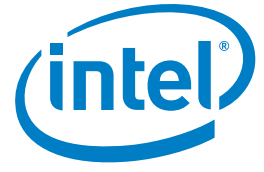


CASE STUDY

2nd Generation Intel® Core™ i5 vPro™ processor



Touch, feel, and see

LCD manufacturer turns to Intel to help drive interactive display technology

Finnish company MultiTouch Ltd. is a ground-breaking manufacturer of interactive liquid crystal display (LCD) screens that can be used for a wide range of purposes. The company launched in 2007 with a selection of interactive screens. More recently, it wanted to develop LCDs that provide truly sensitive interactivity for simultaneous users. An important element in this drive was to reduce the size of the hardware and create a low-maintenance, standardized technology that could be used as a single screen or in combinations of up to 24 wall-mounted screens. 2nd generation Intel® Core™ processors have played an important role in helping MultiTouch achieve its ambitions by enabling computers within the screens, high-speed data transfer in multi-screen displays, and remote management.



"It's a big step forward in the marketplace and, judging by the early demand, it's going to be a huge success."

Hannu Anttila,
Vice President Sales, MultiTouch

Challenges

- **LCD displays need power:** Multitouch wanted to develop interactive LCD screens that could stack together and power interactive virtual reality software
- **Reliable data flow:** With up to 24 interlocking screens planned for large visual displays, reliable data flow between each LCD was essential
- **Object recognition:** Needed to ensure object recognition was fast

Solutions

- **Computer inside:** MultiTouch designed LCDs with a computer inside, using the 2nd generation Intel® Core™ i5 vPro™ processor, an industry first given that computers were previously external to the screen
- **A powerful flow:** By using Intel® 1GbE Network Adapter the company ensured rapid and reliable data flow across multiple screens and between touch points to deliver fast and responsive object recognition
- **Bringing to life:** Intel's Open Architecture initiative helped MultiTouch develop software that enables customers to customize the software they are running on the LCD displays

Impact

- **Powerfully simple:** 2nd generation Intel Core i5 vPro processor enables superior LCD design, powerful processing for applications, and remote management
- **Enticing:** Intel's Open Architecture initiative enabled MultiTouch to develop a Cornerstone* software development kit, which in turn delivers a powerful enticement for customers who want to develop their own software
- **Speed:** New design and added features deliver a standardized product that has a fast time to the marketplace, is easy to maintain, provides greater energy efficiency, and represents a significant advancement for interactive LCD technology
- **Remote management:** MultiTouch customers have the potential to remotely manage their MultiTouch LCDs through Intel® vPro™ technology which is embedded in the motherboard.

A city wall

MultiTouch is a Finnish company headquartered in Helsinki. It was founded in 2007 when it was spun out of the research department of Aalto University. The move into the commercial world followed the creation of a city wall in Helsinki that used computers to project visions onto the wall so that people could interact with them.

When the city wall was built as an open-air installation, it generated a huge amount of interest from organizations that recognized commercial potential. The technology was unique and the company began to integrate it with LCDs to meet commercial demand.

MultiTouch achieved an early success in 2008 when Deutsche Telekom requested a large multi-touch wall for its presence at CeBit 2008, Europe's largest technology tradeshow. Since then, the company has acquired customers as wide-ranging as auto manufacturers Opel and Audi; engineering firms like ABB and Siemens; the Johnson Space Center in Houston, Texas; and military forces.

Today, MultiTouch LCDs have a wide range of professional uses in many areas including retail, exhibitions, marketing, museums, public information, hospitality, research, education, art, design, and other areas. To date, they are found in over 40 countries.

Overcoming limitations

While its products have been enormously successful, the company understood that there were certain limitations. For example, its products used single- or dual-camera setups. While this provided benefits to application developers, drawbacks included a deep and unwieldy form factor, screens that were sometimes not responsive to touch, and displays that were expensive to manufacture and maintain.

If these limitations could be overcome, it could significantly drive the technology forward. For example, touch screens have become the norm in handheld devices, but in large display sizes, from 30 to 100 inches, existing foil-based technology used in hand-held devices could not be utilized.

Large display screens also need to be able to support simultaneous users. This required collaborative applications that worked together rather than single applications as found on small hand-held devices.

To advance the LCD interactive technology, the company has developed a number of technologies that have been fused together to create large LCD screens less than 20 centimeters thick. MultiTouch has called its LCD technology platform MultiTaction* and the first LCD product based on this platform is the MT550 MultiTaction Cell 55" Full HD LCD.

Advanced design

MultiTaction has several technological components that make the MT550 unique among large-display LCDs. Computer Vision Through Screen (CVTS) is an optical imaging process that enables the tracking of an unlimited number of touch points. It also detects whole hands as well as objects and markers placed on the screen. As a result, sophisticated, augmented reality applications can be used.

Integrated backlight emitter camera (IBEC) modules are integrated circuit boards suited for mass production. They uniquely include white LEDs for standard LCD backlighting and infrared LEDs for emitting infrared through the LCD panel. The infrared LEDs reflect from hands and objects back inside the display, where infrared cameras capture the images at up to 200 frames per second¹.

"Cooling and low noise are essential for computers within the LCD and the 2nd Generation Intel® Core™ i5 vPro™ processor deliver on both these counts."

*Hannu Anttila,
Vice President Sales, MultiTouch*

A matrix tracking system (MTS) combines software and hardware logic to interface with all the cameras in the IBEC modules, process the images, and merge them in real time into one full image covering the whole display area. This is also done at the fast rate of 200 frames per second¹. MTS scales from four to more than one hundred cameras depending on the display size. For example, the 55-inch LCD MT550 incorporates 30 cameras.

