

Keeping the buses moving

How information systems are being used to keep passengers up to date. By **Thomas Locher** and **Christian Eder**.

In a bid to ease inner city congestion, local, regional and national authorities are being tasked with raising the profile of public transport. While trains, buses and trams can offer a fast, affordable and largely reliable infrastructure for mass transportation within urban areas, their biggest detractor is unforeseen service delays. Now technology is tackling this problem, by delivering up to date travel information directly to the passenger.

Passenger information systems are beginning to be deployed across all forms of transportation. They rely on information about the local travel conditions, the location of the bus/train/tram, as well as passenger conditions, such as current capacity. Gathering this information has, for some time, been handled through bespoke systems that are complicated to maintain and extend, making the roll out of passenger information systems difficult and expensive.

Now there are industry standard solutions to creating passenger information systems that integrate information about multiple forms of transportation, known as Intermodal Transport Control Systems (ITCS). Based on commercial technology, these systems form the hub of operations for many transportation companies, such as London Bus Services, which operates its ITCS on behalf of Transport for London. With more than 8500 buses running in excess of 770 routes and more than 6million passengers transported every day, this represents the largest ITCS system in operation in the world. Operators must be able to see exactly what is happening anywhere in the system at any given time.





Furthermore, it is becoming increasingly important to disseminate some of the information gathered through ITCS to passengers, so that they are better equipped to plan their onward journey. Wireless technology, including WiFi and GPRS/3G make it increasingly simple to connect devices – even buses – to back office networks.

Today, the technology is being deployed through intelligent displays, which can communicate with ITCS and display the information on LCDs inside the bus. Increasingly, buses are equipped with intelligent displays, which not only inform passengers about the next stops, but also about route diversions, estimated time of arrival and the status of other forms of transport such as connecting buses or trains.

Multifunctional displays

Using a combination of embedded processing and wireless communications, Trapeze ITS has developed a range of multifunctional displays (MFD) which can deliver live route information and travel times, as well as details about other transport services and important passenger information. These MFDs use advanced GPS technology and over the air updates through GSM or radio communications. The MFDs can be used to display route information, as well as other forms of multimedia data, such as advertising messages and infotainment services.

Transportation applications represent a challenging environment for technology that is

more accustomed to being used in a single location. However, the MFDs developed by Trapeze can operate in these harsh conditions, offering a range of mounting options. At the heart of the Trapeze MFD is Congatec's X945 embedded computing module. Based on either Intel Pentium or Celeron processors, these modules provide the processing power needed to drive the MFD and process the information that is received, for display on the LCD. Perhaps from a passenger's point of view, the most important information is the name of the next stop; the MFD displays this and other route information on an easy to read map. This also helps overcome language barriers that can be encountered when only audio announcements are available. This is a particular problem associated with using a personal address system in public spaces.

The X945 represents a well established single-board computer solution. Based on Intel processors, it conforms to the ETX specification 2.7, which offers a fast processor, up to 2Gbyte of RAM, four PCI Express lanes, two serial ATA ports and one EIDE interface. In this configuration, the X945 also offers six USB 2.0 connections, two COM ports, an IrDA interface and support for a PS/2 keyboard and mouse. A fast Ethernet IEEE 802.3u 100Base-Tx connection is also integrated and the module offers AC'97 Rev 2.2 compatibility, with line in, line out, mic in and a digital high definition interface with support for multiple audio codecs.

The X945 also offers support for an advanced multimedia experience, which is important in this application. With two independent pipelines the module can support dual screens and also offers integrated motion video support in the form of motion compensation, subpicture support, dynamic bob and weave and hdtv (1920 x 1080) support. The flat panel interface is a dual 112MHz LVDS transmitter with automatic panel detection via the Embedded Panel Interface, based on VESA EDID 1.3. Environmentally, the module is capable of operating from 0 to 60°C, in a non condensing relative humidity of between 10% and 90%.

An important feature of the Congatec embedded module product family is the ability to customise the embedded BIOS to display an OEM logo at boot up. This feature is supported through a software utility developed by Congatec that allows modifications to the BIOS stored in ROM. The CGUTIL tool from Congatec has been developed specifically for this process. It enables an OEM to substitute the default boot image with their choice of image – typically a company logo – which is then displayed during the initialisation phase of the system. This can provide a valuable differentiating feature for OEMs and their customers.

The team at Congatec not only provided the X945 embedded module, but also assisted Trapeze's engineers in the system design by validating the circuit board and overall design for use in a harsh environment.

Speedy maintenance

The use of modular processing boards is now commonplace in many applications, but using standardised modules is appropriate in this example, as the maintenance cycle for the systems needs to be low, given that the buses are in almost constant use. By using a standard format computer module, any faults can be repaired quickly, thereby minimising downtime.

The availability of passenger information systems is increasing. With the right technical solution operators can now offer their customers – the passenger – a better service, more accurate information and a more enjoyable journey.

Author profiles:

Thomas Locher is a product manager with Trapeze ITS (www.trapezeits.eu). Christian Eder is Congatec's sales and marketing manager (www.congatec.com).