NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	B.Tech. Computer Science and Engineering
Course Code:	2CSDE92
Course Title:	Human Machine Interface
Course Type:	Departmental Elective
Year of Introduction:	2021-22

Credit Scheme

L	T	Practical Component				C
		LPW	PW	W	S	
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Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. explain requirements and components of Human Machine Interface (HMI) systems
2. evaluate user interfaces to detect usability problems in HMI applications
3. apply an appropriate interaction style for a given need
4. design a user interface using analytical methods such as cognitive walkthrough and to build multimodal GUI

Syllabus: **Total Teaching hours: 30**

Unit	Syllabus	Teaching hours
Unit-I	**Introduction:** Introduction to the field of HCI, HCI's and human factors engineering and user experience design. **Human perception:** perception, gestalt perception, information presentation: typography, color, graphic design, displays, paper, and other output devices, layout: forms design and information visualization, virtual reality, context-sensitive interfaces.	05
Unit-II	**User Interface Design and Principles:** principles of HCI, ubiquity of feedback cycles, the importance of direct manipulation, and the extent of human abilities as they relate to computer interfaces, understanding of user tasks and activities, HCI heuristics. Creating good user interfaces: need-finding, prototyping potential interfaces, and evaluating those interfaces with users, research ethics underlying the design life cycle, as well as applications of this life cycle to the modern era of rapid prototyping.	06
Unit-III	**Interactive Devices, User Interfaces and Interaction styles**: Input devices and ergonomics: multi-touch, augmented reality, haptics, wearables, brain computer interfaces, and tangibles. Multimodal user interfaces: basic technologies for handling speech, vision, pen-based	12

interaction, and other modalities, as well as various techniques for combining modalities. Interaction styles: metaphor, direct manipulation, widget survey, other interaction styles, and choosing among interaction styles.

Unit-IV	**Applications:** Exploration into the applications of HCI to open areas like augmented reality, education, social computing, mental health, healthcare, medical science and assistive applications for differently abled.	07

Self-Study: The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents

Suggested Readings/ References:

1. Ben Shneiderman, Catherine Plaisant et al, Designing the User Interface, Addison Wesley
2. Preece, Sharp & Rogers, Interaction Design: Beyond Human-Computer Interaction,
3. Dix A., Finlay J.,Abowd G. D. and Beale R. Human Computer Interaction, Pearson Education,
4. Cooper, Reimann, Cronin, & Noessel, About Face: The Essentials of Interaction Design, Wiley
5. Preece J., Rogers Y.,Sharp H.,Baniyon D., Holland S. and Carey T. Human Computer Interaction, Addison-Wesley
6. B.Shneiderman, Designing the User Interface, Addison Wesley
7. Research Papers related to HCI applications and core research

Suggested List of Experiments:

Sr. No.	Practical Title	Hours
1	To design an experiment to control a sample application using text as an input command.	02
2	To design a voice-controlled application using Cloud services such as IBM conservation service/Alexa Services / or any other cloud service	04
3	To design a user interface using haptics, that provides touch related intelligence to the device by identifying the user intent based on the touch and behaving accordingly.	02
4	To evaluate the functionality of the system developed in Practical 3 as per design and ethical guidelines	04
5	To design a Brain interface-based system using any relevant device and create a dataset pertaining to the scenario [Example: Reading a Paragraph or listening to a song]	02
6	To perform analysis of the data generated by Practical 5 using Emotiv Pro. (or similar softwares). The analysis should be presented scenario based.	04
7	To design and implement a system related to wearable as input method for developing multimodal user interfaces.	04

	8	To design an application which uses input generated from touch sensitive devices like pulse meter and present machine learning based analysis of the health of a person.	02
	9	To design a system related to analysis of eye responses for interpreting the perception of a user for the viewed/read content from the user screen/ visual field.	04
	10	To design a HMI based system that uses visual cues for predicting user behaviour.	02
Suggested Case List:	-NA-		