# Computer Mouse

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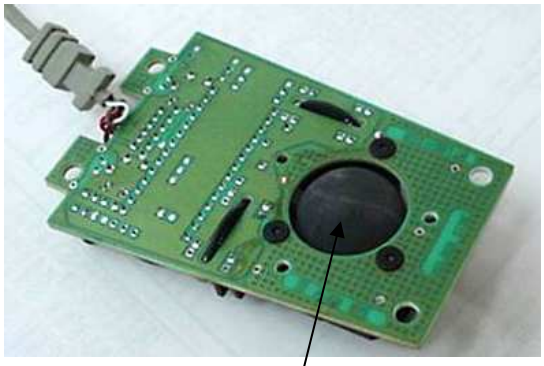
# The Computer Mouse

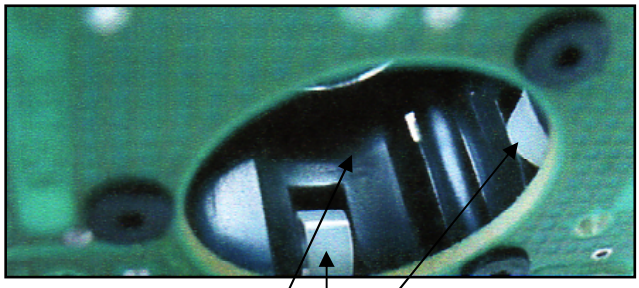
The computer mouse first came about in the early 1980's. The idea being that the movement from the users hand could be turned into signals that the computer could read moving the cursor around and also allowing the buttons to function when pressed.

Today there are a few different types of computer mice on the market. These being the mice that use the traditional tracking ball, the optical mouse and the mouse that has no physical connection to the computer.

The most common mouse found near a computer today is the traditional mouse that uses the tracking ball. This is the same method as was used when the mouse was first released in the 1980's. The track ball inside the mouse touches the desk when it is moved. When the ball moves the motion is detected by two perpendicular axis, one which detects x axis directional motion and the other y-axis direction motion.



Tracking Ball

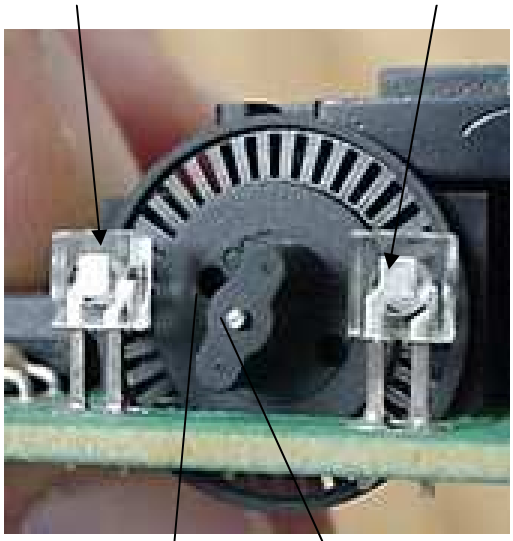


Perpendicular axis motion detectors

Hole in which track ball would sit

The diagrams above show the tracking ball and the hole in which the tracking ball sits. You can see the x and y axis motion detectors of which the y-axis detector lies 90° from the x-axis detector. These motion detectors are also known as rollers. When the mouse is in use the tracking ball moves moving one or both of the rollers. Each roller is connected to a shaft, which spins a disc. The disc has holes in it and next to the disc is an infrared LED and an infrared sensor. As the disc spins the hole in the disc breaks the beams of light generated by the LED and the sensor picks up these pulses of light. The speed of the

