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Modularization: The Right Touch for Screen Panel Development

Touchscreen panels offer an opportunity for developers to simplify how people interact with a variety of devices. Driving demand for improved touchscreen panels is the increased adoption of IoT and IIoT technologies across a wide range of sectors—from industrial process controls to consumer self-service kiosks.

Not only do touchscreen systems now offer higher-resolution graphics, they deliver more sophisticated functionality, encompassing data acquisition and analytics.

The key to innovation in these systems is modularization combined with commercial off-the-shelf (COTS) solutions. This places all CPU, memory, and I/O into a box module, while a panel module handles the display screen and all human interaction with the device. Together they provide a complete platform using available components for developing cost-effective touch panel PC products.

In this article we'll explore criteria for evaluating touch panel PCs and how modularization plays a role in enhancing such systems.

Scalability and Upgradability Simplify Development

Touch panel systems based on a common middleware or software base simplify how developers approach design and increase system scalability. This approach eliminates the need to recode application programs. It also enables easy upgrades to more powerful processors when needed.

This method also offers numerous benefits over traditional touch panel all-in-one PCs that are built from the ground up.

This traditional approach is limited to set combinations of components and configurations.

Modularization allows rapid deployment of custom touch panel systems with reduced development time. Box modules can scale to meet application requirements. And the touch panel can upgrade to a larger screen or accommodate new technology without a complete system redesign.

Versatility Means More Options

Flexibility and expandability are priorities in touch panel modularization design. The combination provides connectivity with inputs and outputs for a wide range of industrial applications and other IoT devices.

These attributes also allow businesses and organizations to avoid replacing existing infrastructure—regardless of application—for smart factories, healthcare, smart homes, or cities.

For example, a vending machine outside a mass transit station can be equipped with an IP camera using anonymous video analytics (AVA) to analyze customer demographics and touchscreen interaction. The vending machine also can contain internal sensors to monitor its refrigerator and storage capacity, helping ensure that items are kept in stock and at the correct temperature.

With numerous options available, the solution provider can decide, for instance, which form of connectivity to use—LAN, cellular, or Lower Power WAN. These decisions will factor in the type and the amount of data being transmitted, weighed against the advantages and disadvantages of each method.

But no matter which form of connectivity is most practical, it's simple to implement using a Mini PCIe expansion slot. This enables the touch panel device to support industry-standard protocols such as Wi-Fi, Bluetooth, GSM, LTE, GPS, and LoRA or NB-IoT.

Robust Design for Hostile Conditions

For touch panel devices to function in industrial settings, it's critical that equipment run for long periods of time and withstand extreme temperatures, dust, humidity, and moisture. Electromagnetic protection as well as vibration and shock resistance are also important factors to consider.

This is an area where modularization enables developers to build touchscreen devices that can thrive in hostile environments. Everything from ruggedized enclosures to waterproof and dustproof front bezels can be selected—preventing equipment damage.

To design a system using traditional techniques that meet similar requirements often requires starting from scratch, making such a choice ineffective in terms of time and expense.

And increased reliability, availability, and serviceability can be achieved more easily in touchscreen equipment using the modular design approach. By selecting industrial-grade materials, implementing security in every part, and eliminating failure-prone components, developers can design more dependable touch panel PCs.

How does modularization improve serviceability? To perform maintenance on traditionally designed touchscreen equipment outdoors or in a harsh location, technicians must make the repair on-site, or uninstall the entire unit. But with a modular-designed touchscreen system, a technician can uninstall only the affected box module or panel module, and then complete the repair in a convenient space.

