SM3603: 3D NATURAL INTERACTION

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
3D Natural Interaction

Subject Code
SM - School of Creative Media

Course Number
3603

Academic Unit
School of Creative Media (SM)

College/School
School of Creative Media (SM)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
CS2313 Computer Programming or equivalent

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract
This course concentrates on the application of human computer interaction via natural user interfaces (NUI) to practical problems. The recent advance in the software and hardware for the sensing of the physical world brings rich applications

and opportunities to NUI designs, allowing users to utilize themselves or physical objects as a more intuitive interactivity metaphor to interact with computers. This course introduces the fundamental and state-of-the-art NUI techniques, and focuses on hands-on works. The topics include interaction with multitouch, real-world 3D objects/scenes, 3D human body posture and shape, 3D motion, gesture, etc. The students will gain practical experience through the application of such techniques to various interactivity scenarios.

The Microsoft Kinect is adopted as the main development platform. This course assumes no prior knowledge of the Kinect system or 3D programming experience, but requires fundamental programming skills (e.g., in C/C++, or Java, Processing, ActionScript etc.). The students will learn how to apply their programming and/or UI design knowledge to NUI applications.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Understand the fundamental and state-of-the-art NUI techniques		x	x	
2	Design a more direct and intuitive interaction using NUI for a particular purpose			x	
3	Integrate different NUI techniques to achieve a complex interaction task			x	
4	Implement their own NUI tools using existing programming libraries			x	x
5	Design and implement interactive media works/ product for particular purpose.		x	x	x
6	Assign or link up extra self-initiated tasks on top of an assignment / coursework for further exploration of the subject		x	x	x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	- Lectures with audio-visual illustration - Reading homework	1, 2, 3	3 hrs/wk for 2 weeks
2	Workshop	- Workshops - Hands-on class exercises	2, 3, 4	3 hrs/wk for 9 weeks

3	Prototyping	- Assignments and project - In-class presentation - Critique	2, 3, 4, 5, 6	3 hrs/wk for 2 weeks

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	- Reading homework	1, 2, 3	0	-	No
2	- Programming assignments - Assignment presentations	2, 3, 4	50	-	No
3	- Final project - Project presentation	5, 6	40	-	Yes
4	- Participation in class discussion - Contribution to classmates' critique sessions	1	10	-	No

Continuous Assessment (%)

100

Examination (%)

0

Minimum Continuous Assessment Passing Requirement (%)

0

Minimum Examination Passing Requirement (%)

0

Assessment Rubrics (AR)

Assessment Task

Summary/notes essay of assigned reading

Criterion

This assessment will grade on rationality, clarity and fluency of argument and comment. The threshold of 'discovery' lies in a student's ability to negotiate a position that is informed, defendable, and standing on personal insight.

Excellent (A+, A, A-)

· Rich content, excellent ability to interpret and integrate various resources
· Rigorous organization, coherent structure, systematic composition
· Precision in argument, well defined and reasoned points of view grounded in insightful interpretation of existing literature
· Readiness to respond to peer opinion and other views initiated in class discussion
· Discussion shed light on new dimensions of the issue

Good (B+, B, B-)

· Adequate content, sufficient ability to integrate various resources based on demand
· Reasonable organization with balanced structure and composition

· Clear elaboration of ideas that sticks to the point, with clearly differentiated issues, ability to interpret opinions independently
· Sufficient responses to peer comments to sustain a discussion

Fair (C+, C, C-)

· Adequate content, fair ability to integrate various resources based on demand
· Fair organization with adequate structure and composition
· Relevant points made to the subject matter in question
· Ability to respond to other statements and engage in class discussion

Marginal (D)

· Weak content, limited use of resources
· Poor organization, structure and composition
· Relevant points to the subject matter, marginal ability to interpret opinions
· Ability to respond to other comments in simple terms

Failure (F)

· Inadequate content, no/ irrelevant use of resources
· No organization, structure or/and composition
· Irrelevant points to the subject matter, no ability to interpret opinions
· Fail to respond to other comments

Assessment Task

Programming Assignments and Final Project

Criterion

This assessment will grade on rationality, clarity and fluency of argument and comment. The threshold of ‘discovery’ lies in a student’s ability to negotiate a position that is informed, defendable, and standing on personal insight.

