

Haptic Technology and Applications

Course Description

The Haptic Technology and Applications course provides students with a comprehensive understanding of haptic technology, its principles, applications, and development. Students will learn about the theoretical foundations, practical implementation, and real-world applications of haptic feedback systems. The course covers topics such as haptic perception, haptic devices and actuators, haptic feedback design and control, haptic interface design, and various applications in domains like virtual reality, gaming, and medical fields.

Audience

The course is intended for students or anyone who wants to learn automation skills of flows as a citizen developer. They review solution requirements, create process documentation, and design, develop, troubleshoot, and evaluate solutions. Power automates flow makers work with team's admin to improve and automate business workflows. They collaborate with administrators to deploy solutions.

Hardware Requirements

Access to a computer with internet connectivity is necessary for accessing online resources, software tools, and engaging in practical exercises related to haptic technology. Additionally, students may benefit from having access to haptic devices and sensors for hands-on experimentation, although it is not mandatory.

Pre-requisite Knowledge/Skills

- A background in engineering, computer science, or a related field is recommended.
- Basic knowledge of electronics, programming, and control systems concepts would be beneficial.
- Familiarity with fundamental concepts in physics and mathematics is helpful.

Course Objectives

Upon successful completion of this course, participant should be able to:

- Gain a solid understanding of the principles and fundamentals of haptic technology.
- Learn about various types of haptic devices, actuators, and sensors.
- Explore the design and development of haptic interfaces and systems.
- Understand the software and control algorithms used in haptic feedback.
- Examine the applications of haptic technology in different domains.

Course Outline

The course comprises 40-hours. It's divided into 8 different modules.

Module-1: Introduction to Haptic Technology

- Definition and principles of haptic technology
- Historical development and milestones
- Importance and applications of haptic feedback

Module-2: Haptic Perception and Psychophysics

- Human tactile perception and haptic sensation
- Psychophysics of touch and perception thresholds
- Haptic interfaces for sensory feedback

Module-3: Haptic Devices and Actuators

- Overview of haptic devices and their classification
- Actuators used in haptic systems (vibration motors, LRAs, EAPs, etc.)
- Sensors for capturing haptic input (force, touch, etc.)

Module-4: Haptic Feedback Design and Control

- Control algorithms for generating haptic sensations
- Modeling and simulation of haptic interactions
- Force, texture, and shape rendering techniques

Module-5: Haptic Interface Design and Development

- Design principles for haptic interfaces and hardware
- Integration of actuators and sensors into haptic systems
- Ergonomics and user experience considerations

Module-6: Haptic Applications

- Virtual reality (VR) and augmented reality (AR) applications
- Gaming and entertainment with haptic feedback
- Medical and rehabilitation applications of haptics

Module-7: Research and Emerging Trends

- Current research in haptic technology and advancements
- Haptic interaction in robotics and automation

- Emerging trends in haptic technology and future prospects

Module-8: Applications of Mid-Air Haptics

- Virtual reality (VR) and augmented reality (AR) applications
- Gaming and entertainment with mid-air haptic feedback
- Industrial and training applications of mid-air haptics