Unit Outline: KXH112 Virtual Reality and Advanced Media Technology

Semester 3, 2008
Newnham Campus, Launceston

Prerequisites
This is open to all students

Corequisites
None

Unit Weight
12.5% of one academic year

Unit Coordinator
Prof. Young Ju Choi

Lecturing Staff
Professor Thomas A. Furness III
Director Emeritus, HIT Lab, University of Washington, Seattle, USA
Adjunct Professor and International Director, HIT Lab NZ, University of Canterbury, Christchurch, NZ

Professor Mark Billinghurst
Director, HIT Lab NZ, University of Canterbury, Christchurch, NZ

Other teaching staff: to be announced.

Scheduled Teaching Sessions
Lectures: N/A
Seminars: N/A

The Unit Timetable can be accessed from the Study Resources section of the School website. (http://www.cis.utas.edu.au/cisview/studyresources.jsp).

Unit Website
The unit website is accessed from . You will need to use your university email pop account username and password to log on to the MyLO system. Once authenticated by the system your personalised MyLO Learning Online area will be displayed. It contains links to the websites that you have permission to access - including the website for this unit.

This unit is . This means that you will need to use the Web for this unit. The unit website contains unit information and resources.

If you are not able to access the unit website, please contact the University IT help desk:

- Entrance Level, Morris Miller Library, Sandy Bay Campus;
- Entrance Level, Launceston Campus Library, Newnham Campus.
- Telephone: 6226 1818 and 1300 304 903.
- The 1300 number is a local call from within Tas, with the exception of mobiles.
- Email: servicedesk@utas.edu.au
- Website: http://www.utas.edu.au/servicedesk/student/index.html

University Website
Information and Resources for 'Current Students' are available on the university website at: http://www.utas.edu.au/students/

Provider
School of Computing and Information Systems - Faculty of Science, Engineering, and Technology. http://www.cis.utas.edu.au

OVERVIEW

Introduction
This unit will explore the exciting field of mixed reality and the advanced concepts and technologies for interfacing humans to complex machines. The course will focus on virtual interfaces and their potential impact on the way we think about computers and the way we think with them. Interface design principles will be reviewed from human factors and technological perspectives. Hardware, software and mindware aspects of virtual interfaces and virtual environments will be investigated and applications postulated and designed in the fields of medicine, education, design and entertainment.

This unit is a companion unit to the Fundamentals of Interactive Entertainment (Digital Games and Animated Film). Both units are precursors to a new cross-disciplinary program in Human Interface Technology and Experience Engineering that is being started at the (proposed) HIT Lab Australia. The new major is an instructional companion to the organization of the Tasmania Research Centre of Human Interface Technology Laboratory in Australia. This Laboratory is linked to the HIT Lab at the University of Washington in Seattle, Washington, USA and the HIT Lab NZ, located at the University of Canterbury,
Christchurch, NZ and will promote the development of advanced human interfaces and media technologies.

This unit is offered by the HIT Lab Australia. The unit will be taught by staff members from the HIT Lab Australia as well as selected international experts from the Human Interface Technology Laboratories in New Zealand and the USA. Notable international authorities and staff from various UTAS schools, especially from the School of Computing, will also be invited for lectures.

Learning Outcomes
On successful completion of this unit, you will be able to:

Unit Content

DRAFT COURSE SCHEDULE

PART ONE
OVERVIEW OF COURSE

- Introduction to course
- Course structure
- Outline of content
- Assignments
- Project
- Expectations/grading
- class attendance
- participation in discussions
- organization of groups
- group meeting dynamics

INTRODUCTION TO VISION

- Importance/history of vision
- Need for advanced interfaces

TAXONOMY FOR MEDIATED EXPERIENCE
DEFINITIONS OF VIRTUAL REALITY

DISCUSSION: What is the take home message?

BRIEF HISTORY OF VIRTUAL INTERFACES

- early concepts
- military developments
- commercial developments

FURNESS JOURNEY IN VIRTUAL SPACE

- US WEST Tape
VIEW: Colonizing Cyberspace

TOPICS FOR STUDENT PROJECTS

DISCUSSION: Interesting Web Sites

HUMAN SIDE OF VIRTUAL INTERFACE DESIGN

- Human Factors of Virtual Environments
- --an interface model
- sensory/perceptual/cognitive considerations
- --interface design considerations
- --bandwidth demands

DISCUSSION: How compare and contrast development of VR as a medium to another medium

MACHINE SIDE OF VIRTUAL INTERFACE DESIGN-INPUT
MACHINE SIDE OF VIRTUAL INTERFACE DESIGN-OUTPUT
HAPTIC INTERFACES
RENDERING THE VIRTUAL WORLD

DISCUSSION: What would be the attributes of an ideal VR medium?

