

A Study Of An Optical Mouse To Customize It For Implementation Of Wireless Draw Pen

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Abstract—The paper represents the study of wireless mouse and implementation of wireless draw pen using Bluetooth Logitech mouse and complete understanding of mouse work and then customizing the same mouse to work as a draw pen in paint application using a simple hand finger. As drawing image by hand in digital format is difficult in any drawing application so to overcome this drawback draw pen is proposed.

Keywords—CMOS(Complementary metal–oxide–semiconductor,),LED (light Emitting Diode),DSP(Digital Signal Processor), PCB (Printed Circuit Board)

I. INTRODUCTION

For drawing a digital image there are different devices exist that helps an architect or a sketcher to represent his idea in digital form rather than doing it on a paper and it helps to refine of art. Several attempts have been made to reduce the size of the drawing devices so that it can be carried out anywhere.

Mostly used drawing device is optical mice. The optical mouse is works as pointer or as pen to draw the objects in digital format. The goal is to customize the mouse in such way that it will work as a pen to draw the objects in digital format.

II. OPTICAL MOUSE DEFINATION

An optical mouse normally contains LED in place of the traditional mouse ball and electromechanical transducer that produces a red light and that red light emitted from LED is reflected back on the CMOS sensor. The CMOS sensor sends each image that is reflected back to a DSP (Digital Signal Processor) for analysis. The optical mouse takes microscopic snapshots of the working surface at a rate of more than 1,000 images per second. If the mouse is moved, changes happened in the image are recorded and the tiniest irregularities in the surface can produce images good enough for the sensor and DSP to generate usable movement data. [1]

III. ARCHITECTURE AND WORKING OF AN OPTICAL MOUSE

As explained in above definition an optical mouse contains LED and a CMOS sensor, the basic architecture is shown in Fig 1. [3]

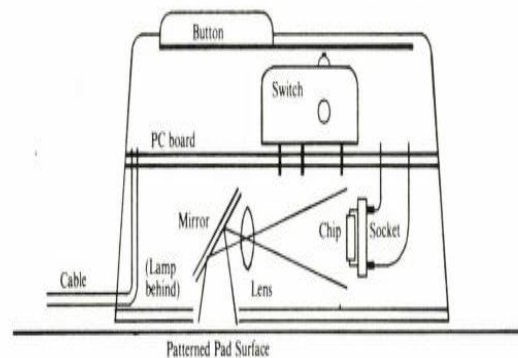


Figure 1. Optical Mouse Architecture

As there is mirror which is nothing but a magnifying glass which helps to predict the exact position of mouse pointer movements and that can be projected on screen from real world to digital world. As shown in Fig 2. The red led light is get reflected on magnifying glass and then the light again gets reflect from the mouse base towards the CMOS magnifier glass and here the light gets converted from analog to digital. All this function is done by CMOS sensor. Similarly in place of LED there can use of infrared light it also function same as that of LED but it's more accurate than the LED mouse. In wired LED mouse the signals are transmitted using USB cable whereas in wireless the signals are transmitted using Bluetooth data transmission.

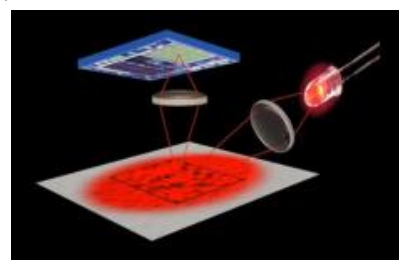


Figure 2. LED Working Mechanism [3]

In optical Mouse there are two main buttons called as left and right click and one scrolling wheel is at the center, these buttons are designed for special functions, such as scrolling device roller helps to scroll the window view upward and down. Fig. 3 shows a basic inside of optical mouse.

