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Company Newsletter of INIT Innovations in Transportation, Inc. for business partners, employees and friends

Winter/2007

INIT's technology on VIVA BRT system.
VIVA wins IT project of the year award.

On November 1, 2007 Viva Bus Rapid Transit (BRT), a transit network connecting the York Region with Toronto and its subway system was awarded the IT Project of the Year award from the Tri-Committee of Ontario. The Tri-Committee is an organization that strives to create opportunities and partnerships to further the use of information technology in the public works sector. INIT is proud to have partnered with Viva in supplying much of the technology that contributed to the award.

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Editorial

Dear transportation professionals,

When INIT won the New York City paratransit contract with MTA (Metropolitan Transportation Authority), I took on the challenge of designing an innovative training course that was adaptable as well as "hands on".

During the planning and analyzing phase of developing the curriculum, I focused on ensuring that trainers would be able to modify the lesson outlines to include operational training alongside the INIT technical training. The format evolved into a "tell, show, do" course, where the trainer would describe, then demonstrate a feature or function, and finally, the trainees would perform the action themselves. This would eventually allow MTA to use the Training System for initial training of all new user-level personnel, as well as provide the tools to rapidly bring their more experienced staff up to speed on the new software/hardware tools developed by INIT.

> **John Crews**
Technical Trainer & Support Specialist

The course was first delivered in New York City to First Transit personnel. The trainers were able to use the adaptability of the course, targeting the job related features, functions, and operational methods. It proved to be successful and extremely functional.

As time goes on, INIT will continue to work hand-in-hand with the MTA to evaluate and revise the content of the Training System in order to keep up with any system enhancements or modifications. It is apparent after implementing the course in NYC, that this is the most cost-effective way for a larger transit authority to provide training to transit employees.

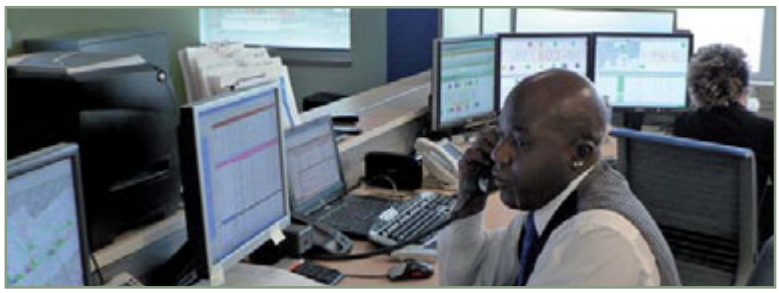
In the meantime, I look forward to moving on to the next "Train the Trainer" Course.

John D. Crews

John Crews

Intermodal Transport Control System (ITCS) – The next generation of CAD/AVL.

Making public transportation more attractive to individual commuters.



> **INIT continues to be an industry leader** with advanced systems like MOBILE-ITCS.

When searching for promising roads to a more mobile future, public transportation services are becoming increasingly more important. With the steady increase in traffic and rising gas prices each year, individual modes of transportation are reaching their limits. This raises new challenges for transportation authorities. To meet the needs of the growing public and to be able to compete with the convenience of private vehicles, public transportation companies are looking for ways of making public transporation more efficient and attractive. This requires both smart ideas and the support of an Intelligent Transportation System like **MOBILE-ITCS** from INIT.

The Intermodal Transport Control System represents the next generation of fleet management systems. It is the advanced central management tool that not only optimizes internal operating processes, but also helps to provide passengers with state-of-the-art information services. Based on long-term national and international experience in public transportation, INIT provides this universal operation management tool. **MOBILE-ITCS** allows for the integration of multimodal means of public transport as well as the exchange of information with various third party systems. All of which is necessary to provide passengers with the most advanced real-time information service.

Providing first-class transportation and real-time information to passengers is the secret to increasing public ridership and passenger satisfaction. It is the first step in attracting new commuters to public transportation.

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Product Spotlight:

PIDmatrix: State-of-the-art LED technology.