BUILDING THE VIRTUAL WORLD
USER INTERACTION IN THE VIRTUAL WORLD
VIRTUAL INTERFACE METAPHORS

MEASURING THE GOODNESS OF VIRTUAL WORLDS

Presence

- Creating the Virtual Message
- The concept of Place
- Measuring
- other metrics

Simulator Sickness

- Some artifacts of virtual interfaces
- Visual/Vestibular interaction
- Cybersickness (Don Parker)

DISCUSSION: VR Solutions to Like Hacker problems

PART TWO

AUGMENTED REALITY

- What is Augmented Reality
- AR vs. VR
- Human Factors of AR Environments
Technical Requirements

- registration
- calibration

Technology

- displays
- tracking

Wearable Computing

DISCUSSION: Contrasting the differences in VR & AR

APPLICATIONS OF AR & VR

Collaborative VR

- Collaboration in Virtual Space (Mark Billinghurst)
- GreenSpace (Tom Furness)
- Discussion: the future of virtual collaboration

DISCUSSION: Brainstorming AR & Wearable computing applications

MEDICAL APPLICATIONS OF VR

- Virtual Simulation for Medicine
- Pain & Phobia

EDUCATIONAL APPLICATIONS OF VR

- Education in Virtual Space

DISCUSSION: Educational Applications of VR

CREATIVE & DESIGN APPLICATIONS OF VR/AR

Design

- Advanced CAD concepts in virtual space

VR as a medium for artistic expression (Peter Oppenheimer)

Architecture

- Designing in Virtual Space

FUTURE DEVELOPMENTS OF VR TECHNOLOGY & APPLICATIONS
FUTURE OF VIRTUAL REALITY

- Matrix for interface design
- Some new affordances

DISCUSSION: Social & Ethical Implications of Virtual Interface Technology

Where do we go from here?

PRESENTATION TEASER

CLASS PRESENTATIONS

Groups to handout project sheet to class and copy of briefing materials to the lecturer. Students will grade each groups presentations

INTRODUCTION TO MAJOR IN HUMAN INTERFACE TECHNOLOGY & EXPERIENCE ENGINEERING

DISCUSSION: Where do we go from here

For more information see the section titled 'Content' on the unit website.

Generic Skills

The university has defined a set of generic graduate attributes expected in its graduates. http://www.utas.edu.au/policy/subject.html#graduates. Your course is designed to enable you to develop generic skills that are valued in, and expected of, graduates. These are skills that you will need to develop over time. Hence you are encouraged to look for opportunities, as you study each unit, to reflect on and improve these skills.

LEARNING AND TEACHING

Approach to Learning

The University is committed to high standards of professional conduct in all activities, and holds its commitment and responsibilities to its students as being of paramount importance. Likewise, it holds expectations about the responsibilities students have as they pursue their studies within the special environment the University offers.

The University's Code of Conduct for Teaching and Learning states:

Students are expected to participate actively and positively in the teaching/learning environment. They must attend classes when and as required, strive to maintain steady progress within the subject or unit framework, comply with workload expectations, and submit required work on time.

You are expected to spend about 130 hrs studying in this unit - this includes attendance at scheduled teaching sessions. (For a 13 week semester this is, on average, 10 hr/wk.) This is the amount of study time that the 'typical' student will need to reach the level of competence and understanding required to fulfil the unit objectives. You are expected to:

- attend all scheduled teaching sessions, unless otherwise notified by the unit coordinator
- prepare for, and actively participate in all scheduled teaching sessions
- complete the assigned learning tasks
- review what has been learnt
- complete assessment items and submit them on time
- access and be familiar with the information and resources available on the unit website
- seek help from teaching staff if you have any questions or difficulties in studying this unit

You are encouraged to read the university's Code of Conduct for Teaching and Learning. Part A describes the 'Responsibility of the University to Students' and part B describes the 'Responsibilities of Students to the University'. http://www.utas.edu.au/tl/policies/codes.html

It is expected that students will familiarise themselves with access and use of the MyLO system operated by the University for the electronic delivery of course materials, and for various forms of communication.