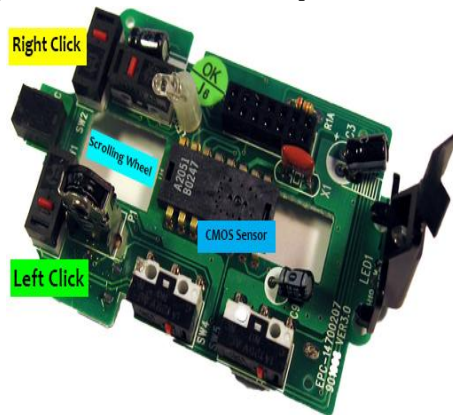


Figure 3. Inside View of Optical Mouse

IV. IMPLEMENTATION TO CUSTOMIZE MOUSE TO WORK AS A WIRELESS DRAW PEN

After understanding the basic architecture and working of an optical mouse, that knowledge is used to customize the optical mouse into a wireless draw pen. For implementing the wireless pen the wireless Logitech (M238) mouse has been considered for this experiment, Fig 4. [2] Shows the inside and outside view of the mouse. This mouse is worked on infrared sensor rather than LED but it works same as that of LED mouse.

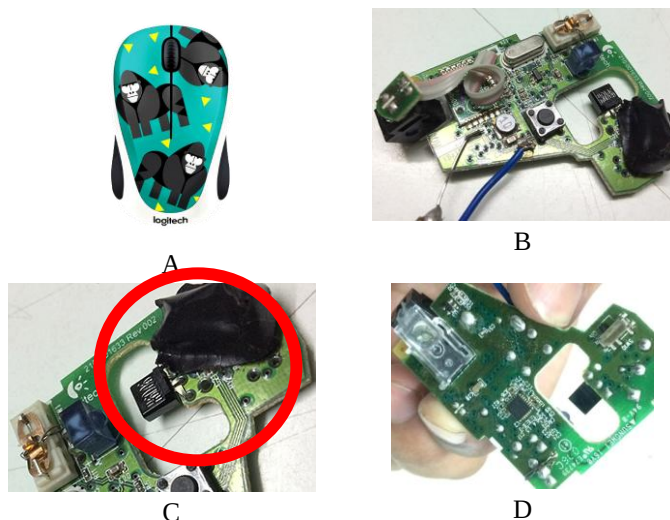


Figure 4. Logitech Optical Wireless Mouse Outer and Inner View

As shown in Fig 4 (C) marked with red, the requirement is only for drawing so the right click and scroll button has been removed also the to increase the battery i.e. power source the power connection are remove and new power connections are established as shown in Fig. 5

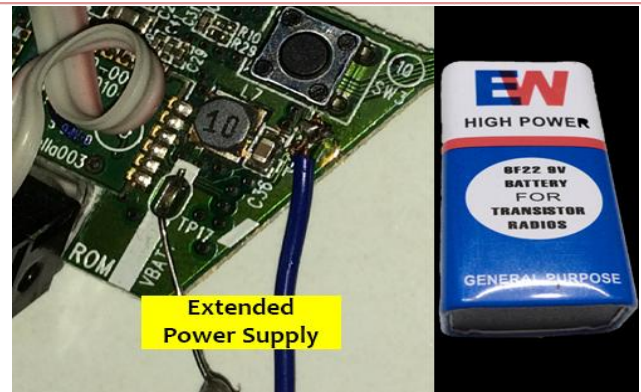


Figure 5. Extended Power Supply by Removing Old Power Connection

After reconstructing the power supply the left click is soldered Fig. 6 (A) in such a way that it will continuously send the analog signals to the system using Bluetooth connection whenever the power is on. Complete PCB is insulated with an electrical tape also known as insulating tape. Fig. 6 (C) shows the complete insulated PCB and power on off switch is included so that it will easy to switch between different function while drawing an object on the system.

Fig. 6 (B) shows the same. A small curved shaped hook is attached so that it can be easily hold into any finger shown in Fig 6 (C).

