IF you handle your mobile phone, or a PC or laptop today, chances are you have used its USB connector to transfer data, attach a speaker, connect an external storage, or just to charge the built-in battery of your device, at least once.

The USB or Universal Serial Bus is arguably the most commonly used connection technology today. There are an estimated 10 billion USB-powered devices out there. Indeed, it is difficult to imagine a world without this mother of all connectors.

But till the mid 1990s, the desktop Personal Computer and its smaller brother, the laptop, were a mess of different-sized ports – a serial port, a printer port, a port for mouse and keyboard, one for the modem (before the days of WiFi routers), another for the ethernet data cable, yet another for the audio connection to speakers or microphone.....

Salvation came in late 1995, when the US-based computer chip leader Intel released the design of a new universal connector.

For the man who was mainly responsible for the invention of the Universal Serial Bus, the stimulus came from his wife and child. Needing to print out their daughter’s school project, his wife used to ring up Chief Architect Ajay Bhatt in his lab at Intel’s Oregon (US) plant, asking for help to connect the PC and printer properly. It was not easy – with different printers needing different ports. Bhatt wondered: Why not create a single solution to replace serial, parallel and printer ports on a PC?

In November 1995, his work which won him 8 patents, resulted in the USB 1.0 standard for connectors. Intel and Bhatt jointly decided to make the standard available free of all licensing and royalty fees. That was one reason why the USB became the de facto standard for PC connections. It is also the reason Bhatt never made a paisa out of his invention. But he has no regrets.

Bhatt has remained with Intel ever since. Currently Intel Fellow and Chief Client Platform Architect for the PC Client Group, Bhatt wanted to be an architect – literally – and even attended classes in the Arts Department of Baroda University, before deciding it was not for him and switched to engineering. (His father was a faculty member in the Arts Department of the University.)

Speaking on the occasion of the USB’s 20th birthday, Dr. Bhatt looked back at two decades of the connector technology. “The USB’s use has exceeded our expectations,” he said, “It’s been an amazing road – and by and large, the vision of a single connector for all forms of the PC has been realised.”

Today he is deeply involved in refining the standards for Type ‘C’. He says he is most excited at the possibilities of USB connectors, both powering up devices and carrying data, since the standard allows for the connector to carry nearly 100 watts of power.

Beyond the USB, his core work at Intel is on future client-computing platforms. Bhatt feels the day is not far, when PCs boot up and shut down in 2 seconds, as if operated by a light switch. And soon they will be powered wirelessly.

Ajay Bhatt dramatically simplified wired connections for all. But he will not be surprised, he told me, if eventually, most of what the USB does will be done wirelessly, rendering obsolete the universal wired connector he invented! Science never stops!

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THE INDIAN BEHIND THE USB

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that could replace almost all these connectors. It was the USB. And the leader of the team at Intel, that developed the connector, the man who earned 8 patents for the design, was an Indian – Ajay Bhatt – an electronics engineering graduate of Maharaja Sayajirao University, Baroda (now Vadodara), and an MS from City University New York, who had joined Intel in 1990 as a chip architect.

It took a few years – actually till Microsoft’s Windows operating system was updated in 1998 to embrace the USB specification – before the new connector became widely available. It soon became a standard fixture on all computing platforms. Even peripherals like printers and external hard disks began to appear with a USB connector.

However, there were minor hassles. It could fit only one way and one had to give it a couple of tries before it sat snugly in the port. But it was the closest thing that we had to a universal connector. The USB connector largely remained unchanged in shape since then. It is known as the USB Type ‘A’ connector. The other end or ‘B’ connector – what is sometimes called the female connector – comes in a variety of forms depending on the peripheral for which it is meant. Printers, for example take a square-ish connector.

The standard USB connector was too big for the new generation of mobile phones and tablets that came into the market after 2000. So they sported what are called micro USBs, miniature versions that nevertheless complied with the USB technical standard. This standard has undergone two revisions since the original USB 1.0 dating back to 1995. The current standard – USB 3.0 – is at least 10 times faster when it comes to transferring data compared to the early USBs – rated for a theoretical 5 GBPS, though in practice, this speed is rarely obtainable.

The USB underwent a radical update: removing two major drawbacks of the Type ‘A’-Type ‘B’ combo: one, it was now bidirectional i.e., both ends were identical in shape; two, the connector at either end was symmetrical i.e., you could insert it either way; there was no right way or wrong way.

The new connector is called the Type ‘C’ connector and it is slowly making its appearance in devices launched in the last few months. It is ‘backward compatible’. This means the underlying USB Type ‘C’ standard will work with all existing connectors, but physically, it is quite smaller and you will need an adapter to connect a USB ‘C’ port to the existing connectors or ports.

The Type ‘C’ also handles more power up to 20Vand 5A which translates to 100W of power. This means it can be used to charge almost all devices – even a laptop typically needs just 60 watts. Speed-wise at 10 GBPS it is rated at twice the speed of a Type ‘A’ USB 3 cable.

The first device to appear on the market that fully exploited the USB ‘C’ standard was Apple’s new 12-inch MacBook laptop computer launched in mid 2015, which sports just one USB port for charging and data transfer – a Type ‘C’ port. Quick to follow was Google’s ChromeBook Pixel. During the transition, we can expect to use both types of connectors. Which is why some makers of USB Flash drives have already launched dual drive versions with a USB Type ‘A’ at one end and a Type ‘C’ connector at the other.

Starting in 2016, we can expect the USB Type ‘C’ to become more common, even as earlier types slowly fade away into history. Finally, two decades and more after it was conceived, the USB connector finally lives up to its name – a truly universal technology to link all devices, even as they do double duty, transferring data and carrying enough current to charge the devices they connect.

Mr Anand Parthasarathy is Editor of the IT news portal IndiaTechOnline.com; Email: anand@indiatechonline.com