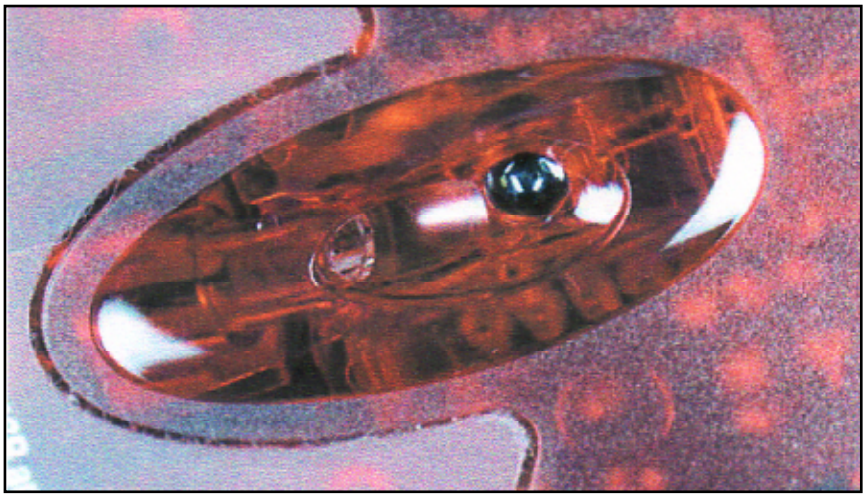
pulses is related to how far the mouse has travelled. If the disc spins faster the further the mouse would have travelled. A diagram below shows one of these discs.




So from the mouse which is mechanical the movement and distance can be measured. This all starts at the track ball as explain above and ends at the transducers, which send the information to the computer. Once the distance, movement and direction data is gathered from the physical and the pulses of light are picked up from the infrared sensor the information is sent to the transducers. These transducers translate the information into electrical signals. These signals are translated into binary and sent to the computer. The computer will understand the binary data thus moving the cursor on the screen as appropriate. This shows that both physical and electrical operations are needed and needed to work side by side in order for the computer mouse to function.

With the latest computer technology came the introduction of a computer mouse, which didn't need a tracking ball. This is called an optical mouse. The optical mouse can work on basically any surface. It works by using a tiny camera that takes 1,500 pictures every second. The optical mouse also has built inside it a red light emitting diode (LED), which allows light to bounce of the surface that the user is using the mouse on onto a complimentary metal-oxide semiconductor or CMOS sensor. This sensor sends each image to a processor. The processor can read patterns in the images and can see how the image has changed since the image before. Dependent on how much the pattern has changed over a sequence of images allows the processor to determine how far the mouse has moved. The processor then sends these measurements or co-ordinates to the

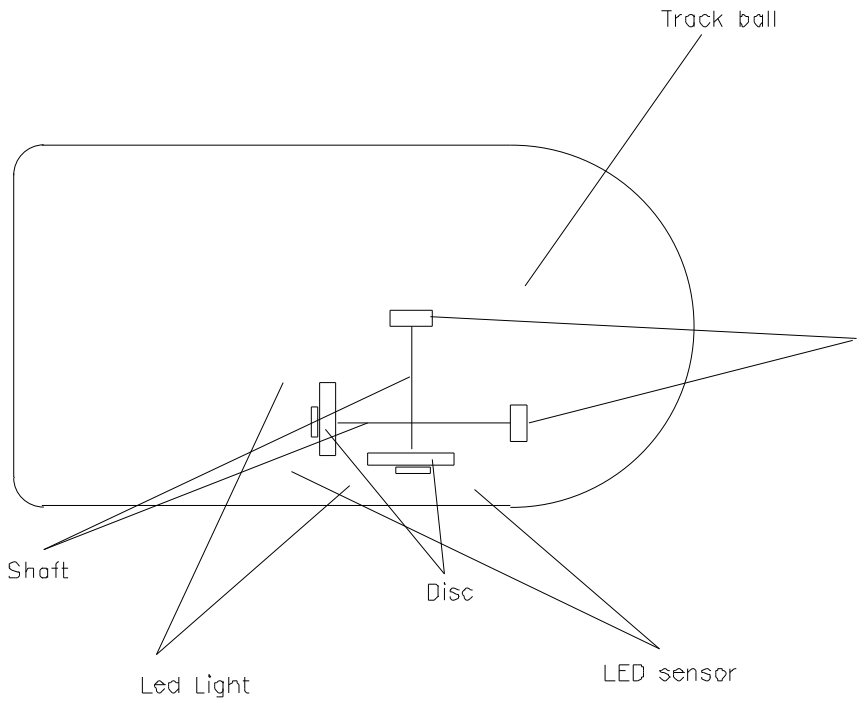
computer. The computer can read these co-ordinates and moves the cursor as appropriate on the screen. These co-ordinates are sent to the computer hundreds of times a second so the cursor can move freely.

