The Future of Television and HDTV

By

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Jim Carey's character believed he lived within it in 1996's dark comedy The Cable Guy, and really did live within it in 1998's The Truman Show.

Peter Finch as Howard "I'm mad as hell and I'm not going to take it anymore" Beale was driven to the brink of madness by it, and ultimately sacrificed for it in 1976's Oscar-winning Network.

It has been brilliant, heartbreaking, amusing, informative, and just plain sordid (Jerry Springer, anyone?). And it is inarguably the most powerful medium in modern history.

But as much as television programming has reflected the attitudes, opinions and – Sometimes – the lowest common denominators of our society, the technology behind it has consistently been groundbreaking.

Though many think of the 1950s as the decade TV began, the very first television technology was in development as far back as the late 1800s. The so-called "electromechanical" technique made use of a rapidly spinning, perforated wheel to produce images no larger than a wallet – a similar approach is used to produce colors in some modern DLP (Digital Light Processing) sets.

The technology used to replace this crude method – the cathode ray tube – had its beginnings before World War I, even though the first commercially available CRT set wasn't released until the 1930s. It seriously makes you wonder what new TV concept is already in the works, doesn't it?

Say Goodbye to CRT, DLP, LCD and Plasma

Sure, we've only recently kissed off CRTs after suddenly realizing they suck power like black holes suck matter. And true, the more fortunate of us are hedonistically enjoying our 50-inch plasmas and LCD HDTV sets, confident we won't need or want another television for the next decade or more. But, as history has proven time and time again, the Next Great Thing is already well into its development cycle, even as we're just starting to get settled in with current technological standards.

We'll get to that Next Great Technology in a moment, but let's first explore why today's technologies are, ultimately, doomed. The first to go – at least as far as consumer television is concerned – is likely the aforementioned DLP. DLP turned some heads a few years back because it had the potential of being something really special. An intense beam of light, a rotating color wheel, a palm-sized chip fitted with hundreds of
thousands of teeter-tottering, microscopic mirrors, and some very pretty images – what was there not to like?

But when consumers started dropping big coin on replacement lamps; when so many manufacturers opted to pour their resources into reducing the cost of LCD; and when it became obvious DLP sets could never be as slim, sleek, flicker-free or "non-mechanical" as other technologies, the writing was on the proverbial wall. Today, you'll find precious few DLP sets at any store.

Plasma, once the darling of the industry, will likely be the next casualty. The clues are seemingly everywhere. Pioneer, one of the foremost proponents of high-end plasma screens, just announced plans to leave the TV business altogether. Rumors currently abound that plasma giant LG is considering doing the same. Why? Plasma and "burn-in" have, rightly or wrongly, become somewhat synonymous with each other.

Furthermore, plasmas are expensive to both manufacture and purchase – a hard, cold reality during a down economy, especially considering how ubiquitous and thusly so inexpensive LCDs have become in recent months. One look at recent sales figures proves the public is deciding this battle: LCDs outsold plasmas globally by an eight to one margin in the first quarter of 2008. Remember, VHS trounced Beta too.

Liquid Crystals Reign Supreme

And that leaves LCD. As in the war between HD DVD and Blu-ray, LCD has emerged as the clear front-runner for the time being, not necessarily due to superior technology, but simply because more manufacturers are involved in the business than they are in plasma and DLP. But LCD proponents aren't merely lucky. LCD sets are potentially more energy efficient, capable of becoming thinner, and their picture quality – to the untrained eye of most consumers – looks just fine, thank you.
But don't count on LCD – at least, not in its current iteration, anyway – to retain that dominance even five years hence. For starters, the same green agenda that points to plasma as being so energy inefficient also has LCD in its sights. The California Energy Commission is already drafting legislation geared toward limiting the sale of LCDs and plasmas by 2011 (if indeed plasmas are still available then) to those sets that meet its rather stringent guidelines. Can other jurisdictions be far behind?

