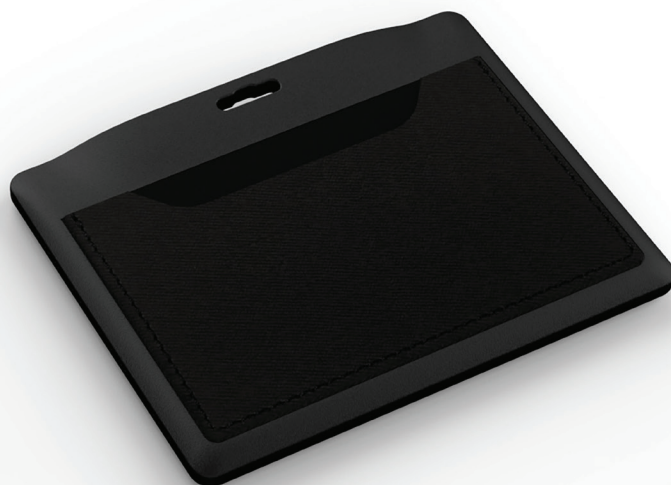


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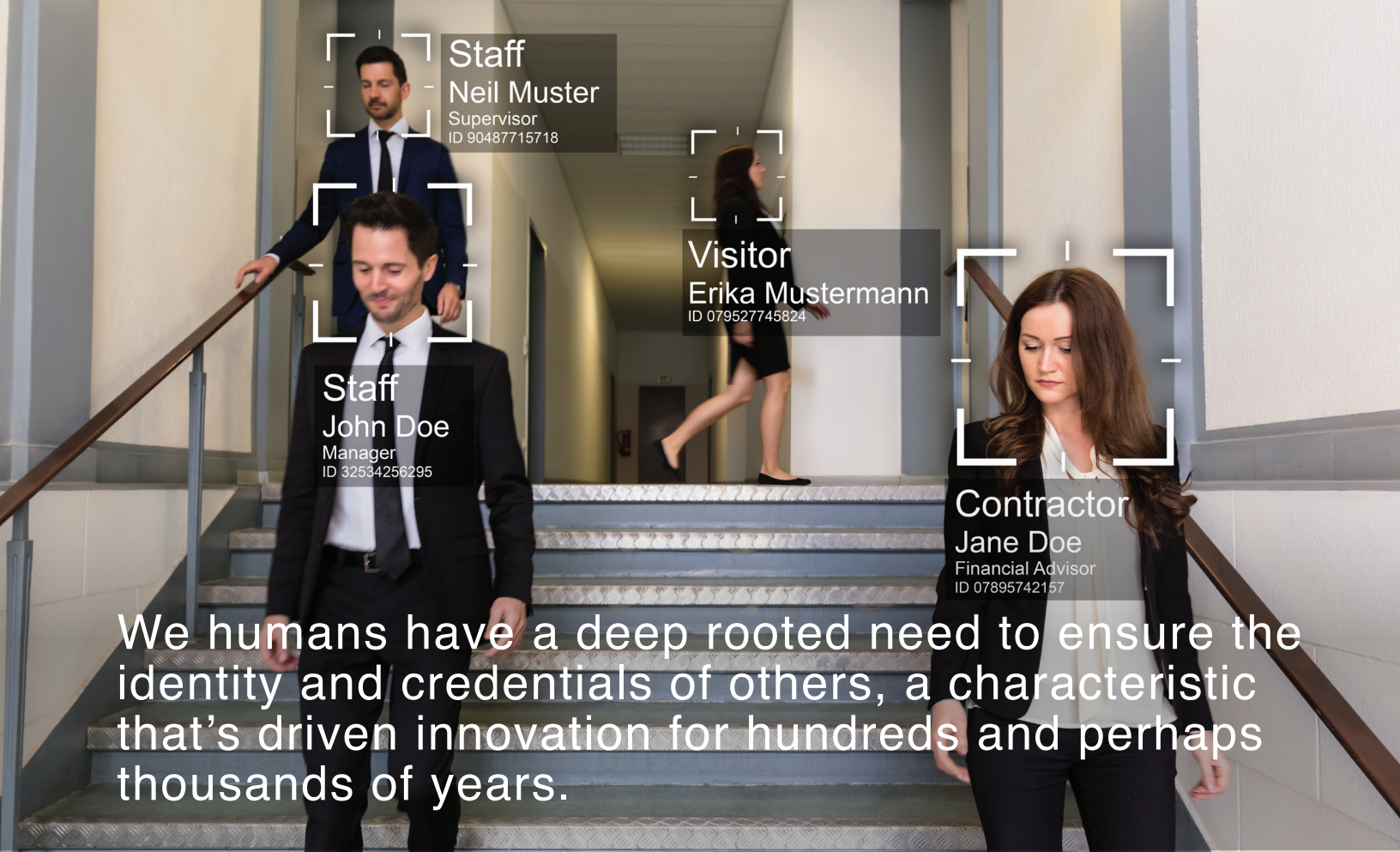
Digital Paper for Smart Credentialing

