

Selecting a Master's Thesis Research Theme
(Ideas for Thesis Research)

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Master's Thesis Research Proposals (Ideas for Thesis Research)

The following topics provide a broad range of thesis research themes or ideas that HCI graduate students can consider and take as their research topic. Each topic can be modified slightly to fit the particular interests of the student. By selecting any one topic, the faculty who proposed the original idea will automatically be the student's thesis advisor.

Topic Titles

1. Cross-cultural cognition: An investigation of designer thinking on web site design
2. Extending the boundaries of new media education: Enhancing student knowledge with human-computer interaction
3. Exploring design thinking processes of interactive systems
4. Emotion design: Assessing user appraisal theory
5. Lost in cyberspace: Exploring new ways to support user navigation in information space or enhancing existing models of user navigation
6. Memory overloading: An inquiry into new models and tools to better enhance complex device functionality
7. Analysis of user errors and user explanations to postulate mental models and predict the effectiveness of design changes
8. Determining standard tasks to use in comparison of usability evaluation methods
9. Evaluation of relative effectiveness of alternative methods of data presentation
10. Modification of e-mail systems to facilitate message management
11. Evaluation of methods for text entry and text display on small displays for mobile devices: Design of speech interfaces for mobile devices.
12. Development of tools used for note-taking during on-line information reviews
13. An evaluation of the importance of prosody in automated telephone conversations
14. Anthropomorphism and universal norms of human beauty
15. Emotion and the uncanny valley
16. The role of gaze in communication
17. The impact of technology on personal and human identity

TOPIC 1

Title: Cross-cultural cognition: An investigation of designer thinking on web site design

Overview: Cross-cultural web design and usability research takes as its theoretical underpinning cross-cultural communication, cultural anthropology, and cognitive science. The focus of research is to explore the cross-cultural design of online information and its impact on the social context of international users. Because empirical research continues to show evidence of cultural differences in cognition, the current study is intended to show how culture shapes the cognitive and/or behavioral style of Web designers. Using subjects from diverse cultures, performance and preference measures are collected online and off to identify designer cognitive styles and user preferences. Studies could explore ways to measure culturally-mediated differences in how people think in different cultures when designing web sites, online information or software.

Question:

1. Does the cultural-context of web designers determine how they design information for the web?
2. Do the cultural cognitive styles of Web designers, as reflected in the Web content they design, cause cross-cultural users to have higher degrees of performance?
3. Do the cultural cognitive styles of Web designers, as reflected in the Web content they design, cause cross-cultural users to have specific preferences toward Web sites created by designers from their own culture?

Proposed by Anthony Faiola

TOPIC 2

Title: Extending the boundaries of new media education: Enhancing student knowledge with human-computer interaction

Overview: The purpose of this survey is to investigate the extent to which Human-Computer Interaction (HCI) theory and best practice are being taught in academic programs that focus on new media; including multimedia/hypermedia, computer graphics technology, advertising, journalism, design, and visual communication. Some faculty may also refer to HCI as interaction design or user experience design. The key is that this perspective of product development employs a user-centered approach in the design and usability testing of the new media products.

Questions:

1. What HCI theories and methods are the most appropriate for teaching new media students the design and evaluation of interactive media as a unified method?
2. What new pedagogical model might better serve new media educators who desire to apply interaction design and user-centered theory and best practice to better understand the context and complexity of human preferences, limitations, and needs?

Proposed by Anthony Faiola

TOPIC 3

Title: Exploring design thinking processes of interactive systems

Overview: Designers and professionals in information technology (computer scientists) have traditionally approached the building of information systems and software very differently. This is because in their disciplinary background particular principles and processes of problem solving differ regarding how to shape the user's experience.

Question:

1. What are the differences between designers and computer science professionals in their approaches and strategy in building software interfaces?
2. Is there a common language that can be considered for software development?
3. What common models might be developed that all could use to direct the design process?

Proposed by Anthony Faiola

TOPIC 4

Title: Emotion design: Assessing user appraisal theory

Overview: Recent research in emotion design by Donald Norman based on research in cognitive psychology since the 1980s has given new light to system designers in understanding the importance of user emotion as they use interactive systems. User have multiple levels of processes that impact the way they use these products.

Question:

1. What are the relationships among the cognitive processes assigned to appraisal that impact usability?
2. Can we pinpoint the key appraisal areas of users when using specific web sites and how much these processes impact usability and the accessibility of information?
3. What new theory and practice can be formed about emotion and cross-cultural users?
4. Do users of diverse cultures respond differently in their emotion to web sites from different cultures?

