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HAPTIC TECHNOLOGY: FEEL THE UNREAL, VIRTUAL WORLD

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Abstract

Haptic technology or kinesthetic communication recreates the sense of touch by applying forces, vibrations, or motions to the user.1st rule of science ,robot fails are funny but to a roboticist like Katherine kuchenbecker watching this is actually terrifying without a sense of touch robots can't work with humans without haptic , like 90% of robot movies are dead on arrival and without an investment in the future of haptics humans cant interact with the digital world in the way that is most instinctive to us by touching it ,as the new director of the max plank institute for haptic intelligence , Kuchenbecker understands what's at stake here and she is using the institutes €70 million investment to propel haptics into the future .A future where there is more interactivity with the things we digitally create and less hardware in that way of touching them. It might sound like you are stating the obvious but touch is arguably the only sense you could not live without, touch is how you map the world you are live in. we're already so used to using haptic tech that you probably don't even know that is the reason, you are feel like you touch a button on your phone, when a button like that doesn't actually exits. The haptic market for smartphones and small consumer devices itself is projected to be a $20 billion market by 2022. Now imagine the size of that when haptic are everywhere like in your cars, in your movie theaters, in your school /colleges where we train doctors / engineers , in the robots in your home but it is an underrated art feeling touch as a computer is not easy to make this happen we've made major strides so far but, most larger haptics that involve VR or big ticket items that you want to touch are usually grounded and not very portable plus there's usually some sort of intermediary that's is a hassle to handle , Uncomfortable gloves , bulky haptics pens , shirts with plastic and metal and sensors that you can feel all over the place .The real far-fetched future of haptics is what's known as contactless haptic and it is exactly what is sounds like , through the use of ultrasonic , lesser and I assume a space wizard , You can feel physically feel something without a device . In a weird way, to the lay consumer it's almost like creating and changing matter itself.

Index Terms: Sense of touch, Virtual world, Kinesthetic, Sensors, Actuators, Tactile.

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1. 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.

2. HISTORY OF HAPTIC:-

- 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.
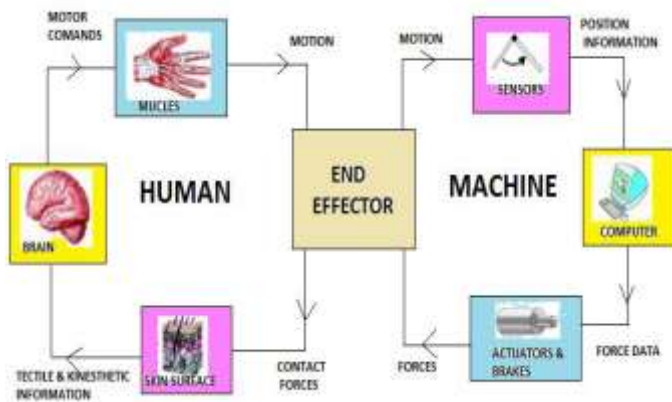
3. HAPTIC TECHNOLOGY: -

- **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.

4. 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.

5. WORKING OF HAPTIC DEVICE: -

Typically, a haptics system includes

A. Sensor(s)
B. Actuator (motor) control circuitry
C. One or more actuators that either vibrate or exert force.
D. Real-time algorithms (actuator control software, which We call a "player") and a haptic effect library.

E. Application Programming Interface (API), and often a Haptic effect authoring tool.

The Immersion API is used to program calls to the Actuator into system's operating system (OS). The calls Specify which effect in the haptic effect library to play. When the user interacts with device's buttons, touch Screen, lever, joystick/wheel, or other control, this control position information is sent to the OS, which then sends the play command through the control circuitry to the actuator.
Haptics applications use specialized hardware to provide Sensory feedback that simulates physical properties and Forces. Haptic interfaces can take many forms; a common Configuration uses separate mechanical linkages to connect a person's fingers to a computer interface. When the user Moves his fingers, sensors translate those motions into Actions on a screen, and motors transmit feedback through The linkages to the user's fingers.
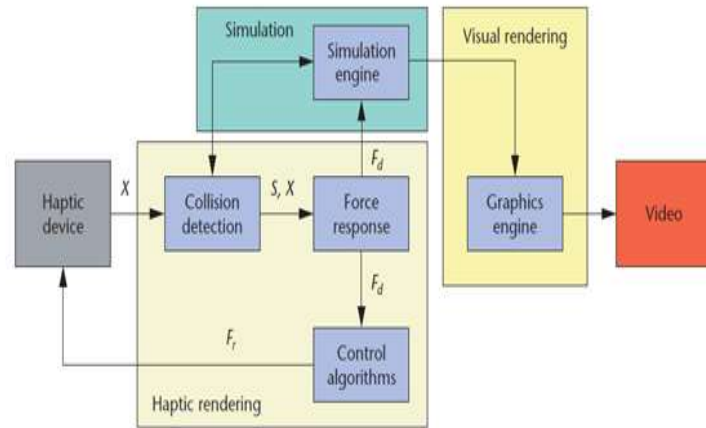
6. COMMONALY USED HAPTIC DEVICES: -

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.

desired.