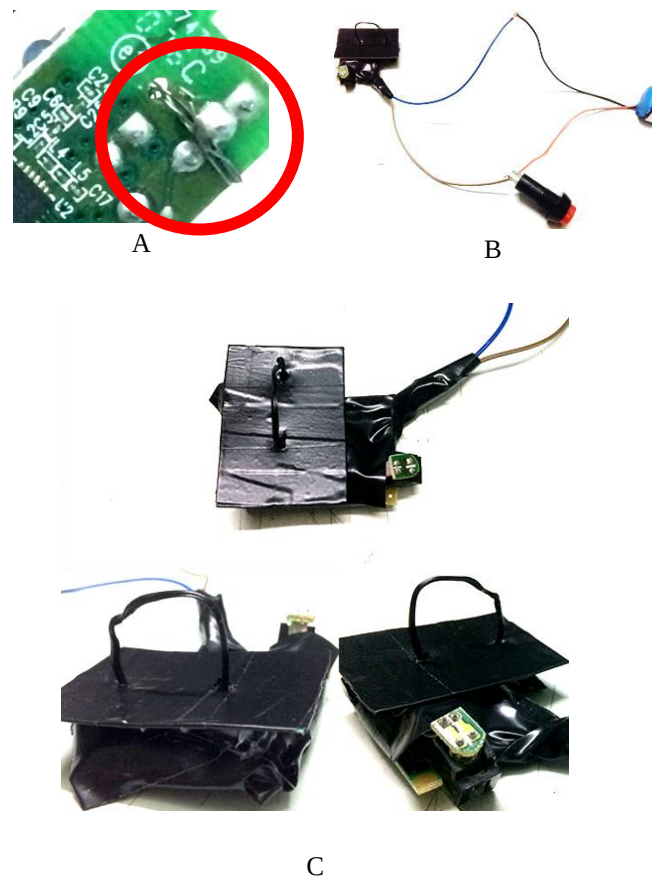


Figure 6. Soldering Of Left Click and Insulation with including of Power Switch

V. EXPERIMENT ENVIRONMENT

For Experimentation when complete connection are made the Bluetooth USB port is attached to the system which has wireless length of around 33 feet (10 Meters) and Logitech mouse PCB integrated with 2.4GHz wireless connectivity 128-bit transmission security. For powering the device a 6F22 9V general purpose battery is used. To switch on and off the power push button on off switch is used and can be controlled while drawing. A complete set is shown in Fig. 7



Figure 7. Experiment Environment Setup

VI. RESULT

After full connection the power is switched on to test the wireless draw pen, to draw a digital image MS paint application is used; Now as the power is on the analog signals are getting continuously transmitted. Whenever the pointer is moved it's able to draw the digital image, result of digital image is shown in Fig 8(A). As it's clearly visible it has drawn every motion on same page Fig 8(B) shown how the device can be used. A full demonstration of the execution is kept on YouTube [5].

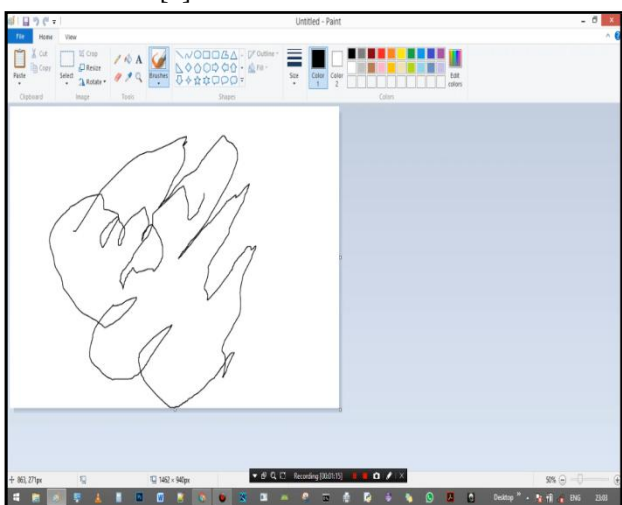


Figure 8(A). Digital Image Drawn By Wireless Draw Pen



Figure 8(B). Wearing Wireless Draw Pen

VII. CONCLUSION

After studying and implementing the first wireless draw pen can be used for basic digital image drawing in some basic application MS paint. The digital image is not up to the mark as there is scope of improvement where the edges can be more smooth and the device can be further customized into a more smaller version but in future work whatever the drawbacks and scope of improvements are remaining can be covered and research work can be further extended for better digital image drawing. Hence from this experiment conclusion can be made that wireless pen draw is very user-friendly, having more power source as well as it's cheaper than outside available drawing device. So far the objective achieved is 55% as Fig 8(A) can conclude that.

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