光電的新科技生活

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彰化師範大學機電工程學系

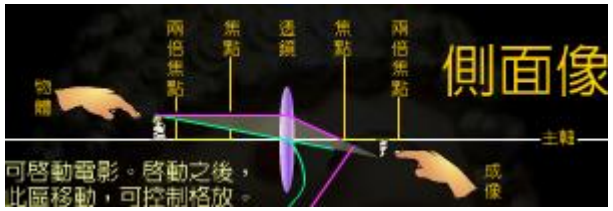
課程簡介

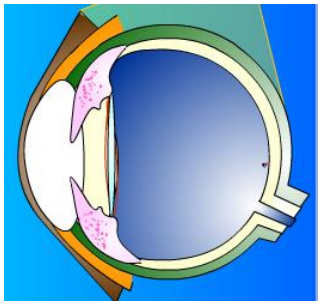
- 第一節: 顯示科技新生活
- - 人性化生活:Do Co Mo
- - 透鏡 成像: 表單
- - 人眼、光學
- - Fresnel 透鏡
- - 立體成像

- 第二節: 光電感測新科技
- - 雷射測量距離:
- 三角測距法
- 游標卡尺

顯示科技新生活

- 透鏡成像
- 人眼、光學
- Fresnel 透鏡
- LCD TV 液晶電視
- LED 大型看板

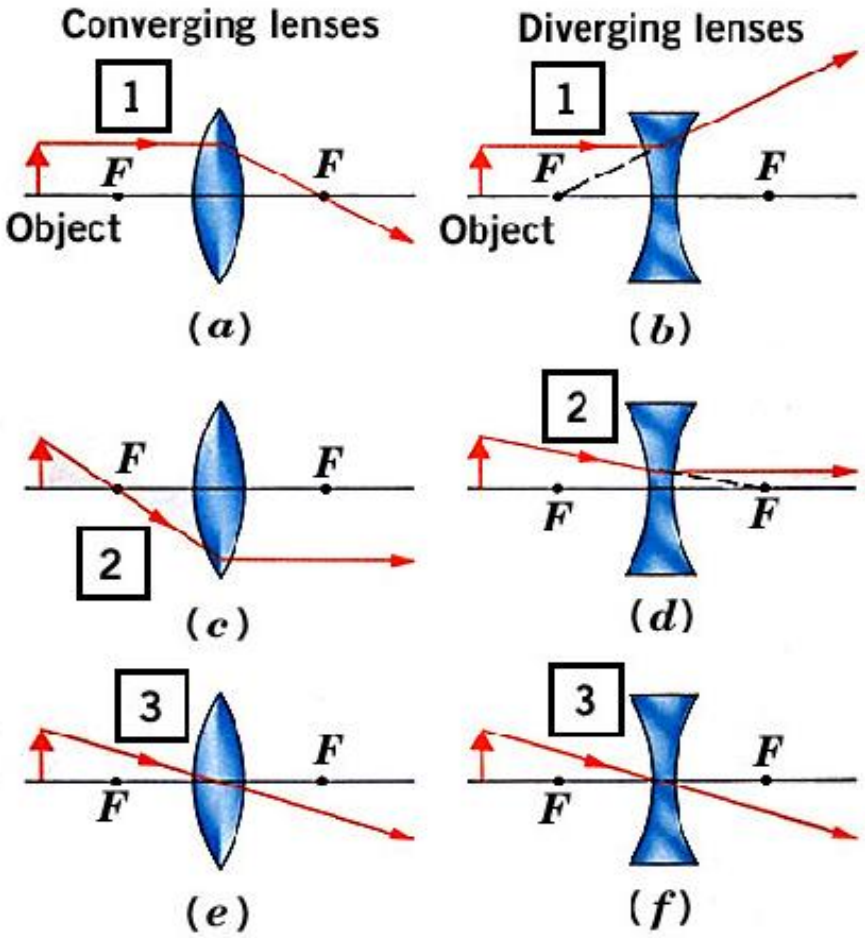




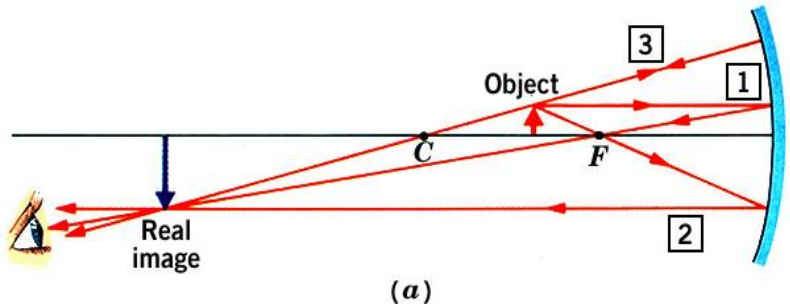
成像位置

透鏡種類	蠟燭的位置	能否在紙屏上成像	正立或倒立	像的大小(與原物比)
凸透鏡	兩倍焦距外	能	倒立	縮小
	介於兩倍焦距與焦距之間	能	倒立	放大
	焦點與鏡面之間	否	正立	放大
凹透鏡	兩倍焦距外	否	正立	縮小
	介於兩倍焦距與焦距之間	否	正立	縮小
	焦點與鏡面之間	否	正立	縮小

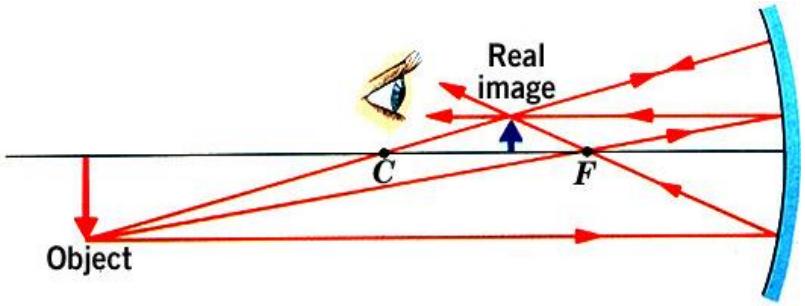
透鏡成像方式


Converging lenses
Diverging lenses
1
F
F
Object
(a)
1
F
F
Object
(b)
F
F
2
(c)
2
F
F
(d)
3
F
F
(e)
3
F
F
(f)

實像

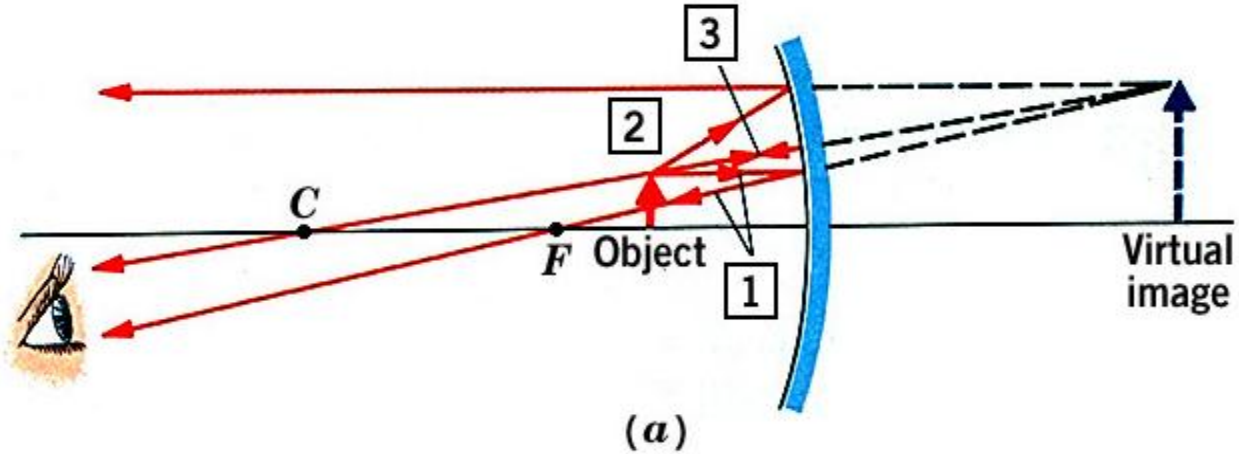


(a)



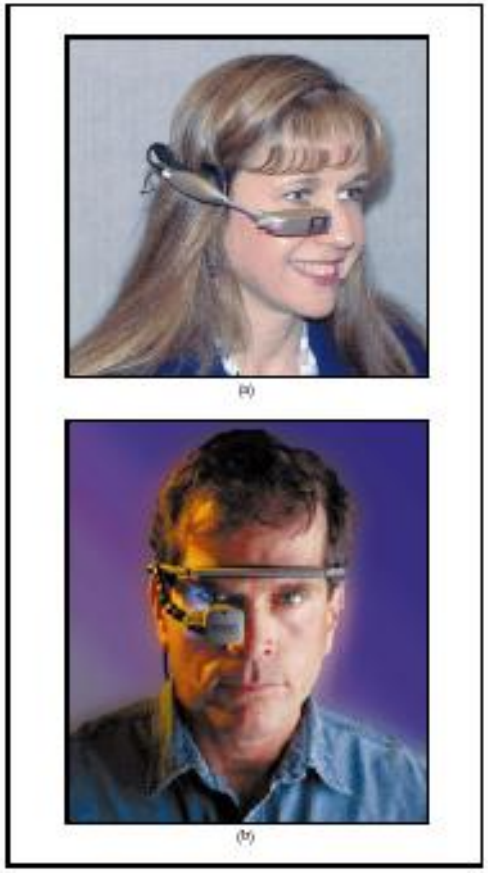
(b)

虛像



(a)