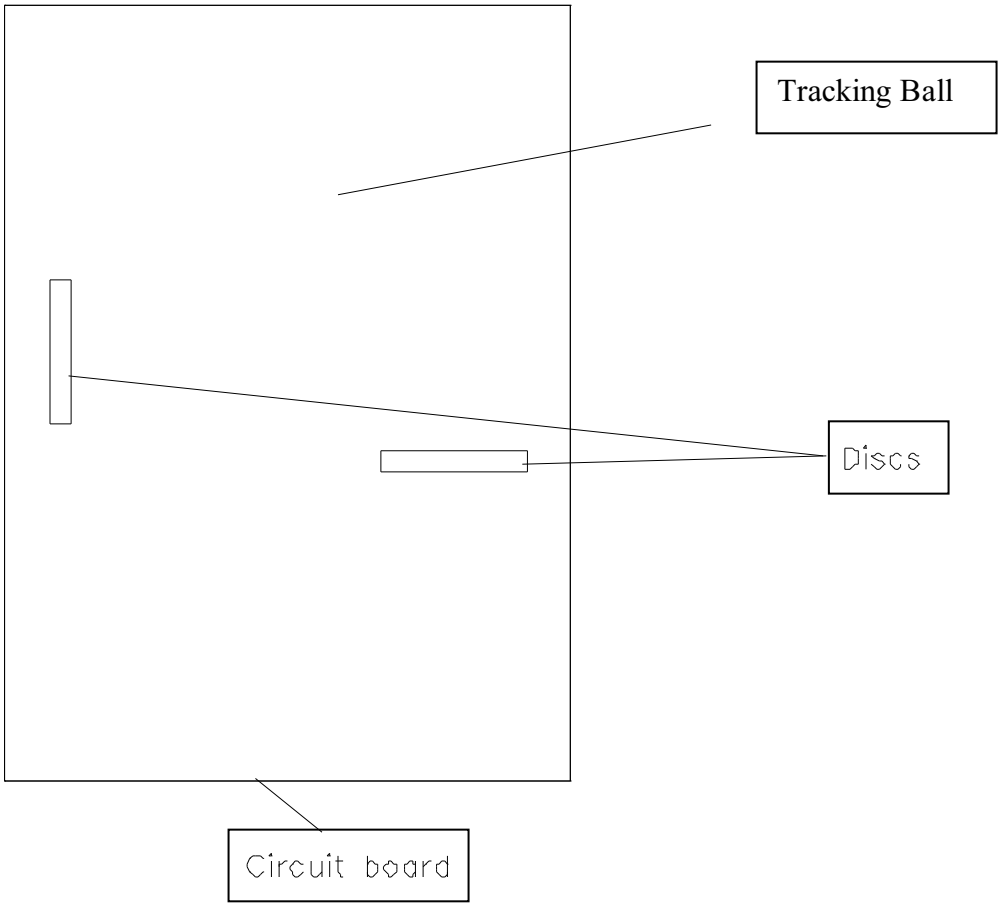


The picture above shows the bottom of an optical mouse. On this particular picture you are able to see the LED.

As technology has moved on we have also seen the introduction of computer mice without a physical connection to the computer. There are two different types of cordless mice. These mice normally come in two pieces. One of which being the mouse and the other a receiver. The power source of the mouse comes from batteries. These mice work by using infrared. The mouse pretty much works in the same way, the only major difference being how the computer receives the information. It's a bit like a remote control used on a telly. You press one on the remote and the telly receives the signal turning the channel to one for you. In this case the mouse is moved and the signal in sent by infrared to the receiver, which gathers the co-ordinates. The receiver is attached to the computer allowing the computer to read the information thus moving the cursor on the screen. The other type of mouse is pretty much the same in the respect that it still needs a receiver. However the data on this mouse is sent by radio waves instead of infrared. This means that you don't need the receiver directly in front of the mouse for it to operate. This receiver can be hidden for a neater look.

**Mechanical circuit and electrical**




Tracking Ball
Discs
Circuit board