

DESIGN & PRODUCTS

SPECIAL FOCUS:
EMBEDDED COMPUTERS

When you want it HHOT!

By Per Holmberg and Christian Eder

A HANDHELD ORDER TAKING system developed for a leading fast food outlet in Sweden demonstrates the benefits and capabilities of mobile computing in the retail sector.

Most people will have experienced the frustration of waiting to be served, but when the wait is for fast food it becomes ironic. Our 'propensity to consume', as economists put it, can be significantly influenced by delays in service and for a fast food outlet that spells danger.

In this scenario, the use of portable point-of-sale (POS) terminals can greatly improve the customer experience, as their use brings a new dimension to the service industry.

McDonald's had realized it could speed up the process of order taking for drive-thru customers through mobilizing its staff. Using portable terminals it could deploy its staff to take orders from customers while they wait and in some cases fulfilling their order before they even reach the front of the queue. McDonald's had tested the concept of portable POS terminals but was looking for a more durable and rugged solution with stable communication to the in-restaurant POS system.

Realizing this goal required a specialist provider; a supplier that was able to deliver a ruggedized computing solution."

However, the project required more than just a ruggedized mobile computer suitable for use in all weather conditions; it needed to tap in to a well established value-chain that could deliver a tailored solution. The Handheld Order Taking (HHOT) project was subsequently commissioned through InTime Mobile Computers, a sales partner of



Swedish-based rugged computing specialist, JLT Mobile Computers.

JLT offers a range of ruggedized computer solutions and for the HHOT project the JLT8404 was chosen. Designed using modular technology and COTS hardware and software, the platform was capable of meeting the technical specifications while being flexible enough to accommodate specific system needs.

An overriding requirement was easy integration into McDonald's existing, proprietary POS software, running under Windows. Essentially, the terminals needed to become an extension of the existing system, connected over a wireless LAN. This would streamline both the back-office order processing – to the system the terminals would appear as any other POS terminal on the network – and the staff's learning curve.

While Tablet PCs have enjoyed some success in the consumer market, their use in industrial and light industrial sectors – such as retail – has been more significant due largely to the availability of high-performance computer-on-module (COM) solutions.

It is this enabling technology that ensures products such as JLT's meet the needs of customers like McDonald's. At the heart of the JLT8404 is congatec's COM technology. As

a leading supplier of COM Express compact modules, congatec specializes in developing COM solutions based on the latest semiconductor technology. This expertise – congatec was the editor of the PICMG's COM Express Design Guide – allowed the company to provide valuable design guidance during the development of the JLT8404.

The carrier board for the first product was developed by JLT over three years ago, around congatec's conga-CLX; a COM Express compact module based on AMD's Geode LX800. With the advent of the Intel Atom processor – and the standardization offered by a COM Express module approach – this module

was subsequently replaced by the conga-CA, which utilises the Intel Atom Z5xx and US15W system controller hub, offering greater power savings, appropriate for a battery powered tablet PC.

Throughout the evolution of the JLT8404, congatec has remained involved, offering design support where appropriate, including a technical review of the carrier board design which resulted in proposals for design improvements. This close client-supplier relationship is critical for JLT, enabling it to develop products for various markets including warehousing, transportation, automation, security and field work.

Limited retail experience

Before the HHOT project, JLT's direct experience of the retail sector was limited but the experience gained through its core markets provided extensive use-cases which are similar from a technical point of view; handheld computers are exposed to extreme environmental conditions so products such as the JLT8404 must withstand rain, dampness, temperature variations and sunlight.

Continually meeting these harsh conditions ensures the products developed by JLT are constantly being evaluated and devel-

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oped to make use of the latest technologies, such as the direct-sunlight readable display with touch-sensitive capabilities used in the JLT8404.

