

# **Human-Computer Interaction**

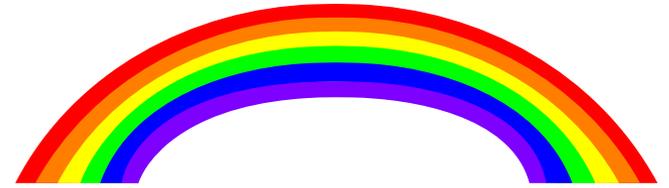
**” User Support and On-Line Information, Guidelines,  
Standards, Prototyping, UI Software Support Tools, Social &  
Individual Impact, Future Trends and The Road Ahead”  
BSc/CQU**

## **Lecture 5**

(September 13, 2002)

Tralvex (Rex) Yeap MAAAI MSCS

# Outline



- ✓ Quick Review of Lecture 4
- ✓ Hollywood and HCI: A.I.
- ✓ M10: User Support and On-Line Information
- ✓ M11: Guidelines, Standards, Prototyping and UI Software Support Tools
- ✓ M12: Social and Individual Impact
- ✓ Extra: Future Trends and The Road Ahead
- ✓ Additional Handouts for L5

## Quick Review on Lecture 4

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- ✓ Assignment 1 Class Presentation by Group B
- ✓ M8. Perception, Representation and Windowing
- ✓ M9. Design and Graphics Design in Computer Human Interaction
- ✓ Class Activity: Assignment 3 Discussion

# Modules for Lecture 5

Corresponding chapters in Textbook/Resource Book



M10.	User Support and On-Line Information	Chapter 15
M11.	Guidelines, Standards, Prototyping and UI Software Support Tools	Chapter 24, 25, 27, 28
M12.	Social and Individual Impact	Chapter 9, 10
Extra.	Future Trends and the Road Ahead	Read Additional Materials

# Hollywood and Human-Computer Interaction

## A.I. Artificial Intelligence (2001)



List 5 aspects  
of HCI in  
this movie.

# M10: User Support and On-Line Information

## Introduction



- ✓ Good design of a computer system will **reduce the number of problems** that users experience.
- ✓ **Providing information** is one of the best ways for users to learn the system effectively, to help them correct their errors.
- ✓ This module consider the various approaches to information design, including **on-line help, hypertext and hypermedia.**

## M10: User Support and On-Line Information Minimalist Manual & Instruction



- ✓ A **minimalist manual** aims to provide a user with just **enough information** to get going and to work things out for themselves. Research suggests that people learn **more effectively** this way.
- ✓ **Minimalist instruction:** (Carroll, 1992) **reduce** the **amount of information** that a learner needs to read in order to learn to use a word processor. Encourages users to **try things out**.

# M10: User Support and On-Line Information

## Principles of Minimalist Training

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**Three key principles of minimalist training are:**

- ✓ Allow learners to **start immediately** on **meaningfully realistic** tasks.
- ✓ **Reduce** the amount of **reading** and other **passive activity**.
- ✓ Help make errors and **error recovery** **less traumatic** and **more** pedagogically **productive**.

**Additional principles include:**

- ✓ Encourage learners to **reason** about what they are doing.
- ✓ Design reading material to be **read in different orders**.
- ✓ Use learners' **prior knowledge** to advantage.

# M10: User Support and On-Line Information

## Contemporary Online Help Features



### Contemporary Online Help Features:

- ✓ Help messages generated by selecting a desired object (Shift + F1 key or **balloon help**).
- ✓ **Context sensitive help** built into application system states or Dialogue boxes.
- ✓ **Generic help text**, usually limited in length (OS/2 Master Help Index Icon).
- ✓ Extended help screens, **integration of hypertext**.
- ✓ **Extensive written documentation** available online.

# M10: User Support and On-Line Information

## What Do We Know About Help?



**Typical users's questions** (Preece, 1994) focus on:

- ✓ **Goal exploration:** What can I do with this program?
- ✓ **Definition and description:** What is this? What is it for?
- ✓ **Task achievement:** How do I do this?
- ✓ **Diagnostic:** How did that happen?
- ✓ **State identification:** Where am I?

