Evaluate Popular Inventions and apply their new point of view to Re-Design

STORAGE DEVICES

FLOPPY DISK

A floppy disk or floppy diskette (sometimes casually referred to as a floppy or diskette) is a type of disk storage composed of a thin and flexible disk of a magnetic storage medium in a square or nearly square plastic enclosure lined with a fabric that removes dust particles from the spinning disk. Floppy disks store digital data which can be read and written when the disk is inserted into a floppy disk drive (FDD) connected to or inside a computer or other device.

The first floppy disks, invented and made by IBM, had a disk diameter of 8 inches (203.2 mm). Subsequently the 5¼-inch and then the 3½-inch became a ubiquitous form of data storage and transfer into the first years of the 21st century. 3½-inch floppy disks can still be used with an external USB floppy disk drive. USB drives for 5¼-inch, 8-inch, and other-size floppy disks are rare to non-existent. Some individuals and organizations continue to use older equipment to read or transfer data from floppy disks.

 

The first commercial floppy disks, developed in the late 1960s, were 8 inches (203.2 mm) in diameter; they became commercially available in 1971 as a component of IBM products and then were sold separately starting in 1972 by Memorex and others. These disks and associated drives were produced and improved upon by IBM and other companies such as Memorex, Shugart Associates, and Burroughs Corporation. The term "floppy disk" appeared in print as early as 1970, and although IBM announced its first media as the Type 1 Diskette in 1973, the industry continued to use the terms "floppy disk" or "floppy".

In 1976, Shugart Associates introduced the 5¼-inch FDD. By 1978, there were more than ten manufacturers producing such FDDs. There were competing floppy disk formats, with hard- and soft-sector versions and encoding schemes such as differential Manchester encoding (DM), modified frequency modulation (MFM), M2FM and group coded recording (GCR). The 5¼-inch format displaced the 8-inch one for most uses, and the hard-sectored disk format disappeared. The most common capacity of the 5¼-inch format in DOS-based PCs was 360 KB, for the Double-Sided Double-Density (DSDD) format using MFM encoding. In 1984, IBM introduced with its PC-AT model the 1.2 MB dual-sided 5¼-inch floppy disk, but it never became very popular. IBM started using the 720 KB double density 3½-inch microfloppy disk on its Convertible laptop computer in 1986 and the 1.44 MB high-density version with the IBM Personal System/2 (PS/2) line in 1987. These disk drives could be added to older PC models. In 1988, IBM introduced a drive for 2.88 MB Double-Sided Extended-Density (DSED) diskettes in its top-of-the-line PS/2 models, but this was a commercial failure.

Throughout the early 1980s, limits of the 5¼-inch format became clear. Originally designed to be more practical than the 8-inch format, it was becoming considered too large; as the quality of recording media grew, data could be stored in a smaller area. Several solutions were developed, with drives at 2-, 2½-, 3-, 3¼-,3½- and 4-inches (and Sony's 90 mm × 94 mm (3.54 in × 3.70 in) disk) offered by various companies. They all had several advantages over the old format, including a rigid case with a sliding metal (or later, sometimes plastic) shutter over the head slot, which helped protect the delicate magnetic medium from dust and damage, and a sliding write protection tab, which was far more convenient than the adhesive tabs used with earlier disks. The large market share of the well-established 5¼-inch format made it difficult for these diverse mutually-incompatible new formats to gain significant market share. A variant on the Sony design, introduced in 1982 by many manufacturers, was then rapidly adopted. By 1988, the 3½-inch was outselling the 5¼-inch.

Generally, the term floppy disk persisted even though later style floppy disks have a rigid case around an internal floppy disk.

By the end of the 1980s, 5¼-inch disks had been superseded by 3½-inch disks. During this time, PCs frequently came equipped with drives of both sizes. By the mid-1990s, 5¼-inch drives had virtually disappeared, as the 3½-inch disk became the predominant floppy disk. The advantages of the 3½-inch disk were its higher capacity, its smaller physical size, and its rigid case which provided better protection from dirt and other environmental risks. If a person touches the exposed disk surface of a 5¼-inch disk through the drive hole, fingerprints may foul the disk—and later the disk drive head if the disk is subsequently loaded into a drive—and it is also easily possible to damage a disk of this type by folding or creasing it, usually rendering it at least partly unreadable. However, largely due to its simpler construction (with no metal parts) the 5¼-inch disk unit price was lower throughout its history, usually in the range of a third to a half that of a 3½-inch disk.

By 2002, most manufacturers still provided floppy disk drives as standard equipment to meet user demand for file-transfer and an emergency boot device, as well as for the general secure feeling of having the familiar device. By this time, the retail cost of a floppy drive had fallen to around $20 (equivalent to $29 in 2020), so there was little financial incentive to omit the device from a system. Subsequently, enabled by the widespread support for USB flash drives and BIOS boot, manufacturers and retailers progressively reduced the availability of floppy disk drives as standard equipment. In February 2003, Dell, a leading computer company at the time, announced that floppy drives would no longer be pre-installed on Dell Dimension home computers, although they were still available as a selectable option and purchasable as an aftermarket OEM add-on. By January 2007, only 2% of computers sold in stores contained built-in floppy disk drives.