Excellent (A+, A, A-)

· Excellent grasp of materials, able to explain key concepts and assumptions
· Completed all the basic requirements
· Well motivated ideas
· User-friendly user interface and well-designed graphics
· Creative use of the knowledge
· Without any runtime errors
· Clearly and effectively documented

Good (B+, B, B-)

· Firm grasp of materials, able to explain key concepts and assumptions
· Completed all the basic requirements
· Reasonably motivated ideas
· Usable user interface
· Reasonable organization, balanced structure, adequate content, sufficient ability to integrate various resources based on demand
· With few runtime errors
· Clearly documented

Fair (C+, C, C-)

· Comprehensive grasp of materials, able to explain key concepts
· Completed between 80-90% of the requirements
· Fairly motivated ideas
· Fairly usable user interface
· Fair organization, weak structure, adequate content, fair ability to integrate various resources based on demand

- With several runtime errors
- Basic documentation

Marginal (D)

- Loose grasp of materials, cannot explain key concepts
- Completed between 70-80% of the requirements
- Poorly motivate ideas
- Poor user interface
- Poor organization and structure, weak content, limited use of resources
- With many runtime errors
- Basic documentation

Failure (F)

- Poor grasp of materials
- Completed less than 70% of the requirements
- No organization and structure, inadequate content, no/irrelevant use of resources
- With compilation errors
- No documentation

Assessment Task

Presentation

Criterion

This assessment will grade on content and fluency of presentation. Students should show their co-operation to conduct a well-organized presentation with their own argument and evidence from readings and notes. The threshold of ‘discovery’ lied in a student’s self initiatives to conduct additional research and to personalize theories for her/his personal daily experience.

Excellent (A+, A, A-)

- Rich, informative content, excellent grasp of the material with in-depth and extensive knowledge of the subject matter
- Rigorous organization, coherent structure, and systematic exposition with a strong sense of narrative
- Superior presentation skills: distinct pronunciation, fluent expression and appropriate diction, exact time-management
- Critical analysis with insightful comments opening up new issues, or suggesting the ability to theorize

Good (B+, B, B-)

- Adequate content with firm grasp of the material that informs the audience on a subject matter
- Reasonable organization, balanced structure and composition
- Good verbal communication: comprehensible pronunciation, fluent expression and diction, fair time-management

Fair (C+, C, C-)

- Adequate content with comprehensive grasp of the material demonstrating basic knowledge of the subject matter
- Fair organization, weak structure and composition
- Fair presentation skills: acceptable pronunciation, expression and diction, fair time-management

Marginal (D)

- Weak content, loose grasp of the general ideas with some knowledge of the subject matter
- Poor organization, structure and composition
- Poor presentation skills: marginal pronunciation, expression and diction, poor time-management

Failure (F)

- Inadequate content, fail to identify the general ideas with knowledge of the subject matter
- No organization, structure or/and composition
- Poor presentation skills: marginal pronunciation, expression and diction, minimal time-management

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Assessment Task

Class Participation and Contribution

Criterion

This assessment task reviews students' participation and performance in discussions, debates and peer critique during the tutorial sessions. The evidence of 'negotiation', the sign of discovery, lies in students' pre-class preparation and interpersonal sensitivity to his/her peer members.

Excellent (A+, A, A-)

- Active in-class participation, positive listening, strong ability to stimulate class discussion and comment on other points
- In-depth pre-class preparation and familiarity with peer reports and other materials
- Interpret others' views with an open mind and ready to negotiate
- Readiness to share personal insight via analysis and synthesis with informed views
- Constructively critical, thus facilitating the discovery of new issues

Good (B+, B, B-)

- Active in-class participation, positive listening, ability to initiate class discussion and comment on other points
- Adequate pre-class preparation and familiarity with peer reports and other materials
- Interpret opinions effectively

Fair (C+, C, C-)

- Attentive in in-class participation, listening with comprehension, but only infrequently contributing
- Adequate pre-class preparation but little familiarity with peer reports and other materials
- Fair ability in interpreting opinions

Marginal (D)

- Unmotivated to participate in class discussion or comment on other people's views
- Little pre-class preparation and familiarity with peer reports and other materials
- Poor ability in interpreting opinions

Failure (F)

- Unwilling to participate in class discussion and comment on other points, even when requested by the teacher
- No pre-class preparation and familiarity with peer reports and other materials
- Minimal ability in interpreting opinions

Additional Information for AR

All A+/A/A- grade assignment should comply with the highest performance of Discovery-oriented learning.

Part III Other Information

Keyword Syllabus

Interaction, Interactive media, Interaction design, Interface design, Human-computer Interface, Natural user interface, Depth image processing, Bodily interaction, Pose detection, Skeleton tracking, Gestures, Speech recognition, Multitouch, Mixed/augmented reality

Reading List

Compulsory Readings

	Title
1	Brave NUI World: Designing Natural User Interfaces for Touch and Gesture by Daniel Wigdor and Dennis Wixon
2	3D User Interfaces: Theory and Practice by Bowman et al.

Additional Readings

	Title
1	Kinect for Windows: http://www.microsoft.com/en-us/kinectforwindows/
2	Beginning Microsoft Kinect for Windows SDK 2.0: Motion and Depth Sensing for Natural User Interfaces by Mansib Rahman