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Research on E-Paper Technology

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Abstract :

E-Paper is invented by Nick Sheridon in 1970. E-Paper are just like traditional paper. E-Paper are E-papers of the future are just around the corner, promising to hold libraries on a chip and replace most printed newspapers by the end of the decade. They are made of flexible material, require ultra-low power consumption, are cheap to manufacture, and most importantly, are easy and convenient to read. E-paper is a portable form of electronic paper. Reusable storage and display media that resembles paper but that can be written on (refreshed) thousands or millions of times via electrical means. E-paper will be utilised for e-books, electronic newspapers, portable signs, and foldable, rollable screens, among other applications. The data to be shown is either retrieved from a computer or a cell phone, or it is manually made using mechanical tools like an electronic "pencil." This article explores the past, present, and future of the subject.

Keywords:

Electronic paper, E Ink, Invention, Printing, Innovation, Print Media.

Introduction

Electronic paper, often known as e-paper or electronic ink display, is a type of display that imitates the appearance of regular ink on paper. Electronic paper, unlike a traditional flat panel display, which requires a backlight to illuminate its pixels, reflects light like regular paper. It can store text and images endlessly without consuming electricity, and the image can be updated at any time. Several various technologies exist to create e-paper, some of which use a flexible display and a plastic substrate. Reading on e-paper could be more comfortable than on a traditional display. This is owing to the steady image that does not require regular refreshment, the broader viewing angle, and the fact that it reflects rather than emits ambient light.

-- Analysis & Findings --

Literature Review

The main topics of our literature review are E-Paper. The purpose of this study is to find how e-paper work, problem faced by e-paper, study of e-paper. Battery consumption are our main priorities. With using the technology we can less harm to our eyes. We can use the normal ink display instead of digital display.

Problem Definition :

The display have 60 fps (frames per second) or 90 fps which we generally use. But the display of E-Paper technology have only 7 fps so it is comparatively less used than normal display. It is more expensive than normal displays. It has less memory and it have only limited fonts.

Objective/Scope:

The objective of making this research paper is find the solution to increase the refresh rate of e-paper display and to increase the more use of this technology in day to day life.

Research Methodology:

I use the review methodology and study the previous research paper. Accordingly I compare the both paper and find some important points. And on internet I got some additional points.

I. Technology

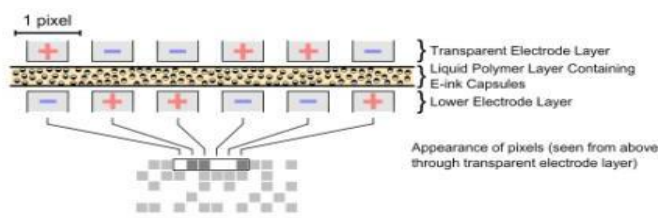
A. Electrophoretic: In the most basic electrophoretic application, titanium dioxide (titanium) particles with a diameter of one micrometre are disseminated in hydrocarbon oil. Surfactants and also charging real estate agents are usually added to the oil, causing the particles to combat an electrical charge. This mixture is sandwiched between two parallel conductive dishes separated by a gap.

Ranging from ten to one hundred micrometres When a voltage is put across the two dishes, the debris move electrophoretically to the plate that contains the opposite charge. Because light is dispersed, your particles seem white when they are positioned at the cab end (viewing) side of the display.

II. Gyricon

It was the first electronic paper developed at Xerox's Palo Alto Research Center in the 1970s. It is made up of polyethylene spheres ranging in size from 75 to 106 micrometres in diameter, each of which is made up of black plastic on one side and white plastic on the other, both of which are negatively and positively charged. The spheres are embedded within a clear silicone sheet. Each sphere is suspended in an oil bubble, allowing it to freely rotate. The polarity of the voltage given to each pair of electrodes determines whether the white or black side of the electrode is facing up, giving the pixel its white or black appearance. The integrated display, which is bi-stable, will generate images and text.

Diagram :



Explanation:

Electrophoretic Because of their paper-like appearance and decreased power consumption, electrophoretic displays are regarded as the top of the electronic paper classification. Ernest Jacobson, who later cofounded the Elizabeth Tattoo Corporation and entered a partnership with Philips Components a few years later to develop and market the technology, produced another sort of electronic paper in the 1990s. Philips sold the electronic paper business, as well as related patents, to Prime Watch International in 2005. This was accomplished by suspending microscopic microcapsules rich with electrically conductive white detritus within the coloured fluid. The underlying circuitry in early designs controlled whether the white debris was close to the capsule's surface (so it seemed white to the spectator) or far away.

Why E Paper :

E-Paper is device that do not emits blue light towards your eyes. Generally what does happen when we use the normal display it emits blue light and it directly affect our eyes if we use it for so long.

Due to the normal display you do not naturally feel sleepy, you get tired that's why you think that I should sleep. But E-paper works like sunlight reflect on a surface and we can able to see it. While you are laying on a bed that time in such a way the light of your lamp reflect on your e-paper device that it do not emit the blue light. You'll feel like your are reading a book of a paper.