**Dorazio On Help:**

- ✓ "The goal of the help system **should not be to teach users** about a **system's capabilities and functions**, but rather to provide **quick and immediate access to information about a specific task, command, or message**. In other words, help should **refresh** or **remind** the memory of what it already knows."

# M10: User Support and On-Line Information

## Important Reminders in Designing Successful Interfaces



Pointers extracted from Mountford, 1990:

- ✓ Users will **never do what you think** they will.
- ✓ Watch out for the **stunning demo**: try it out yourself
- ✓ Never underestimate the power of **visualization** to facilitate the interface design process
- ✓ Never underestimate the use of **early testing**
- ✓ Do not hesitate to use **informal testing methods**
- ✓ There is **no** such thing as a "**stupid**" user
- ✓ There is **no** such thing as a "**typical**" user
- ✓ You can never **iterate interface designs** too much
- ✓ What seems **obvious** is often the **hardest to anticipate** in design
- ✓ **Simple and elegant interface designs** always take the **longest time to design**

# M10: User Support and On-Line Information Paper: “Hypertext & Hypermedia”



## Hypertext and hypermedia

The contents of this page may seem familiar to you. It draws heavily on the ideas of [Conklin \[1987\]](#) which he wrote down in his *'Hypertext: An introduction and survey'*. I consider this an essential work for a thorough examination of hypertext systems.

### Hypertext is not a new concept

Already in 1945(!), [Vannevar Bush](#) came up with the idea of the Memex, a system that would contain scientific literature, as well as photographic images and personal notes. The user should be able to link different entries. The concept of the never build Memex influenced later hypertext pioneers, like [Nelson \[1980\]](#). The following fragment describes the Memex. It makes you think of a computer applying a desktop [interface metaphor](#).

[..] A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory. It consists of a desk, and while it can presumably be operated from a distance, it is primarily the piece of furniture at which he works. On the top are slanting translucent screens, on which material can be projected for convenient reading. There is a keyboard, and sets of buttons and levers.

[Nelson](#) once defined hypertext, also known as non-sequential text or non-linear text, as

a combination of natural language text with the computer's capacity for interactive branching, or dynamic display [...] of a non-linear text [...] which cannot be printed conveniently on a conventional page.

Please note that intertextual references are not new. The importance of hypertext is simply that references are supported by a computer.

### Requirements for a hypertext environment

In our opinion, The COOPerator may be considered a hypertext tool. The following requirements, given by [Conklin](#), who states that a hypertext system is a union of three powerful and well known [metaphors](#), prove our point:

# M10: User Support and On-Line Information FAQ on Hypertext & Hypermedia



## [alt.hypertext] Frequently Asked Questions (FAQ list)

Message-ID: <hypertext-faq\_967111942@rtfm.mit.edu>  
Supersedes: <hypertext-faq\_965898650@rtfm.mit.edu>  
Expires: 21 Sep 2000 10:12:22 GMT  
X-Last-Updated: 2000/06/13  
From: jamie@csd.uwo.ca (J. `send no junk mail' Blustein)  
Newsgroups: [alt.hypertext](#), [alt.answers](#), [news.answers](#)  
Subject: [\[alt.hypertext\]](#) Frequently Asked Questions (FAQ list)  
Reply-To: [jamie@csd.uwo.ca](mailto:jamie@csd.uwo.ca) (J. Blustein)  
Followup-To: [alt.hypertext](#)  
Organization: Computer Science Dept., Univ. of Western Ontario, London, Canada  
X-Copyright: copyright (c) Jamie Blustein 1997-2000. All rights reserved. See question 6  
Summary: Answers to questions frequently asked in alt.hypertext and references  
to other online resources about hypertext and hypermedia.  
Keywords: hypertext hypermedia faq  
Date: 24 Aug 2000 10:13:25 GMT  
X-Trace: dreaderd 967112005 9424 18.181.0.29

Archive-name: hypertext-faq  
Posting-Frequency: every two weeks  
Last-modified: 12 June 2000  
URL: <http://www.csd.uwo.ca/~7ejamie/hypertext-faq.html>  
Created: 2 February 1997 by J. Blustein  
Maintainer: J. Blustein <[jamie@csd.uwo.ca](mailto:jamie@csd.uwo.ca)>  
Copyright: (c) 1997-2000 Jamie Blustein, all rights reserved. See part C of question 6.1 :

This document is my personal attempt to answer some of the most frequently asked questions in [alt.hypertext](#) and provide some necessary background. Although I am solely responsible for its content I've tried to keep it close to what I think of as the consensus view on all the topics I discuss. I welcome all constructive criticism (and compliments). Please send them by e-mail to [jamie@csd.uwo.ca](mailto:jamie@csd.uwo.ca). Do not send me junk mail!

