

Accessible Computing Seminar

Lecture #2 – Disability and Design

Prothetics

- The most common forms of prostheses are prosthetic limbs.
- The body part may be missing due to a congenital disorder, through trauma or disease (e.g., diabetes or bone cancer).
- The history of prosthetics goes back to prehistory.
- Prostheses can also include glass eyes (e.g., Sammy Davis, Jr.), metal noses (e.g., Tycho Brahe), and artificial joints.

Iron Hand of Götz von Berlichingen,
1480-1562



Replica of the artificial nose of Tycho Brahe,
1546-1601



Peter Stuyvesant,
1611-1672



Peter Stuyvesant,
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Issues in the Design of Prostheses

- Attachment to the body
- For artificial legs and feet, shock absorption shock and stability
- For artificial joints, how the user can control them.
- For artificial arms and hands, dexterity
- **Cosmesis** – disguising injuries and disfigurements

Cosmesis



Prosthetic enhancement



Control of Artificial Extremities



Bath Wheelchair



Everest and Jennings Wheelchair



Electric
Wheelchair



Franklin
Delano
Roosevelt's
Wheelchair



iBot Wheelchairs



10 Quirky Facts About White Canes

1. Yes, it's legal to take a white cane through security at an airport, according to the TSA, but it has to go through the X-ray machine.
2. White canes are white because of George A. Bonham. A white cane makes it easier to see a blind person crossing a street at night.
3. White canes are going high-tech. Inventors in India, Great Britain and France have equipped white canes with ultrasonic devices that detect obstacles up to nine feet away.
4. The standard technique for using a white cane is the Hoover Method, developed by Richard Hoover.

10 Quirky Facts About White Canes

5. Only 2 - 8% of people who are visually impaired use a white cane. The rest rely on their useable vision, a guide dog or a sighted guide.
6. There are actually three different kinds of white canes. There's the standard mobility cane, used to navigate. There's the support cane, used by people with visual impairments who also have mobility challenges. And there's the ID cane, a small, foldable cane used by people with partial sight to let others know they have a visual impairment.

10 Quirky Facts About White Canes

7. Unless you're willing to "walk the walk," you can't become a certified Orientation & Mobility specialist. O&M specialists teach white cane technique to people who are blind, but to become certified, you must spend at least 120 hours blindfolded, navigating with a white cane.
8. Today's modern, lightweight canes are usually made from aluminum, fiberglass or carbon fiber, and can weigh as little as seven ounces. Some white cane users prefer straight canes, which are more durable, while others prefer collapsible canes, which can be folded and stored more easily.

10 Quirky Facts About White Canes

9. White caning can be fun. The Braille Institute sponsors an annual Cane Quest, where youngsters aged 3-12 compete to quickly and safely navigate a route in their community using their white canes. The contest helps kids master proper white cane techniques and encourages independence.
10. In some states, it's illegal for a person who is not legally blind to use a white cane to gain right-of-way while crossing a street. Get caught in Florida, for example, and you'll face second-degree misdemeanor charges and up to 60 days in prison.

Eyewear

- In 1268 Roger Bacon made the earliest recorded comment on the use of lenses for optical purposes, but magnifying lenses inserted in frames were used for reading both in Europe and China at this time,
- In Europe eyeglasses first appeared in Italy, their introduction being attributed to Alessandro di Spina of Florence.
- In 1784 Benjamin Franklin invented bifocals, dividing his lenses for distant and near vision, the split parts being held together by the frame. Cemented bifocals were invented in 1884, and the fused and one-piece types followed in 1908 and 1910, respectively.

Contact Lenses

- Contact lens are thin artificial lens worn on the surface of the eye to correct refractive defects of vision. The first contact lens, made of glass, was developed by Adolf Fick in 1887 to correct irregular astigmatism.
- Why do people choose to wear contact lenses instead of glasses?

Hearing Aids

Ear trumpets don't amplify sound – but they funnel it



Evolution of the Hearing Aid

- Early electric hearing aids used carbon transmitters like those in telephone to provide amplification to 15 dB, about half of what is normally needed,
- These hearing aids were in use from 1902 until the vacuum tube hearing aids.
- Vacuum tube hearing aids could increase sound levels up to 70 dB. These first appeared in 1924 with wearable hearing aids coming out in 1938.
- In 1952, transistor technology came to hearing aids, with 200,000 sold in 1953 alone.
- The first fully digital hearing aid came out in 1996. And they keep getting better.

Hiding a
Disability –
Kaiser
Wilhelm II
(1859- 1941)



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