ACADEMIC TASK

PHY 110

(Engineering Physics)

COMPUTER SCIENCE AND ENGINEERING

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INDEX

1. Introduction –

A mouse is a pointing device and it is used to interact with a computer's GUI (graphical user interface).

1.1 ◉ Invention of Mouse –

Douglas Engelbart invented the computer mouse. The first prototype of mouse was developed in 1960 at Stanford Research Institute.
The prototype consists of a wooden block with two wheels. SRI was the first company to file patent for mouse.

- Need for such Input Device –

When the GUI (Graphical User Interface) was introduced to the world, we need a input device so that users can easily navigate the graphical interface efficiently and effectively.
As the computing technology enhanced and Advanced, tasks became more complex and we can't only depends upon text-commands based input. We need a device so that more users can do the complex tasks using this technology.
So that we can perform precise selection using this kind of device.
Mouse's invention extends beyond desktop computing it makes easy to perform editing, gaming, paiting etc.

1.2 Evolution of Computer Mouse

- Ball Mouse Era (1970s - 1980s) -

- Ball mouse was invented by Bill English in 1972. In this kind of mouse a small rubber or plastic ball was introduced in place of the pre-existing wheel in the mouse.
- Sensors detect the movement of the ball and then mouse can move in any direction.

- Optical Mice (1990s - Present) -

- The design of mouse recreated and optical mouse design came into picture. An optical mouse use LED light to detect the movement of the mouse. The LED shoots light to a plain surface and the rays bounce back then the sensor picks and detect the movement.

- Wireless Mouse (2000s - Present) -

- Wireless mouse use the Blutetooth technology or the Radio frequency the movement detected by this.
  There is a reciever connected to the PC/Laptop. and the mouse communicate using this reciever. As there is no wire we got the freedom to easily move the mouse.

2. Result and Discussion -

2.1

Mouse Technology benefits -

- Before the mouse technology invented, the interaction with computers totally based on text-based commands and every user can't access means limited user only can access.

  When the GUI introduced to the world, there is a need of input deviced required to navigate the graphical elements in a effective way.

- Here some of the modern mouse which offers touch-Sensitive surfaces on the top or side of mouse that allows the user to swipe, scroll etc.

- Technological advancements represents a significant trend in a focus on eco-friendly mouse, a focus on voice-enabled mouse, a focus on ergonomic mouse and also in gaming mouse, also focus on biometric mouse.

  From the early mechanical mouse to wireless laser mouse the enhancement has been happens and Now enhancement in Ergonomic designs also happening that enhance user comfort during long time use.

2-2 How does Optical Mouse Works

Basically an Optical Mouse uses an infrared LED and four-quadrant infrared sensor. On a special metallic surface there is infrared absorbing ink with grid-lines printed on it.

→ There is a Image Acquisition system consists of an Infrared LED, Lenses, and a pixel Array.

→ First of all beam of light which is generated by the LED, passes through the lens and radiate the surface then again the beam of light bounce back passes through the another lens, then it passes through a tiny aperature, and Finally the light hits the image pixel Array (which is consists of approx. 1600 pixels.

→ Next thing is Image Sensor can capture upto 17000 picture of the surface, it doesnot captures the colour of the surface it only captures the texturally and topographically complex surface.

→ Then the microchip determines the change in x & change in y direction for every captured image. and the microchip is called Digital Signal Processor. where a algorithm Cross-Correlation executed.

Displays / Image overlays over each-other and check the difference and this continues until the minimum resultant Image obtained.

→ Once the Required Image we get, then it detects the movement as we move the mouse by our hands. and button presses are detected by switches and the the Analog movement of Hands converted into the Digital Signals, that can be sent to the computer.

→ The movement of the rotational wheel can be detected in a variety of different-different ways. Some use potentiometers broading or rotary switches.

→ Then finally the physical cable connects and carries the digital information to the computer via USB (Universal Serial Bus) or PS/2 Port.