Microdisplay



MOEMS

Microdisplay

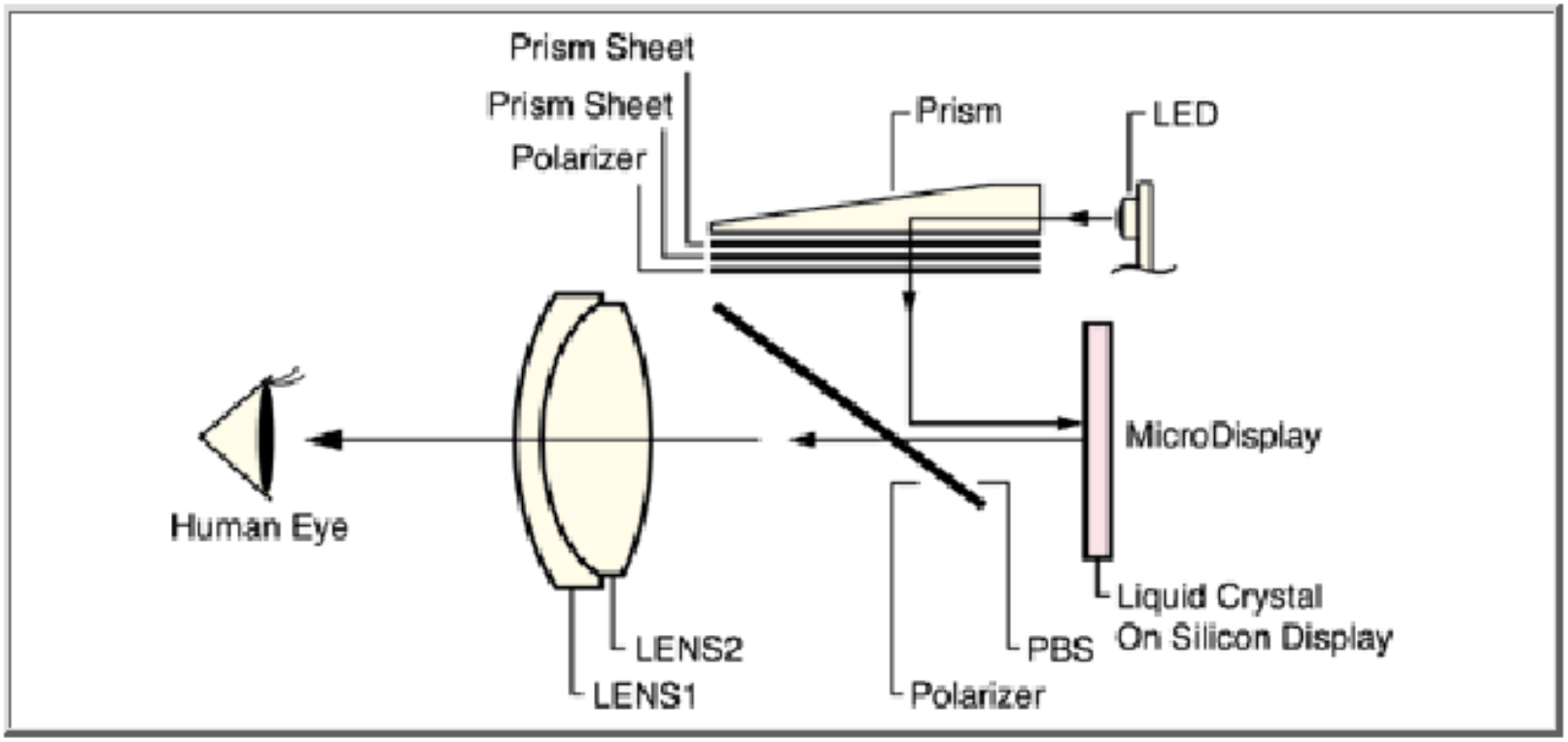
MOEMS

Microdisplay technology for incorporation into the Strike Helmet

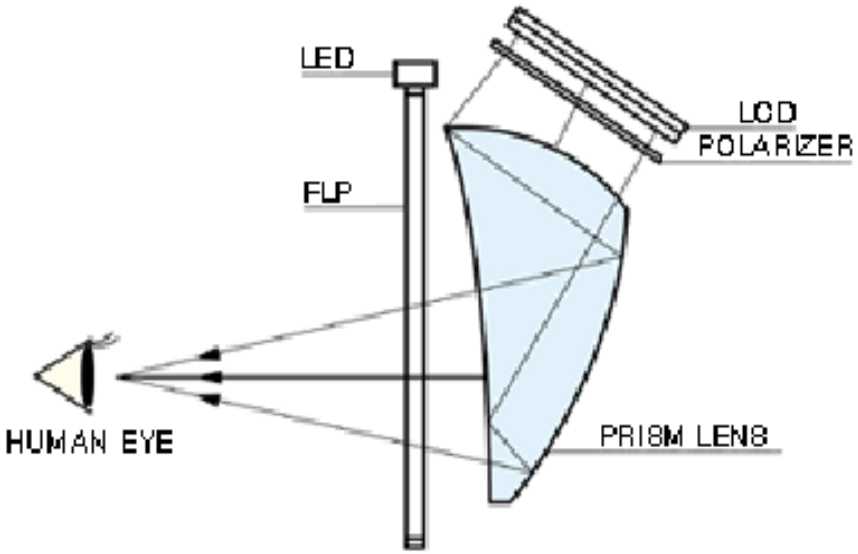
The U.S. Air Force has selected eMagin Corporation's OLED microdisplay technology for incorporation into the Strike Helmet 21 system that uses the Integrated Panoramic Night Vision Goggles in avionics helmets.
The Strike Helmet 21 system is targeted for integration into F-15E aircraft by the 2003-2004 time period.
"Now that we have moved beyond the R&D stage for our initial microdisplay products, much of which was supported by US military research contracts, we continue to work closely with military contractors and customers," said Gary Jones, president and CEO of eMagin. "Of the first more than 40 potential customers to whom we have shipped OLED microdisplay evaluation kits or from whom we have received initial production orders, over 17 are evaluating our microdisplay for a variety of military systems."

Flight Helmet Mounted

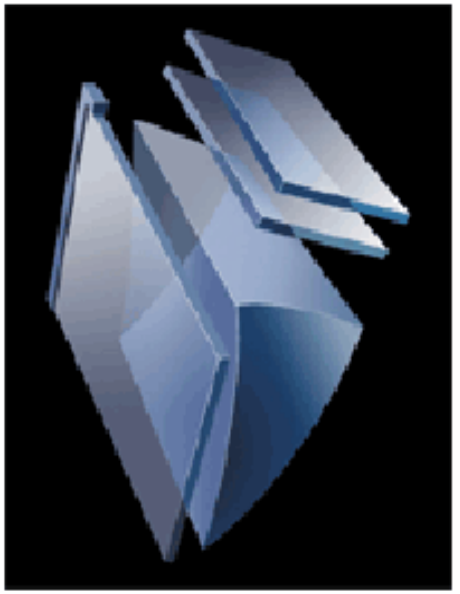
Microdisplay-LCD 1



Microdisplay-LCD 2



[Display Engine]



[Free Curvature Prism Lens]

Type of Microdisplay

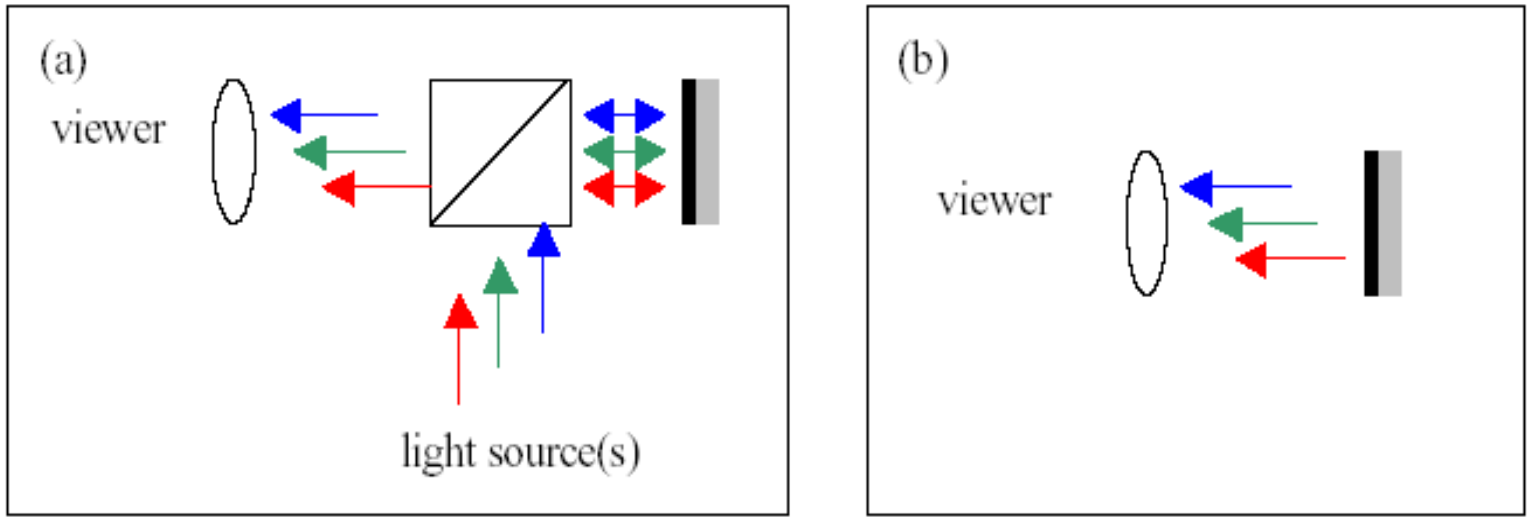
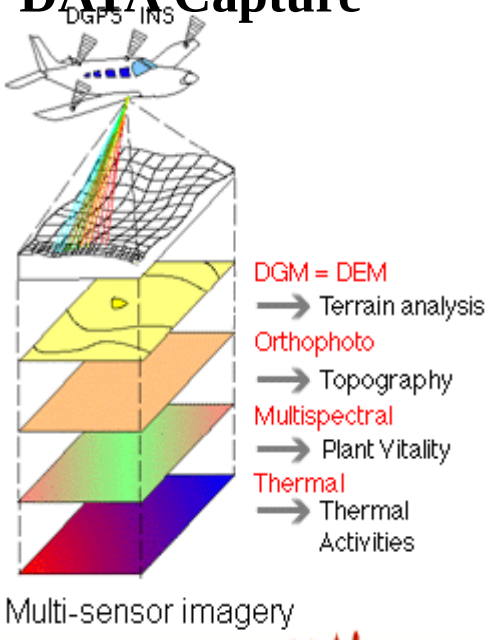