It is expected that students will consult email sent to their University email address at least twice a week for notices relating to the administration of the unit, and for notification of the results of assignments.
It is expected that students will read the background material specified in the course curriculum, will actively attend and participate in tutorials, and be prepared to discuss relevant issues arising with tutors, lecturers and fellow students.

You are encouraged to read the university's Code of Conduct for Teaching and Learning. Part A describes the 'Responsibility of the University to Students' and part B describes the 'Responsibilities of Students to the University'. http://www.utas.edu.au/tl/policies/codes.html

**Schedule**

See the 'Schedule' section on the unit website.

**Teaching and Support Staff**

**Teaching Staff**

**Unit Coordinator:**

Prof. Young Ju Choi  
E-Mail: Y.J.Choi@utas.edu.au  
Phone: (03) 6324 3346  
Room: V105, Newnham Campus, Launceston

**Lecturing Staff**

Professor Thomas A. Furness III  
Director Emeritus, HIT Lab, University of Washington, Seattle, USA  
Adjunct Professor and International Director, HIT Lab NZ, University of Canterbury, Christchurch, NZ

Professor Mark Billinghurst  
Director, HIT Lab NZ, University of Canterbury, Christchurch, NZ

Other teaching staff: to be announced.

**School Help Desk**

Contact the School Help Desk if you have any queries or problems with accessing, using, or printing from the computers in the School of Computing and Information Systems labs.

In Hobart the Help Desk is located on level 3 in the Centenary building, and is open from 10:00am-12:00pm, and 2:00pm-4:00pm Monday-Friday. The phone number is 62262929.

In Launceston the Help Desk is located near the entrance to the computing labs and is open from 10:00am-12:00pm, and 2:00pm-4:00pm Monday-Friday. The phone number is 6324 3447.

Both help desks will accept queries over the phone outside the standard opening hours.

The computer labs at the Cradle Coast Campus are maintained by ITR - please contact the University Help Desk for assistance with these computers.

**University Services and Support**

If you are experiencing difficulties with your studies or assignments, have personal or life planning issues, disability or illness which may affect your course of study, you are advised to raise these with your lecturer in the first instance.

The University has staff available to assist you, such as the:

- Learning Development Advisor
- Student Counselor
- Careers Advisor
- Disability Officer

For more information and contact details see the Services and Support section on the University 'Current Students' web page: http://www.utas.edu.au/students/

**Resources**

**Unit Website**

The unit website contains unit information and resources.

**Prescribed Text**

None

**Readings**
Software

The software that you will need to access the unit website and to study this unit, including general purpose software such as word processors, is provided on the computers in the School's computing labs. If you intend to use software on other computers please check that the versions are compatible.

A CD containing course materials (presentations and readings) will be distributed the first day of class. Students will have also have access to a course website that will provide up-to-date information.

Computing Facilities

The School has PC labs (running Windows XP), Mac labs (running Mac OS X 10.5), and special purpose Networking labs at the Newnham and Sandy Bay campuses. All students are provided with logins for Windows, Macintosh and Unix environments. If you have not used these facilities before please contact the School Help Desk to collect your account details. If you would like to access these facilities after hours please contact the School Help Desk.

In Hobart, there are 3 PC labs, 2 Mac Labs, and 1 Networks lab in the Centenary building, and 3 PC labs in the CIS building. In Launceston, there are 2 PC labs, 1 Mac Lab, 1 Networks lab, and one multipurpose lab in Building V.

Use of Facilities

Use of computing facilities provided by the School is subject to the School’s Ethics Guidelines, details of which are posted at http://www.cis.utas.edu.au/cisview/ethics.jsp. Copies of the guidelines are also available in all School labs. The School's facilities may only be used for study-related purposes, and may not be used for personal gain. Anti-social behaviour in labs such as game playing, viewing pornography, loud discussion, audio without the use of head-phones, etc is strictly prohibited in all labs at all times. Eating, drinking, and smoking is not permitted in the labs. Before being granted access to the School’s facilities, you will be required to sign a declaration that you have read and understand these guidelines, and that you will abide by them. Disciplinary action may be taken against students who violate the guidelines.

Occupational Health and Safety

The university is committed to providing a safe and secure teaching and learning environment. For more information see http://www.admin.utas.edu.au/hr/ohs/pol_proc/

ASSESSMENT

Assessment
Items

See the 'Assessment' section in unit website for more detailed information about assessment items.

