Haptics

• From the Greek word for “touch”

• Generally, senses that provide information about adjacent objects

• Not strictly defined
Sense Receptors

• Sight
  – Red
  – Green
  – Blue
  – Gray-scale
Sense Receptors

• Taste
  – Sweet
  – Sour
  – Salty
  – Bitter
  – Umami (meaty)
Sense Receptors

- Touch (approximately)
  - Pressure
  - Vibration
  - Stretching
Sense Receptors

- Temperature
  - Hot
  - Cold
- Internal temperature senses
- Pain temperature senses
Haptics Devices

- **Wearable**
  - Suit, Gloves
  - Cover wide area
  - Inconvenient

- **Hand-held**
  - Stylus, Controller
  - Limited region of sensation
  - Shape can mimic virtual object
Haptic Stylus

Haptic Suit

http://www.elitac.nl/tactile-sdk/
Haptic Ultrasound Device

Haptic Ultrasound Device

http://mashable.com/2014/12/02/ultrasonic-haptic-feedback/
Rendering

• Haptics are rendered

• Generally 1 kHz is desirable
  – Less for soft surfaces
  – Compare with graphics, 60 Hz

• Insufficient rate can cause “buzzing”