# M11: Guidelines, Standards, Prototyping and UI Software Support Tools

## Paper: “Windows Interface Guidelines for Software Design”



### Update to the Windows Interface Guidelines for Software Design (DRAFT)

Microsoft Corporation

October 1998

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# M11: Guidelines, Standards, Prototyping and UI Software Support Tools

## Why Standardisation in UI?



- ✓ In an attempt to **codify usability** and provide **some consistency from interface to interface**, several standards organizations are working to develop UI software standards which they perceive will provide benefits such as:
  - Providing **enhanced usability** which results in **increased satisfaction and productivity**
  - Providing some **assurance** of the **users well being** and **lack of frustration**
  - Providing needed **consistency** within and between **systems** and **applications**
  - Helping software procurers in their **selection of acceptable products**
  - Helping to **protect the employer** from **complaints** and **possible litigation**

# M11: Guidelines, **Standards**, Prototyping and UI Software Support Tools

## Some Available Standards

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- ✓ **ISO 9241**: Ergonomic principles for **visual display terminals**.
- ✓ **ISO/IEC 10741**: What happens to the **cursor control** when users interact with **text editors**.
- ✓ **ISO/IEC 11581**: Usage and appropriateness of **icons** in the user interface.
- ✓ **ISO 13407**: Designing **user interfaces** with humans in mind.
- ✓ **ISO/IEC 14754**: Defines the basic **gesture** commands.
- ✓ **ISO 14915**: Recommendations for **multimedia** controls and navigation.
- ✓ **ISO/IEC 18019**: A standard for the design and preparation of software user **documentation** . .

## M11: Guidelines, Standards, Prototyping and UI Software Support Tools



### Why Prototyping?

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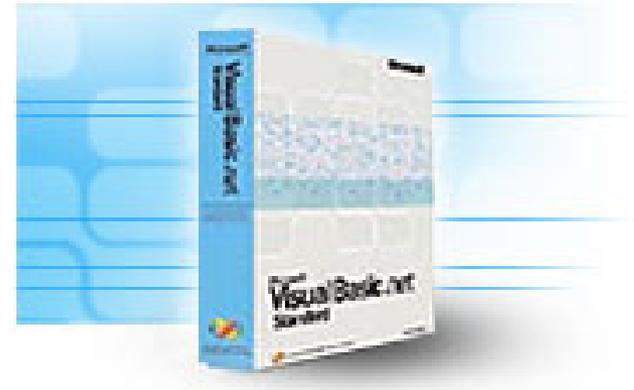
- ✓ **User testing may reveal problems**, but depending on the nature of a problem, it may often be **too late**, i.e. **too expensive**, to implement a real solution.
- ✓ To **gain profits from user testing** in commercial software development, **prototyping** is the key.
- ✓ When implementing and testing prototypes, one should start with the **clarification of basic concepts**, such as the mapping of a certain task to a certain functionality of the application.
- ✓ **Details of screen presentation**, colors, and button labels **can be left undecided** until the project is advanced to provide a reasonable frameset.

# M11: Guidelines, Standards, Prototyping and UI Software Support Tools

## Microsoft Visual BASIC

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- ✓ **Visual BASIC** allows
  - prototyping
  - limited form of modelling
  - good diagramming tools
  - availability of a wide range of plug-ins/DLLs that allows advanced form of visualisation
  - plentiful of UI toolkits offered by third party vendors
  - integrated environment for software development
  
- ✓ Alternatives includes **Borland Delphi**.
  