Touch Panel PCs Centered on Modularization

DFI Inc. is one company that uses modularization in touch panel design with its KS070-AL Touch Panel PC, which leverages the company's adaptive display platform (ADP) design approach **(Figure 1)**. With this platform, DFI offers enterprise organizations touchscreen technology that meets their specific needs.
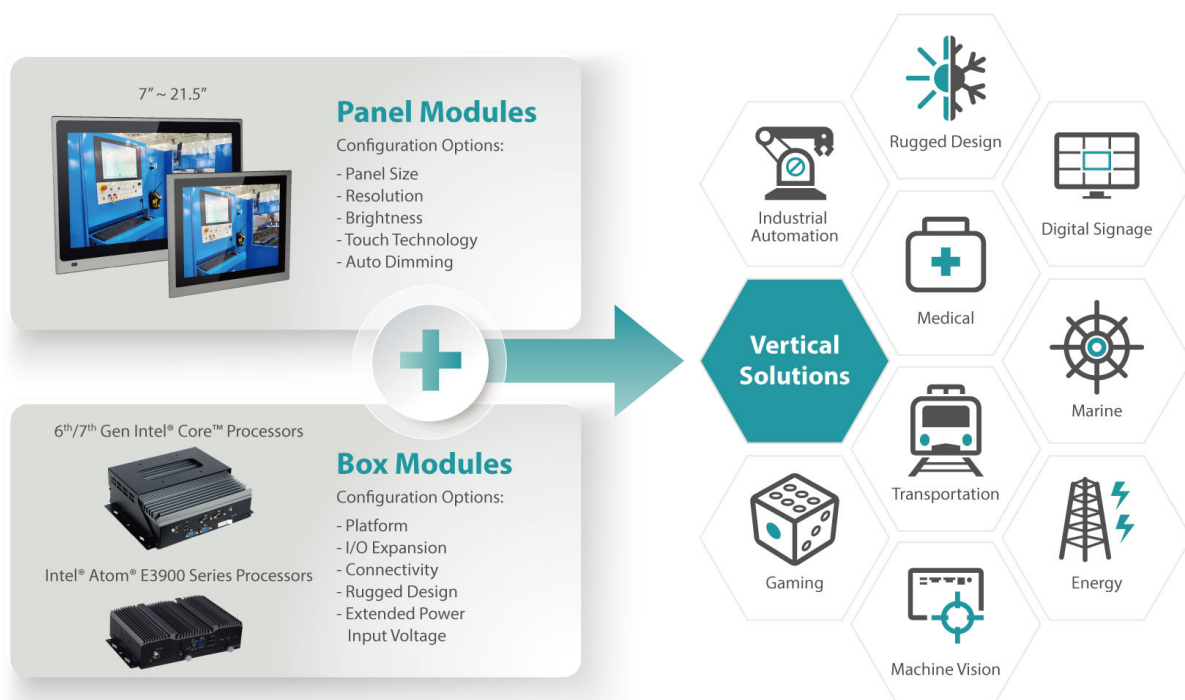
Figure 1. DFI's modular adaptive display platform (ADP) designs enable developers to provide customized touchscreen panel solutions. (Source: DFI)

Through ADP, the company's wide range of box and panel modules can scale to meet power, performance, and cost requirements for various industrial applications.

Features such as temperature, humidity, and dust resistance, as well as industrial protection like IP65, can be factored into the design. Plus, wide power input range (9~36V or 9~48V DC) as well as surge and overcurrent protection allow the panels to be used in situations with unstable power supplies.

Many of the company's systems feature Intel® technology such as the Intel Atom® Processor E3900, as well as the Intel® Celeron®, Intel® Skylake, and Intel® Kaby Lake processors. This enables DFI to build touchscreen technology that can process sophisticated graphics for medical imaging to gaming, along with necessary computational requirements.

DFI's box modules come with interfaces such as USB, I2C, SPI, PCIe, and UART, making it convenient to connect sensors and systems for data acquisition and communication.

Other application-specific interfaces like CAN bus and DIO ports as well as additional USB and LAN ports can be integrated easily. And the dual Power-over-Ethernet (PoE) LAN configuration enables adaptor teaming and eliminates the need for connected devices to have their own power supply.

All modules are equipped with an ignition signal input control for in-vehicle IoT applications, such as fleet management.

True to the modular approach, DFI's open platform supports a variety of frameworks, middleware, and integrated software stacks. As a result, the platform delivers greater flexibility in product development. And solution providers can use Intel® OpenVINO™ to implement video analytics in DFI's touchscreen panels.

Modularization Reinvigorates the Touchscreen Market

As businesses and organizations find new applications for touchscreen technology, developers will switch from traditional design methods to a modular design—taking advantage of low-cost COTS components. By moving to a modular approach, developers can provide touchscreen equipment that fits the growing needs of their customers at a lower price.