SEMINAR ON
Surface Computing

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IN THIS SESSION

- WHAT IS COMPUTING?
- WHAT IS SURFACE COMPUTING?
- TIME LINE.
- WHAT SURFACE CAN DO?
- APPLICATIONS DEVELOPMENTS
- SMART TABLE
- TABLE SPECIFICATION
- SOFTWARE / HARDWARE USED.
- THE TECHNOLOGY.
  - HOW FLEXIBLE IT IS?
  - THE POND EFFECT.
  - DIGITAL CAMERA TO MOBILE
- PRACTICAL USE
- +VE AND –VE
- CONCLUSION.
What is computing?

- Computing to mean any goal-oriented activity requiring, benefiting from or creating computers.
- Computing includes designing and building hardware and software system for a wide range of purposes;
- Processing, structuring, and managing various kinds of information;
- Doing scientific studies using computers; making computer systems behave intelligently;
- Creating and using communications and entertainment media; finding and gathering information relevant to any particular purpose, and so on. The list is virtually endless, and the possibilities are vast.
Microsoft Surface (Codename: *Milan*), is a Multi-touch product from Microsoft which is developed as a software and hardware combination technology that allows a *user, or multiple users*, to manipulate *digital content* by the use of *natural motions*, *hand gestures*, or *physical objects*.

Surface features a 30-inch tabletop display whose unique abilities allow for several people to work independently or simultaneously.

All without using a mouse or a keyboard.
• 2001: Microsoft researchers Steve Bathiche and Andy Wilson developed idea of an interactive table.

• 2003: 1st prototype was presented to Bill Gates for approval.

• 2007: Interactive tabletop device was built that seamlessly brings both the physical and virtual worlds into one.

Note: There were 85 prototypes built before the final coffee table look was established.
What surface can do?

- A form of computing that offers “a natural way of interacting with information,” rather than the “traditional user interface.”

- **Direct Interaction**
- **Multi-Touch**
- **Multi-User**
- **Object Recognition**
What surface can do?

Direct Interaction:
The ability to "grab" digital information with hands - interacting with touch/gesture, not with a mouse or keyboard.

Multi-Touch:
The ability to recognize multiple points of contact at the same time, not just one (Ex. One finger, like with most touch screens), but dozens.
What surface can do?

**Multi–User:**

The Surface’s screen is horizontal, allowing many people to come together around it and experience a “collaborative, face-to-face computing experience”.

**Object Recognition:**

Physical objects can be placed on the Surface’s screen to “trigger different types of digital responses” (Ex. cell phones, cameras, & glasses of wine).
Applications Development

- Microsoft Surface applications can be written in Windows Presentation Foundation or XNA (a set of tools and technologies for game developers from Microsoft).

- The development process is much like normal Vista development, but custom WPF controls had to be created by the Surface team due to the unique interface of Surface.

- Developers already proficient in WPF (Windows Presentation Foundation) can utilize the SDK (Software development kit) to write Surface apps for deployments for the large hotels, casinos, and restaurants.
Smart Table

HEART OF SURFACE COMPUTING

42 inches (107 cm) wide

30-inch (76 cm)

21 inches (53 cm) deep

22 inches (56 cm) high
Smart Table

1. SCREEN
2. INFRARED
3. CPU
4. PROJECTOR
Screen: Diffuser -> "multitouch" screen. Can process multiple inputs and recognize objects by their shapes or coded "domino" tags.

Infrared: The "machine vision" is aimed at the screen. Once an object touches the tabletop -> the light reflects back and is picked up by infrared cameras.

CPU: Uses similar components as current desktop computers -> Core 2 Duo processor, 2GB of RAM and a 256MB graphics card. Wireless communication -> WiFi and Bluetooth antennas (future -> RFID). Operating system -> modified version of Microsoft Vista.

Projector: Microsoft’s Surface uses the same DLP (Digital Light Processing) light engine found in many rear projection HDTVs. The footprint of the visible light screen, at 1024 x 768 pixels., is actually smaller than the invisible overlapping infrared projection to allow for better recognition at the edges of the screen.
Software & Hardware

• The software platform runs on a custom version of Windows Vista.

