Microsoft Surface Computer

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Microsoft Surface, the first commercially available surface computer from Microsoft Corp., turns an ordinary tabletop into a vibrant, interactive surface. The product provides effortless interaction with digital content through natural gestures, touch and physical objects. Surface is a 30-inch display in a table-like form factor that's easy for individuals or small groups to interact with in a way that feels familiar, just like in the real world. In essence, it's a surface that comes to life for exploring, learning, sharing, creating, buying and much more.

At a high level, Surface uses cameras to sense objects, hand gestures and touch. This user input is then processed and the result is displayed on the surface using rear projection.

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.

The key attributes of surface computing

Surface computing has four key attributes:

- **Direct interaction.** Users can actually "grab" digital information with their hands and interact with content by 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.

History of Microsoft Surface Computer

The making of Microsoft's first commercially available surface computer May 2007.

Beyond the Mouse and Keyboard

Surface computing is a major advancement that moves beyond the traditional user interface to a more natural way of interacting with digital content. Microsoft Surface™, Microsoft Corp.'s. First commercially available surface computer breaks down the traditional barriers between people and technology to provide effortless interaction with all forms of digital content through natural gestures, touch and physical objects instead of a mouse and keyboard.

An idea inspired by Cross-Division Collaboration

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. Although there were related efforts happening in academia, Bathiche and Wilson saw the need for a product where the interaction was richer and more intuitive, and at the same time practical for

everyone to use. This conversation was the beginning of an idea that would later result in the development of Surface, and over the course of the following year, various people at Microsoft involving developing new product concepts, including the gaming-specific Play Table, continued to think through the possibilities and feasibility of the project. Then in 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.

Humble beginnings on an IKEA Table

In early 2003, the new Consumer Products Group, led by David Kurlander, presented the idea to Bill Gates, Microsoft chairman, in a group review. Gates instantly liked the idea and encouraged the team to continue to develop their thinking. 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. As more applications were developed, the team saw the value of the surface computer beyond simply gaming and began to favor those applications that took advantage of the unique ability of Surface to recognize physical objects placed on the table. The team was also beginning to realize that surface computing could be applied to a number of different embodiments and form factors.

One of the key attributes of Surface is object recognition and the ability of objects placed on the surface to trigger different types of digital responses, including the transfer of digital content. This feature went through numerous rounds of testing and refining. The team explored various tag formats of all shapes and sizes before landing on the domino tag (used today) which is an 8-bit, three-quarter-inch-square tag that is optimal thanks to its small size. At the same time, the original plan of using a single camera in the vision system was proving to be unreliable. After exploring a variety of options, including camera placement and different camera lens sizes, it was decided that Surface would use five cameras that would more accurately detect natural movements and gestures from the surface.

Hardware Design

By late 2004, the software development platform of

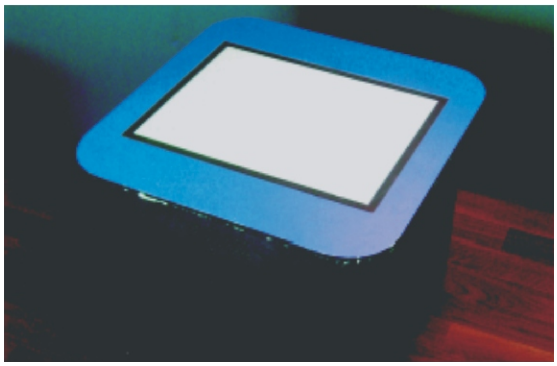
"Tub" model prototype

Surface was well-established and attention turned to the form factor. 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. Also in 2005, Wilson and Bathiche introduced the concept of surface computing in a paper for Gates' twice-yearly "Think Week," a time Gates takes to evaluate new ideas and technologies for the company.

