HAPTIC TECHNOLOGY

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WHAT IS ‘HAPTICS ’?

• ‘HAPTICS’- The technology that interfaces human interaction with external environment via touch.
• Haptic technology refers to technology that interfaces the user with a virtual environment via the sense of touch by applying forces, vibrations, and/or motions to the user.
• Originated from the Greek word ‘HAPTETHESAI’.
WORKING OF HAPTICS

Ref. 1
CLASSIFICATION OF HAPTICS INFORMATION

1. Tactile information

Tactile information refers the information acquired by the sensors which are actually connected to the skin of the human body with a particular reference to the spatial distribution of pressure.

2. Kinesthetic information

Kinesthetic information refers to the information acquired through the sensors in the joints.
VIRTUAL REALITY

- It’s only an imitation of the real world.
- Virtual reality is the technology which allows a user to interact with a computer-simulated environment, whether that environment is a simulation of the real world or an imaginary world.
HAPTIC FEEDBACK

- MAIN ELEMENTS:
  1) Simulation Engine
  2) Haptic Rendering Algorithms
  3) Transducers
HAPTIC DEVICES

• Common interface devices like mouse and joystick are only input devices. No feedback.
• Haptic devices are input-output devices.
• A device that intervenes a user and computer for haptic interactions.
POPULAR DEVICES

1. CYBERGLOVE

Ref.1

Ref.4

2. FORCE DRIVER

Ref.3
2. PHANTOM

OTHER POPULARLY USED HAPTIC DEVICES..

BMW iDRIVE

Ref.3

VIBROTACTILE VEST

Ref.3

NOVINT FALCON

Ref.3
CONTACT DISPLAY DESIGN

Contact Display Design

Contact Display Assembly

Contact Force

Human Finger

DC motor

Roller Travel

Push-Pull Wires

Linear Actuator

Thimble Assembly

Human Finger

Roller

Thimble

Carriage

Lead Screw

Linear Actuator Assembly

DC motor

Ref.3
HAPTIC INTERFACE
AVATAR

• Virtual representation of the haptic interface by which the user physically interacts with the virtual env.

• Choice depends on the object simulated and the device capabilities.
HAPTIC RENDERING ALGORITHMS
SYSTEM ARCHITECTURE

Ref.4
Contd..

HAPTIC RENDERING TECHNIQUES

• Point interaction rendering Single points of a probe, thimble or stylus is employed.

• Ray based rendering Probe is modeled in the virtual environment as a finite ray.
APPLICATIONS

1) Graphical user interfaces.
2) Surgical simulation and medical training.
3) Gaming
4) Telerobotics.
5) Military applications.
6) Museum displays.
7) Assistive technologies for the blind and visually impaired.
GRAPHICAL USER INTERFACES
SURGICAL SIMULATION & MEDICAL TRAINING
Gaming Application

Make real experience of gaming

Novint Falcon haptics controller
MILITARY TRAINING

Ref.2
LIMITATIONS OF HAPTICS

1) Can only exert forces with limited magnitude.
2) Haptic systems aren’t ideal force transducers due to existence of friction, inertia, backlash etc.
3) Haptic rendering algorithms operates in discrete time while user’s in continuous time.
4) The position sensors have finite resolutions.
FUTURE VISION

Touch can be distributed over space and time, recorded and broadcasted like streaming data.
CONCLUSION

• Haptic is the future for online computing and e-commerce, it will enhance the shopper experience and help online shopper to feel the merchandise without leave their home.

• Large potential for applications in critical fields as well as for leisurely pleasures.

• Haptic devices must be smaller so that they are lighter, simpler and easier to use.

• Because of the increasing applications of haptics, the cost of the haptic devices will drop in future.
REFERENCES


THANK YOU