Written and produced by: Captains of Industry®

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We humans have a deep rooted need to ensure the identity and credentials of others, a characteristic that's driven innovation for hundreds and perhaps thousands of years.

A trip in our Way Back Machine to 1803 shows us that Napoleon Bonaparte was the first to implement a national ID system. The French emperor had nothing to be proud of given that his system was designed to prevent workers from switching jobs.¹ Credentialing took a big step forward in 1876 at the Centennial Exposition in Philadelphia, Pennsylvania, with the first use of a photographic ID.² Visitors to the exposition could only gain entrance by having their picture taken, creating a “photo ticket.” Fast forward to 1960 to what can be considered the genesis of the smart card, when Forrest Parry, an engineer with IBM, had the ingenious idea of adhering a magnetic stripe onto a plastic card. Parry’s wife, Dorothea, should rightfully share equal credit for the invention. When Forrest couldn’t figure out how to make the stripe stick to cards, Dorothea suggested he melt them on with her iron.³

Packing data onto devices used for credentialing and access control, from fobs to ID badges, has continued to rapidly evolve in ways Bonaparte and Parry would marvel at, with digitalization now driving a revolution in the multibillion dollar “smart credentialing” industry. This very broad category includes everything from a basic ID badge for site visitors to sophisticated blockchain-based smart credentialing systems. Not only can a company verify a person’s identity, but also gain assurance that they actually did get their master’s degree in engineering from Stanford while double majoring in psychology and playing violin with the San Francisco Symphony orchestra.

Not every kind of organization, however, will choose a multidimensional and perhaps costly credentialing solution. A growing number of companies are opting to use technology employees and site visitors already have: their smartphones. But security experts cite serious drawbacks to the Bring Your Own Device (BYOD) approach of mobile credentialing. “If I am allowing you to come into my network on a personal device that I am not managing there is a potential for loss of data, so some companies are anti-BYOD,” explains Art Perez, a senior applications engineer with Honeywell.⁴

In addition, smartphones are too heavy to wear as a badge or lug around on a lanyard. As a result, phones tend to stay out of sight in a pocket or briefcase. Lacking visibility, a security credential is missing a vital function. Namely the ability of employees to readily see human faces matched with names. At the most security-minded firms, the mantra of “security is everyone’s business” is taken very seriously. Professional security personnel are joined by hundreds or thousands of employees who are continuously checking ID badges to make sure every person’s face matches their ID badge photo.

*“The serial number of a human specimen is the face,
that accidental and unrepeatable combination of features.”*

— Milan Kundera, *Immortality*

Until now, however, having a photo on a badge has meant making people wait at the front desk to have their picture taken, getting it printed on a so-so printer and stuck on their clothes. It’s ironic that in 2021 most modern companies, many of them high tech titans of industry, are essentially using the same analog photo ticket concept used in Philadelphia not long after the Civil War. Not to mention the fact that this decidedly old-fashioned approach creates a constant stream of waste that ends up in landfills.

Technological breakthroughs are dramatically transforming the world of smart credentialing.