Hand prints

Hannu Anttila, vice president of sales for MultiTouch, said: “The touch technology is integrated into the backlight plane and the cameras are at a 90-degree angle to the screen. This enables it to capture much more information than other touch technologies—for example, fingertips and hand contours. This information is run through a sophisticated computer algorithm, which essentially enables the screen to detect individual hands and thus separate between individual users.”

MultiTaction represents a leap forward in interactive LCD display technology. It throws off limitations previously associated with LCD displays such as the need for calibration, and interactivity that was not very sensitive to touch. It also enables high levels of clarity and transparency, a completely flat surface, and narrow borders around the screen.

The potential is enormous. One organization in Australia has been quick to adopt it, with several more major companies also lining up. This educational institute has made use of several screens placed together—up to 24 can be used to create enormous wall displays—and developed virtual reality software that runs on the screens.

The software shows a map of Australia and various major tracks used by settlers through the Australian outback and historic hotspots on these tracks. Touching the screen—specifically, the hotspots—reveals historical information relating to the geographic areas.

Going deep

Intel® technology has been absolutely central to these LCD advancements which, in turn, have also helped MultiTouch advance its business model. The MT550, and MultiTaction technology, is based on 2nd generation Intel Core i5 vPro processors. Alongside this, Intel® 1GbE network adapters and Intel’s Open Architecture initiative have delivered significant benefits.

The inclusion of 2nd generation Intel Core i5 vPro processor technology to run the applications marks a significant moment in interactive LCD design. For the first time, computers are embedded within the display unit rather than in boxes external to the LCD.

Importantly, the 2nd generation Intel Core i5 vPro processors low energy consumption has essentially enabled MultiTouch to introduce the computing components to the inside of the LCD.

Anttila said: “Cooling and low noise are essential for computers within the LCD and the 2nd generation Intel Core i5 vPro processors deliver on both these counts. What’s more, because they are also powerfully performing, they can run the applications on the LCDs with plenty of power left over. Because of their benefits, we’ve signed up to the Intel roadmap. This means that should we choose to use, for example, the 2nd generation Intel® Core™ i7 vPro processor within the LCDs, we just simply swap the processors around, without having to reengineer the inside.

Isolate and manage

“Computing power inside the display makes support a lot simpler. Complexity is removed and maintenance is a lot easier. Customers find this a lot more enticing. If, for example, you have a large wall display consisting of 20 screens, it takes a lot of work out of maintenance,” adds Anttila.

Intel’s Open Architecture initiative has also been invaluable, helping initiate a

“Computing power inside the display, a single set of components, makes support a lot simpler.”

Hannu Anttila,

Vice President Sales, MultiTouch

sea-change in how the company sells its products. Prior to the development of the MultiTaction platform, software development for each LCD was a complex task. However, the company has developed what it calls Cornerstone SDK which makes software development far easier and allows maximum performance at ultra high resolutions.

Cornerstone is an SDK that is offered to customers when they buy the MT550. It allows customers to develop their own software for the LCD. It consists of 15 software tools and applications can be developed for Linux,* Windows* and OS X* operating systems. Most third-party multi-touch application development tools are also supported.

Great enticement

Customer's own SDKs can usually only support a number of touch points for their applications but the Cornerstone SDK, developed on Intel Open Architecture, is specifically designed for the optical markers such as finger and touch points required for interactive software. This ensures the applications are ultra-responsive when customers engage with the screen.

As a result, customers can buy the MT550 LCDs and now develop their own interactive and ultra responsive software. It's an added selling point for MultiTouch and makes the MT550 and MultiTaction technology platform even more attractive to customers.

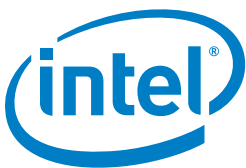
Anttila said: "Intel technology has played a central role in helping us develop the MultiTaction technology platform. We enjoy working with Intel and they are active in driving technology and raising awareness of how you use interactive technologies in the marketplace too.

"We now have an interactive LCD technology platform that can be mass-produced, is easy to maintain, can be quickly and simply upgraded when required, and addresses all the limitations of previous interactive LCDs. It's a big step forward in the marketplace and, judging by early demand, it's going to be a huge success."

Spotlight on MultiTouch

MultiTouch provides interactive multiuser displays and software platforms. MultiTouch displays are full high-definition LCDs, stackable into any size table or wall. They support multiuser environments. Software provides unlimited touch points, hand recognition, and object recognition on Windows*, Linux* and OS X*. MultiTouch products are currently in use in more than 40 countries around the world. The products are designed for retail, exhibition, marketing, museum, public information, hospitality, research, education, art, design, and other professional uses.

Find a solution that is right for your organization. Contact your Intel representative or visit us at www.intel.com/go/digitalsignage



This document and the information given are for the convenience of Intel's customer base and are provided "AS IS" WITH NO WARRANTIES WHATSOEVER, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. Receipt or possession of this document does not grant any license to any of the intellectual property described, displayed, or contained herein. Intel® products are not intended for use in medical, lifesaving, life-sustaining, critical control, or safety systems, or in nuclear facility applications.

*Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel® products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit <http://www.intel.com/performance/resources/limits.htm> or call (U.S.) 1-800-628-8686 or 1-916-356-3104.

Intel® vPro™ Technology is sophisticated and requires setup and activation. Availability of features and results will depend upon the setup and configuration of your hardware, software and IT environment. To learn more visit: <http://www.intel.com/technology/vpro>.

© 2011 Intel Corporation. All rights reserved. Intel, the Intel logo, Intel vPro, Intel Core and 2nd generation Core are trademarks or registered trademarks of Intel Corporation in the United States and other countries.

*Other names and brands may be claimed as the property of others.