

STUDY OF KEYBOARD AND MOUSE

1. Introduction

Keyboard

A computer keyboard is one of the most widely used input devices that helps in submitting data and instructions to a computer. It is made up of a number of keys, including letter, number, and punctuation keys. Each key strikes a separate character or performs a function any time it is pressed and sent to the computer. Keyboards may either be inbuilt or external but are very useful in activities such as document typing, software manipulation and submitting commands. They are still an improvement from the typewriter design, now having added features such as numerous keys, light up keys, and curved designs respectively.

Mouse

A mouse is an object that one holds and uses to operate the computer by pointing to the graphical user interface, ways, and means of any device or object which can be fitted with a two-dimensional pointer. The device can sense motion in two axes relative to the surface thus moving the arrow cursor on the screen. Moving the mouse and pressing the buttons on it enables a user to select, drag and drop objects, open folders and even perform operations. Most modern mice come with scroll wheels and other extra buttons to improve their usability. They may be made available through USB, Bluetooth, or wireless connections, which enhances the ability of one to control their environment. The use of a mouse is easy and has been accepted as integral to computing.

2. History

History of the Keyboard

Origins of the Typewriter: The creation of the keyboard can be traced back to the typewriter which was built by Christopher Latham Sholes in 1868. As such, the QWERTY layout was patented in 1878 in order to prevent mechanical jamming from overused letters.

Earlier Generation of Computers: The invention of the first computer keyboards based on the technique of the electric typewriter. The first computer keyboards specifically incorporated for the purposes of a computer were introduced in the 1960s for example The Model 33 Teletype.

Types of Modern Keyboards: The keyboards available today are mechanized, membraned or virtual type - and they come in different forms. They are made to accommodate different user wants, such as having their designs being arc, including enhancing lighting and changing keys.

Mouse History

Invention: The concept of a computer mouse was presented by Douglas Engelbart in 1964, more at the Stanford Research Institute. The first attempt contained a wooden shell and contained also two metallic wheels.

Development: A working example of the mouse was shown for the first time at a meeting in San Francisco in 1968, changing the way human beings interacted with machines. One of the first computers that had a mouse peripheral device attached to it was the Xerox Alto in 1973.

Commercialization: In the 1980's mouse devices, as well as the computer itself, became widespread and Microsoft produced its first mouse in 1983. Also, the introduction of GUI (Graphical User Interface) operating systems, such as the Apple Macintosh in 1984 or Windows 3.0 in 1990, encouraged many users to acquire a mouse.

Modern Mouse: Today's mice are highly advanced, featuring optical sensors, wireless connectivity, and additional buttons for enhanced functionality.

3. Available technologies in the field

The evolution of the keyboard and mouse has been tremendous due to prospects for better performance, comfort, and connectivity. Some of the technologies that can be found at the forefront include:

Keyboards

Wireless Keyboards: Today's wireless keyboards incorporate both Bluetooth and USB connections reducing dependency on cables entirely. For instance, Logitech MX Keys S, Cherry Stream Desktop, Compucessory Wireless Keyboard.

Mechanical Keyboards: Such keyboards have separate mechanical switches for each key which gives a more pleasant experience of typing with them. In this category fall, Razer Pro Type Ultra, Epomaker TH80 Pro.

Ergonomic Keyboards: As the name suggests, such keyboards seek to minimize any possibilities of discomfort, such as the case of the Logitech Wave Keys, which has been designed for prolonged periods of typing.

Backlit Keyboards: Keyboards with backlighting whose colors can be changed depending on one's moods are useful in dark rooms and peeps up the device to some levels.

Form Factor Keyboards: Less space consuming in nature, Smaller-looking keyboards are for travel purposes and help in using the desk effectively like the Logitech MX Keys Mini.

Mouse

Advanced DPI Detectors: Mice manufactured today, with the example of the Logitech MX Master 3S, are equipped with high DPI (dots per inch) sensors that go as high as 8,000 DPI. This enables better control and more fluid motion even on different surfaces².

Wireless Connectivity: Wireless mice have advanced a lot and are working perfectly. Most of them, including the Logitech MX Master 3S, feature Bluetooth and 2.4GHz wireless connections that enable less cabling and hassle².

Alterable Buttons: The majority of today's mice include alterable buttons and motions. It enables users to modify the mouse according to a particular job or software making it efficient¹.

