Virtual Reality Engineering
Multidisciplinary

Instructor Name: Prof.M Manivannan
Institute: IIT Madras
Department: Multidisciplinary

About Instructor: Dr.M.Manivannan is a professor of Biomedical Engineering in IIT Madras, Department of Applied Mechanics. He has been working in Virtual Reality for past 15 years, specifically on Haptics. He was a visiting scientist at the Massachusetts Institute of Technology (MIT), Massachusetts General Hospital (MGH) of Harvard Medical School (HMS) in Boston, and National Institute of Standards and Technology (NIST) in Maryland. He was a visiting faculty in the Christian Medical College (CMC) Vellore, and the Indian Institute of Science (IISc) Bangalore.

Pre Requisites: : Engineering Mathematics taguht in first year of Engineering, Basic programming (no need of extensive programming experience)
Core/Elective: : Elective
UG/PG: : Both
Industry Support : Many IT companies

Course Intro: : Virtual Reality is an emerging technology that promises to disrupt our lives unlike any other technologies in the past. In this course you will learn how to design a better VR system by understanding several engineering concepts (hardware, software, perception) that are used in the current VR systems. This is a highly interdisciplinary course involving computer science, electrical engineering, mechanical engineering, neuroscience, and psychology

COURSE PLAN

SL.NO	Week	Module Name
1	1	Introduction, Goals, Definitions, History, Overview of the course
2	2	Geometric Modeling, Transforms, Quaternions
3	3	Study of Perception and Sensation, Perceptual Engineering, Importance in Virtual Reality
4	4	Light and Optics, Human Optical System
5	5	Human Visual Physiology
6	6	Visual Perception, Depth and Motion Perception
7	7	Tracking Systems. Pose tracking, technologies for pose tracking
8	8	Visual Rendering, Rastering, Shading, CUDA programming
9	9	Auditory Sensation and Perception, Rendering Audio, 3D audio

10	10	Haptic Sensation and Perception, Rendering Haptics, Stereognosis, Sensation and Perception of Other Senses, Rendering other senses
11	11	Interfaces for Virtual Reality, Locomotion, Manipulation, Social Interaction
12	12	Applications and Challenges in VR, Evaluation of VR systems