From Prototype to Product

The next phase of the development of Surface focused on continuing the journey from concept to product. Although much of what would later ship as Surface was determined, there was significant work to be done to develop a market-ready product that could be scaled to mass production. When we developed the T1 prototype, it couldn't be moved without having to recalibrate it. Now, obviously the product can easily be moved. To get Surface to where it is today, the code had to be rewritten from the ground up."

Today Surface has become the market-ready



T1 prototype

Microsoft Surface today

product once only envisioned by the group, a 30-inch display in a table-like form factor that's easy for individuals or small groups to use collaboratively. The sleek, translucent surface lets people engage with Surface using touch, natural hand gestures and physical objects placed on the surface. Years in the making, Microsoft Surface is now poised to transform the way people shop, dine, entertain and live.

This is a radically different user-interface experience than anything Microsoft has done before, and it's really a testament to the innovation that comes from marrying brilliance and creativity."

Beyond Surface - Surface Computing tomorrow

Although surface computing is a new experience for consumers, over time Microsoft believes there will be a whole range of surface computing devices and the technology will become pervasive in people's lives in a variety of environments. 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 part of the countertop, the wall or the refrigerator.

Features of Surface Computer

Multi-touch display - The Surface display is capable of multi touch interaction, recognizing dozens and dozens of touches simultaneously, including fingers, hands, gestures and objects placed on the surface.

Horizontal orientation - The 30-inch display in a table-sized form factor allows users to share, explore and create experiences together, enabling a truly collaborative computing experience.

Dimensions - Surface is 22 inches high, 21 inches deep and 42 inches wide.

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

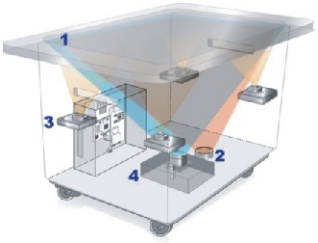
Requirements - Standard American 110120V power

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.

Availability - Beginning at the end of this year, consumers will be able to interact with Surface in hotels, restaurants, retail establishments and public entertainment venues.

Internal Architecture of Surface Computer

The name Surface comes from "surface computing," and Microsoft envisions the coffee-table machine as the first of many such devices.



Surface computing uses a blend of wireless protocols, special machine-readable tags and shape recognition to seamlessly merge the real and the virtual world. The table can be built with a variety of wireless transceivers, including Bluetooth, Wi-Fi and (eventually) radio frequency identification (RFID) and is designed to sync instantly with any device that touches its surface.

The above picture gives a view of the internal architecture of the surface computer. The major and important components are described as follows

Screen: A diffuser turns the Surface's acrylic tabletop into a large horizontal "multi touch" screen, capable of processing multiple inputs from multiple users. The Surface can also recognize objects by their shapes or by reading coded "domino" tags.

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 with a net resolution of 1280 x 960.

CPU: Surface uses many of the same components found in everyday desktop computers a Core 2 Duo processor, 2GB of RAM and a 256MB graphics card. Wireless communication with devices on the surface is handled using WiFi and Bluetooth antennas (future versions may incorporate RFID or Near Field Communications). The underlying operating system is a modified version of Microsoft Vista.

Projector: Microsoft's Surface uses the same DLP 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.

Early Users of Microsoft Surface Computer

Surface will be shipped to partners with a portfolio of basic applications, including photos, music and virtual concierge applications that can be customized to provide their customers with unique experiences. Harrah's Entertainment Inc., Starwood Hotels & Resorts Worldwide Inc., and T-Mobile USA Inc. will be some of the first companies to provide unique Surface experiences for their customers. These first partners are exploring a variety of avenues for Surface, which may include the following:

Advantages of Microsoft Surface Computer

- Surface breaks down the traditional barriers between people and technology, providing effortless interaction with digital content.
- Similar to the way ATMs changed how people got money from the bank, Microsoft is changing the way people will interact with all kinds of everyday content, including Photos, Music a Virtual concierge , Games.
- Common everyday tasks become entertaining, enjoyable and engaging, alone or face-to-face with family, friends or co-workers.

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.

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