作品名稱

光之裁決
To be determined by the light

隊伍名稱

光之魔法使 The Magicians of light

隊　　長

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作品摘要

辦公室常有的會議報告，演講或是產品的推銷等，現今幾乎常常利用投影機投影當做媒介。簡報是報告者在有限的時間內將所要表達的內容，清楚而簡潔的傳達給與會者的重要利器。使用簡報軟體搭配投影機做簡報時，演講者最適當的位置並不是筆記型電腦前，而是聽眾可以同時看到演講者和投影出來的視覺輔助材料，而演講者也可以清楚看到所有聽眾的位置。通常在那樣的位置，電腦和滑鼠已經在演講者伸手可及的範圍之外。要引導演講者及與會者之間的契合，雷射筆是基本的配備工具。藉著光點的移動，清楚的引領目前講者所敘述的內容。然而一個好的簡報內容常常是圖文並茂，甚至透過動態圖表、文字，與影像聲音，以更活潑、清楚，容易明白的方式，將講者的意見與思想，傳遞給所有的與會者，以便凝聚所有與會者的注意力，而這需要進一步的使用滑鼠。透過滑鼠的移動、點選，達成所要的目的。然而一般做簡報時如演講者離電腦比較遠的時候，常常需要額外的操作者，如此易造成搭配上的問題。較先進者有採用簡報筆，可由演講者自行操作，如此流程比較順暢。較簡單的簡報筆只有上一頁、下一頁的功能再加上雷射指示功能，更進一步者有加入滑鼠的功能。但簡報筆上的滑鼠功能，因使用習慣不同，並不如預期的效果。

另有採用雷射光點當作滑鼠的游標點來操作者，然而現今的作法是其使用CMOS感測器，經由簡報用電腦解析出滑鼠游標的功能，將佔用系統資源，將使得簡報的流暢性大打折扣。而其透過特殊的雷射筆機構解決Click的問題，將限制其使用的用途。另外其校正相當繁瑣，且遠距離的操控引發手震動而無法進行精確定位的問題更限制該產品的發展。

本研究是以一般的雷射筆的光點作為簡報的指引以及兼做滑鼠功能的使用，整個系統猶如從遠方控制一觸控面板，當初始化後就可使用雷射筆來控制並使用，當演講者將雷射光(Laser Light)投射至布幕時，除了講解自己的報告外，還可控制PowerPoint的上一頁、下一頁、超連結等...，因此演講者可打破以往的操控方式，單單使用一支雷射筆就可以完成會議報告。本研究以雷射光點作為滑鼠游標的操作點，是以FPGA做影像分析解出雷射光點座標，以作為滑鼠游標的依據，解析過程中完全不經過電腦，不佔用電腦資源。且以硬體的方式分析將可以在每個Frame解析出一組座標點，效率遠比用軟體分析來得高，因此將可以增加簡報的流暢度。而本研究將利用自然法則解決手震動的問題，使得吾人使用一般的雷射筆功能就可以做到精確的Click、Double Click的功能。另外本研究也將提出自動校正的方法，以達更實用的目的。

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- 研究成果：獲得2007德國紐倫堡國際發明展金牌獎，國內外專利三十多項，指導學生參賽獲獎超過50項，其中連續五年入圍旺宏金矽獎決賽，連續七年教育部微電腦比賽獲獎。

Abstract

Projectors are often used in the conditions of the conference meeting, the oral speech, the promoted sales, etc. A briefing report is important thing to be clearly and definitely expressed an idea to listeners by the speaker within a limited time. The best location of the speaker, who utilizes the projector and the software of the PowerPoint, is not near the notebook computer. The better place is at which the listeners can see the speaker and the screen of the projection, and the speaker can also see the whole listeners in the same time. The place is often far away from the computer. The speaker can no longer operate the conventional mouse in hand. A laser point is the fundamental tool to indicate the keynote contents to the listeners. The speaker makes a distinct report to the listeners by moving the place of the luminous laser point. The content of a good briefing report is a multi-media type which includes texts, dynamic graphics, tables, sounds and movies to make the speech more clearly, more richly and more attractively to condense all conferees' attention. The mouse is necessary for the further more functions. These functions can be completed by moving the mouse, selecting the icon, and clicking/double clicking the mouse button. Another extra operator is necessary when the reporter is far from the computer, but it is hard to arrange in pairs. A briefing tool can be used in addition such that the reporter can operate the process by him. There are only functions of page up, page down and laser light point for a simple briefing tool. The mouse function is another choice for the briefing tool, but it is not so popular by the user's customs.

The place of a laser light point is as the cursor of the mouse is another application. A CMOS sensor is used to detect the place of the laser light point, and a image process is made by the briefing's computer. The image process will take up systematic resources of the computer, and then will the briefing will not be smooth. And the above system solves the click function of the mouse through a special structure of the laser light pointer, and the occasions of the briefing tool will be limited. The calibration of the above system is minute and complicated, and it is not able to get precise cursors due to the hand's tremble of the reporter.

This research is concerned with the topics which the place of a laser light point is used as an indicator of current keynote speech and a cursor of mouse function. The system is as remote touch screen. The functions can be reached after calibration. The functions of the PowerPoint software, such as the page up, the page down, and the hyperlinks etc., can be remotely executed when the laser light is put on the screen.

The research is focus on the place of laser light point being as the cursor of the mouse. The coordinate of the laser light spot is analyzed by the hardware of an image based FPGA. The personal computer is not necessary in the image analysis process, and then the resources of the computer are not occupied. The cursor of mouse can be got as rapidly as the image frame rate of the CMOS sensor in the FPGA hardware method. The efficiency of the proposed method is higher than one of the software method. A natural rule will be proposed to solve the problem of the hand's tremble, such that more accurate functions of the click/double click can be reached by a general laser point device. An automatic calibrated method will be also proposed in this research for in practice.