- ✓ Check out the comparison between VB and Delphi [http://www.consist.it/de\\_vb.htm](http://www.consist.it/de_vb.htm)

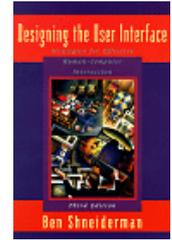


Microsoft   
**Visual Basic .net™**

# M12: Social and Individual Impact

## Introduction

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- ✓ Materials from module 12 is extracted from Ben Shneiderman's excellent HCI book titled “**Designing the User Interface**”.

<http://www.amazon.com/exec/obidos/ASIN/0201694972/o/qid=971496687/sr=2-2/104-4404940-4696700>

## M12: Social and Individual Impact Between Hopes and Fears



- ✓ **Hopes** can invigorate others to join in purposeful action.
- ✓ Often **hope** can **overcome resistance** created by **fear**.
- ✓ **Fear** can be a **terrifying barrier to change**, but also an **energizer for action**.
- ✓ Computing is **ubiquitous** world wide.
- ✓ Technology extrapolation suggests that **advances in technology** are themselves **beneficial to society**.

# M12: Social and Individual Impact Between Hopes and Fears (cont)



## Potential issues to shape the future:

- ✓ **Universal access to computing technology**
  - o Convenient, low-cost
  - o Electricity, software, hardware
  - o Simplify common tasks
  
- ✓ **Universal medical records**
  - o Easy access to details
  - o Standardized record formats could speed data entry and access
  - o Privacy issues and cost must be addressed
  
- ✓ **Universal educational support**
  - o Education is the hope of civilization
  - o Dissemination of results through community-information tools

# M12: Social and Individual Impact

## Ten **Plagues** of the Information Age

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1. Anxiety
2. Alienation
3. Information-poor minority
4. Impotence of the individual
5. Bewildering complexity and speed
6. Organizational fragility
7. Invasion of privacy
8. Unemployment and displacement
9. Lack of professional responsibility
10. Deteriorating image of people

## M12: Social and Individual Impact Overcoming the Obstacle of Animism



- ✓ **Animism:** The doctrine that all natural objects and the universe itself have souls; "animism is common among primitive peoples" (*even modern people!*).
- ✓ Computer revolution has **passed its infancy**, but still tremendous **opportunity for change**.
- ✓ **Metaphors, images, and names** chosen for systems play a key role.
- ✓ **Metaphor and terminology of human form** can **mislead** designers and users of robots (eg. "Please wait a minute, the program is thinking...").
- ✓ ATMs as example of evolution from **anthropomorphism** (*an interpretation of what is not human or personal*) to **service orientation**.
- ✓ **Focus** should be on **service to human needs**, not technology itself.
- ✓ **Human-human** communication is a **poor model** for **human-computer** interaction.
- ✓ Users want to be **empowered by technology, not awed** by it.

## M12: Social and Individual Impact In the Long Run



- ✓ **Successful interactive systems** will bring **ample rewards** not only to the **designers**, but also widespread use of effective tools is only the means to reach higher goals.
- ✓ The **message of quality** is compelling to the recipients and can **instill good feelings, appreciation** for the designer, and the **desire to excel** in one's own work.
- ✓ At first, it may seem remarkable that computer systems can instill a kinship among people, but **every technology has the potential to engage people in cooperative efforts.**

# Future Trends and The Road Ahead

## Paper 1: "Strategic Directions in Human Computer Interaction"



### Strategic Directions in Human Computer Interaction

Revised; Final version of November 13, 1996

Edited by\*:

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*\*This article is based on the results of the [Human Computer Interaction Working Group](#) of the [ACM Workshop on Strategic Directions in Computing Research](#), and was authored by:*

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**Abstract:** Human Computer Interaction (HCI) is the study of how people design, implement, and use interactive computer systems, and how computers affect individuals, organizations, and society. HCI is a research area of increasingly central significance to computer science, other scientific and engineering disciplines, and an ever expanding array of application domains. This more prominent role follows from