Proposed by Anthony Faiola

TOPIC 5

Title: Lost in cyberspace: Exploring new ways to support user navigation in information space or enhancing existing models of user navigation

Overview: Navigation is still a big problem for users of large and complex web sites. Such users need more help in locating and moving to information in these sites.

Questions:

1. What are the ways we can improve existing models of web navigation?
2. Are there tools that could be designed for a web browser that would allow the user easier access to the location of information? Existing web maps appear too superficial and limited to supporting user navigation.

Proposed by Anthony Faiola

TOPIC 6

Title: Memory overloading: An inquiry into new models and tools to better enhance complex device functionality

Overview: Memory off-loading is increasing useful in light of more complex and information rich devices. For example, multi-purpose multi-functional entertainment or business devices challenge user memory to recall how menus work, where they are located, and the information they contain.

Questions:

1. What forms of information should be consider as off-loadable?
2. What models and tools might better support memory in using complex multipurpose devices?
3. What new forms of navigation and cognitive modeling might we consider in light of a new range of hand held devices? New products with new system designs and interfaces should prompt new ways of thinking about the hand held device.

Proposed by Anthony Faiola

TOPIC 7

Title: Analysis of user errors and user explanations to postulate mental models and predict the effectiveness of design changes

Overview: This research involves the selection of specific interfaces (devices, PC applications, web sites) and the observation of user interactions to identify errors or “misunderstandings.” Based on analysis of interaction behavior and user interviews, a representation of the user’s mental model of the interface can be constructed. This mental model can then be validated by predicting behavior with a different interface.

Questions:

1. How can the reasons for errors in a user interface be determined?
2. Does a mental model representation allow prediction of the effectiveness of interface changes in reducing errors?
3. Given experience with one interface, can user errors on a novel interface be predicted?

Proposed by Mark B. Larew

TOPIC 8

Title: Determining standard tasks to use in comparison of usability evaluation methods

Overview: Several procedures have been devised for estimating the “usability” of an interface (e.g., usability tests, expert reviews, cognitive walkthroughs). Projects in which multiple methods have been used to assess the usability of the same interface have yielded varying results – even when using the same procedure.

Questions:

1. Can a standard metric for usability be developed that is applicable across interfaces?
2. Can standard interfaces be developed for use in benchmarking usability assessment procedures?
3. Can interfaces be developed that allow for variation in parameters that systematically affect usability metrics?

Proposed by Mark B. Larew

TOPIC 9

Title: Evaluation of relative effectiveness of alternative methods of data presentation

Overview: Current applications allow for capture and storage of very large sets of data. The utility of these data sets depends on presentation of summaries of the data that can readily be processed by users.

Questions:

1. What factors should govern selection of display formats for data sets?
2. What tools are helpful to allow users to explore data sets to uncover relevant relationships?

Proposed by Mark B. Larew

TOPIC 10

Title: Modification of e-mail systems to facilitate message management

Overview: Electronic mail has become a common means of communication for a variety of user groups. For users who receive and send large numbers of e-mail messages, management of these messages so that they achieve their intended goals becomes challenging.

Questions:

1. What are the primary e-mail management challenges for specific user groups?
2. How might an e-mail interface be developed to address e-mail management challenges?

Proposed by Mark B. Larew

TOPIC 11

Title: Evaluation of methods for text entry and text display on small displays for mobile devices

Design of speech interfaces for mobile devices.

Overview: Portable electronic communication devices (cell phones, PDAs, etc.) are now commonplace. To maximize portability, the controls and displays on these devices are relatively small. As a result, the entry and reading of large amounts of text is challenging for users.

Questions:

1. What current methods for text entry on portable devices can be used most effectively?
2. What alternative methods for text entry on portable devices might be developed?
3. What current methods for text presentation on portable devices are most effective?
4. What alternative methods for text presentation on portable devices might be developed?
5. How can a speech interface be developed for text entry or text presentation on portable devices?

Proposed by Mark B. Larew

TOPIC 12

Title: Development of tools used for note-taking during on-line information reviews

Overview: During on-line information searches, users frequently encounter information that they want to reference later. For example, when reviewing publications on various topics via a library site, users may want to capture entire articles, capture only a citation, or capture specific notes in a format that readily allows the recollection of this information at a later time. A variety of methods allow for capturing this information, but opportunities may exist for the development of a tool specifically for this purpose.

Questions:

1. What are primary user needs for note-taking during on-line literature reviews?
2. What interface elements can be designed to facilitate note-taking during on-line literature reviews?