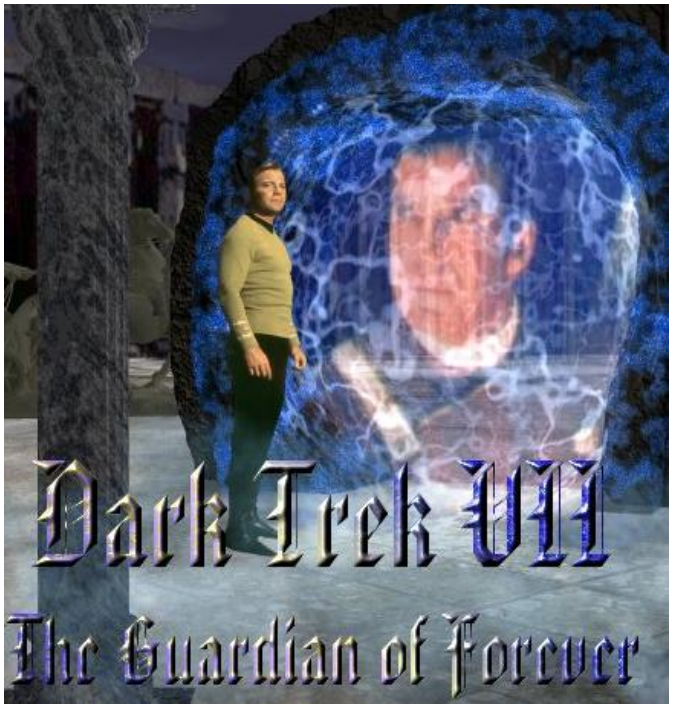
Fig 2.1 Simple system schematic of (a) modulating microdisplay (b) emissive microdisplay