Working Of E-Paper :

The first is electronic ink, also known as the 'frontplane,' and the second is the electronics needed to create the pattern of text and images on the E-ink sheet, also known as the 'backplane.' Over time, a number of different e-ink creation technologies have been created. Gyricon E-ink is based on a thin sheet of flexible plastic containing a layer of tiny plastic beads, each contained in a small pocket of oil and thus able to freely rotate within the plastic sheet, and was

invented by Xerox's Nick Sheridon in the 1970s. The hemispheres of a bead are coloured differently and contain different electrical charges. When the backbone generates an electric field, the beads rotate, creating a pattern.

KEY BENEFITS :

E-Paper has a lot of advantages. Reading an E-Paper is the same as reading a printed newspaper, thus the reader does not need to adjust to a new format. E-Paper, on the other hand, ensures independence in terms of space and time. E-Paper may be read at any time, anywhere in the world, and because digital versions can also be obtained on PDAs and smart phones, mobility is nearly unlimited. E-Paper also conserves resources. On the one hand, EPaper saves paper and space because it does not pile up, and on the other hand, it saves time. Because the entire page is displayed on the computer monitor, one may receive a quick overview of all headlines and thus get to the relevant articles much faster. In contrast to traditional LCDs and other types of reflective screens,

Solution for increase refresh rate of E-Paper :

We can store the previous frame in the non-volatile memory and we can use this when we turn on the E-Paper display again that time when can use the previously stored frame again.

Advantages

Electronic paper has a lot of advantages over printed paper. You can use electronic bookmarks, for example, and choose your preferred magnification level. You'll be alright if you use search to quickly find information. You can print on real paper if necessary. One of the advantages of electronic paper is its low power usage. (Power is pulled when the display is changed), flexibility It's also easier to read than most screens. Electronic-ink Printing can be done on walls, billboards, and other surfaces.

T-shirts and product labels are two examples of this. The versatility of the ink would also be advantageous. enable the creation of electronic displays that can be rolled up into devices.

Disadvantages

Working Of E-Paper :

The first is electronic ink, which is sometimes referred to as the 'frontplane,' and the second is the electronics required to generate the pattern of text and images on the E-ink sheet, which is referred to as the 'backplane.' A variety of e-ink creation technologies have been developed over time. Gyricon E-ink, created by Xerox's Nick Sheridon in the 1970s, is based on a thin sheet of flexible plastic containing a layer of tiny plastic beads, each contained in a small pocket of oil and therefore able to freely rotate within the plastic sheet. A bead's hemispheres are coloured differently and have various electrical charges. The beads rotate when the backbone applies an electric field, generating a pattern.

Limitations & Future Scope

Limitations:

Electronic paper technology has a considerable disadvantage in terms of refresh rate when compared to other low-power display technologies such as liquid crystal displays (LCDs).

This makes it difficult for products to implement complex interactive programmes (such as those found on mobile computers) that demand fast-moving menus, mouse pointers, or scrolling.

Piracy has become a major source of problems for firms in niche areas like music, films, and video games. Businesses might easily lose a lot of money owing to piracy when it comes to e-books.

The paper used in e-technology is incapable of supporting animation.

Because e-paper lacks such a feature, advertising is limited to images alone, which

is bad news for any company that wishes to include animations in their ads.

Further Scope :

The E-paper will be implanted in a cylindrical tube with a diameter of about 1 centimetre and a length of 15 to 20 centimetres that may be easily carried in one's pocket. The tube will contain a tightly rolled sheet of Epaper that can be spooled out of a slit in the tube as a flat sheet for reading and then stored again at the touch of a button.

An overhead satellite, a cell phone network, or an internal memory chip will be used to download data (through a basic user interface). The document reader will be able to read e-mail, the internet, books downloaded from a digital library, technical manuals, newspapers, magazines, and other documents from anywhere on the planet. It will be a fraction of what it is now.

Conclusion :

While we may be familiar with digital paper because of its widespread use among eBook readers, the technology's flexibility allows for far more advanced applications. The paperless office of the future, in contrast to speedy autos and personal teleporters, may not be so far-fetched in the end. It all begins with a clean, fresh workspace. Because of its plausibility, tangibility, simplicity, flexibility, portability, and compatibility, paper remains the most preferred document medium, making it difficult to replace. The paperless workplace is still a long way from its original ideal, despite growing usage of computers and online documents. The need for extra document management systems has never been greater, with document documents flowing at a quicker rate than ever before.

Reference :

- [\[Ben Krasnow\] Hacks E-Paper For Fastest Refresh Rate | Hackaday](#)
- [E-Paper Technology \(ijert.org\)](#)
- [1379772539 ELECTRONIC PAPER TECHNOLOGY.pdf \(ijarse.com\)](#)
- [\(1612\) E-paper hacking: fastest possible refresh rate - YouTube](#)

