Surface Computing
What is Surface Computing?

• A new way of working with computers that moves beyond the traditional mouse-and-keyboard experience.
• It is a natural user interface.
An Idea Inspired by Cross-Division Collaboration

In 2001, Stevie Bathiche of Microsoft Hardware and Andy Wilson of Microsoft Research began brainstorming concepts for an interactive table. Their vision was to mix the physical and virtual worlds to provide a rich, interactive experience.
Humble Beginnings on a Table

In early 2003, the team presented the idea to Bill Gates, Microsoft Chairman, and within the month the first prototype was born, based on an IKEA table with a table cut through its top and a sheet of architect vellum as a diffuser.
**Humble Beginnings on a Table**

In 2004, the team grew and became the Surface Computing group. Surface prototypes, functionality and applications were continuously refined. The team built more than 85 early prototypes for use by software developers, hardware developers and user researchers.
Hardware Design

By late 2004, the Microsoft Surface development platform was established and attention turned its form. A number of different experimental prototypes were built, including the “tub” model that was encased in a rounded plastic shell, a desk-height model with a square top and cloth-covered sides and even a bar-height model. After extensive testing and user research, the current look and feel of Surface was finalized in 2005.
From Prototype to Product

Today, Microsoft Surface is a 30-inch diagonal display table that is easy for individual or small groups to use collaboratively. With a sleek, translucent surface, people engage with Surface using natural hand gestures, touch and physical objects placed on the surface.
Four Key Attributes

Direct Interaction

Multi-user experience

Multi-touch contact

Object recognition
Direct Interaction

- Direct interaction means that, we can interact with the Surface by using our fingers.

- No other input device is needed to give input.

- This provides a natural interface effect.
Multi-user experience

- A single touch screen can support more than one user.
- Each user can interact independently with the surface.
Multi-touch contact

- Ordinary touch screens provide only single touch sensing
- In surface more than one touch can be recognized at the same time.
Object recognition

- Object recognition is done in the surface by using special bar codes called Domino tags.

- These are infrared sensitive patterns which are read by the infrared sensing cameras inside the surface.
Technology Behind Surface Computing

- Uses IR cameras to sense objects, hand gestures and finger touch.
- Uses a Rare projection system which displays on to the underside of a thin diffuser.
Technology Behind Surface Computing (contd..)

- Objects such as fingers are visible through the diffuser by series of IR cameras, positioned underneath the display.
- An image processing system processes the camera images to detect the fringes.
- Objects recognized are reported to the applications running in the computer so that they can react to objects shape, movement and touch of the finger.
What is Microsoft Surface?

- It is a computer with different look & feel.
- Surface does not have any keyboard or mouse.
- This uses a multi touch screen as user interface.
- Change an ordinary tabletop into a vibrant, interactive surface.
- 30-inch display
- Able to recognize actual unique objects that have barcode.
What is Microsoft Surface (Cntd..)

- Now it is only available in restaurants, hotels, retail and public entertainment venues.
- Will transform the way people shop, dine, entertain and live.
1. **Screen:-**
   A large horizontal “multitouch” screen, The Surface can recognize objects by reading coded “domino” tags.

2. **Projector...**
   The Surface uses DLP light engine found in many rear projection HDTV's.

3. **Infrared:-**
   Surface uses a 850-nm light source.

4. **CPU...**
   Core2Duo processors
   2GB of RAM
   256MB graphics card.
How does Screen Work?

- Acrylic tabletop.
- Multi-Touch display (Multiple inputs from multiple users).
- Recognize objects.
How does Infrared Work?

- Machine vision.
- A near-infrared spectrum.
- LED light source (850 nanometer-wavelength).
- Multiple infrared cameras (a net resolution of 1280 x 960).

Screen

Infrared

Surface Computing
How does CPU Work?

- The same components found in everyday desktop computer
- A modified version of Microsoft Vista.

CPU

Screen

Infrared
How does Projector Work?

- The footprint of the visible light screen (1024 x 768 pixels)
- Wireless Communication (Wireless Protocol) Future version may incorporate RFID
Specification

**Features:** Multi-touch display, Horizontal orientation.

**Requirements:** Standard 110–120V power.

**System:** The Surface custom software platform runs on Windows Vista™ and has wired Ethernet 10/100 and wireless 802.11 b/g and Bluetooth 2.0 connectivity. Surface applications are written using either Windows Presentation Foundation.

**Dimensions:** 30-inch (76 cm) display in a table-like form factor, 22 inches (56 cm) high, 21 inches (53 cm) deep, and 42 inches (107 cm) wide.

**Materials.** The Surface tabletop is acrylic, and its interior frame is powder-coated steel.

**Availability:** Consumers will be able to interact with Surface in hotels, restaurants, retail establishments and public entertainment venues.
Specification (Cntd..)

- At Microsoft's MSDN Conference, Bill Gates told developers of "Maximum" setup the Microsoft Surface was going to have:
- 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.
How Surface Works

- At a high level, Surface uses five cameras to sense objects. This user input is then processed and the result is displayed on the surface using rear projection.
- Microsoft Surface can also identify physical objects that have bar-code-like tags (Domino tag).
Applications...

- Digital photo handling with finger tips.
- Instantly compares while shopping.
- Interaction with digital content by share, drag and drop digital images.
- Surface Restaurant.
- Quickly browse through play list entries dragging favorite song to the current track...
- Easy to take complex shopping decisions.
Digital photo handling with finger tips.

We can handle images directly with our finger.

Manipulating the images is even more better than the real photos.
Instantly compares while shopping

We can directly compare different products just by placing them on the surface.

This is done using object recognition technology.
Interaction with digital content by share, drag and drop digital images.

Digital images are manipulated, sheared & send via technologies like wi-fi, Bluetooth, etc.
Surface Restaurant

Orders can be placed on the Surface from a sliding menu
Quickly browse through play list entries dragging favorite song to the current track...

Huge play lists can be easily manipulated
Advantages..

- **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.
Disadvantages:

- Incredibly expensive.
- Currently designed only in some areas.
- Need for dim lighting to avoid washing out the screen.
In Future

Surface Computing Tomorrow

The future: As form factors continue to evolve, surface computing will be in any number of environments – school, businesses, homes and any number of form factors - parts of the countertop, the wall or the refrigerator.
Conclusion

‘A computer on every desktop.’

Now we say,

‘Every desktop will be a computer.’