And LCD isn't picture perfect either. Fast-motion video (say, for instance, what you'd find in a hockey game) causes motion lag and blur on the vast majority of LCD sets made today. And LCD, despite some recent advancement in the area, is far from the best TV technology for off-center viewing. But the most damning aspect of LCD may be that newer, better technologies are already appearing on store shelves.

The Birth of OLED

That brings us back to the Next Great Thing we alluded to earlier. It's called Organic Light Emitting Diode (OLED) technology, and it's already a reality. Sort of.

When Sony introduced its TV in 2008, it took the first step into a new world of television technology. Like all OLED sets, the XEL-1 display consists of layers of organic polymers sandwiched between two conductors. An electrical current is applied, and voila, a bright, electroluminescent light is produced.

The coolest thing about OLED is that it doesn't require backlighting. A "white" OLED element is white because it glows, and a "black" OLED element is black because it's simply "off." This is far removed from LCD, where black elements temporarily block the backlight and, in the process, waste energy. This difference allows OLED screens to draw less power than other technologies – a huge advantage in these days of energy conservation.

Moreover, OLED produces extremely bright whites and exceedingly black blacks. The whites are so white because the pixels produce light themselves rather than relying on backlighting, and the blacks are so black because they are switched off.
No backlight also means OLED screens are slim. Really slim. Some are so thin and so flexible that you could roll them up like a carpet, and so lightweight they can be easily mounted on a wall without any of the typical quantum-engineering hassles involved in hanging plasma and LCD displays.

No Big Screens Here

So why isn't this grand new technology in all our homes by now, particularly as it's been in development, quite literally, for decades? In a way, it actually is. A variation of the same OLED we'll eventually find in our living rooms is already hard at work in a wide variety of portable devices.

But big screens are another story altogether. Among several other developmental issues, blue OLEDs simply don't last as long as other colors of OLEDs. And that's forced key players such as Panasonic, Toshiba, and Sony into a concerted effort to find solutions.

So, despite ongoing rumors concerning the imminent release of big- or even medium-screen OLEDs, all we've seen so far is the tiny XEL-1. Sure, its screen is a miniscule three millimeters thick, but it also measures just 11 inches diagonally. That makes it far from the centerpiece of a home entertainment system, yet its price tag is equivalent to that of a 60-inch LCD monster. How does $2500 grab you?

There’s no promise OLED will succeed, but there's simply too much promise, marketing and research muscle behind it now to think otherwise. There's certainly more chance you'll have an OLED-based TV in your living room 'round about 2015 than one based on SED.

The Tech That Almost Was

SED (Surface-conduction Electron-emitter Display) is yet another example of a technology that once seemed so promising, but now may never reach the marketplace. Like the evolutionary hybrid child between CRT (in which electrons are fired at a phosphorescent screen from a single cathode "gun") and DLP (which, instead of a single light transmitter, uses millions), SED was purportedly ready to deliver better-than-CRT picture quality in a power-efficient, long-lasting, flat-screen package that looked good from any viewing perspective.

Instead, SED fell victim to lawsuits and litigation. Without diving into the headache-inducing specifics, let's just say the mega-corporation in-fighting seemed as nasty as it was protracted. Even though SED has been a no-show ever since it was supposedly ready to debut back in 2005, it may not be completely dead. Just a few months ago, SED originator Canon was legally cleared to begin production. Whether we’ll ever see anything come to market is another story altogether, though eternal optimists may want to keep an eye on this one.

And of course, what discussion of modern and future technology would be complete without mentioning the ubiquitous laser?

When Mitsubishi released its massive 65-inch LaserVue TV in November of 2008, it signaled the dawn of a new, yet not-so-new television concept – laser TV. Like DLP, a laser television uses a system of hinged mirrors...
to convey a source of light to the viewing screen. But unlike DLP, that light source is laser. Three of them in fact: Red, green, and blue. Like the trio of color guns in latter-day, high-end DLP sets, these negate the need for a mechanical, spinning color wheel.

Laser displays are theoretically superior to those based on regular projection lamps because they can produce better color saturation and higher contrast. Moreover, lasers don't degrade – which means you won't be racing to the store every two or three years to pick up replacement bulbs. And the picture quality of Mitsubishi's first LaserVue has certainly received its fair share of glowing reports.

