Multimodal Interaction and Interfaces

Programme: B.Tech. (ECE, CCE) Year: 4th Semester: VIII
Course: Research Elective Credits: 3 Hours: 40

Course Context and Overview (100 words):

This course will provide an understanding of multimodal communication between humans and multimodal interaction between humans and machines. The course will begin with basic principles of human-human communication and human-machine interaction. Then, it will describe the processes taking place in humans when perceiving auditory, visual and tactile signals, as well as how these perceptions are integrated in order to form a multimodal perception. The signals can be generated and received by machines which are able to interact with humans in limited domains. The set-up of such machines will be discussed, and limitations as well as potential solutions to overcome these limitations will be explained.

Prerequisites Courses:
Signals and Systems, Digital Signal Processing

Course outcomes(COs):

On completion of this course, the students will have the ability to:
CO1: Describe how alternative or multi-modal HCI interfaces work, that utilize the latest technology
CO2: Evaluate the strengths and weaknesses of exiting or proposed multi-modal interfaces
CO3: Implement HCI interfaces that use new interaction technologies, for limited tasks
CO4: Suggest efficient design solutions for new interfaces that use different modalities

Course Topics:

Topics	Lecture Hours	
UNIT – I		**10**
Introduction to HCI, Multimedia, medium and Multimodality; human-human communication, human-machine communication, introduction to different input modalities, Modality relations, Characteristics of Multimodal Systems, Hearing and Speech; Vision, Depth perceptron		
UNIT – II		**10**
Other Senses, Multimodal Perception, Integration and Cognition, Human Multimodal Interaction, Gesture to Space, Case Study		
UNIT – III		**8**

Multimodal Input and Output Systems-Speech, Emotion, Text, Gesture, Eye, Face, Case study.		
UNIT – IV		**8**
Multimodal Interactive Systems, Virtual Environments, Spatial hearing, Dummy heads, crosstalk cancellation, Projection based Systems, Case study		
UNIT – VII		**4**
Applications of multimodal system currently in India and outside India		

Textbook references (IEEE format):

Text Book:

[1] Multimodal Processing and Interaction by Maragos, Petros, Potamianos, Alex, Gros, Patrick, Springer 2008.
[2] Shneiderman B. "Designing the User Interface - Strategies for Effective Human-Computer Interaction." Pearson Education

Reference books:

[1] Multimodal Human Computer Interaction and Pervasive Services, Patrizia Grifoni , IGI Global, 2009.
[2] Stivers, Tanya, and Jack Sidnell. "Introduction: multimodal interaction." Semiotica 2005, no. 156 (2005): 1-20.
[3] Turk, Matthew. "Multimodal interaction: A review." Pattern Recognition Letters 36 (2014): 189-195.
[4] Norris, Sigrid. Analyzing multi.modal interaction: A methodological framework. Routledge, 2004.

Additional Resources (NPTEL, MIT Video Lectures, Web resources etc.):

https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs34/

Evaluation Methods:

Item	Weightage
Midterm	20
Endterm	30
Quiz	10
Case Study	20
Project + paper (in groups)	20

Prepared By: Joyeeta
Last Update: 28-12-2020