The first is a new generation of sophisticated mobile battery solutions to power increasingly smart eBadges. One company, Atmosic Technologies, has found a way to integrate energy harvesting with its BLE wireless solution to enable the potential for “forever battery” products. For Internet of Things (IoT) applications at a network’s edge, Atmosic’s “Forever Battery” capability can harvest energy from RF signals in the air to power a Bluetooth chip or can combine a tiny supercapacitor chip with a solar cell about the size of a fingernail (on the little finger, no less).

Cutting-edge mobile power technology, however, must be combined with an eBadge display that requires very little power to operate. This essential feature has led inventors to the door of E Ink, the pioneers of digital paper and market leaders of this unique reflective display technology. Most people think of digital paper (also called ePaper) as the screen in popular eReaders like the Kindle. A digital paper display requires about 99 percent less power than the LED displays common in TVs and many mobile technologies. And of

particular value to eBadge developers, digital paper requires no power at all to display a static image. How is this possible?

Digital paper: How it works, why it matters.

E Ink's digital paper is comprised of particles within microcapsules or microcups that are coated onto a thin film layer and act as a form of ink. Instead of ink being pressed permanently upon paper, the ink particles are automatically recycled to form new letters and images when the display image is updated. Power is only consumed when an electrical charge rearranges the particles to form a new image. In this way digital paper is actually very similar to the traditional paper we experience in a book. The images we read in a book are static and no power is required to display them. Power is only used when we burn a tiny amount of calories to physically turn the page. E Ink has brought this simple concept into the digital realm.

Sophisticated software completes the puzzle.

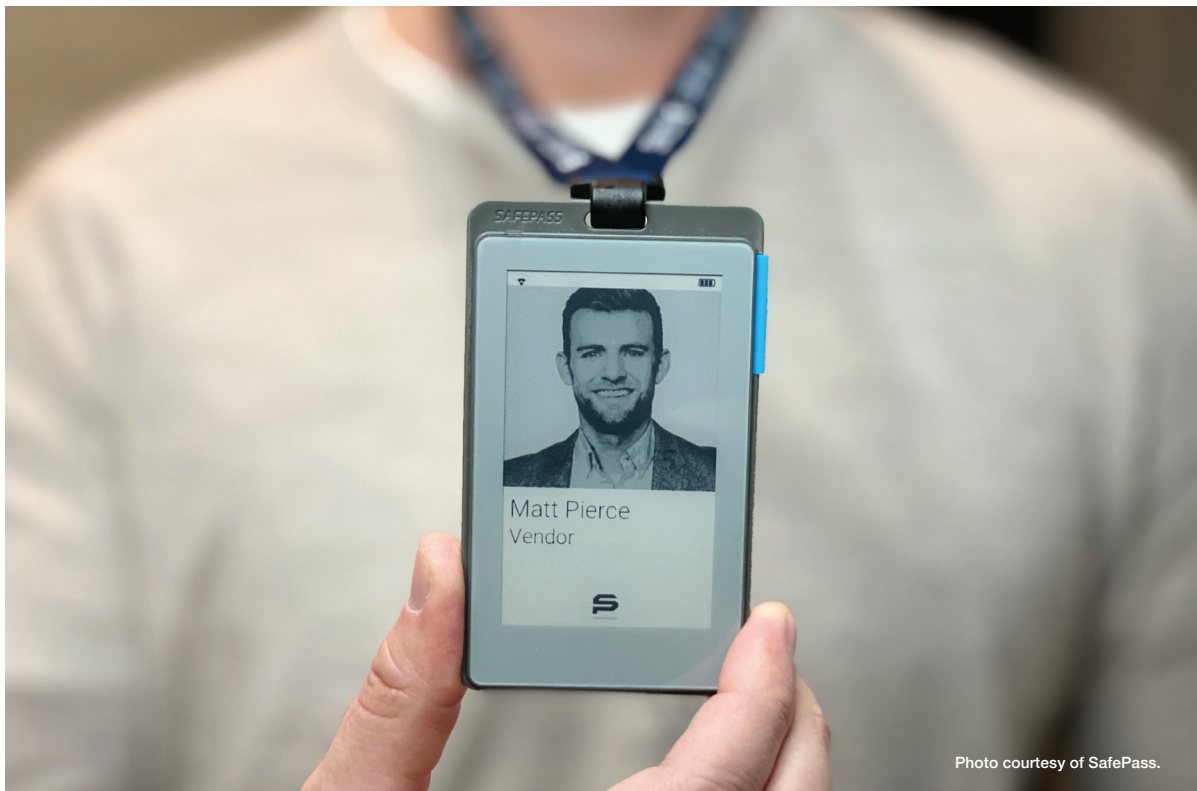
Hardware from Atmosic and E Ink is paired with software that performs a range of critical functions, from security authentication to alerts. In fact the level of functionality built into a complete eBadge system can be dialed up or down to meet the needs of an organization. So long as an eBadge's built-in electronic components are not too power hungry (or heavy), a wearable E Ink display running with advanced software can pack a great deal of smarts into a very thin footprint.