Proposed by Mark B. Larew

TOPIC 13

Title: An evaluation of the importance of prosody in automated telephone conversations

Overview: To minimize costs many corporations are automating aspects of customer support by devising computer systems capable of limited dialog. These systems, however, orient to a text-based transcript of what the user says. They do not respond to other aspects of speech such as pitch, rhythm, and timing (which are collectively called prosody), except sometimes to call a human agent if the user sounds upset or angry.

Questions:

1. How important is prosody in these dialogs?
2. Does prosody affect the usability of a speech-based computer interface?
3. Does prosody affect the perceived usefulness or likeability of the interface?

Proposed by Karl F. MacDorman

TOPIC 14

Title: Anthropomorphism and universal norms of human beauty

Overview: Nancy Etcoff and other researchers have identified certain universal norms of human beauty that indicate hormonal health and potential reproductive success. These norms include youth, vitality, bilateral symmetry, skin quality, and the proportions of the face and body. They appear in both physical appearance and quality of movement. In human-computer interaction, insights drawn from this body of work can assist in designing avatars and simulated characters that are more appealing and engaging for a particular target user group or gender. However, the norms of (perceived) beauty may vary depending on how humanlike the character appears, since it can be depicted as a robot, animal, or other creature.

Questions:

1. How does the degree of anthropomorphism affect the norms of human beauty in bodily and facial proportions?
2. Are users as sensitive to facial and body proportions in less humanlike characters?
3. What kinds of movements are desirable for different levels of anthropomorphism?
4. What is the relationship between bodily and facial proportions and entrainment when interacting with an avatar?

The research could focus on appearance or behavior, but tackling both topics might be a little too broad.

Proposed by Karl F. MacDorman

TOPIC 15

Title: Emotion and the uncanny valley

Overview: Masahiro Mori observed that as robots appear more humanlike they seem more familiar until a point is reached at which subtle imperfections make the robot seem eerie. This “dip” just before near human likeness he called *bukimi no tani* (the uncanny valley). One explanation of the uncanny valley parallels Rozin’s theory of disgust. Rozin argued that disgust is an evolved cognitive mechanism to ensure that human beings avoid infection. The more closely another organism is related genetically, the more probable it will be carrying transmittable bacteria and viruses. According to Rozin, the reason we perceive certain individuals as attractive is owing to selective pressures on our ancestors, which favor mixing our genes with those of individuals that could maximize the fitness of our progeny. Thus, while organisms with very different genes will not elicit disgust, nor healthy members of our own species, other we may perceive as disgusting, if they are diseased or have bad genes. However, the relationship between the uncanny valley, eeriness, and disgust has not been demonstrated. PANA-X and other psychological – or physiological – methods of evaluation can be useful in determining the relationship.

Questions:

1. What emotions if any are related to the eeriness experienced in beholding near humanlike entities?
2. Are different emotions involved depending on whether the source of the eeriness relates to appearance or movement?
3. If disgust or emotion does not provide an adequate explanation of the uncanny valley, what alternative hypotheses seem most likely (e.g., norms of beauty related to fertility as opposed to contagion, expectation violation, reminder of death, Sorites paradoxes)?

Proposed by Karl F. MacDorman

TOPIC 16

Title: The role of gaze in communication

Overview: Various hypotheses have been proposed concerning how and why people break gaze while thinking and how lying and other factors influence gaze behavior (e.g., social signaling, arousal reduction, differential cortical activation). In designing simulated interactive characters or humanoid robots, it is important that the character or robot exhibits gaze behavior that supports the interaction. Depending on the circumstance, this could include behaving in ways that engage the user more.

Questions:

1. How does gaze function in online and offline interactions?
2. Is gaze influenced by a person's mental state during a stereotyped interaction?
3. Is gaze a form of *epistemic action* (i.e., a transformation in the mental states of individuals in a distributed system)?
4. How does cultural background influence the timing and direction of gaze?

Proposed by Karl F. MacDorman

TOPIC 17

Title: The impact of technology on personal and human identity

Overview: Our identity as persons and human beings is constructed from various distinctions (self versus other, human versus nonhuman). Technology that extends our mental and communicative abilities has the potential to blur such distinctions as self versus other. Technology that mimics human appearance and behavior has the potential to blur such distinction as human versus nonhuman. This creates Sorites paradoxes that challenge our concept of self.

Questions:

1. What is the practical and emotional impact of losing mind-extending technology (e.g., stolen notebook computer, lost cellular phone with contacts list)?
2. Do technologized people construct their personal identity differently from those who shun or have no access to technology? (And can you control for age, education, and culture in trying to answer that question?)
3. To what extent does the prospect of having humanlike technology challenge our notions of self?
4. Would the prospect of humanlike androids cause people to redefine, either consciously or subconsciously, what it means to be human?

Proposed by Karl F. MacDorman