Comfortable Designs: Ergonomics is one focus area, with these types of mice made in a way that enhances comfort and minimizes fatigue while using over a period. The Logitech MX Master 3S for instance has a shape that considers large handed users¹.

Battery Capacity: The rechargeable battery of a wireless mouse is quite large nowadays, with some models lasting even 70 days within a single charge.

4. Working and Basic concepts

KEYBOARDS

Components:

Keys: Set up in a regular matrix of rows and columns.

Microcontroller: Recognizes when a key has been pressed and relays information to the computer.

Connection: Could be either wired (USB) or wireless (Bluetooth, RF).

Working:

Key Press Detection:

Mechanical Keyboards: Each button works individually. Pressing a key closes the switch and sends an electric signal to the computer.

Membrane Keyboards: Do not use any physical mechanism. Pressing a key and pushing the soft cover flexes a membrane and completes a circuit.

Scanning Process: It looks for a pressed key by scanning the key matrix.

Data Transmission: The computer translates the pressed key into information and communicates it to the system.

Input Interpretation: The operating system of the computer recognizes this information and produces a suitable character or a command action.

MOUSE

Components:

Sensor: Senses motion.

Buttons: Used for clicking, typically left and right.

Scroll Wheel: To scroll pages up and down.

Microcontroller: Accepts input and emits signals to the computer.

Working:

Movement Detection: Detects Motion.

Optical Mouse: It contains a lens and a LED light inside it to help in detecting motion.

Laser Mouse: It is the same as an optical mouse but uses a laser for more accuracy.

Data Transmission: The moused movement is captured and converted to data and sent to the computer through either a cable (USB) or wireless means (Bluetooth/RF).

Pointer Movement: This information is sent to the display screen's operating system to shift the point rather than the user's hand.

5. Study of Various parameters (Cost, Speed and Performance)

Cost:

Keyboard: The cost of keyboards is between Rs 500 to Rs 10,000 based on some features present including mechanical keyboards, backlight, and wireless connectivity.

Mouse: The cost of a mouse ranges between 1000 and 5000 rupees but has higher costs when it comes to gaming mice since they are equipped with advanced sensors and serviceable features.

Speed:

Keyboards: Mechanical keyboards often respond faster than others because there are switches beneath each key. Those components geared towards gaming usually have an actuation edge of up to 1 millisecond.

Mouse: Apart from that, a high DPI (Dots Per Inch) mouse can reach a top speed of 16,000 DPI which allows for very fast and accurate movements of the cursor.

Performance:

Keyboards: Mechanical keyboards have made a mark in gaming and typing owing to their great longevity and tactile. The benefit of wireless Keyboards is that they are portable however they can come with a bit of input lag compared to the wired ones.

Mouse: Most gaming performance mice feature high dpi sensors and buttons geared towards actions that are highly precision oriented including gaming. Latency and reliability have overcome a big challenge with the hand-held devices that are wires less.

6. Market Study

Number of Users:

Global Market Size: The worldwide revenues for keyboard and mouse set market were estimated at USD 5.8 billion in 2023 and is likely to be valued at USD 12.15 billion by 2032, registering a patterned growth of 8.4% CAGR.

Gaming Segment: The global market for I.J. gaming mouse and keyboard however is supposed to grow from base USD 1,446.4 million in the year 2021 to a staggering figure of USD 2,836.1 million by the end of the year 2031, at CAGR of 7.0%.

Key Players in the Market:

Logitech: A major vendor recognized for her quality gaming accessories and office apparatus.

Microsoft: Provides various kinds of positioning devices and input devices used for play and office.

Razer: Gaming peripherals manufacturer most equipped with robust and unique characteristics.

Corsair: A company mainly engaged in the production of keyboards and mice that are intended for gaming.

SteelSeries: One more famous company within the world of gaming peripherals.

Market Segmentation:

By Type: Compact, Ergonomic, Standard, Gaming, Wireless, Multi-device keyboards and mice.

By Application: Gaming, Office, Personal, Programming, Design/Editing, and Telecommuting.

By Connectivity: Wired, Wireless, and Bluetooth.

By Distribution Channel: Online and Offline sales.

By geography: Asia Pacific, North America, Latin America, Europe as well as Middle East & Africa.

7. Future advancement in progress

Keyboards:

Ergonomic Designs: Retinal strain and injury risk reduction will still be an essential area of improvement regarding shapes and layouts. Typing habits based ergonomic design solutions are likely to be available.

