摘要

以直下式LED背光(Direct Backlight)模組搭配局部調光(Local Dimming)技術是下一波液晶電視在背光控制的主力发展方向。其好處是可大幅降低耗電量、提高顯示畫面對比值、灰階數，及減少殘影等，為其它背光源難以取代之處。目前LED背光之局部調光技術其最佳的效果則屬2D Dimming。現今LCD降低耗電量作法大致分以下方式: (1)使用高效率LED背光模組開發;(2)提高LCD面板之透光比率(aperture ratio);(3)使用新式光學膜(Optical Film)來開發及減少電路使用數。本計畫將設計一套新型數位化LED背光模組之局部調光控制器，利用高效率LED背光模組並搭配二維Local Dimming技術，開發於直下式LED背光控制電路。利用掃描驅動之控制方式，減少驅動IC的使用數量與降低動態影像殘留之問題。並利用脈衝驅動方式，克服因人眼視覺暫留所造成的殘留現象。本計畫先期將依據電路設計與分析，以及相關實務考量，設計42吋新型白光LED背光模組之局部調光控制系統；在本計畫後期將驗證硬體電路與實際量測效能，實現一套低成本、高效率架構之可局部調光LED背光模組控制電路。

Pairing direct type LED backlight module with local dimming technology is the main direction of development in the next wave of backlight control for liquid crystal display (LCD) TV. Its advantage is a huge reduction of power consumption, improvement of the display contrast ratio and grayscale, decrease in the amount of ghosting, and so on. These benefits make it difficult for other backlight devices to take the place of said technology. At present, the best effect of LED backlight’s local dimming technology is 2D Dimming. Currently, LCD generally reduces power consumption using the following methods: (1) Utilizing high efficiency LED backlight module to develop power saving functions; (2) Enhancing the aperture ratio of the LCD display; (3) Employing novel optical films to develop the circuitry and reduce the number of circuits used. In this project, the local dimming controller of a new digital LED backlight module will be designed. A high efficiency LED backlight module will be paired with a two-dimensional local dimming technology to develop the direct type LED backlight control circuitry. Using the control mode of the scan drive, drive IC use will decline and the problem of video residual will be reduced. Also, by employing pulse drive, the residual effect caused by the persistence of vision in humans will be overcome. In the beginning phases of this project, the local dimming control system of a 42 inch new white LED backlight module will be constructed based on circuit design and analysis, as well as related practice considerations. In the later phases of this project, the hardware circuitry will be tested and actual results will be measured. This is done in an effort to create a low cost, high efficiency framework for the control circuit of a LED backlight module that can be dimmed locally.