Luminous Efficiency of Large Displays

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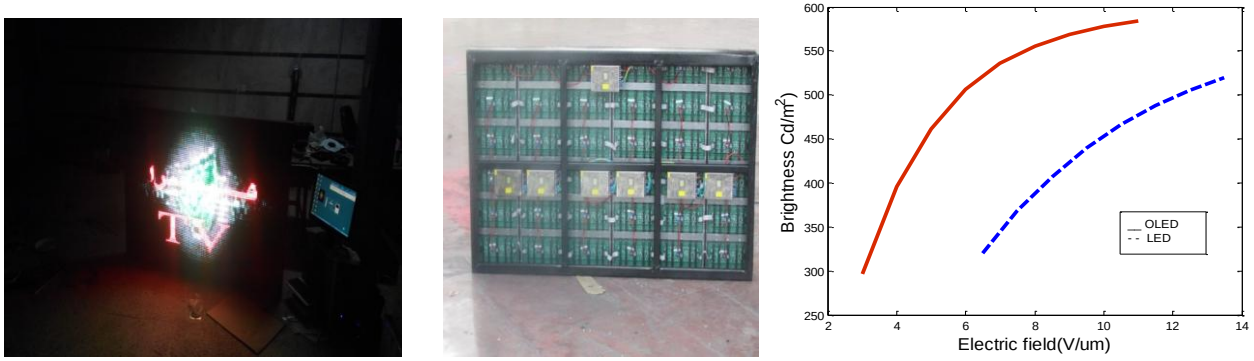
Large displays and panels are increasingly being manufactured and commercially exploited for both indoor and outdoor screens. LED displays are flat panel displays that through arrays of light-emitting diodes have become suitable video displays and in which their brightness intensity allows them to be ideal for outdoor LED displays; in particular large televisions of up to 50m^2. LED panels are commonly categorized into conventional (using discrete LEDs) and surface-mounted device (SMD) panels [1], [2] and due to the low brightness of SMD technologies, they have become most popular for indoor screens. Henceforth, brightness of technologies is a key determinant for application suitability.

In considering that the maximum brightness required of a CRT is typically 70 cd/m^2 and that for outdoor screens it is approximately 5,000 cd/m² under direct sunlight (the sun emits approximately 4,000 cd/m^2) [3], understandably outdoor large LED displays may experience high power consumption and heating complications. This is further increased when such displays are used under high temperatures during summer afternoons. In this regards, this paper investigates how heat display may be reduced while ensuring luminous efficiency within large displays.



(a) (b) (c)

Fig. 1. (a) Image of an OLED display (b) power supplies (c) currency vs luminous efficiency

As shown in Fig. 1, this work experiments on large displays including both conventional LEDs and OLEDs. The maximum brightness for LEDs and OLEDs are 800 cd/m² and 900 cd/m², respectively. However, based on luminous efficiency and long lifetime, experimental results demonstrate that the performance of OLEDs are superior in comparison with LEDs. During experimentations, the number of power supplies were increased accordingly (Fig.1.(b)) to reduce the heat of the displays. By controlling the electric for the OLED, we successfully reached a lower operating voltage at 0.5V and a 20% higher efficiency. Henceforth, in comparison brighter pictures are displayed.

References

1. M. Jacobsen, Extended Abstract of the 1st International Conference on the Science and Technology of Display Phosphors, *Society for Information Display*, 1995, p. 213 (1995)
2. S. Altazin et.al, Multi-Scale Modeling of Organic Light-Emitting Devices, *IMID2013*, p.108 (2013)
3. A. Werner, ETL materials: challenged by the diversity of applications, *IMID2013*, p.26 (2013)