In this white paper, we highlight the work of leading-edge companies across a range of sectors that are poised to revolutionize the world of smart credentialing.

SafePass. Reinventing the visitor pass for the 21st century.

Having worked at Fortune 500 companies like Exxon where security is a high priority, Ronald Huff knew that employees play a vital role in checking ID badges. Having a face paired with a name is essential. But the problem with ID badges — and specifically visitor badges — was that they lacked a level of smarts that could enhance security to a new level in our digital age. This was the genesis of SafePass,[™] an early leader in launching a smart eBadge system made with an E Ink display.

After two years of in-market customer research, Huff determined the key product attributes that would make the SafePass badge attractive to customers at a desirable price point. On one level, SafePass is an efficient and convenient reusable digital ID. Corporate visitors can go to a website and upload their photo and credentialing information in advance, so their SafePass is fully synced with their information when they arrive. Or they can have their picture taken at the front desk. The eBadge is thin and lightweight, yet with a crisp high-quality digital photo of the visitor, their name and other pertinent information the organization may want to add. When visitors leave, their SafePass is placed in a dock where it recharges overnight. Unlike analog visitor badges, there's zero waste involved at any stage in the credentialing process.



SafePass is launching an integrated eBadge system that includes geolocation tracking.

For Huff, however, all this was simply a starting point that allowed him to build extra intelligence into an integrated system. Employing a combined Wi-Fi/Bluetooth chip, SafePass provides real-time location tracking. “In our target markets, facilities already have existing Wi-Fi infrastructure,” explains Huff. “We can leverage those access points to communicate with our back end tracking algorithm and based on the signal strength of those access points we’re able to geolocate exactly where the badge is located in real-time throughout the building.” Especially for organizations with higher security needs, knowing exactly where visitors are at any given moment is a compelling benefit.

SafePass provides additional benefits related to the pandemic.

In the era of COVID-19, location tracking offers a more efficient way to conduct contact tracing. When infections occur, organizations can quickly determine which SafePass eBadges came within a specified radius of other eBadges, and report this information to health authorities to support their contact tracing efforts. As many organizations move to a hybrid model where employees might work from home two or three days a week, they’ll be seen less often within a corporate complex. When hundreds or thousands of employees see each other in person much less frequently, some might be perceived as virtual strangers who may or may not belong within the complex. This will make it all the more important for people to be easily recognized with a highly visible eBadge at all times. “In the age of COVID,” says Huff, “Everyone is a visitor.”

eBadges show visitors that a company embraces smart technology.

Another benefit of SafePass and other smart eBadge solutions is that they simply make a good impression. After all, many visitors are VIPs. An eBadge reinforces the image of a smart, cutting-edge company. The cool factor matters. And nobody wants an ID stuck on their clothing.

DigMe – the universal digital credential.

