CS4187: COMPUTER VISION FOR INTERACTIVITY

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Computer Vision for Interactivity

Subject Code
CS - Computer Science
Course Number
4187

Academic Unit
Computer Science (CS)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

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

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
CS2303 Data Structures for Media or
CS3334 Data structures

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

The elective course introduces students to computer vision technologies to support human computer interactions, such as face, hand or body tracking. The focus of the class is three-fold: 1) to learn about existing computer vision technologies; 2) to develop skills using these algorithms through hands-on experience; 3) to design and create a computer vision system for a real-world interactive program. Topics will focus on image processing, feature detection, segmentation, face and object recognition, and motion estimation and tracking. Advanced topics may include real-time face detection and object detection. This course will use open source software libraries (e.g., OpenCV and openFrameworks) to create interactive programs with computer vision.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Understand and explain the main characteristics of different computer vision techniques.		x		
2	Develop skills implementing computer vision algorithms to create interactive programs.		x	x	
3	Analyze and evaluate the effectiveness of different computer vision approaches, and assess their relative merits.			x	
4	Create and design a computer vision system for a real-world application.		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.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	The lecture will present selected computer vision techniques and algorithms, and the intuition behind them. Each technique will be illustrated with examples from real-world applications to motivate the students understanding. Implementation details will also be discussed.	1, 3	3 hours/week
2	Tutorial	Students will develop skills implementing and testing the computer vision algorithms introduced in lecture. Students will implement, observe the characteristics, and evaluate the performance of these different algorithms.	1, 2, 3	At least 8 tutorials per semester.
3	Project	The students design and create a computer vision system for a real-world application. The students will apply the principles they have learnt from the course for their design. Students will present their projects at the end of the class in a live-demo session.	2, 3, 4	After class

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Quiz	1, 2	10	
2	Programming Assignments & Project	2, 3, 4	50	

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)
2

Additional Information for ATs
For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

Assessment Rubrics (AR)

Assessment Task
Course Projects

Criterion
QUALITY of the implemented computer vision algorithms/systems

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
Examination

Criterion
ABILITY to evaluate and compare the results of different computer vision algorithms

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Face and object recognition, motion estimation and tracking, and face and object detection.

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Gary Bradski and Adrian Kaehler. Learning OpenCV: Computer Vision with the OpenCV Library.
2	Richard Szeliski. Computer Vision: Algorithms and Applications.