3D Imagery

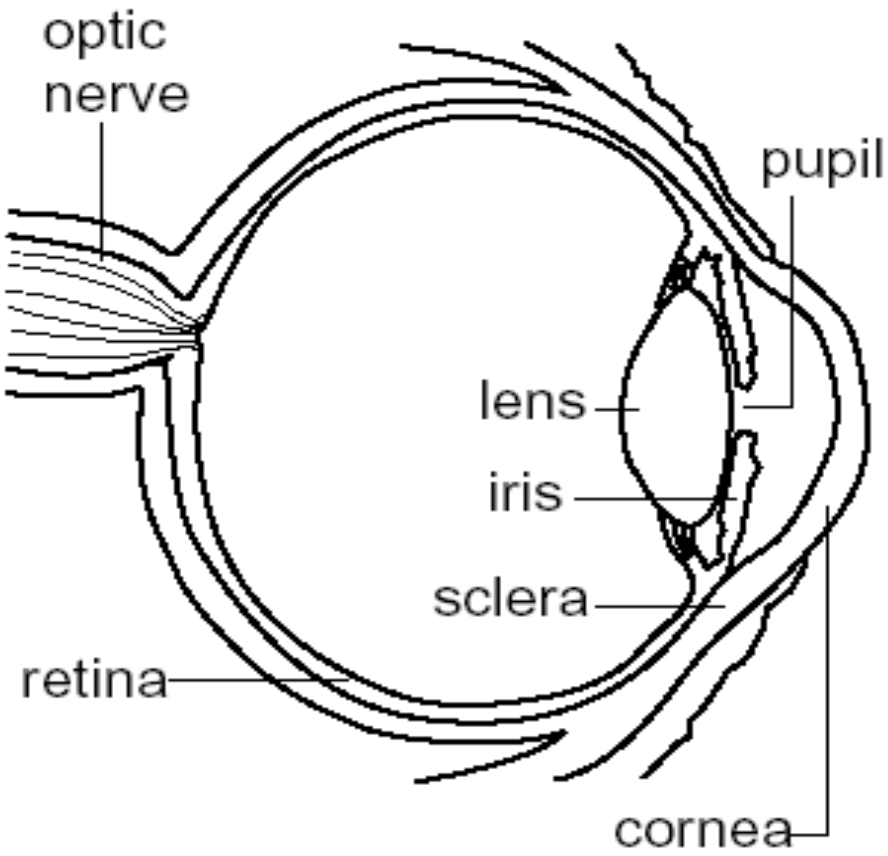
DATA Capture



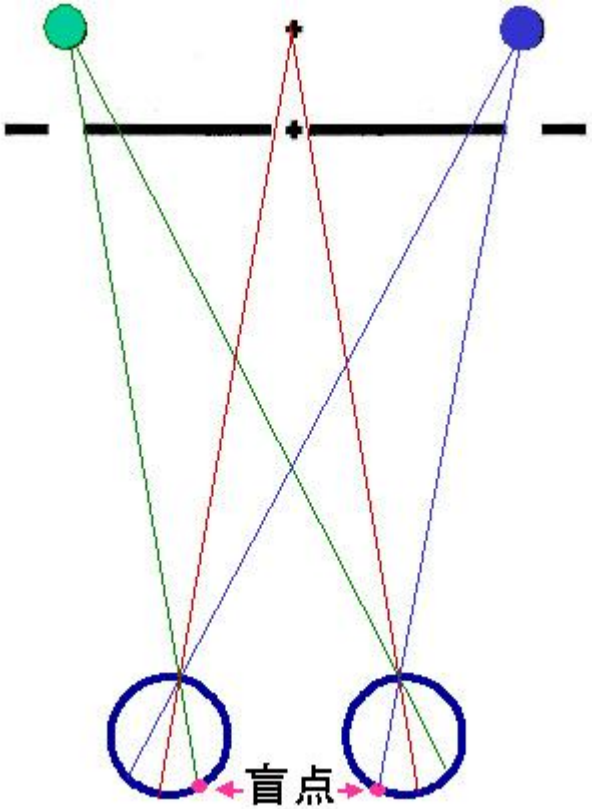
DATA Display



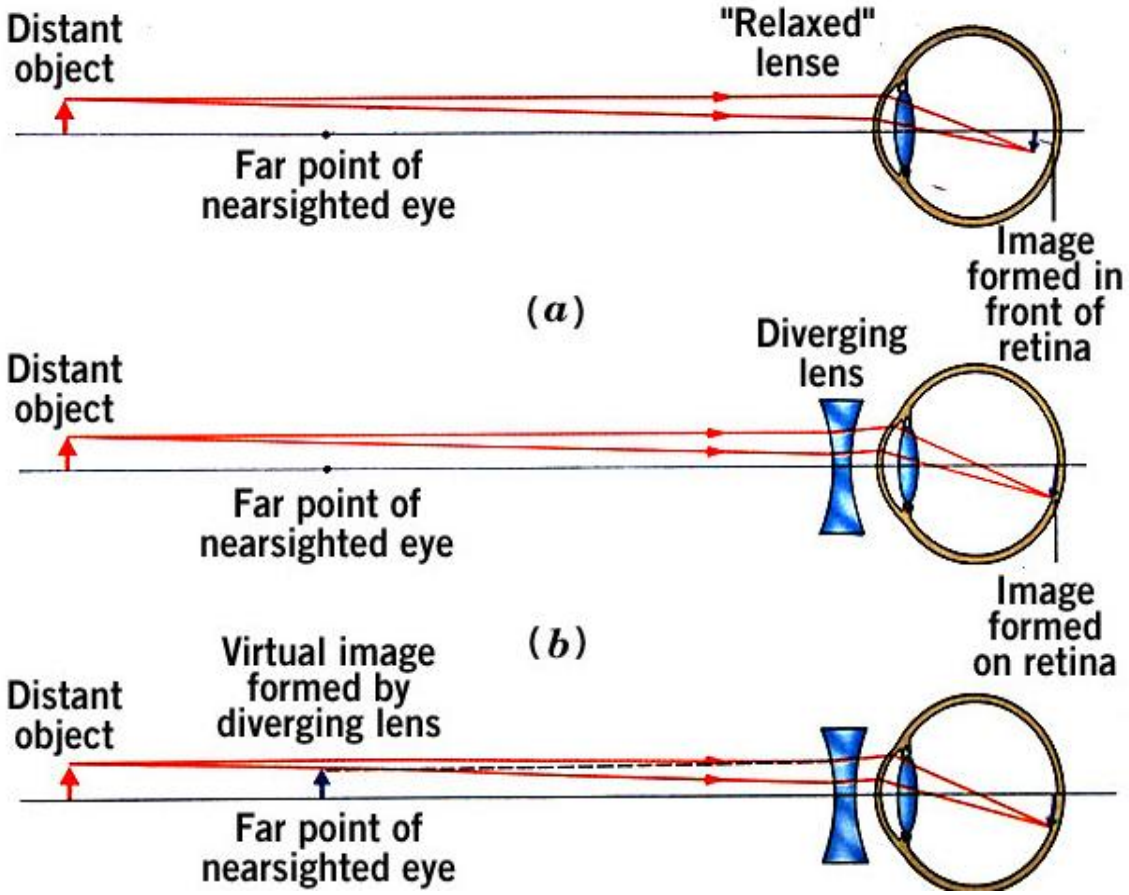
人眼結構



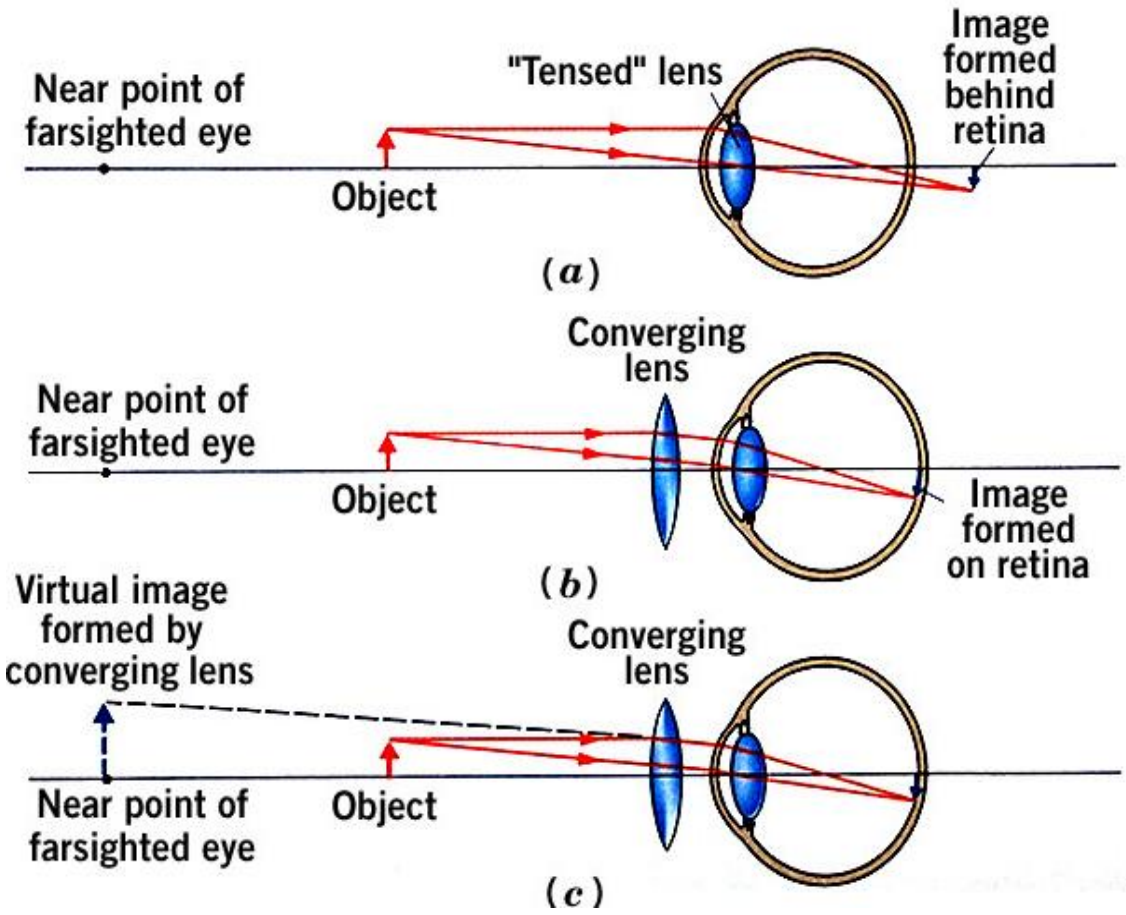
盲點



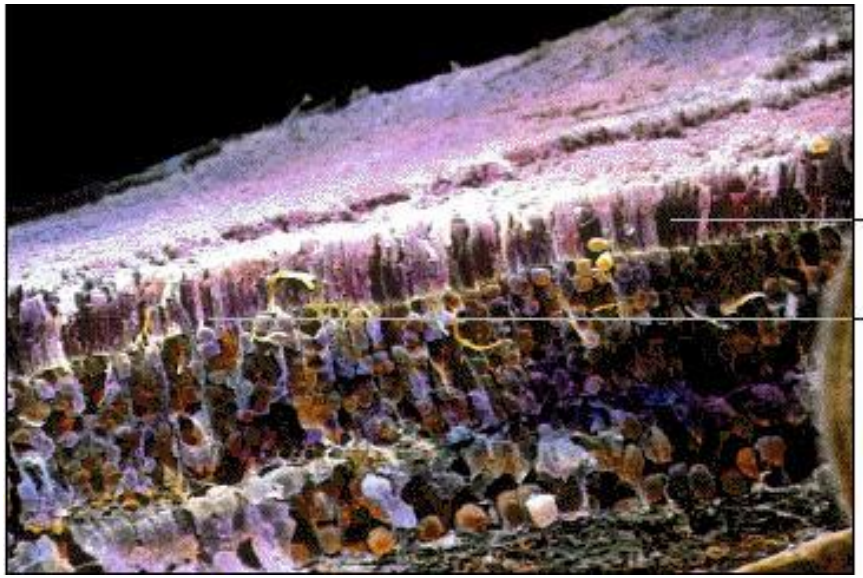
近視與修正

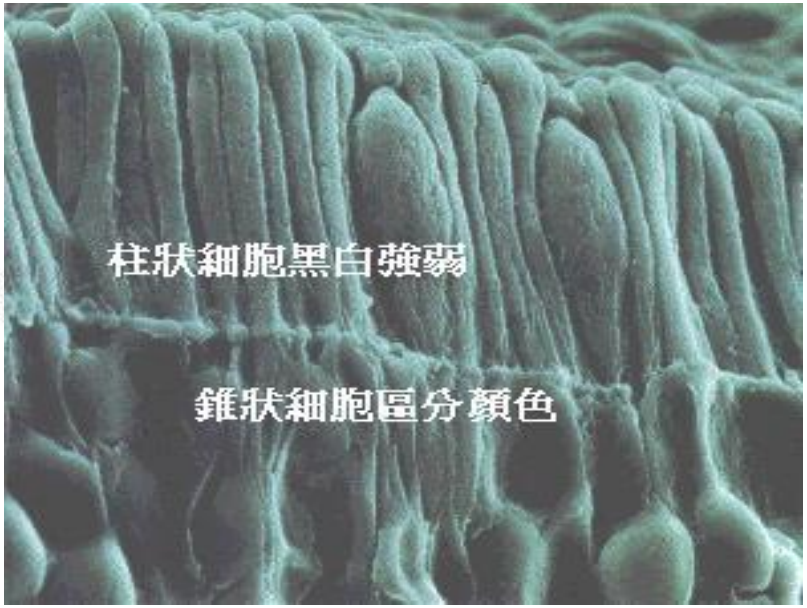

Distant object
"Relaxed" lense
Far point of nearsighted eye
Image formed in front of retina
(a)
Distant object
Diverging lens
Far point of nearsighted eye
Image formed on retina
(b)
Virtual image formed by diverging lens
Distant object
Far point of nearsighted eye

遠視與修正


Near point of farsighted eye
"Tensed" lens
Image formed behind retina
Object
(a)
Converging lens
Near point of farsighted eye
Object
Image formed on retina
(b)
Virtual image formed by converging lens
Converging lens
Near point of farsighted eye
Object
(c)

人眼



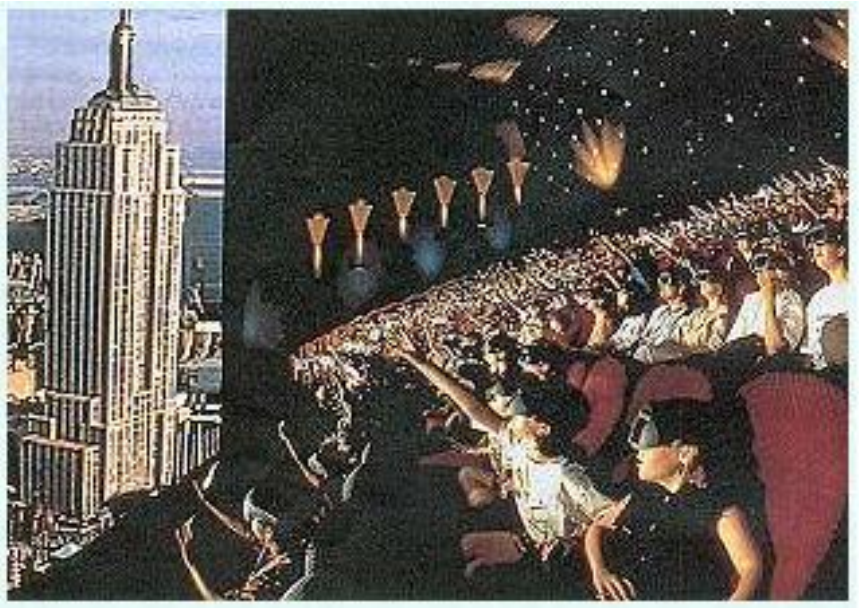


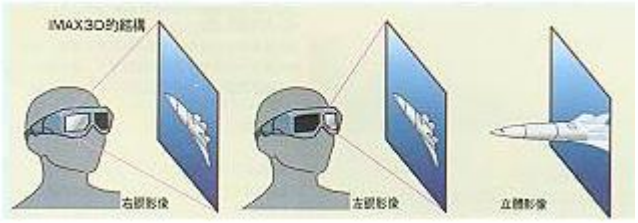
Polarization--可呈現6層樓高巨大畫面的大型立體影像系統

加拿大愛馬克斯公司(lMAX)是著名的立體影像裝置的開發者，該公司係發跡於蒙特婁(Montreal)萬國博覽會，當時該公司曾經將多放影機的方 式(multi一screen)應用於電影上面，產品推出後獲得極高的評價。

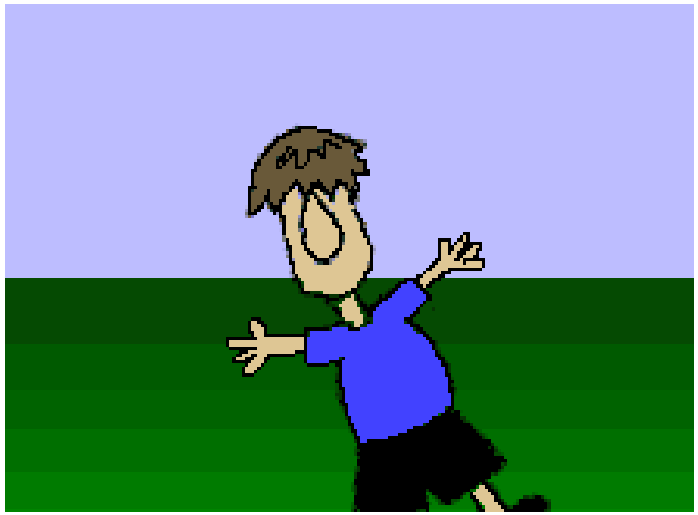
由於電影製作人想避免使用複雜的多放影機方式，於是該公司又開發出以單架強力放影機就能獲得同等效果的裝置，這就是所謂的「IMax影像系統」。