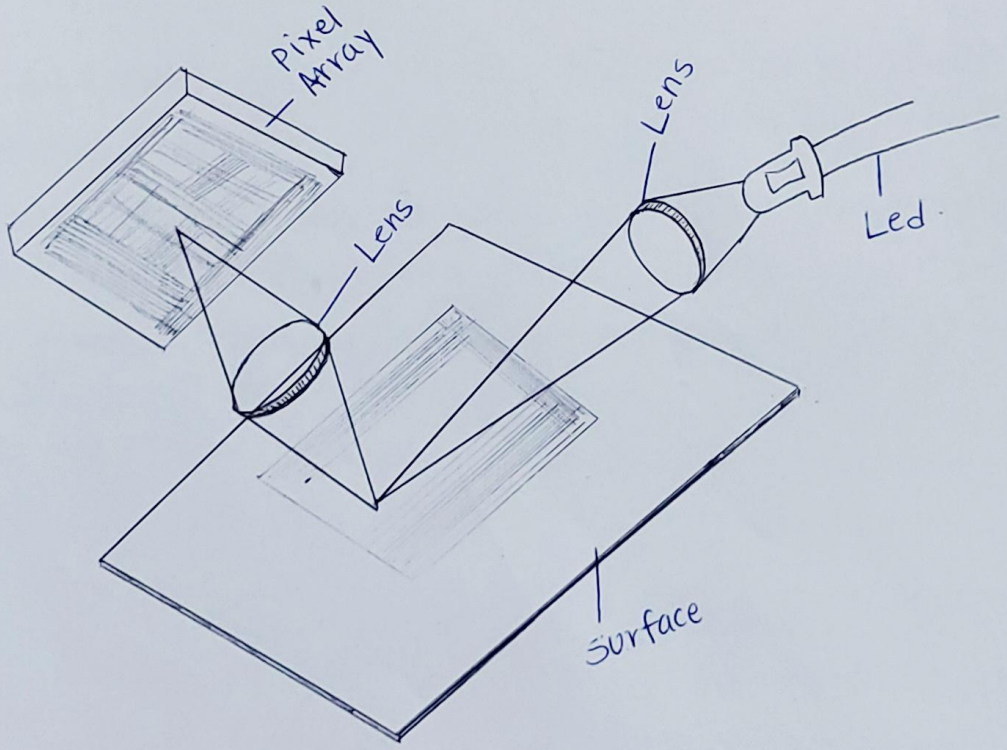

Diagram of capturing movement by Mouse

2.3 How does wireless mouse works-

Basically a wireless mouse uses the idea of RF (Radio frequency) or Blutooth to operate.

→ The wireless mouse works on similar principle only difference there are some other components also present. It uses Optical sensors like wired mouse does to track movement and capture images of surface.

→ Additionally it has transmitter that transmits data wirelessly to the computer.
In wireless mice having bluetooth mouse where transmitter is integrated with the mouse but in RF (Radio frequency) mouse have a seperate transmitter connected to the PC/Laptop, with a USB reciever.

→ An additional power source batteries or recharable batteries required to operate the wireless mouse.
Wireless mouse have a range of several ranges, we can't operate from anywhere, and it also depends on factors like obstacles, transmission power etc.

2.4 Comparison between Optical & Wireless

Optical	Wireless
Typically wired, can be connected to computer via USB or PS/2 port.	Connected by Bluetooth or Radio frequency.
Restricted by length of wire.	Free dom of movement but restricted by Range.
Use Computer USB port's power supply.	Additional Battery required for power supply.
Low latency but high responsiveness.	Slight latency or interference issue.
Less portable due to wires.	More compact and portable
There might be a chance of potential damage due to bending, twisting of cable wire.	No such issues.
Low cost as compared to the wireless mouse.	Higher Cost as compared to the optical mouse.

3. Conclusion

Computer mouse is an emblem of innovation, which makes complex navigation to a easy and precise navigation. It enhances the productivity and enhanced the interaction.

Beyond the Optical and Wireless mouse there is a future for the mouse integrated with AR (Augmented Reality) and VR (Virtual Reality), there might be a chance that gestural input based mechanisms came into picture.

Some Advanced sensors and algorithms of ML may enable mouse to tackle more complex movements.

Some advanced manufactoring techinique including more durable and light-weight mouse design may introduced in future.

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