Like many successful entrepreneurs, Robin Bienfait's inventions are born from the challenges she seeks to solve in her own daily experiences. Bienfait led AT&T Global Network Services and Bell Labs for part of her 20+ years with the company, and has held leadership positions with numerous tech firms including Blackberry and Samsung. Currently, she's the founder and CEO of the Atlanta Tech Park, a thriving technology accelerator that's home to over 90 firms. Bienfait is also the founder of Emnovate, which advises her tech park members and a roster of corporate clients on ways to spur innovation. "At AT&T, Blackberry and Samsung I've had this issue with having the right business card with me and easily being able to share the correct card," explains Bienfait. "In addition to that, I was always carrying this lanyard with access devices hanging off of it for me to be able to get into this or that building. I currently have three separate digital access cards, just for one business I work with."

Bienfait sees an opportunity to create a comprehensive and unified digital version of her identity. Instead of having multiple lanyards and ID cards, a separate driver's license, passport, birth certificate, and various business cards, why not bring them all together into a single eBadge that does it all?

This was the genesis of Bienfait's new product My Digital Identity, which will be marketed as the "Digital Me" DigMe™ eBadge. Incorporating a color E Ink display that will work with a phone app, DigMe will be a first of its kind lightweight wearable IoT device. The eBadge will include a biometric fingerprint sensor to ensure only the user controls access to their identify and credentials. With one touch, the user can share their business card digitally with one person, multiple people in a meeting or an entire audience at a speaking event. Or display their passport, driver's license or any other form of credential.

While the DigMe eBadge has computing power through its smartphone integration, credentials are only accessible via the E Ink intelligent display. "From a security perspective," says Bienfait, "I wanted to make sure that if somebody did steal my phone they didn't steal my identity."

Emnovate will be piloting DigMe at the Atlanta Tech Park, with plans to build upon the eBadge's functionality with future product iterations. Bienfait envisions a range of new features that can help make both facilities and individuals more secure. In addition to managing physical building access and visual security, by adding geolocation functionality DigMe could be turned into an internal corporate emergency broadcast system. In the event of an earthquake or fire, for example, an organization could send out customized

alert messages based on where an employee or visitor is within a facility. A DigMe eBadge can be designed to light up or vibrate while displaying a message that instructs the eBadge holder to proceed to the exit nearest where they are at that moment. Knowing to proceed immediately to stairwell 19B versus 20C could be a lifesaver.

Making healthcare smarter.

An attractive market for smart credentialing is healthcare, where privacy concerns are elevated and the need for patient safety and confidentiality is paramount. In hospitals, for example, mobile credentialing with smartphones is not an option given strict HIPPA regulations for their use.⁵

One company blazing a trail is Palarum, an Ohio-based startup that's taking the concept of a security badge in new directions. While traditional ID badges are geared toward protecting facilities from intruders, Palarum is focused on protecting hospital patients from injury. Palarum found that patients suffering injury from falls was an intractable problem. Studies showed that issues such as adverse drug events dropped 28 percent between 2014 and 2017, yet the incidence of falls dropped only 5 percent.⁶



Palarum's solution? A sock. More specifically, the PUP[®] Fall Prevention System, a wearable technology that's part of an integrated platform. In addition to being something patients are already comfortable with, the PUP sock is wirelessly connected to a system that automatically notifies nurses if a fall risk patient gets out of bed when they're not supposed to. Nurses are equipped with eBadges, made with E Ink displays that are connected to a central monitoring station. Using geolocation, the eBadges know where each nurse is within the hospital. So when a patient's sock sends out a warning, not only does it trigger an alert in the patient's room, it also sends out a signal that's picked up by the three eBadges closest to the patient's room. The eBadges vibrate, red lights blink, and graphics show what room the at-risk patient is in. As soon as the first nurse enters the patient's room, their eBadge automatically turns off the beeping audio alarm as well as the warning signal on nearby eBadges and the patient status display monitor at the unit's nurse station.

Palarum's PUP Fall Prevention System incorporates an eBadge that alerts nurses when a patient is at risk.

A solution for “alarm fatigue.”

Studies have shown that 85 to 99 percent of alarms going off in hospitals don't actually require clinical intervention, leading to alarm fatigue.⁷ Patients are driven nuts by the constant clamor, and time-stressed nursing staff can't easily determine which patients really need help. A patient leaning over to pick up a tissue can set off an alarm, for example. With Palarum PUP, patients get more peace and quiet and nurses get a more accurate and timely reading of who needs assistance.