IMAX影像系統於1970年大阪萬國博覽會首次亮相，那個時候是利用極大型的銀幕來展現嶄新的影像。1985年筑波科學博覽會，此項系統則以能提供立體影像的方式露面。

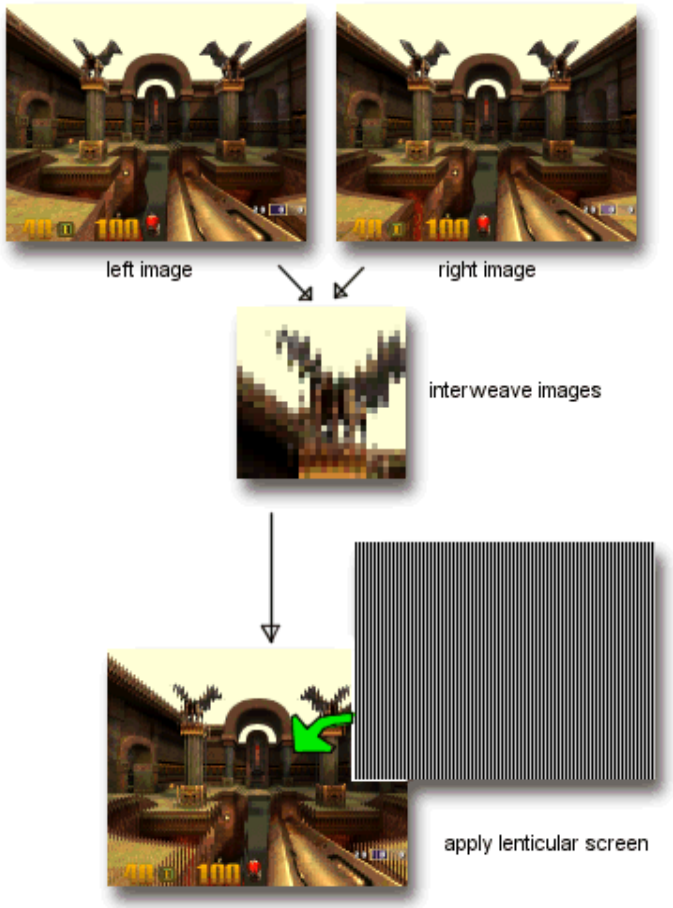




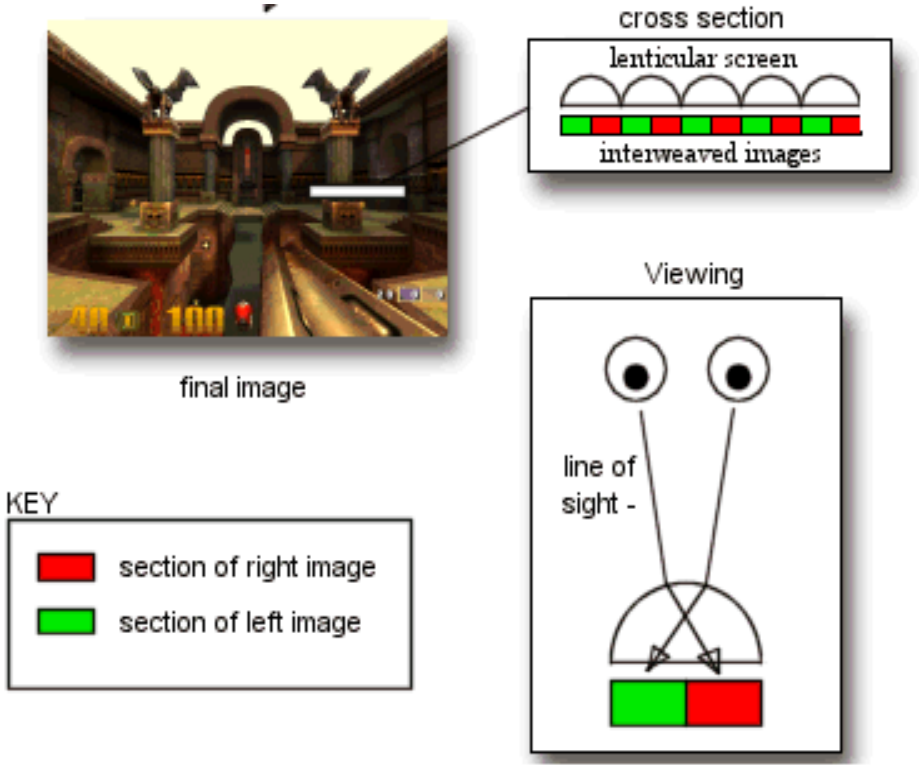
Inter-vision /3D Display Techniques



Principle I.

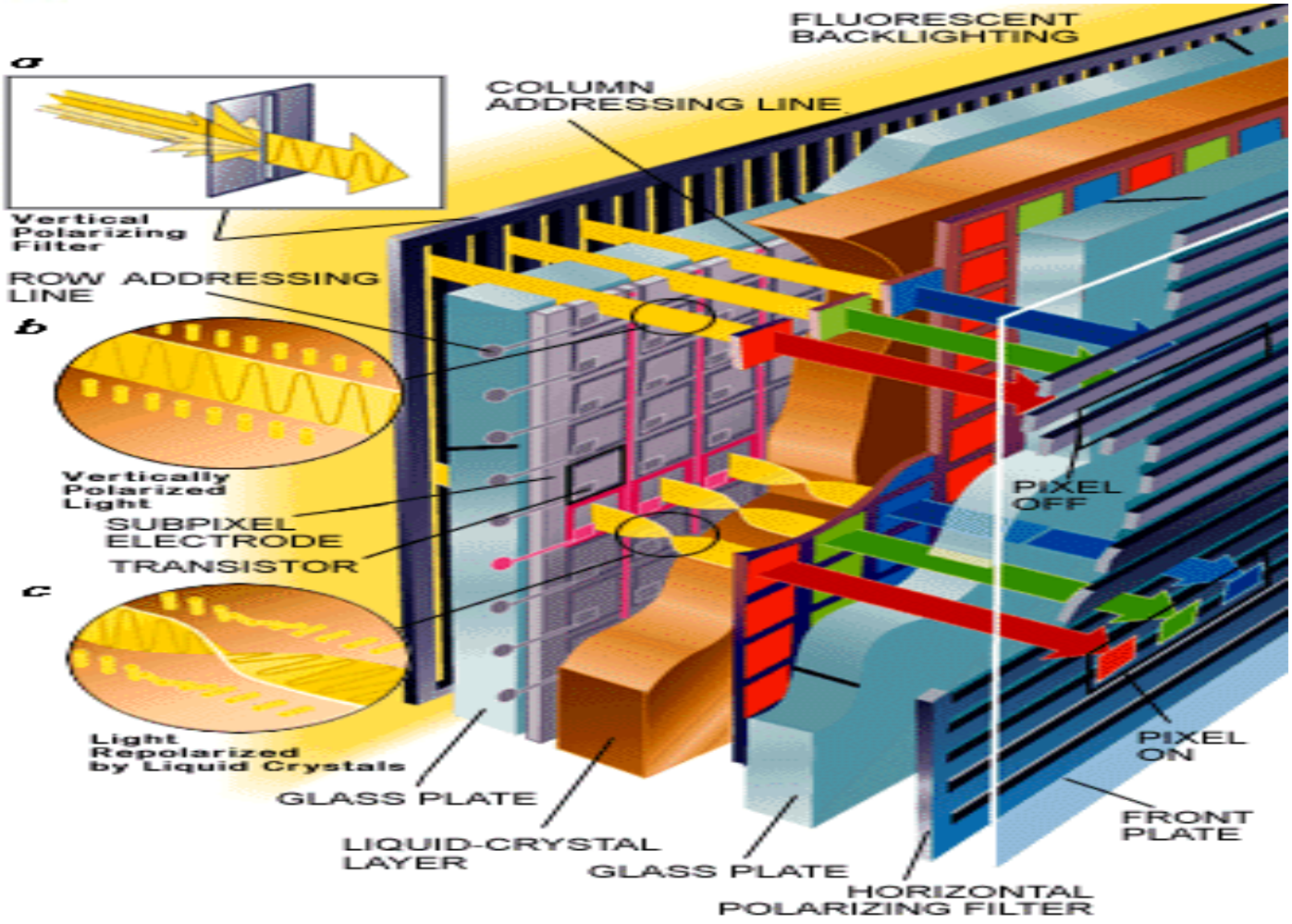

left image
right image
interweave images
apply lenticular screen

Principle II.

