE AUDITORY SYSTEM



Sound

A wave of pressure created when an object vibrates

• Compression and rarefaction of air molecules





Physical amplitude frequency waveform complexity physical location

Perceptual

- \rightarrow loudness
- \rightarrow pitch
- \rightarrow timbre
- \rightarrow apparent location



Amplitude & loudness

Physical Characteristic	Psychological Experience
(objective)	(subjective)
Amplitude	Loudness
intensity of pressure wave	absolute threshold = 0 dB
measured in decibels (dB)	(measured in sone)

Common sounds (dB)

- 0 lowest sound audible to humans watch ticking 20 feet away
- 50 rainfall or hear the refrigerator running
- 60 conversation, sewing machine
- 80 heavy city traffic, alarm clock
- 90 lawnmower; blender
- 100 chain saw; subway train
- 120 rock concert in front of speakers
- 140 gunshot blast; jet plane at 50 feet)
- 180 rocket launching pad



Frequency & pitch

Physical Characteristic	Psychological Experience
Frequency	Pitch
how rapidly air vibrates	highness or lowness of sound
human range: 20-20,000 Hz	



Waveform complexity & timbre

Physical Characteristic	Psychological Experience
Complexity waveform	Timbre distinct quality of a sound
combination of fundamental & harmonics (of different frequencies and amplitude)	violin vs. tuba



What is Timbre

Each instrument emits a complex tone containing more than one frequency simultaneously



Q: Okay... How is sound used in design?

A: Auditory alarms!

Examples of auditory alarms ???





























Auditory alarms

Benefits?

- I. Omnidirectional
 - Useful when eyes are busy
- 2. Induces greater compliance
 - If an alarm is very important, use auditory alarm
- 3. Can't close our ears

But if too loud, can startle, disorient

• When OK, not OK?

Auditory alarms

Designing good alarms

- I. Not above danger level for hearing (85-90 dB)
- 2. Not startle (rise time)
- 3. Not disrupt understanding of other signals
- 4. Should be informative

Making Alarms Informative

Earcons

- Sound like the condition they represent
 - Deleting files = crushing paper
- Voice / Speech Alarms
- More information
 - BUT confusable with other voice communication, multilingual considerations



Recycle Bin



Design Consideration: False Alarms

False alarms

- Alarms are automated to detect a signal
 - Can sometimes go off when nothing is wrong
 - False Alarm
- False alarms consequences?
 - Distrust
 - Ignore
 - Try to disable
- NPR News Clip

http://www.npr.org/2011/02/15/133785372/Report-Nurses-Can-Become-Desensitized-To-Monitor-Sounds

How to design to avoid false alarms? Thoughts?

Improve sensitivity of system

- More sophisticated decision algorithms
- Training users
- Provide "raw data" on why triggered
- Signals the system's confidence

Design Consideration: Noise

Masking effects of noise

- Some sounds make it difficult / impossible to hear other sounds
- Needs environmental analysis!



Masking: Frequency (Pitch)

- Louder sound masks soft sound within the critical bandwidth - with similar frequency
- Lower frequency masks higher frequency
 - Gender: Female = higher ; male = lower

Enhancing auditory performance

Designer must consider:

- Ambient noise (environment analysis)
- Frequency of sound
- Intensity of the sound
- Duration of the sound

Depends on the user, the task, the environment

Examples of sound

- Factory
 - http://www.youtube.com/watch?v=-I--kN_1AC0
- Subway
 - http://www.youtube.com/watch?v=NS7iiVCUwXM
- Airport
 - https://www.youtube.com/watch?v=jlnPa4eU3gk

One last example

- Imaging you are hired by Boeing to improve communication systems between pilot and air traffic control.
- <u>https://www.youtube.com/watch?v=jZPvV</u>
 <u>wvX_Nc</u>