# Future Trends and The Road Ahead

## Paper 2: "Predicting Text Entry Speed on Mobile Phones"



### Predicting Text Entry Speed on Mobile Phones

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#### ABSTRACT

We present a model for predicting expert text entry rates for several input methods on a 12-key mobile phone keypad. The model includes a movement component based on Fitts' law and a linguistic component based on digraph, or letter-pair, probabilities. Predictions are provided for one-handed thumb and two-handed index finger input. For the traditional multi-press method or the lesser-used two-key method, predicted expert rates vary from about 21 to 27 words per minute (wpm). The relatively new T9 method works with a disambiguating algorithm and inputs each character with a single key press. Predicted expert rates vary from 41 wpm for one-handed thumb input to 46 wpm for two-handed index finger input. These figures are degraded somewhat depending on the user's strategy in

This research is concerned with the problem of text entry on mobile phones. Although we usually think of phones as devices for speech input and output, the transmission and reception of text messages on mobile phones is increasing rapidly. For example, Finland's largest teleoperator, Sonera, reports a six-fold increase of text messages during 1998 ([http://www.sonera.fi/investor\\_en/publications/annualreports/sonera98\\_english.pdf](http://www.sonera.fi/investor_en/publications/annualreports/sonera98_english.pdf)).

Text entry on contemporary mobile phones is mainly based on the 12-key keypad (Figure 1). This paper describes a method for predicting potential expert user text entry speed for input methods that utilize the 12-key keypad. The model provides individual predictions for one-handed thumb and two-handed index finger use.

# Future Trends and The Road Ahead

Paper 3: "Face to InterFace: Facial Affect in (Hu)Man and Machine"



## Face to InterFace: Facial Affect in (Hu)Man and Machine

Diane J. Schiano, Sheryl M. Ehrlich, Krisnawan Rahardja & Kyle Sheridan

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### ABSTRACT

Facial expression of emotion (or "facial affect") is rapidly becoming an area of intense interest in the computer science and interaction design communities. Ironically, this interest comes at a time when the classic findings on perception of human facial affect are being challenged in the psychological research literature, largely on methodological grounds. This paper presents two studies on perception of facial affect. Experiment 1 provides new data on the recognition of human facial expressions, using experimental methods and analyses designed to systematically address the criticisms and help resolve this controversy. Experiment 2 is a user study on affect in a prototype robot face; the results are compared to the human data of Experiment 1. Together they provide a demonstration of how basic and more applied research can mutually contribute to this rapidly developing field.

the design of affect-based computer interfaces [9, 13].

The question of how to best characterize perception of facial expressions has clearly become an important concern for many researchers in affective computing. Ironically, this growing applied interest is coming at a time when the established wisdom on human facial affect is being strongly challenged in the basic research literature. In particular, recent methodological criticisms have thrown suspicion on a large body of long-accepted data.

The classic psychological research on facial expression of emotion was performed by psychologist Paul Ekman and colleagues, beginning in the 1960s [see 5 for a review]. A substantial body of evidence has been gathered in over three decades, identifying a small number of so-called "basic" emotions: anger, disgust, fear, happiness, sadness and surprise (contempt was tentatively added only recently). In Ekman's theory, the basic emotions are considered to be the building

# Future Trends and The Road Ahead



Paper 4: "Charting Past, Present, and Future Research in Ubiquitous Computing"

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## Charting Past, Present, and Future Research in Ubiquitous Computing

GREGORY D. ABOWD and ELIZABETH D. MYNATT

Georgia Institute of Technology

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The proliferation of computing into the physical world promises more than the ubiquitous availability of computing infrastructure; it suggests new paradigms of interaction inspired by constant access to information and computational capabilities. For the past decade, application-driven research in ubiquitous computing (ubiquitous computing) has pushed three interaction themes: *natural interfaces*, *context-aware applications*, and *automated capture and access*. To chart a course for future research in ubiquitous computing, we review the accomplishments of these efforts and point to remaining research challenges. Research in ubiquitous computing implicitly requires addressing some notion of scale, whether in the number and type of devices, the physical space of distributed computing, or the number of people using a system. We posit a new area of applications research, *everyday computing*, focussed on scaling interaction with respect to time. Just as pushing the availability of computing away from the traditional desktop fundamentally changes the relationship between humans and computers, providing *continuous* interaction moves computing from a localized tool to a constant companion. Designing for continuous interaction requires addressing interruption and resumption of