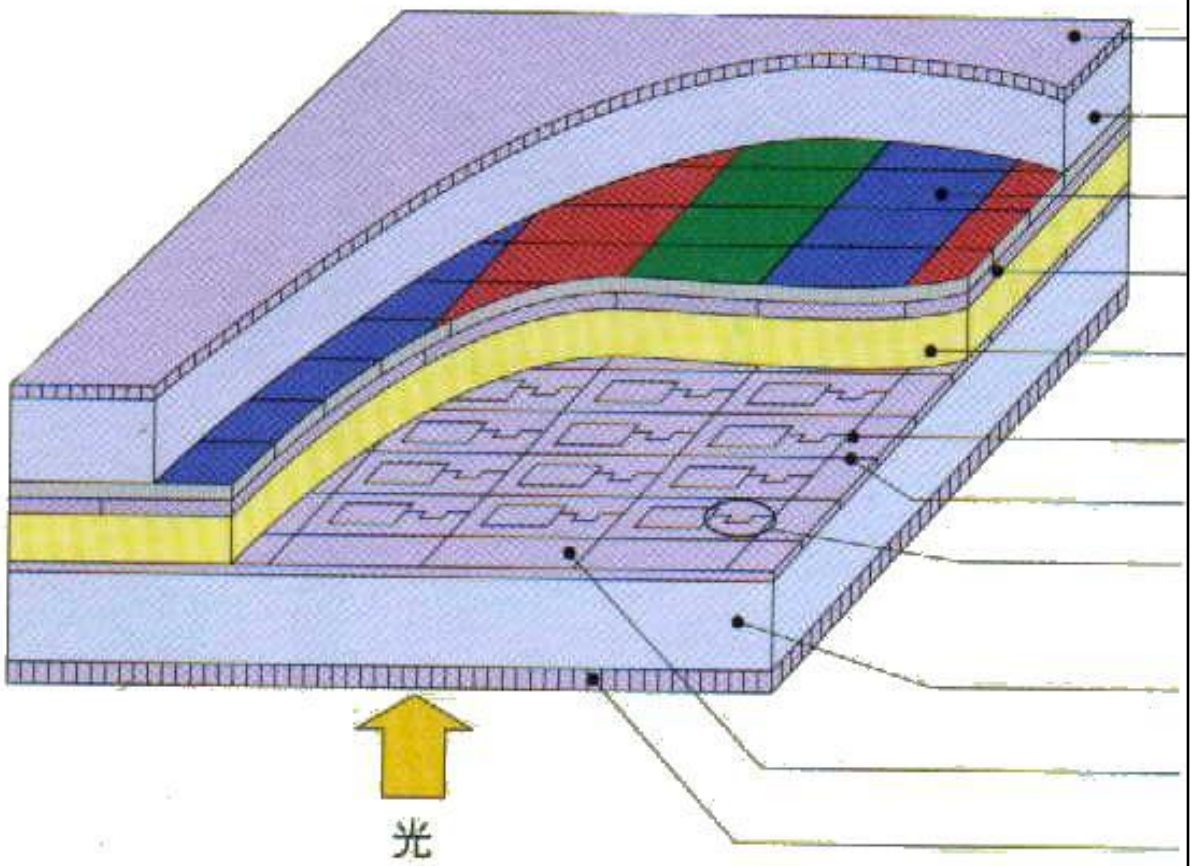


LCD TV 液晶電視

TFT-LCD 的顯示原理 (一)



TFT-LCD 構造剖面圖



上偏光片

彩色濾光片

液晶

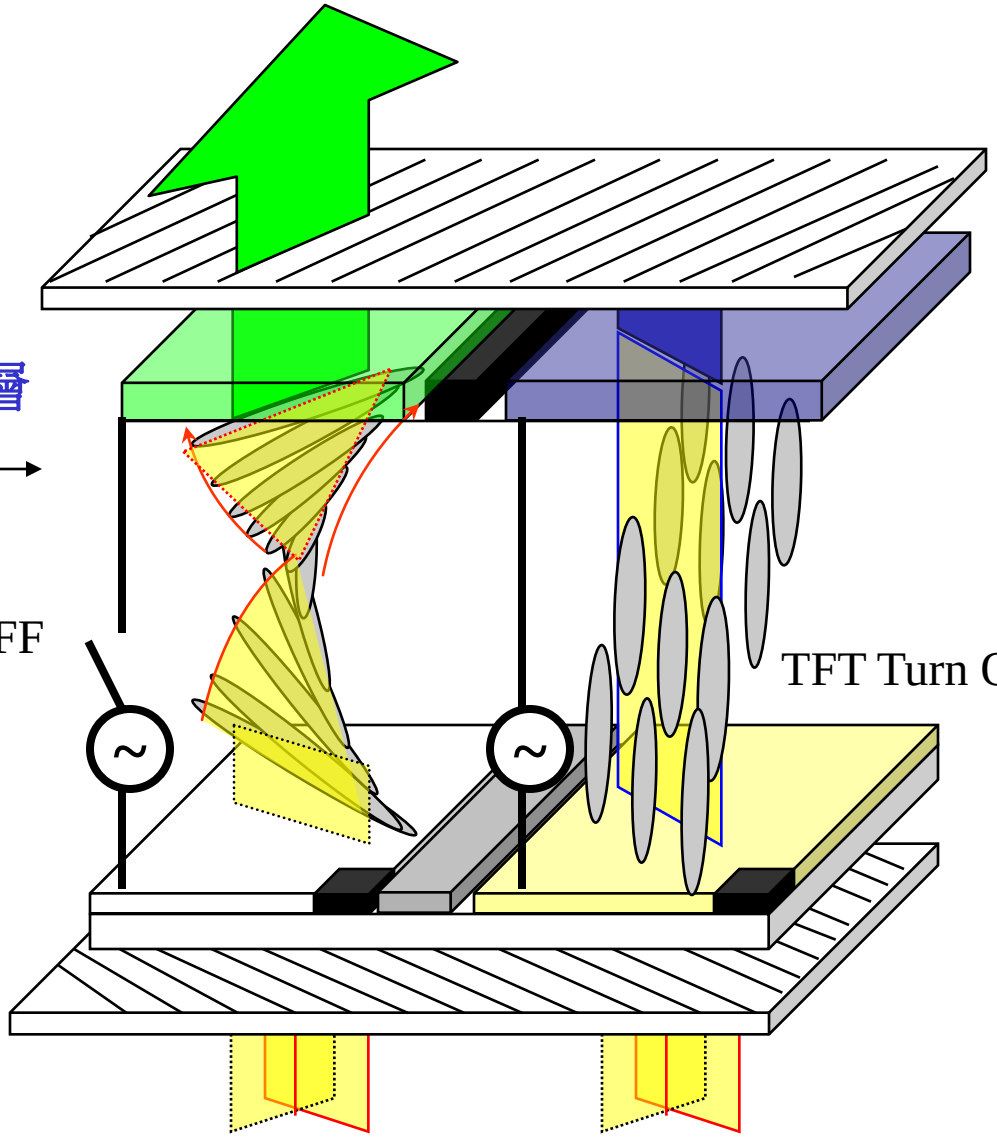
線路

電晶體

薄膜(TFT)基板

下偏光片

TFT-LCD的顯示原理 (二)

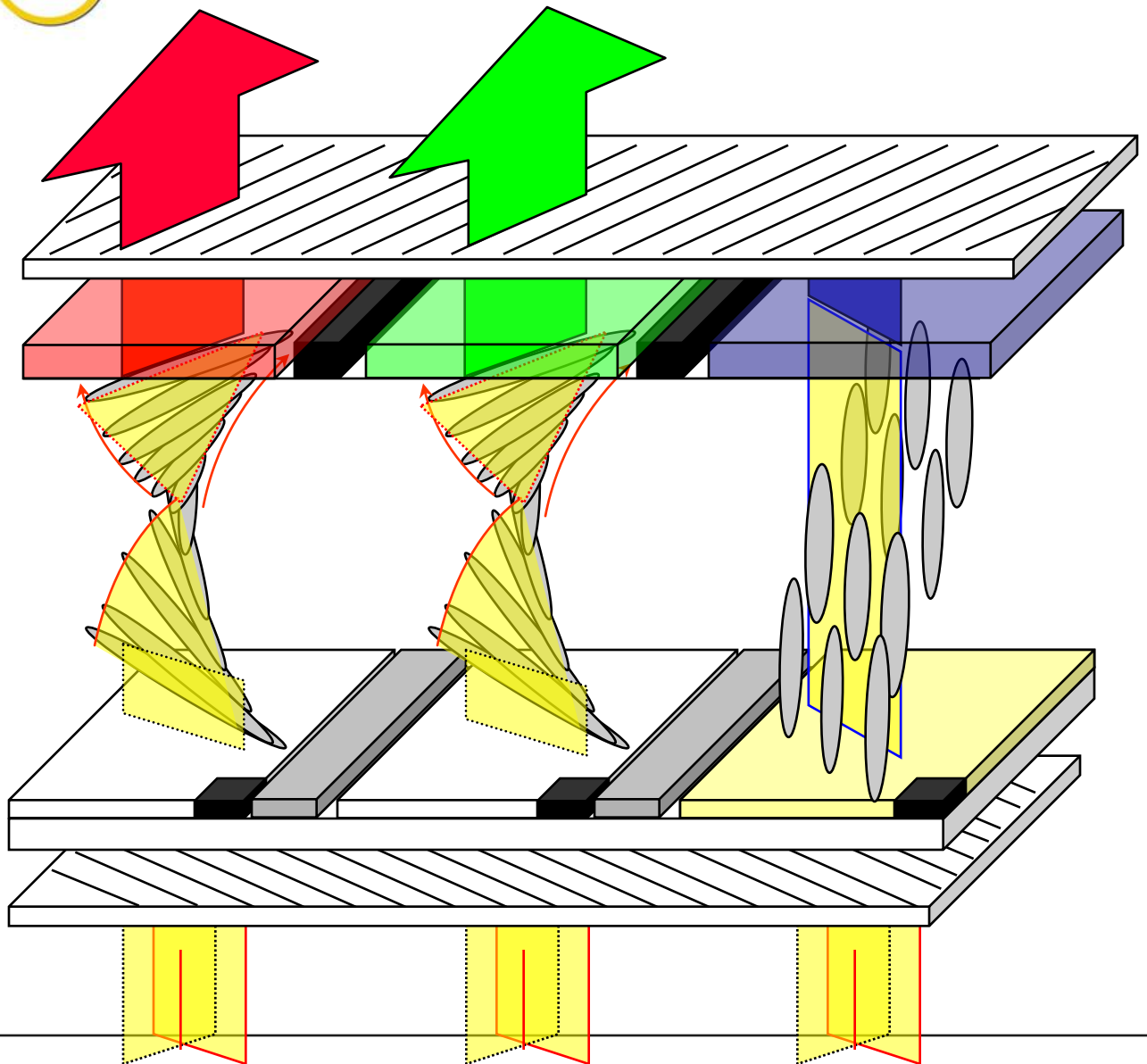


光源經液晶層
扭轉90˚

TFT Turn OFF

TFT Turn ON

TFT-LCD的顯示原理 (三)