• Wired Ethernet 10/100,

• Wireless 802.11 b/g,

• Bluetooth 2.0 connectivity.

• Intel Core Quad Xeon "WoodCrest" @ 2.66GHz

• 4GB DDR2-1066 RAM

• 1TB 7200RPM Hard Drive

• It has a custom motherboard form factor about the size of two ATX motherboards.

• Surface applications are written using either Windows Presentation Foundation or Microsoft XNA technology.

• 5 video infrared cameras
The technology allows non-digital objects to be used as input devices. In one example, a normal paint brush was used to create a digital painting in the software.

• This is made possible by the fact that, in using cameras for input, the system does not rely on restrictive properties required of conventional touch screen or touchpad devices such as the capacitance, electrical resistance, or temperature of the tool used.
The Technology

- The computer's "vision" is created by a near-infrared, **850-nanometer**-wavelength LED light source aimed at the surface.

- When an object touches the tabletop, the light is reflected to multiple infrared cameras with a net resolution of 1280 x 960, allowing it to sense, and react to items touching the tabletop.
A unique feature that comes preinstalled with Surface is the pond effect "Attract" application. Simply, it is a "picture" of water with leaves and rocks within it.

By touching the screen, you can create ripples in the water just like you were putting your hand into a real stream.

Additionally, the pressure of touch alters the size of the ripple created, and objects placed into the water create a barrier that ripples bounce off, just as they would in real life.
Transfer a photo from digital camera to mobile phone
Who’s using the Surface today?

• Currently only commercially available and being used in the retail, hospitality, automotive, banking and healthcare industries.

• Current customers are AT&T, T-Mobile, the Rio All Suite Hotel & Casino in Las Vegas, Sheraton Hotels, Disney Innovations House in California, Hotel 1000 in Seattle, Harrah’s Entertainment, and Starwood Hotels and
**PRACTICAL USE**

- **Restaurant uses** - see a virtual menu on screen and order right from the table your beverages and food selections then split the bill and pay electronically at the same time by putting your card on the surface.

- **Hotel uses** - concierge services for guests to look up a theater in the area and order tickets, pull up a map on how to get there and download the directions and the tickets into your cell phone or mobile device.

- **T-mobile stores** - can place two cell phones on the surface and compare the different price points and features, experiment with ring tones and look at plans then program the phone to your liking and have it all set to use before you walk out of the store.

- **Video puzzle** - use clear tiles on the surface and each tile has a moving piece of the puzzle that you have to match up with other pieces while the picture(video) is in perpetual motion on the tiles.
Positive vs Negative

Positive
- Multi users- collaborative effort of users interacting
- Seamless- no wires or USB ports
- Instant download/upload of photos
- Users have more control of technology- ordering food or manipulating photos fast
- Educational- learn more info about the products you are using

Negative
- Not portable- table has to stay put
- Must own devices such as a cell phone to upload photos into or share with others
- Have to be careful of table surface to not damage it
- Very expensive to own
- Tailored to high end clients
Microsoft Surface’s Future...

• **Pete Thompson**, Microsoft’s general manager for surface computing, the Surface could potentially be available to the “broader consumer market” as soon as 2010. Microsoft goal is for consumers test the Surface in commercial settings, and then want them in their own households. Microsoft wants to expand to the consumer market by making a product people can use in their home environment (using other surfaces like desks or making a version that hangs on the wall).

• Computer scientists hope to incorporate this kind of technology in peoples’ daily lives... Future goals are to surround people with intelligent surfaces (look up recipes on your kitchen counter or table, control TV with coffee table, etc.)

• "I firmly believe that in the near future, we will have wallpaper displays in every hallway, in every desk. Every surface will be a point of interaction with a computer, and for that to happen, we really need interfaces like this."  - Jeff Han founder of Perceptive Pixel and NYU professor
CONCLUSION

Surface Computing brings to life a whole new way to interact with information that engages the senses, improves collaboration and empowers consumers. By utilizing the best combination of connected software, services and hardware, Microsoft is at the forefront of developing surface computing products that push computing boundaries, deliver new experiences that break down barriers between users and technology, and provide new opportunities for companies to engage with people.
Works Cited


ANY QUERIES?