Customizable Keyboards: Keyboards with the ability to modify key functions and layouts will be more widespread allowing users to use keyboards as per their activities or preferences.

Virtual And Laser Keyboards: These keyboards project a layout on a plane for efficiency in movement, though they do not have tactile response.

Flexible and Foldable Keyboards: Keyboards which can be easily rolled and place in a bag or a briefcase, perfect for travelers and individuals in confined areas.

Sustainability: Environmentally friendly bamboo and recycled plastic, and even solar keyboard designs.

Artificial Intelligence (AI): Development of AI for purposes such as predictive texting, autocorrect systems and efficient speech-to-text technology.

Augmented Reality (AR): Augmented Reality interfaces that can apply for certain roles at the place of the physical keyboard to allow more interaction while typing.

Mouse:

High DPI Sensors: Further enhancements are being made in sensor technologies for tracking whether visitors move their hands more precisely within the measured area or not.

Wireless Connectivity: Increased wireless applicability by addition of devices that connect faster and more reliably.

Customizable Buttons: Advanced options for customizing buttons and gestures to meet different users' preferences.

Ergonomic Designs: Aims to reduce strain and enhance comfort when using for long periods.

AI Integration: AI-based features enhance the user experience, such as motion sensors and variable sensitivity.

Ambidextrous Designs: There are more mice nowadays that can be used by both left and right-handed people.

8. Conclusion

The progress made in keyboards and mice has revolutionized the interaction with computers, ensuring that tasks are done more effectively, conveniently, and according to personal preferences. With their robust sound response of mechanical keyboards, hit precision sensors in the modern mice relate to the improvement in technologies in these peripherals that enhance its use in a wide range of activities ranging from gaming, professional work, and even normal use.

Key Takeaways:

The need for Versatility and Customization: These days keyboards and mice are equipped with features which can be modified to improve productivity and enhance their usage.

Enhanced Ergonomics: Design improvements have been made on both peripherals that can help to mitigate most of the strains caused by prolonged usage.

Technological Advancements: None the least, other things such as High DPI sensors, wireless operation, and artificial intelligence systems all enhance the capabilities of devices in the present time.

Market Dynamics: The scenario is healthy and the market for keyboards and mice is quite large which is primarily because of the rise in remote working, gaming, and technology.

Future Prospects: Moving on, enhanced ergonomic design, AI, and eco-friendly technology are anticipated to be even more enhanced in the future making the devices more effective and friendly to the users.

Such accessories are not only aiding anymore but rather they have become part and parcel of our life in this instant age. Mice and keyboards are indispensable regardless of the purpose, be it professional use, entertainment, or inclusiveness, all of which are digital.

9. Indian contribution to the field

India has made significant contributions to the field of technology, including keyboards and mice, through the work of Indian and Indian-origin scientists and engineers. Here are a few notable contributions:

Ajay Bhatt: An American computer architect of Indian origin who is known for his stupefying inventions, USB A, B, and Mini – the most used peripheral connectors which connect devices such as a mouse and keyboard to the computer.

Vinod Dham: A Man of Indian Origin, widely credited for the development and commercial contribution of the Intel Pentium microprocessor considered to be a key success factor for computers that use a mouse and keyboard comfort interface.

Narendra Singh Kapany: He is one of the pioneers in Fiber optics, and he is often called ‘The Father of Fiber Optics’ by the Indian community for his research work in fiber optics and cable

technology that enables high performance of data transmission, a necessity for every computer including their peripherals.

Dr. Rajagopalan Vasudevan: A thorough Indian professor of Chemistry who is the proponent of the invention of the technique used to use plastic waste in making materials for the roads, assisting indirectly on the infrastructure setup in the manufacture and distribution of technologies.

These benefits mentioned above demonstrate the contribution of Indian innovators towards the development of development and its associated peripherals from keyboards to mice. These along with many other contributions have resulted in the better technology that we have today.

10. References

1. "The Evolution of Computer Input Devices," Journal of Human-Computer Interaction, 2023.
2. Logitech Official Website, www.logitech.com.
3. "Gaming Keyboards and Mice: A Market Overview," Tech Insights, 2022.
4. "Advancements in Keyboard and Mouse Technologies," IEEE Transactions on Consumer Electronics, 2021.
5. Razer Official Website, www.razer.com.