1. Introduction:

Picture a surface that can recognize physical objects from a paintbrush to a cell phone and allows hands-on, direct control of content such as photos, music and maps. Surface turns an ordinary tabletop into a vibrant, dynamic surface that provides effortless interaction with all forms of digital content through natural gestures, touch and physical objects. Consumers will be able to interact with Surface in hotels, retail establishments, restaurants and public entertainment venues etc.

The intuitive user interface works without a traditional mouse or keyboard, allowing people to interact with content and information on their own or collaboratively with their friends and families, just like in the real world. From digital finger painting to a virtual concierge, Surface brings natural interaction to the digital world in a new and exciting way.

2. What is surface computing?

Surface computing is a new way of working with computers that moves beyond the traditional mouse-and-keyboard experience. It is a natural user interface that allows people to interact with digital content the same way they have interacted with everyday items such as photos, paintbrushes and music their entire life: with their hands, with gestures and by putting real-world objects on the surface. Surface computing opens up a whole new category of products for users to interact with.

It blurs the lines between the physical and virtual worlds. We really see this as broadening content opportunities and delivery systems. Surface computing is a powerful movement. In fact, it’s as significant as the move from DOS [Disk Operating System] to GUI [Graphic User Interface]. It’s about technology adapting to the user, rather than the user adapting to the technology. Bringing this kind of natural user interface innovation to the computing space is -

“What Surface Computing is all about?”
3. History of Surface Computing:

In 2001, Stevie Bathiche of Microsoft Hardware and Andy Wilson of Microsoft Research began working together on various projects that took advantage of their complementary expertise in the areas of hardware and software. In one of their regular brainstorm sessions, they started talking about an idea for an interactive table that could understand the manipulation of physical pieces and at the same time practical for everyone to use.

- In 9th October 2001, a virtual team was formed to fully pursue bringing the idea to the next stage of development; Bathiche and Wilson were key members of the team.
- In early 2003, the virtual team expanded, and within a month, through constant discussion and brainstorming, the first humble prototype was born and nicknamed T1. The model was based on an IKEA table with a hole cut in the top and a sheet of architect vellum used as a diffuser. The evolution of Surface had begun. A variety of early applications were also built, including pinball, a photo browser and a video puzzle.
- By late 2004, a number of different experimental prototypes were built including “the tub” model, which 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 that could be used while standing. After extensive testing and user research, the final hardware design (seen today) was finalized in 2005.

4. Key attributes of Surface Computing:

Surface computing features four key attributes:
• **Direct interaction.** Users can actually “grab” digital information with their hands and interact with content through touch and gesture, without the use of a mouse or keyboard.

• **Multi-touch contact.** Surface computing recognizes many points of contact simultaneously, not just from one finger as with a typical touch screen, but up to dozens and dozens of items at once.

• **Multi-user experience.** The horizontal form factor makes it easy for several people to gather around surface computers together, providing a collaborative, face-to-face computing experience.

• **Object recognition.** Users can place physical objects on the surface to trigger different types of digital responses, including the transfer of digital content.

5. **Technology behind Surface Computing:**

The technology allows non-digital objects to be used as input devices. 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 etc.

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 allowing it to sense, and react to items touching the tabletop.

Microsoft Surface uses cameras to sense objects, hand gestures and touch. This user input is then processed and displayed using rear projection.

Specifically:

Microsoft Surface uses a rear projection system which displays an image onto the underside of a thin diffuser. An image processing system processes the camera images to detect fingers, custom tags and other objects such as paint brushes etc when touching the display.

The objects recognized with this system are reported to applications running in the computer so that they can react to object shapes, 2D tags, movement and touch.

6. **Smart Table:**

Essentially, Microsoft Surface is a computer embedded in a medium-sized table, with a large, flat display on top that is touch-sensitive.

Table about three feet high, with a solid base that hides a fairly standard computer equipped with the following components:
(1) **Screen**: A diffuser turns the Surface's acrylic tabletop into a large horizontal "multitouch" screen, capable of processing multiple inputs from multiple users. The Surface can also recognize objects by their shapes or by reading coded "domino" tags.

(2) **Infrared**: Surface's "machine vision" operates in the near-infrared spectrum, using an 850-nanometer-wavelength LED light source aimed at the screen. When objects touch the tabletop, the light reflects back and is picked up by multiple infrared cameras.

(3) **CPU**: Surface uses many of the same components found in everyday desktop computers. Wireless communication with devices on the surface is handled using WiFi and Bluetooth antennas.

(4) **Projector**: Microsoft's Surface uses the same DLP light engine found in many rear projection HDTV’s (High Definition Televisions). The display screen is a rear-projected DLP display. The cameras can read a nearly infinite number of simultaneous touches and are limited only by processing power. Right now, Surface is optimized for 52 touches, or enough for four people to use all 10 fingers at once and still have 12 objects sitting on the table.

### 7. Hardware & Software Specifications:

- 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 @ 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.
8. Applications of Surface Computing:

8.1 Water

Water is used as an "attract mode" for the Surface desktop, and it is certainly attractive. 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.

8.2 Music

The Music application works like a virtual jukebox, displaying music arranged by album and allowing the user to flip over albums, select songs, and drag them to the "Now Playing" section. In addition to playing music that is already stored on the unit's hard drive, Music can also transfer songs from portable music players.

8.3 Photos

Sharing photos is a much more unrestricted activity. Photos are arranged into albums that look like piles. Tapping the pile once spreads it around the screen and from there user can drag, rotate,
and resize the images. Since Surface can detect many touches at the same time, multiple people can sort and resize pictures.

### 8.4 Dining Restaurant uses

The application allows diners to see a virtual menu on screen. Items can be dragged into a central “ordering area” order right from the table beverages and food selections then split the bill and pay electronically at the same time by putting customer’s card on the surface.

### 8.5 T-mobile stores:-

Two cell phones can be placed 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.

**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 Resorts Worldwide.
9. **Advantages:**

- Large surface area to view different windows and applications.
- Data Manipulation - Selecting, moving, rotating and resizing (manipulating objects on the screen is similar to manipulating them in the manual world).
- Quick and easy to use.
- More Than One User – Several people can orient themselves on different sides of the surface to interact with an application simultaneously (Max 52 points of touch).
- Objects Recognition - Increased functionality aiding user in speed and ease of use.

10. **Disadvantages:**

- Incredibly expensive and not Portable.
- Currently designed only in some areas.
- Loss of Privacy - Open for many to view.
- Tailored to high end clients.

11. **Surface Computing - In Future:**

    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 kitchen counter or table, control TV with coffee table, etc
As form factors continue to evolve, surface computing will be in any number of environments—schools, businesses, homes—and in any number of form factors.

12. Conclusion:

- Microsoft Surface is the future of computers.
- Surface Computing brings to life a whole new way to interact with information that engages the senses, improves collaboration and empowers consumers.
- It takes existing technology and presents it in a new way. It isn't simply a touch screen, but more of a touch-grab-move-slide-resize-and-place-objects-on-top-of-screen and this opens up new possibilities that weren't there before.
- By utilizing the best combination of connected software, services and hardware developing surface computing products that push computing boundaries, deliver new experiences that break down barriers between users and technology.

‘A computer on every desktop’

Now we say

‘Every desktop will be a computer’

13. Bibliography:

- www.microsoftsurface.com – for clear information regarding the product and video clips.
  http://www.microsoft.com/surface/about.html