



Active-matrix liquid-crystal display

An **active-matrix liquid-crystal display** (AMLCD) is a type of flat-panel display used in high-resolution TVs, computer monitors, notebook computers, tablet computers and smartphones with an LCD screen, due to low weight, very good image quality, wide color gamut and fast response time.

The concept of active matrix LCDs was proposed by Bernard J. Lechner at the RCA Laboratories in 1968.^[1] The first functional AMLCD with thin-film transistors was made by T. Peter Brody, Fang-Chen Luo and their team at Westinghouse Electric Corporation in 1972.^{[2][3]} However, it took years of additional research and development by others to launch successful products.

Introduction

The most common type of AMLCD contains, besides the polarizing sheets and cells of liquid crystal, a matrix of thin-film transistors to make a thin-film-transistor liquid-crystal display.^[4] These devices store the electrical state of each pixel on the display while all the other pixels are being updated. This method provides a much brighter, sharper display than a passive matrix of the same size. An important specification for these displays is their viewing angle.

Thin-film transistors are usually used for constructing an active matrix so that the two terms are often interchanged, even though a thin-film transistor is just one component in an active matrix and some active-matrix designs have used other components such as diodes. Whereas a passive matrix display uses a simple conductive grid to apply a voltage to the liquid crystals in the target area, an active-matrix display uses a grid of transistors and capacitors with the ability to hold a charge for a limited period of time. Because of the switching action of transistors, only the desired pixel receives a charge, and the pixel acts as a capacitor to hold the charge until the next refresh cycle, improving image quality over a passive matrix. This is a special version of a sample-and-hold circuit.

See also

- Organic light-emitting diode
- Active-matrix organic light-emitting diode

- Display resolution

References

1. "IEEE Jun ichi Nishizawa Medal" (https://web.archive.org/web/20130912052239/http://www.ieee.org/about/news/2011/honors_ceremony/releases_nishizawa.html). *Institute of Electrical and Electronics Engineers (IEEE)*. Archived from the original (http://www.ieee.org/about/news/2011/honors_ceremony/releases_nishizawa.html) on 2013-09-12. Retrieved 2013-11-01.
2. "Liquid crystal image display panel with integrated addressing circuitry" (<https://patents.google.com/patent/US3840695A/en>) *Google Patents*. 1972-10-10.
3. Brody, T. P.; Fang Chen Luo; Szepesi, Z. P.; Davies, D. H. (1975). "A 6 x 6-in 20-lpi electroluminescent display panel". *IEEE Transactions on Electron Devices* **22** (9) 739 doi 10.1109/T ED 1975 18214 (<https://doi.org/10.1109%2FT ED 1975 18214>) S2CID 1378753 (<https://api.semanticscholar.org/CorpusID:1378753>).
4. "History of TFT LCD" (https://web.archive.org/web/20130823203913/http://www.plasma.com/classroom/what_is_tft_lcd.htm). Archived from the original (http://www.plasma.com/classroom/what_is_tft_lcd.htm) on 2013 08 23 Retrieved 2011 02 22 "There are many kinds of AMLCD. For their integrated switching devices most use transistors made of deposited thin films, which are therefore called thin-film transistors (TFTs)."

External links

- Eduard Rhein Stiftung 1988 Technology Award Dr T Peter Brody Basic development of TFT liquid crystal display (<http://www.eduard-rhein-stiftung.de/preistrager/chronologie/>)
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