CYBER GRASP: - The cyber grasp system fits over the user's entire hand like an exoskeleton and adds resistive force feedback to each finger. Allows 4 doff for each finger. Adapted to different size of finger.

7. PRINCIPAL OF HAPTIC DEVICES: -
Interaction occurs at an interaction feel that mechanically copies to controlled dynamical systems.
- Haptic interface with the computer.
- Human user with the nervous system.
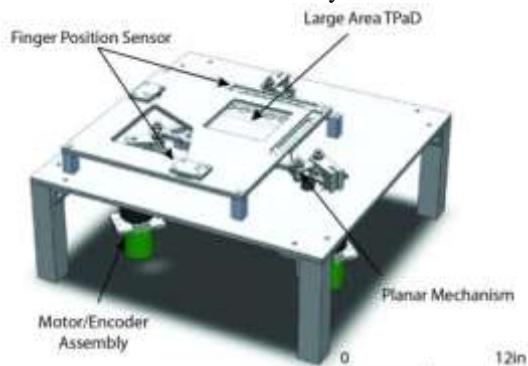
8. TOUCHING REAL AND VIRTUAL OBJECT:-

When a human user touches a real object directly or Through a tool, forces are imposed on the user's skin. The associated sensory information, mediated by sensors in the skin, joints tendons and muscles, is conveyed to the brain by nervous system and leads to haptics perception. The subsequent motor commands issued by the brain activate the muscles and results in motion that modifies the touch sensory information.

In order to create this effect a weak current is given area of the device that is being used for interaction. If the material is conductive ,a capacitive set up will be created when dry finger touches it .the capacitive set-up will generate an oscillating electric field around the skin and finger tips ,which then go on to create a variable sensation of fiction depending on the frequency and applied signal. The ability to control friction by varying the frequency and amplitude will allow to create different 'virtual surrounding' as

9. APPLICATION:-
- Medical application
- Military application
- Museum display
- Holographic interaction
- Assistive technology for the blind
- Entertainment
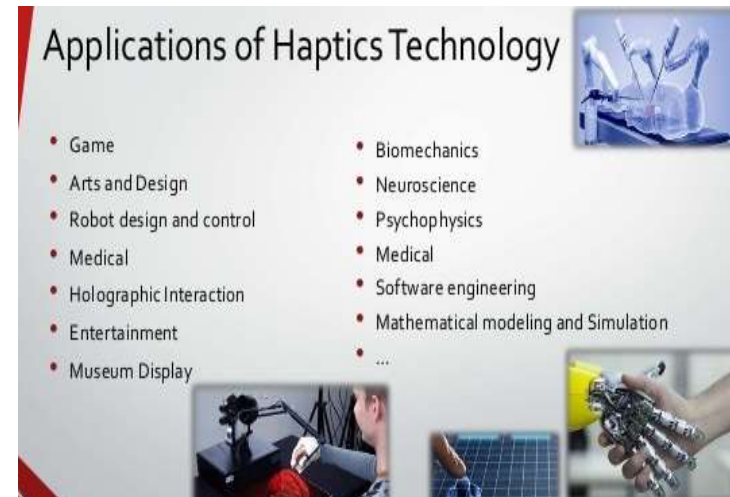
10. CHARACTERISTIC OF HAPTIC DEVICES:-

- 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.

11. ADVANTAGES OF HAPTIC TECHNOLOGY:-

1. Communication is centered through touch and that the digital world can behave like the real world.

2. Reduction of working time as objects can be captured, manipulated, modified and rescaled digitally.

3. Haptic touch technology can be applied to small and Large surfaces and a wide range of form factors.

4. With haptic hardware and software, the designer can maneuver the part and feel the result, as if he/she were handling the physical object.

5. Medical field simulators allow would be surgeons to Practice digitally, gaining confidence in the procedure Before working on breathing patients.

12. DISADVANTAGES OF HAPTIC TECHNOLOGY:-

1. Haptic applications can be extremely complex requiring highly specialized hardware and considerable processing power.

2. Haptics projects are not easily portable.

3. With only a sense of touch, haptic interfaces cannot Deliver warnings.

4. Debugging issues—these are complicated since they involve real-time data analysis.

5. Haptic project needs fixed installation.

13. 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

14. 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.

15. 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.

16. REFERENCES:-

[1] https://en.wikipedia.org/wiki/Haptic_technology

[2].https://www.mepits.com/tutorial/284/Biomedical/Applications-of-Haptic-Technology

[3].https://www.slideshare.net/ikunjodhani/hapric-technology-best-ppt

[4].https://www.quora.com/Whats-the-future-of-haptic-technology