E Ink enables compact and lightweight design.

Palarum eBadges are powered with a small rechargeable lithium ion battery. The entire eBadge including electronics and the E Ink display is only 7 millimeters thick and weighs just 30 grams.

Palarum is exploring future iterations of the PUP system that will include an alert system for nurses. By pressing a button on their eBadge, they could alert staff members nearby that they need help with a patient or feel they themselves are in danger.

The first generation of PUP is proving to be a resounding success, with a 43 percent reduction in patient falls. Palarum is entering into a Cooperative Research Development agreement with the VA in Palo Alto, California. “We've shown this to quite a few hospitals and they're just blown away,” says Dr. Glenn Wolfe, Palarum's vice president of engineering.

Looking ahead to new applications on the near horizon.

The flurry of entrepreneurial activity in the smart credentialing space is in full swing and will likely accelerate in the coming months and years as new products find market success. Alpha-ICT, based in India, designs customized solutions for a range of industry verticals. President and Executive Director Nikhil Joshi is planning to launch Alpha-ICT's own proprietary eBadge system in 2021 with a series of continuous product enhancements over time. “We've heard from several potential users that what they'd want is a combination of digital ID badge and access control,” says Joshi.

Netronix, a computer hardware manufacturer based in Taiwan, is working with partners to develop a range of new eBadge solutions for different industries. “We believe trade shows are an ideal market for smart eBadges,” says Netronix CEO Derek Ma.



Photo courtesy of Netronix.

The Netronix eBadge will feature a color display made with E Ink Gallery Palette™ 4000.

eBadges made with E Ink can serve double duty. First as digital ID badges that feature an attendee's face and credentials, and secondly as a wearable advertising medium for sponsors. A trade show eBadge could know where an attendee is within a vast labyrinthine hall at the Consumer Electronics Show. When the attendee is nearing the booth of a sponsor, the eBadge could display an ad that invites him or her to visit their booth and get a free Starbucks coffee. The sponsored eBadge concept will provide a new revenue stream for event organizers, and make a positive impression on attendees eager to learn about new technologies.

E Ink's next-generation color screen technology will make digital event sponsorships even more appealing. The ads can be updated automatically, with new eye-catching images and brand colors that engage both the person wearing the eBadge and everyone around them.

Conclusion.

Technology at its best is human. And the more technology we have — in all its forms — the more the human face will matter. COVID-19 may be keeping us at a distance for the moment, but nearly every online portal and app invites us to share our profile picture (it's called Facebook for a reason). Faces bring us together and create a common way of recognizing one another. With the rise of ultralow power E Ink displays and integrated circuit solutions, the digitized human face will become visible and wearable in more forms than currently imagined, bringing innumerable benefits. Credentialing systems will become more robust and foolproof. Digital personas will become more unified, secure and convenient. Hospitals can improve patient outcomes. Employees and visitors will be safer in emergencies. And maybe, if we're lucky, we'll get a free coffee or two at our favorite trade show. Let's make sure your eBadge and mine stay connected as this story develops.

About the Author

Ted Page is a Co-Founder and Principal of Captains of Industry. Page has created content and marketing for a wide range of global companies including Apple, Microsoft and Starbucks.

About the Sponsor

E Ink is the originator, pioneer and commercial leader in digital paper technology. The company delivers its advanced display products to the world's most influential brands and manufacturers, enabling them to install extremely durable, low-power displays in previously impossible or unimaginable applications and environments.

E Ink encompasses the combined E Ink Corporation, which was spun out of the MIT Media Lab in 1997 to commercialize electronic ink and EPD technology, and Prime View International, which was established in 1992 as the first TFT LCD company in Taiwan, focusing on high-quality small-to-medium-sized TFT LCDs. In 2009, Prime View acquired E Ink Corporation to further integrate and expand the EPD supply chain and the new combined companies were branded as E Ink.

E Ink's corporate philosophy centers around delivering revolutionary products, excellent user experiences, and environmental benefits through advanced technology development.

Sources:

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