Touch Screen Technology

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BSECE IV
ENGSEMS
Mrs. Nesse Resurreccion
What Are Touch screens Used For?

• Public Information Displays
• Retail and Restaurant Systems
• Customer Self-Service
• Control and Automation Systems
• Computer Based Training
• Assistive Technology
I. History

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the first "touch sensor" was developed by Doctor Sam Hurst (founder of Elographics) called “Elograph”.

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I. History

-1974
the first true touch screen incorporating a transparent curved glass sensor surface came on the scene developed by Sam Hurst and Elographics.

-1977
Elographics developed & patented *five-wire resistive* technology, called “AccuTouch”.
I. History

- **1987**
  new technology were purchased. The *surface acoustic wave* product, named “IntelliTouch”.

- **1994**
  the company officially changed its name from Elographics to Elo TouchSystems.
II. Types

4-Wire Resistive Touchscreens
- consists of a glass or acrylic panel that is coated with electrically conductive and resistive layers. The thin layers are separated by invisible separator dots.

Advantages
- High touch resolution
- Pressure-sensitive, works with any stylus
- Not affected by dirt, dust, water, or light
- Costs are relatively low when compared with active touch screen technologies.

Disadvantages
- 75% clarity
- Resistive layers can be damaged by a sharp object
- Less durable than 5-Wire Resistive technology
II. Types

5-Wire Resistive Touchscreens
- better version of 4-Wire Resistive technology.

Advantages
- High touch resolution
- Pressure sensitive, works with any stylus
- Not affected by dirt, dust, water, or light
- More durable than 4-Wire Resistive technology

Disadvantages
- 75% clarity
- Resistive layers can be damaged by a sharp object
- Much expensive than 4-Wire Resistive technology
II. Types

- Capacitive Touchscreens
  - consists of a glass panel with a capacitive (charge storing) material coating its surface.

**Advantages**
- High touch resolution
- Pressure sensitive, works with any stylus
- Not affected by dirt, dust, water, or light

**Disadvantages**
- Must be touched by finger, will not work with any non-conductive input
II. Types

PenTouch Capacitive Touchscreens

-is a durable Capacitive type touchscreen with an attached pen stylus. It can be set to respond to finger input only, pen input only, or both.

**Advantages**
- High touch resolution
- Pressure sensitive, works with any stylus
- Not affected by dirt, dust, water, or light
- Attached pen stylus for precise input

**Disadvantages**
- Must be touched by finger or attached pen stylus, will not work with any non-conductive input
II. Types

- **Surface Acoustic Wave Touchscreens**
  - is one of the most advanced touch screen types. It is based on sending acoustic waves across a clear glass panel with a series of transducers and reflectors. When a finger touches the screen, the waves are absorbed, causing a touch event to be detected at that point.

**Advantages**
- High touch resolution
- Highest image clarity
- All glass panel, no coatings or layers that can wear out or damage.

**Disadvantages**
- Must be touched by finger, gloved hand, or soft-tip stylus. Something hard like a pen won't work
- Not completely sealable, can be affected by large amounts of dirt, dust, and/or water in the environment.
III. How It Works

How the iPhone Works: Basic Touchscreens

Flexible Transparent Surface
Transparent Conductive Layer
LCD Display Layers
Glass Substrate
Non-conductive Separator Dots
III. How It Works
III. How It Works

How the iPhone Works

- Protective Anti-reflective Coating
- Sensing Lines
- Insulating Material
- Driving Lines
- Protective Cover
- Bonding Layer
- Driving Lines
- Sensing Lines
- Glass Substrate
- LCD Display Layers

*Not to scale

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III. How It Works

How the iPhone Works: Self Capacitance Screen*

- Protective Anti-reflective Coating
- Capacitive Sensing Circuit
- Electrodes
- Protective Cover
- Bonding Layer
- Transparent Electrode Layer
- Glass Substrate
- LCD Display Layers

*Not to scale

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How the iPhone Works: Touch Sensing

1. Screen registers touch
2. Raw data is captured
3. Background noise is removed
4. Pressure points are measured
5. Touch areas are established
6. Exact coordinates are calculated

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The iPhone's processor and software are central to correctly interpreting touch input. The capacitors send raw touch-location data to the iPhone's processor. The processor uses software located in the iPhone's memory to interpret the raw data as commands and gestures.
IV. References

- http://bugclub.org/beginners/history/TouchScreen.html