In-Semester Assessment

Unless specifically stated in the specification of the assessment item provided on the unit website, it is required that:

- work submitted by a student is the work of that student alone OR
- where the assessment item is to be completed by a group of students, the work submitted by the group of students is the work of that group of students alone.

Plagiarism

Unless specifically stated in the specification of the assessment item provided on the unit website, it is required that:

- work submitted by a student is the work of that student alone OR
- where the assessment item is to be completed by a group of students, the work submitted by the group of students is the work of that group of students alone.

While students are encouraged to discuss the assignments in this unit and to engage in active learning from each other, it is important that they are also aware of the University’s policy on plagiarism. Plagiarism is taking and using someone else's thoughts, writings or inventions and representing them as your own; for example downloading an essay wholly or in part from the internet, copying another student's work or using an author’s words or ideas without citing the source.

"Plagiarism is a form of cheating. It is taking and using someone else’s thoughts, writings or inventions and representing them as your own; for example, using an author's words without putting them in quotation marks and citing the source, using an author’s ideas without proper acknowledgment and citation, copying another student's work.

If you have any doubts about how to refer to the work of others in your assignments, please consult your lecturer or tutor for relevant referencing guidelines, and the academic integrity resources on the web at http://www.utas.edu.au/tl/supporting/academicintegrity/index.html.

The intentional copying of someone else’s work as one’s own is a serious offence punishable by penalties that may range from a fine or deduction/cancellation of marks and, in the most serious of cases, to exclusion from a unit, a course or the University. Details of penalties that can be imposed are available in the Ordinance of Student Discipline – Part 3 Academic Misconduct, see http://www.utas.edu.au/universitycouncil/legislation/.

The University and any persons authorised by the University may submit your assessable works to a plagiarism checking service, to obtain a report on possible instances of plagiarism. Assessable works may also be included in a reference database. It is a condition of this arrangement that the original author’s permission is required before a work within the database can be viewed."

It is important that you understand this statement on plagiarism. Should you require clarification please see your unit coordinator or lecturer. Useful resources on academic integrity, including what it is and how to maintain it, are also available at: http://www.utas.edu.au/tl/supporting/academicintegrity/students.html

Referencing

The preferred text referencing systems for the School is the Harvard system (also referred to as the author-date system). In your written work you will need to support your ideas by referring to scholarly literature, works of art and/or inventions. For information on presentation of assignments, including referencing styles: http://www.utas.edu.au/library/assist/gpoa/gpoa.html

It is important that you understand how to correctly refer to the work of others and maintain academic integrity. Failure to appropriately acknowledge the ideas of others constitutes academic dishonesty (plagiarism), a matter considered by the University of Tasmania as a serious offence. The university document on plagiarism contains information about referencing the work or ideas of others (see http://www.utas.edu.au/plagiarism/).
Submissions

The details of the submission method (paper, electronic or other) for each assignment will be supplied in a separate assignment specification sheet. All in-semester assignment submissions (including electronic submissions) are to include an Assignment Cover Sheet which includes a statement confirming that the submission is your own work. The Assignment Cover Sheet is available from the School Help Desk in Launceston and Hobart, and on the School’s web site: http://www.cis.utas.edu.au/cisview/studyresources.jsp.

Students must take responsibility for the correct submission of their assignments. Students are expected to adhere to the following procedure for submission:

- Submitted files MUST be checked by the student to ensure that correct submission of the file has been undertaken.
- Students are expected to notify the Lecturer WITHIN TWO HOURS of submission if their files have not been submitted correctly.
- Students must take responsibility for safely backing up of their own files during the academic year to ensure that no files are permanently lost.

Extensions

Assessment items will not be accepted after the due date except under the conditions stated in the school policy on late assessment. http://www.cis.utas.edu.au/downloads/ExtensionPolicy.pdf (PDF - 100KB).

Final Grade

Passing grades will be awarded based on the AVCC guidelines:

- PP at least 50% of the overall mark but less than 60%
- CR at least 60% of the overall mark but less than 70%
- DN at least 70% of the overall mark but less than 80%
- HD at least 80% of the overall mark

In order to comply with the benchmarks set by the Faculty of Science, Engineering & Technology for distribution of grades in units, both the in-semester and examination marks that students obtain may be adjusted either upwards or downwards. See http://fcms.its.utas.edu.au/scieng/scieng/policies.asp for details of the Faculty Assessment Guidelines.