# Future Trends and The Road Ahead

## Paper 5: "Beyond HCI - towards Information Interaction"



Information Design

### Beyond HCI - towards Information Interaction

*Online preprint*

P. Duchastel

[Information Design Atelier](#)

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#### Abstract

HCI grew out of the difficulties people had with using computer applications. The relationship of interest in HCI is that between a human and an interactive cognitive task that is mediated by computer. The interface is the mediational framework that is designed to optimally support task processes. That framework consists of concrete elements (such as displays...) as well as abstract task structures (cognitive processes...) that interface the human agent with task goals. Such an abstract HCI model places the interaction within the larger human plane, thus bringing out two implications for the field. First, it helps explain the difficulties of grounding HCI in psychology. Second, it announces the arrival of a new brother: AAI (Autonomous Agent Interaction). Each of these implications leads to a redefinition of focus for the field. Psychology must re-emphasize the role of learning in interaction and furthermore, the enlarged scope of the field offered by AAI shifts our attention to the more abstract nature of the underlying interaction, characterized as information interaction (II).

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# Future Trends and The Road Ahead

## Paper 6: US Patent 6,081,750



US006081750A

**United States Patent** [19]

[11] **Patent Number:** **6,081,750**

**Hoffberg et al.**

[45] **Date of Patent:** **Jun. 27, 2000**

[54] **ERGONOMIC MAN-MACHINE INTERFACE  
INCORPORATING ADAPTIVE PATTERN  
RECOGNITION BASED CONTROL SYSTEM**

[76] Inventors: **Steven Mark Hoffberg**, 20 Greystone Ter., Yonkers, N.Y. 10701-1705; **Linda Irene Hoffberg-Borghesani**, 40 Jackson Dr., Acton, Mass. 01720

[21] Appl. No.: **08/471,213**

[22] Filed: **Jun. 6, 1995**

### Related U.S. Application Data

[63] Continuation-in-part of application No. 07/812,805, Dec. 23, 1991, Pat. No. 5,903,454.

[51] **Int. Cl.<sup>7</sup>** ..... **G05B 11/01**

[52] **U.S. Cl.** ..... **700/17; 700/56; 700/11;  
700/83; 700/86; 345/520; 345/521**

[58] **Field of Search** ..... 364/140-147,  
364/148, 518, 188-190; 382/1, 8, 27, 30,  
34, 56, 16, 36, 42, 249; 700/11, 17, 28,  
56, 47, 48, 49, 83, 84, 85; 345/520, 521

### OTHER PUBLICATIONS

Hoffberg, Linda I., Thesis "An Improved Human Factored Interface for Programmable Devices: A Case Study of the VCR", Tufts University, Master of Sciences in Engineering Design.

Micromint, "The Catalog of Embedded Controllers", (Winter 1991):1-28.

Didier LeGall, "MPEG: A Video Compression Standard for Multimedia Applications", *Communications of the ACM*.

Shepard, Jeffrey D, "Tapping the Potential of Data Compression", *Military & Aerospace Electronics*, (May 17, 1993): 25-28.

(List continued on next page.)

*Primary Examiner*—Paul P. Gordon

*Assistant Examiner*—Ramesh Patel

*Attorney, Agent, or Firm*—Milde, Hoffberg & Macklin, LLP

[57] **ABSTRACT**

An adaptive interface for a programmable system, for predicting a desired user function, based on user history, as well as machine internal status and context. The apparatus receives an input from the user and other data. A predicted input is presented for confirmation by the user, and the

