HAPTIC TECHNOLOGY

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Abstract: *Haptic technology is a feedback technology which takes advantage of a user's sense of touch by applying forces, vibrations, and motions upon the user. Haptic is the "science of applying tactile sensation to human interaction with computers". This object existing only in a computer simulation for control of such virtual objects and for the enhancement of the remote control of machines and devices (teleoperators). It has been described as the sense of touch what computer graphics does for vision. However, computer scientists had great difficulty transferring this basic understanding of touch into their virtual reality systems without a mistake. Application of haptic technology in Surgical Simulation and Medical Training.*

Keywords: - Human sense of touch, tactile feedback, virtual object creation, phantam.

Introduction: -

Haptics is the technology of adding the sensation of touch and feeling to computers. When virtual objects are touched, they seem real and tangible. Haptics senses links to brain sensing position and moment of the body by means of sensory nerves within the muscles and joints. Haptics devices may join tactile sensor that measure forces exerted by the user on the interface. Haptic technology has made it possible to investigate how the human sense of touch works by allowing the creation of carefully controlled haptic virtual objects.

- Haptics= touch= connection.

- Touch is the code of personal experience.

- Of the live sense, touch is the most proficient, the only one capable of simultaneous input and output.

History of haptics: -

- Scientist used term haptics to label the field of their studies that addressed human touch-based perception and manipulation.

- By 70's and 80's research efforts in a completely different field, robotics also began to focus on manipulation and perception by touch building a dexterous robotic hand.

- In the early 1990 a new usage of world haptics began to emerge.

- The confluence of several emerging technology made virtualized haptics or computer haptics possible.
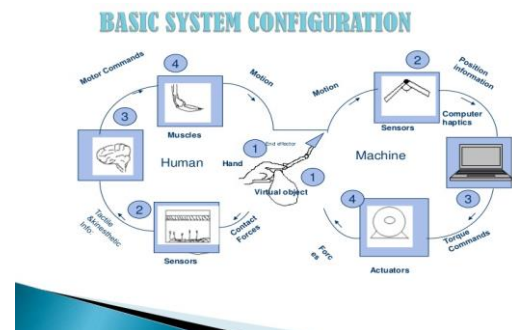
Haptic information: -

- Tactile information.
- Kinesthetic information.

Tactile information: -

It is acquired by the sensors connected to the body.

Kinesthetic information: -

It is acquired by sensors in the joints.

Creation of virtual environment: -

- The haptic technology is based on virtual reality.

- Simulated environment can be either same or different from reality.

- Used to describe wide variety of application.

- Users interact with virtual reality through input devices.

Types of haptic devices: -

- Virtual reality or tele robotics-based devices.
- Feedback devices.

Virtual reality: -

- Exoskeletons and stationary devices.
- Gloves and wearable devices.
- Point sources.
- Specific task devices.
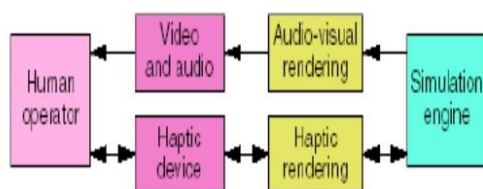- Locomotion interfaces.

Feedback devices: -

- Force.
- Tactile.

Working of haptic device: -

BASIC BLOCK DIAGRAM OF HAPTIC ENVIORMENT

Commonly used haptic devices: -

PHANTOM: -

Providing a 3D touch to the virtual objects. When the user moves his finger then he could really feel the shape and size of the virtual 3D objects that has been already programmed. Virtual 3-dimensional space in which phantom operates is called haptics sense.

Cyber grasp: -

The cyber grasp system fits over the user's entire hand like an exoskeleton and adds resistive force feed back to each finger. Allows 4 dof for each finger. Adapted to different size of finger.

Principal of haptic device: -

Interaction occurs at an interaction feel that mechanically copies to controlled dynamical systems:

- Haptic interface with the computer.
- Human user with the nervous system.

Global Haptic Technology Market for Mobile Devices 2015-2019

Characteristic of haptic technology: -

- Low back-drive inertia and friction.
- Balanced range, resolution and bandwidth of position sensing.

- Force reflection, minimal constraints on motion.
- Symmetric inertia, friction and resonant frequency properties.

Application of haptics: -

- Medical application
- Military application
- Museum display
- Assistive technology for the blind
- Entertainment
- Holographic interaction

Limitation: -

- High cost
- Large weight and size of haptic devices
- Haptic interfaces can only exert forces with limited magnitude.
- Haptic rendering algorithm operate in discrete time
- Users operate in continuous time.

Future scope: -

The feedback allows a user to interact with hologram and actually receive tactile response using acoustic radiation pressure. Use of central work station from which surgeons would performs operation in various location with machine setup and patient preparation performed by local nursing staff. User could study and feel the texture and quantity of material during the sale of cloth through internet.

Conclusion: -

Advances in hardware will provide opportunities to produce haptic device in smaller packages, and haptic technology will find its way into increasingly the common place tools. Continued implementation of tactile device to aid people with disabilities will advance further. Currently limited to consumers. Perhaps also in desktop consumer and laptops still embryonic when compared to full-fledged virtual reality simulation.

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