Floppy disks are used for emergency boots in aging systems lacking support for other bootable media and for BIOS updates, since most BIOS and firmware programs can still be executed from bootable floppy disks. If BIOS updates fail or become corrupt, floppy drives can sometimes be used to perform a recovery. The music and theatre industries still use equipment requiring standard floppy disks (e.g. synthesizers, samplers, drum machines, sequencers, and lighting consoles). Industrial automation equipment such as programmable machinery and industrial robots may not have a USB interface; data and programs are then loaded from disks, damageable in industrial environments. This equipment may not be replaced due to cost or requirement for continuous availability; existing software emulation and virtualization do not solve this problem because a customized operating system is used that has no drivers for USB devices. Hardware floppy disk emulators can be made to interface floppy-disk controllers to a USB port that can be used for flash drives.

SD CARDS/SOLID STATE DRIVES

Secure Digital, officially abbreviated as SD, is a proprietary non-volatile memory card format developed by the SD Association (SDA) for use in portable devices.

The standard was introduced in August 1999 by joint efforts between SanDisk, Panasonic (Matsushita) and Toshiba as an improvement over Multi Media Cards (MMCs), and has become the industry standard. The three companies formed SD-3C, LLC, a company that licenses and enforces intellectual property rights associated with SD memory cards and SD host and ancillary products.

The companies also formed the SD Association (SDA), a non-profit organization, in January 2000 to promote and create SD Card standards. SDA today has about 1,000 member companies. The SDA uses several trademarked logos owned and licensed by SD-3C to enforce compliance with its specifications and assure users of compatibility.

In 1999, SanDisk, Panasonic (Matsushita), and Toshiba agreed to develop and market the Secure Digital (SD) Memory Card. The card was derived from the Multimedia Card (MMC) and provided digital rights management based on the Secure Digital Music Initiative (SDMI) standard and for the time, a high memory density.

It was designed to compete with the Memory Stick, a DRM product that Sony had released the year before. Developers predicted that DRM would induce wide use by music suppliers concerned about piracy.

The trademarked "SD" logo was originally developed for the Super Density Disc, which was the unsuccessful Toshiba entry in the DVD format war. For this reason, the D within the logo resembles an optical disc.

At the 2000 Consumer Electronics Show (CES) trade show, the three companies announced the creation of the SD Association (SDA) to promote SD cards. The SD Association, headquartered in San Ramon, California, United States, started with about 30 companies and today consists of about 1,000 product manufacturers that make interoperable memory cards and devices. Early samples of the SD card became available in the first quarter of 2000, with production quantities of 32 and 64 MB cards available three months later.

2003: Mini cards

The miniSD form was introduced at March 2003 CeBIT by SanDisk Corporation which announced and demonstrated it. The SDA adopted the miniSD card in 2003 as a small form factor extension to the SD card standard. While the new cards were designed especially for mobile phones, they are usually packaged with a miniSD adapter that provides compatibility with a standard SD memory card slot.

2004–2005: Micro cards

The microSD removable miniaturized Secure Digital flash memory cards were originally named T-Flash or TF, abbreviations of TransFlash. TransFlash and microSD cards are functionally identical allowing either to operate in devices made for the other. microSD (and TransFlash) cards are electrically compatible with larger SD cards and can be used in devices that accept SD cards with the help of a passive adapter, which contains no electronic components, only metal traces connecting the two sets of contacts. Unlike the larger SD cards, microSD does not offer a mechanical write protect switch, thus an operating-system-independent way of write protecting them does not exist in the general case. SanDisk conceived microSD when its Chief Technology Officer (CTO) and the CTO of Motorola concluded that current memory cards were too large for mobile phones.

2006–2008: SDHC and SDIO

The SDHC format, announced in January 2006, brought improvements such as 32 GB storage capacity and mandatory support for FAT32 file system.[citation needed] In April, the SDA released a detailed specification for the non-security related parts of the SD memory card standard and for the Secure Digital Input Output (SDIO) cards and the standard SD host controller.[citation needed]

In September 2006, SanDisk announced the 4 GB miniSDHC. Like the SD and SDHC, the miniSDHC card has the same form factor as the older miniSD card but the HC card requires HC support built into the host device. Devices that support miniSDHC work with miniSD and miniSDHC, but devices without specific support for miniSDHC work only with the older miniSD card. Since 2008, miniSD cards are no longer produced, due to market domination of the even smaller microSD cards.

2009–2019: SDXC

The storage density of memory cards has increased significantly throughout the 2010s decade, allowing the earliest devices to offer support for the SD:XC standard, such as the Samsung Galaxy S III and Samsung Galaxy Note II mobile phones, to expand their available storage to several hundreds of gigabytes.

2019–present: SDUC

The Secure Digital Ultra Capacity (SDUC) format supports cards up to 128 TB and offers speeds up to 985 MB/s.