# Additional Handouts for Lecture 5



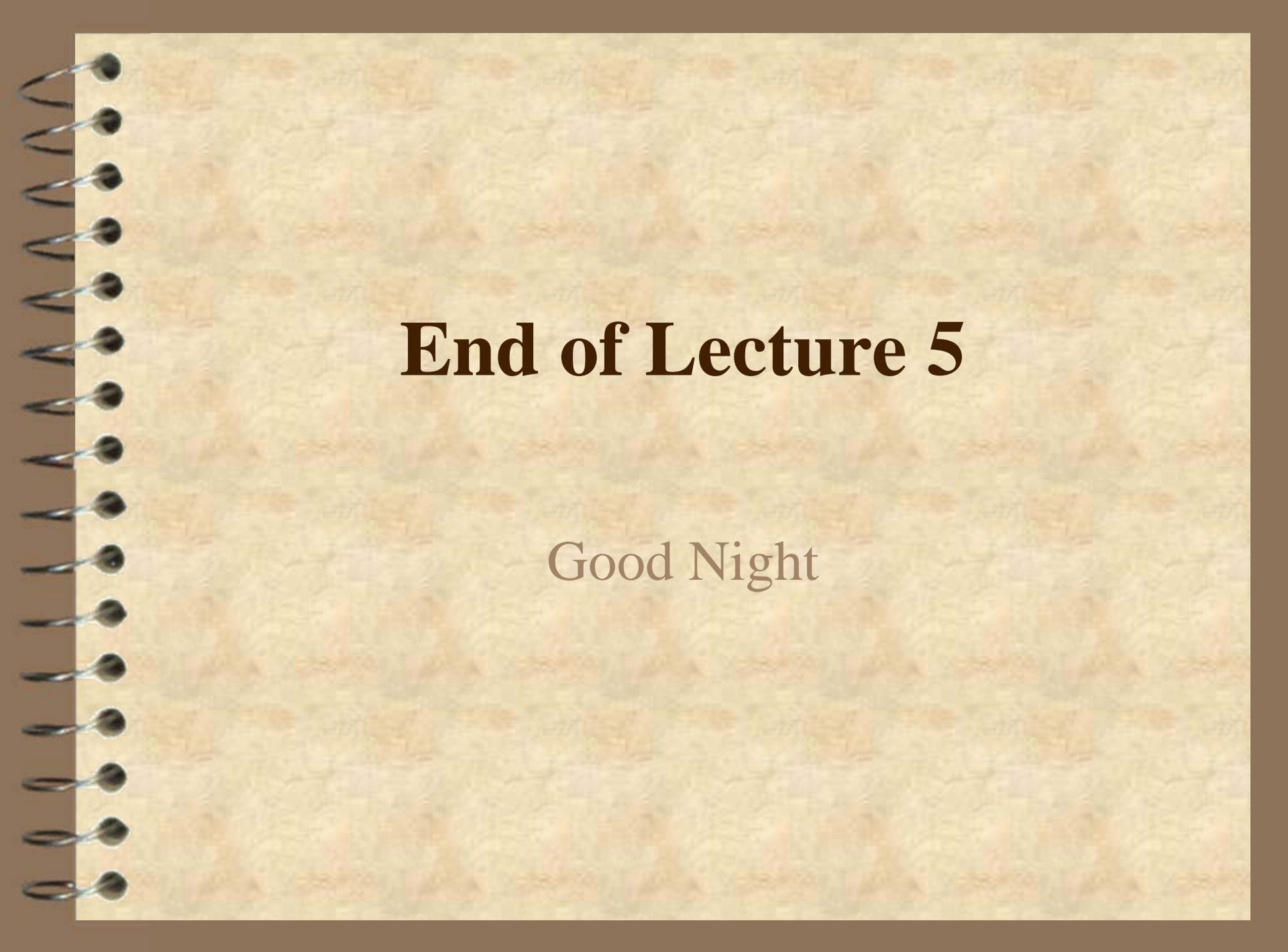
- ✓ 1. Paper: “Hypertext & Hypermedia”
- ✓ 2. FAQ on Hypertext & Hypermedia
- ✓ 3. HCI Tools Online Website
- ✓ 4. Paper: “Windows Interface Guidelines for Software Design”
- ✓ 5. Strategic Directions in Human Computer Interaction
- ✓ 6. Predicting Text Entry Speed on Mobile Phones
- ✓ 7. Face to InterFace: Facial Affect in (Hu)Man and Machine"
- ✓ 8. Charting Past, Present, and Future Research in Ubiquitous Computing
- ✓ 9. Beyond HCI - towards Information Interaction
- ✓ 10. US Patent 6,081,750 "Ergonomic man-machine interface incorporating adaptive pattern recognition based control system"

# What's in Store for Lecture 6

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- Assignment 3 Class Presentations

A spiral-bound notebook with a light brown, textured cover. The spiral binding is on the left side. The text is centered on the cover.

**End of Lecture 5**

Good Night