上偏光片

彩色濾光片

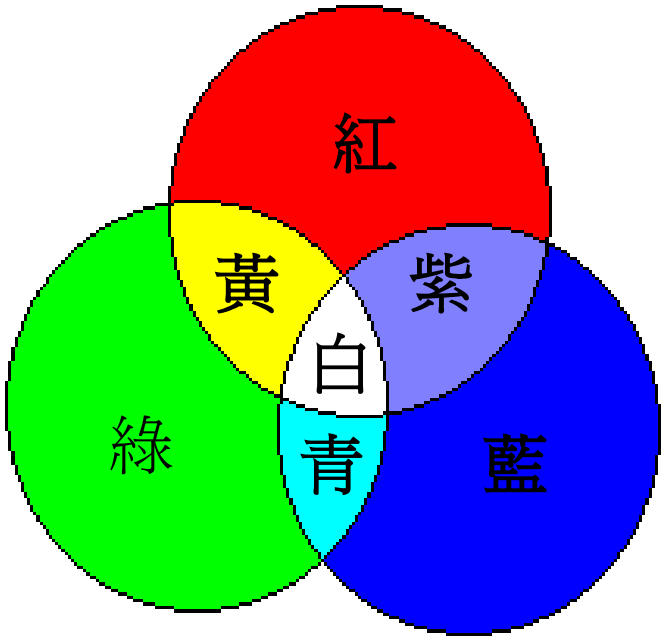
液晶

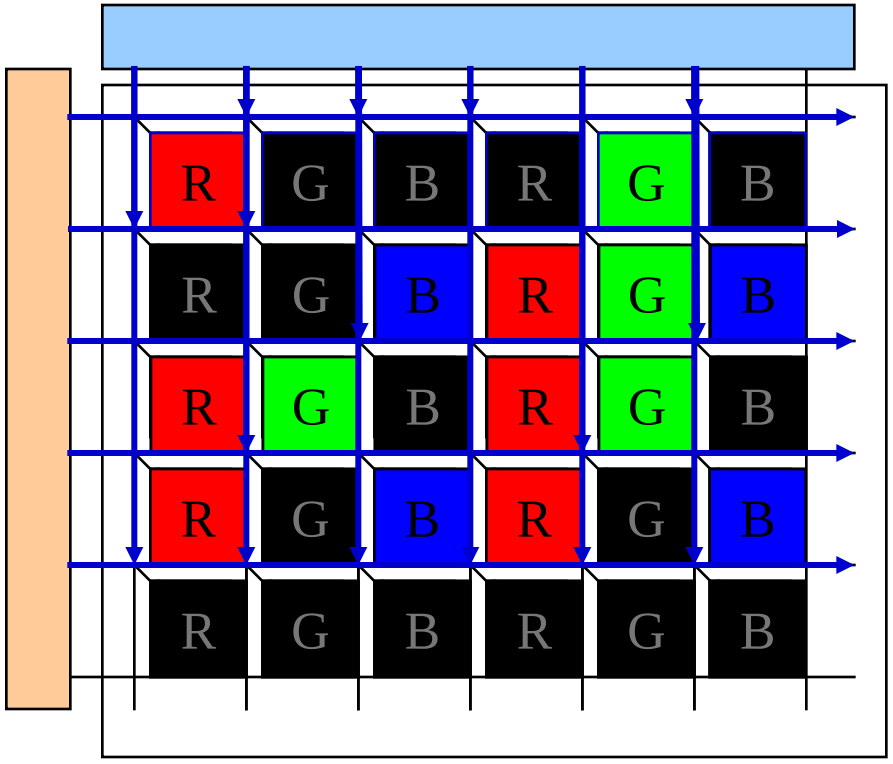
TFT基板

下偏光片

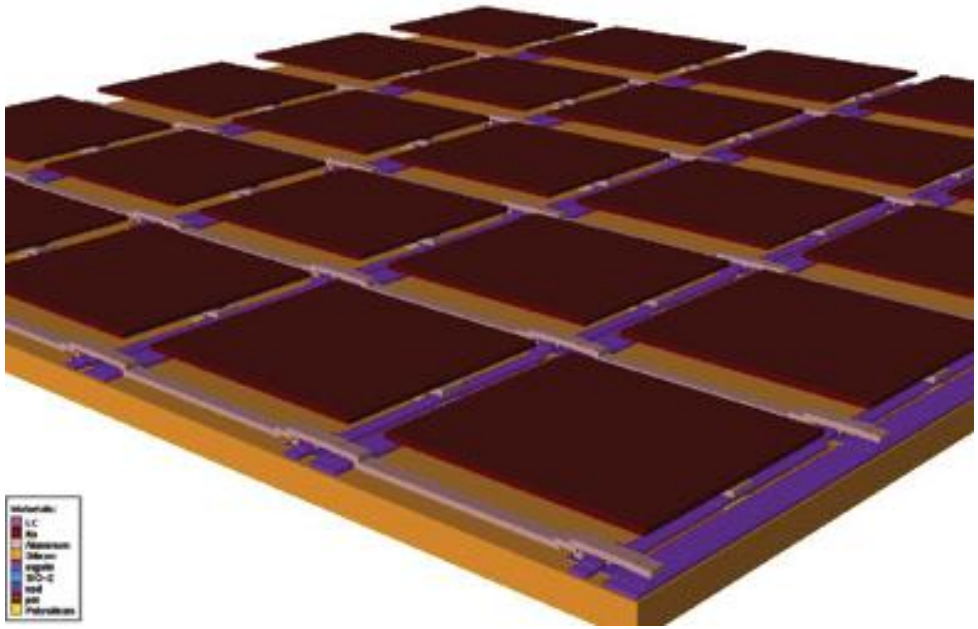
光源

TFT-LCD 的色彩驅動原理





平面顯示技術



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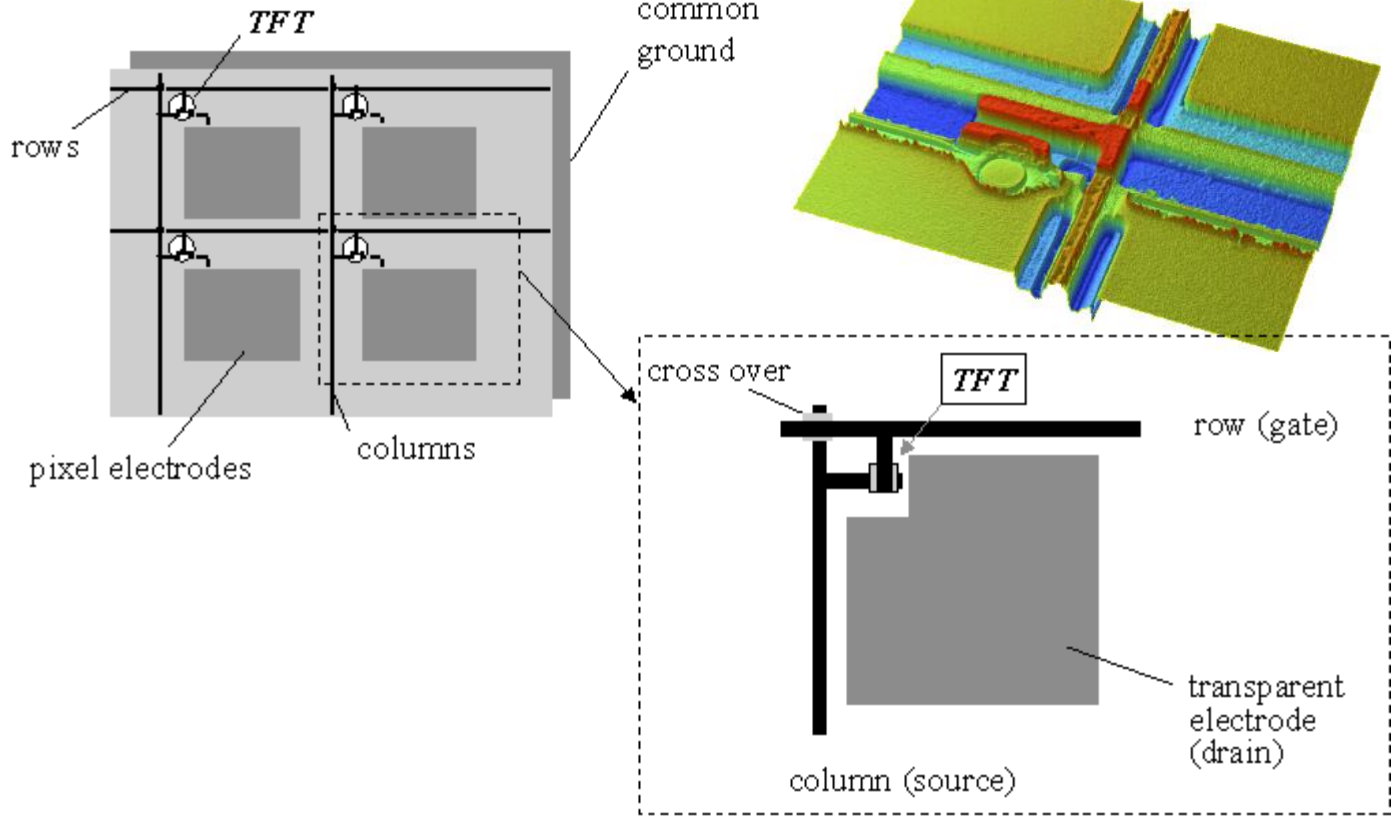
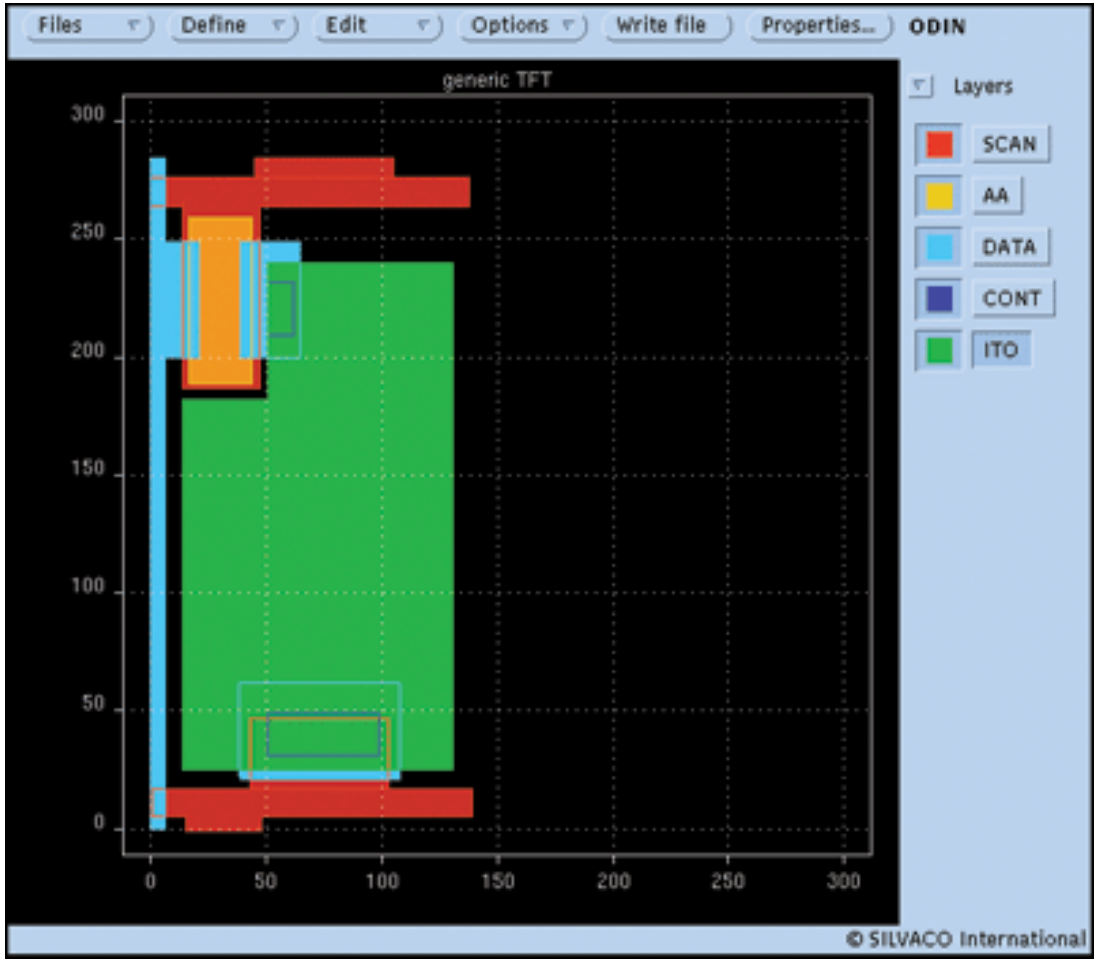
TFT transistor