PIDmatrix is the multi-purpose, full-matrix display that allows you to display virtually any information you want to your transit customers. In addition to next bus arrival / departure information and the current time, you can display advertising information, special announcements and even icons.

The **PIDmatrix** has been designed with high performance LEDs to provide intense luminosity and brightness, so that it is suitable for use in any condition or environment. Automatic brightness control allows passengers to always be able to read the information, even in intense sunshine. The highlight of **PIDmatrix** is its versatility. The user can choose the display size, allowing **PIDmatrix** to meet any installation requirement. It can be used one- or two-sided and delivered in different body designs. Each line of text can be divided into several fields with different text attributes assigned to each field.

Even with all of these features, **PIDmatrix** is still easy to maintain. New software, fonts and other changes can even be loaded remotely using the wireless data interface.

> **The full-matrix display** can be used to visualize graphics and symbols but also for rendering texts using various fonts and font sizes.

German ingenuity – From mapmaking to GPSgo.
Advancing the state of navigation.

> **The Waldseemueller wall map dated 1507,** depicts the Americas, Africa, Europe, Asia and the Pacific Ocean separating Asia from the Americas.

INIT's German headquarters are located in Karlsruhe, north of the Black Forest, which was also home to Martin Waldseemueller, the famous German cartographer. Although the name Martin Waldseemueller is not familiar to most Americans, history reveals that the naming of the North American continent is credited to this mapmaker. Waldseemueller first produced a globular world map bearing the name "America" in the early 1500s. His source of information at the time came almost entirely from Amerigo Vespucci's maps who — he believed — had discovered a new landmass in the West.

A visionary for his time period, even Martin Waldseemueller could not have imagined how high-resolution satellite imagery and GPS technology have changed the way we relate to and use maps and geographic data today. In many homes and workplaces the combination of web-based mapping sites such as Google Maps and broadband internet access have even replaced the traditional atlas!

Despite these advances in technology, and in part because of them, there are new challenges to face and problems to solve. One of these is determining accurate vehicle positioning in environments where GPS coordinates are either inaccurate or not available, such as tunnels or urban environments with many tall buildings.

In response to this challenge INIT has created the **GPSgo**, the GPS receiver with dead reckoning. Already in use in New York City and the York Region, **GPSgo** addresses this issue through the innovative use of a gyro to correct the GPS signal. Combining information provided by the gyro with odometer pulse input, the outputs correct GPS coordinates sending them to the **COPILOT**-the vehicle's IT platform. For further display accuracy, the **COPILOT** can employ "vector matching" where it corrects small discrepancies between map data and the coordinates by "snapping" the vehicle location to the street grids. The end result is that in-vehicle navigation works properly, and GIS displays show the vehicle in the correct location.

Although times have changed, German ingenuity and technology are still advancing the state of navigation and by extension, transportation.

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> **INIT employs a GPS receiver,** combined with a gyro module, which corrects the coordinates in instances of weak GPS signals in urban canyons.

Automatic Passenger Counting Systems.

The evolution of advanced counting technology — INIT uses most advanced method of data security with WPA2.

Since the late 1990s Automatic Passenger Counting (APC) systems have become a vital component of Intelligent Transportation Systems (ITS). Reliable APC data supports scheduling and planning departments to improve the on-time performance of their system and provide accurate data to the agency for numerous evaluation purposes.

The basic idea behind these systems is quite simple; some type of sensing device is needed to easily and accurately read people as they board and de-board the vehicle. It becomes a little more complicated when you have to decide which type of sensing technology will work and perform the best.

Of the technologies currently available, an infra-red sensing device that utilizes the combination of both an active and passive sensing element combined into one sensor head has a proven track record to be perfectly suited for the public transit market.

The passive part of the sensor is a pyro-electric sensing unit that detects the heat movement pattern of a person. In this instance, the movement is detected through the innovative use of "inner" and "outer" curtains projected by the sensors. Each sensor utilizes three individual segments. Movement, therefore, is detected when either the "inner" or "outer" curtain is interrupted. Depending on which curtain is interrupted first, will determine if the passenger is boarding or leaving the vehicle.