**Laser TV: An Uncertain Future?**

However, the future of laser TV is uncertain. Detractors prognosticate it's merely a late arrival at the DLP party – a party that seems to have ended some time ago. Specifically, they rightly say a projection- and mirror-based laser TV can never be as slim and convenient (and non-mechanical) as an OLED screen.

Furthermore, there have been reports that laser televisions produce enough "speckle" – a visually annoying laser byproduct – to interfere with viewers' enjoyment. Then, there's the fact that long-term exposure to lasers isn't entirely good for the eyes. Granted, the lasers used in laser TVs are intended to reside within the cabinet, but it’s still reason for some to worry.

Perhaps most importantly of all, laser television is new, and therefore darned expensive. That wouldn't matter so much if it was truly a groundbreaking, masterful technology that surely spelled the death of everything else. But this isn't DVD versus VHS. The $7,000 MSRP on that 65-inch Mitsubishi model seems a bit harsh.

Furthermore, LCD is so established, and has such a pricing lead, that by the time mass production brings laser TVs into the range of affordability, LCDs may already be half the price they are now. When looked at in this manner, the future doesn't so look bright for a technology that could well be a step up on LCD, yet isn't as intriguing as OLED.

**Coming Attractions: 3DTV and More**

And what of the distant future? If only someone could come up with something that would truly knock us off our collective couches. Perhaps they already have. Are you ready for 3D TV?

It'll be many long years before any of us will see a quality 3D product in our homes, and possibly even more before we have 3D content, but it's seemingly on its way. Although there will be 3D TV concepts that incorporate specialized eyewear, we're going to focus on the kind that doesn't force you to wear modern permutations of those nerdy cardboard glasses our moms and dads gleefully donned during 1950s-era matinees. This kind of 3D is substantially more sophisticated, and, if the reports coming from early screenings of the technology are to be believed, will convince you objects exist outside the surface of the viewing screen.

The first key to the eventual success of this form of 3D TV
hinges on our ability to create a viewing screen that presents the viewer with two sets of slightly different images: one for the left eye, and one for the right. It must then deliver those images to the viewer separately, so that none of the image intended for the right eye hits the left, and vice versa. The solution lies in "autostereoscopic" displays.

Autostereoscopic displays won't look particularly unusual at first, but they'll be ingeniously fitted with a plastic lenticular sheet that sits in front of the display. Upon this sheet resides a multitude of teeny-tiny lenses that refract light from the pixels in the display so that each eye sees an ever-so-slightly unique perspective. If that sounds like back magic, yeah, we thought so too.

Autostereoscopic displays must also take into account the high probability that viewers will not always sit dead center in front of the screen. Eye-tracking systems can do that, though the cost then skyrockets even further. Resolution is another concern, along with finding some way to broadcast and store all that extra information. And let us not forget that 3D content must be filmed with multiple cameras shooting multiple perspectives.

Holographic TV Puts You in the Action

Another take on this 3D thing, but one that likely won't see the light of day for a decade or more, is holographic television. With holographic TV, images don't merely project outward from the TV, as much as they appear to float in mid-air. And yes, that means you'll be able to walk around a specific object and look at it from behind. Or even put yourself in the middle of the action – whether that action is a sporting event, a battlefield, or something else altogether.

The principles behind holographic TV are much the same as
those involved in holographic storage, but on a crazily miniaturized scale. Currently, there are so many hurdles yet to be jumped, and so many diverse approaches to the technology, that it's anyone's guess as to which will eventually win out. But rest assured that researchers the world over – such as those at the University of Arizona, who made real inroads into the feasibility of holographic TV last year when they discovered a way to erase and rewrite holographic display data in a matter of minutes – are on the case.

Ultimately, 3D TV is a very high stakes game of poker, because it's an expensive proposition that involves many facets of the industry, and much technological rebirth. And if truth be known, nobody really knows if the public will enjoy the 3D sensation over the long haul.

But remember, they said that about color TV’s back in your grandparents’ day too.