

Wearable Haptics

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Introduction

- ❑ Humans have 5 senses and touch is one among them
 - ❑ The sense of touch allows to feel, perceive and also to interact
 - ❑ Haptic is defined as: is of, or relating to the sense of touch.
 - ❑ The word 'Haptic' came from the Greek word 'haptesthai', which means 'to touch' or come in contact with. [wikipedia, 2008]
 - ❑ The Haptic technology refers to the technology of touch that interacts with the user via the sense of touch by applying forces, vibrations and/or motions to the user.
 - ❑ This mechanical stimulation is used to mimic real touch and also to create haptic virtual objects.
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Wearable haptics

- Wearable haptic is any haptic device that could be worn on the body.
 - could either be in the form of clothes or footwear or even accessories that could be worn on the body.
 - Advantages:
 - Flexibility
 - Tangibility (touch, feel real)
 - Portability
 - Purpose:
 - To stimulate or trigger different emotions
 - To treat people with stress
 - To nurture human touch or intimacy
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Haptic scarf (1/2)

- The haptic prototype called TapTap (see Figure 2) is a wearable haptic device that allows asynchronous distributed transmission of tactile information to be recorded, broadcast and played back for emotional therapy
- This haptic scarf could be a comfortable and personalized garment that a parent can leave with their child or a therapist with their patient to provide some element of nurture and affection



Haptic scarf (2/2)

- The haptic prototype scarf has pockets into which actuators or a wallet and keys can be placed (see Figure 2).
- Different actuators is placed in different pockets, and the system works only when the scarf is held against the body.
- [Video](#)



Figure 2. The flexible i/o haptic insert tucks into the felt scarf (left) and connects to central power through conductive steel snaps (right).

Haptic Hug Shirt

- ❑ "Hug from a Distance" is a vest that can be electronically controlled to give someone a hug over the Internet.
- ❑ It copies the strength, length, temperature and heart rate of the hug.
- ❑ using Bluetooth technology and their cell phone, the hug can be sent to someone else wearing a Hug Shirt that simulates the feeling of the hug
- ❑ Children with autism spectrum disorders who calm with pressure might benefit from this type of vest.
- ❑ [Video](#)



Haptic massage therapy

- ❑ The haptic prototype called Touch·Sensitive is a haptic apparel that allows massage therapy to be diffused, customized and controlled by people while on the move
- ❑ It is a matrix made of clothing elements that allows diffusion of haptic information through heat sensors, mechanically driven textural sensation and liquid diffusion .
- ❑ A feedback embedded microphone/headphone in the clothing also allows the user to control the system
- ❑ It is manually actuated and takes advantage of the body morphology to trigger the desired actuation. [Cati Vaucelle and Yasmine Abbas, 2007]



Vinyl pockets filled with liquid, that diffuses around the massaging wooden ball through thermoelectric sensors

Haptic sports garments

- ❑ Haptic sports garments, which use tactile signals to prompt the wearer to optimise their technique or to use specific muscle groups
 - ❑ Being tested on rowers
 - ❑ sensors in the garments measures the speed at which the rower moves and how they coordinate their leg and body movements
 - ❑ If the rower deviates from the optimum speed or rhythm, pads worn at the ankle and waist start vibrating at the correct stroke intervals to help the rower recapture the rhythm
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Haptic Suit for Improved Human Motor Learning

- ❑ The haptic suit is designed to help teach people physical activities
- ❑ It analyses the movements of the behaviour and provides instant feedback to the user.
- ❑ To learn some movements, the student receives realtime tactile feedback, simultaneously over all joints, delivered through this wearable haptic suit (see Figure 6).
- ❑ This tactile feedback can supplement the visual or auditory feedback from the teacher.
- ❑ This haptic suit is intended for use in various activities including sports training, motor rehabilitation after neurological damage, dance, postural retraining for health, and many more



Haptic gloves

- ❑ Haptic glove is a mechanism that is shaped like the human hand
 - ❑ It allows for the insertion of the human hand and the easy movement of the fingers
 - ❑ the gloves allow the wearer to receive stimulation along the fingertips that mimics actual physical contact with an object or another person
 - ❑ also can physically interact with it.
 - ❑ The sense of movement and touch will seem perfectly natural to the person wearing the gloves
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Haptic glove that enable user to feel panels and switches

- ❑ It is very demanding task when evaluating complex design (such as cockpits) based on visual sense
- ❑ Some researchers at Tampere University of Technology developed tactile feedback devices, such as a haptic glove which enable user to feel panels and switches.
- ❑ This wearable haptic glove enables user's unlimited movement in virtual environment



Musical Haptic gloves

- ❑ It allows their wearers to create musical compositions by linking hands together
- ❑ Each participant wears the gloves, headphones (through which they can hear their personal music) and a clip-on box housing circuits
- ❑ As soon as they touch the gloved hand of another, they can hear their own music mixed with the other person's sound
- ❑ The interaction through physical touch attempts to physically bring people together even if they don't speak the same language. [Kaho Abe and Jung Sin 2005]
- ❑ [Video](#)



Conclusions

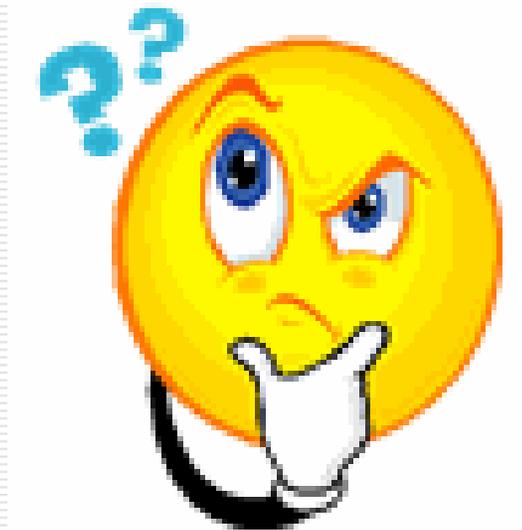
□ Advantages

- Flexibility: The design is very flexible and sky is the limit when it comes to designing wearable's
- Portability: As it is in the form of clothing, it is easy to carry around and doesn't need extra baggage's.
- Tangibility: The device can be touched, it is real and so is tangible.

□ Disadvantages

- Current functionality of the devices are not yet up to the level that it could be used conveniently in public
 - Lot more studies and research needs to be done in this area.
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Any Questions?



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