Thin-Film-Transistor or active matrix displays

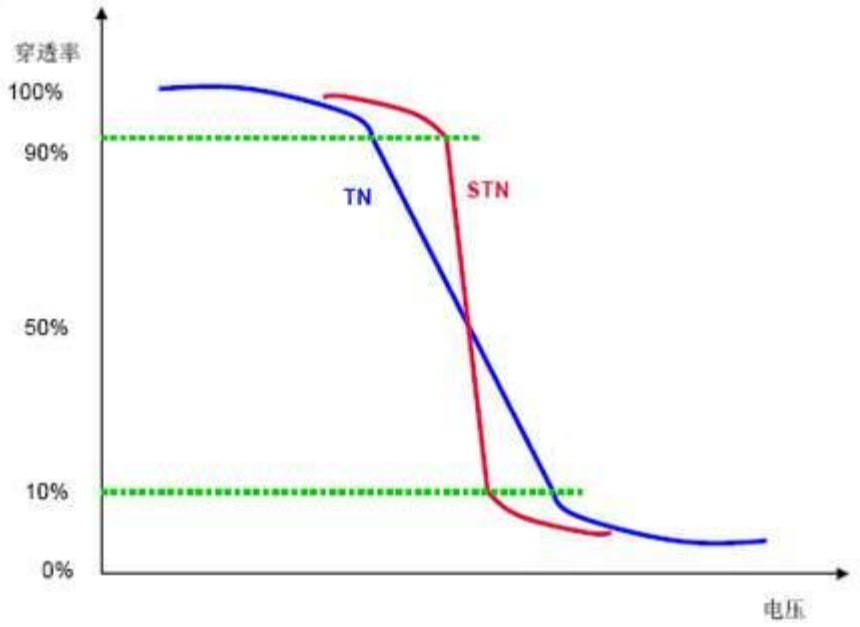


Layout


Files
Define
Edit
Options
Write file
Properties...
ODIN
generic TFT
Layers
SCAN
AA
DATA
CONT
ITO
300
250
200
150
100
50
0
0
50
100
150
200
250
300
© SILVACO International

Transmission vs. Voltage

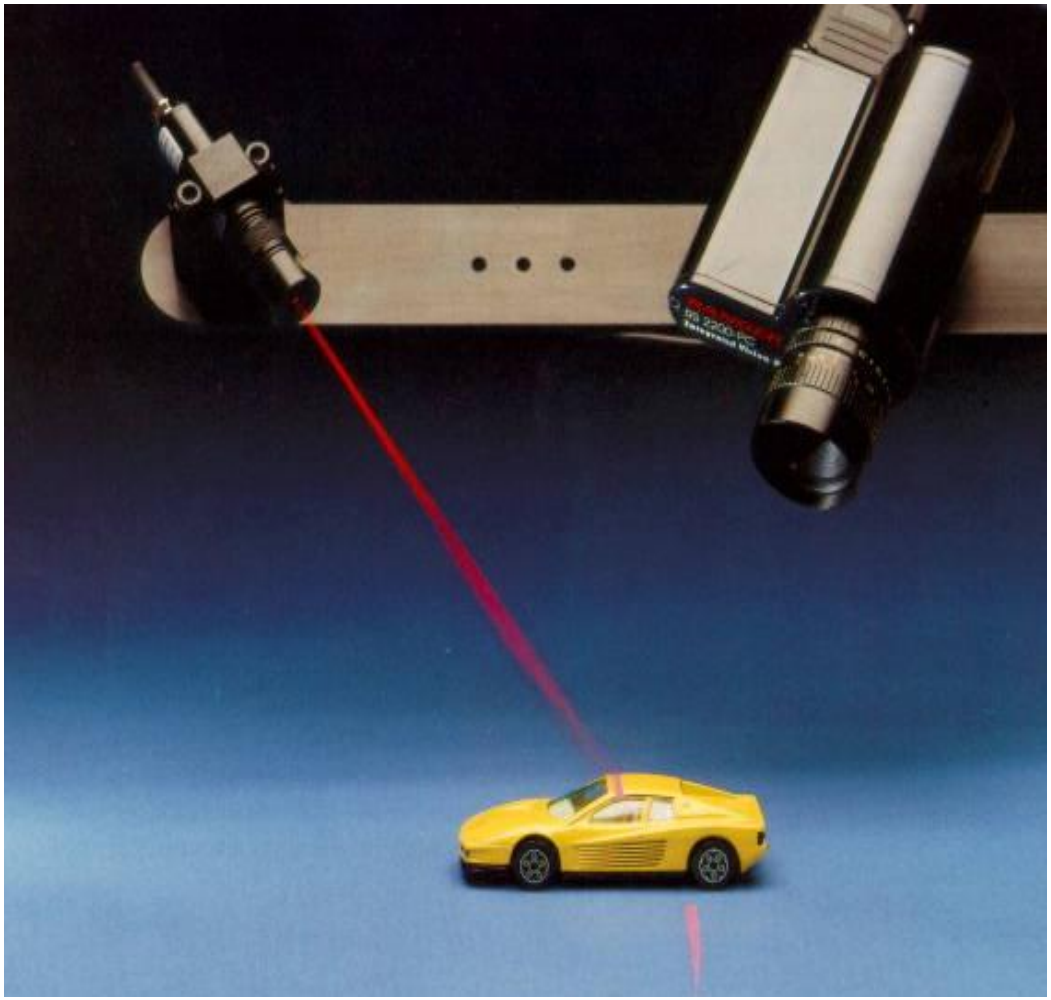
图13：TN型与STN型LCD的电压对穿透率曲线



LED 大型看板

時間調變技術-亮度控制

光電感測新科技



MOEMS

三角測距

FIGURE 1.6A

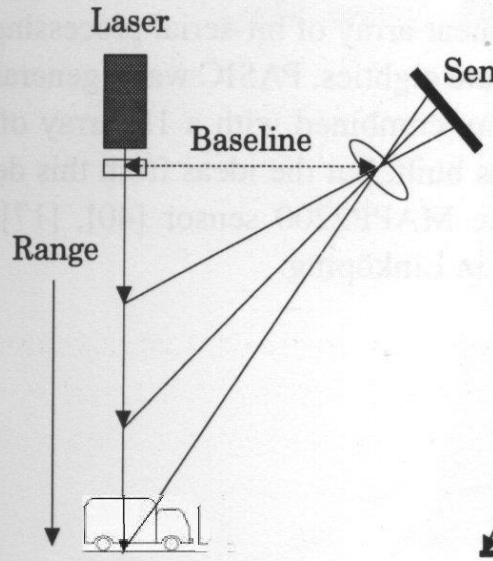


FIGURE 1.6B

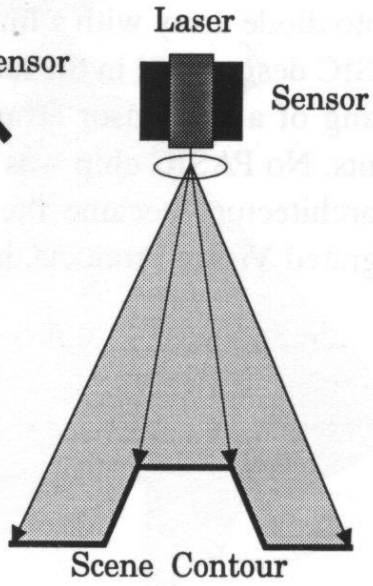
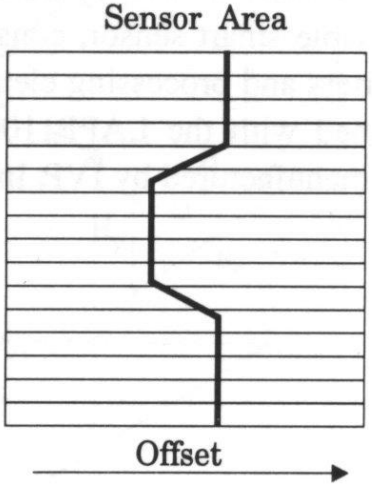


FIGURE 1.6C



3D 量測應用