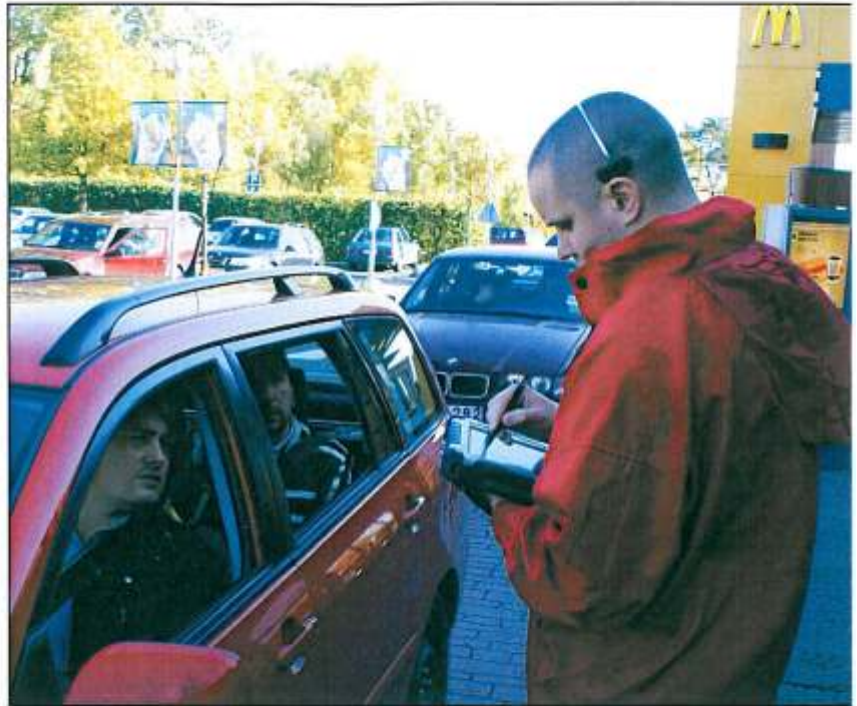
Another crucial factor is the ruggedness of the end-product and here, again, the design of the COM represents a critical element in the overall system's performance. For a rugged design the conga-CA has no removable parts; even the system memory is soldered into the module. This is augmented by the rugged COM Express connector which enables the module to withstand extreme shock and vibration.

The JLT8404 is available in a variety of build standards, including optional GPS and 3G wireless communications, which are in addition to wireless LAN and/or Bluetooth capability, making it a truly mobile computer. As explained, the overall product is capable of withstanding harsh conditions including water and dust ingress, extremes in relative humidity and temperature, as well as a drop test of 4 feet on to a concrete floor from 26 different directions.

The portable nature of the device dictates operation from an internal battery source and so low power operation is essential. The Intel Atom COM provides the power balance – in terms of power provided versus power consumed – needed for a portable computer. However, to get the most from each charge, JLT developed its own battery management solution. The firmware for the onboard controller was adapted for the COM by congatec, further illustrating the benefits of a close working relationship. In addition, special BIOS settings were required for this application – specifically, support for the flat panel display. This was achieved using CGUTIL, congatec's own system utility tool; a powerful tool that allows multiple customizations, from a bespoke boot logo to fully customized BIOS settings.

Fast food, even faster

The end client, in this case McDonald's, was fully committed to the HHOT project, devoting the necessary IT resources to ensure seamless integration of the JLT8404 based handheld terminals, while JLT's Swedish sales partner, InTime Mobile



Computers, handled the overall project management. A significant element of the HHOT project was ensuring the bespoke POS software was able to port easily across to the TabletPCs. Being Windows-based

may have eased this task, but the processing requirements of the operating system, wireless communications and the POS software demanded a processing module that was capable both in terms of performance and operating conditions.

Thanks to close working relationship between JLT and congatec, the proposed solution exceeded the requirements, leading to the roll-out of 80 HHOT terminals in McDonald's restaurants across Sweden.

Wireless POS terminals represent a significant market opportunity for the retail sector. As proven with the HHOT project, being able to meet customers face to face, in their own environment – in this case in their cars approaching a drive-thru kiosk – brings a new dimension to customer service. Now, during busy periods, customers using the drive-thru service can have their orders taken quickly and efficiently, in some cases McDonald's has reported orders that have been taken and filled in just 45 seconds! Now that really is fast food. ■



The conga-CA which utilises the Intel Atom Z5xx and US15W system controller hub.