> **The IRMA sensors** provide precise counts of boarding and alighting passengers.

> **Today, transit agencies expect to have** ITS technologies that utilize the most secure method of data transfer on passenger counting.

The sensor combination detects the direction and how many passengers pass through the door. The sensors are installed above the door, and the width of the doors determines if one or two sensors need to be installed. The sensors are connected to an analyzer which compiles data.

Manual & Automatic Data Transfer.

Once buses started being equipped with APC systems and were able to collect the passenger count data automatically, a new challenge presented itself: How to get the data from the vehicle into the reporting system? Most of the early APC systems relied on the use of some form of removable media storage. This could be a floppy disc or memory card. Unfortunately, these required manual labor to retrieve and replace, and these small devices were often lost or broken by the people carrying them around.

However, in today's advanced technological environment it is easy to obtain highly accurate ridership data. Once the ridership data is collected by the APC system it is in a raw format and contained on the vehicle. The APC analyzer holds this information and passes it to the on-board computer after the door is cycled. The on-board computer stores the count information with locations until the vehicle returns to the garage or a location near a wireless access point where the data is automatically uploaded to the server. To be truly useful to the transit agency however, this information needs to be combined with other information like vehicle location and then transferred off the vehicle.

Data Security.

In 2000, APC systems began migrating to automatic data transfer methods to get information to and from the vehicle. However, the first systems did not have any security during the data transfer process resulting in potential network security problems. As a result, a WEP (wired equivalent protocol) security key was the best solution found to upload and download the data to the vehicle.

WEP – Wired Equivalent Protocol.

WEP encryption relies on a secret key that is shared between an on-board unit and an access point. The secret key is used to encrypt packets before they are transmitted, and an integrity check is used to ensure that packets are not modified in transit. In practice, most installations use a

single key that is shared between all mobile stations and access points. As a result, system administrators and users generally use the same keys for weeks, months, and even years. However, there are better solutions.

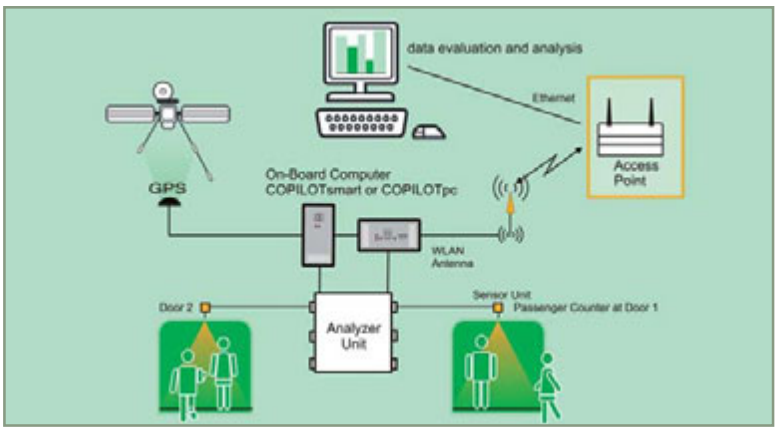
PEAP – Protected Extensible Authentication Protocol.

Nowadays, transit agencies expect to have ITS technologies that utilize more advanced methods of data security. PEAP, Protected Extensible Authentication Protocol, presents a strong authentication method and a dynamic WEP key encryption. PEAP actually encompasses a two step process: First the system establishes a secure connection via encryption to create a tunnel; secondly it authenticates the client through a user ID and password system. However, technology has progressed here. Today, the most advanced and secure method of data transfers is WPA2.

WPA2 – Wi-Fi Protected Access.

Transportation agencies try to switch their network to the new WPA2 standard which is the most advanced and secure method of data transfers available today. Currently INIT is the only company in the transit business delivering secure data transfers using WPA2. WPA2 is based on the Robust Security Network (RSN) mechanism, which provided support for all of the mechanisms available in WPA. Some other advantages of this method of data transfer are:

- Strong encryption and authentication support for infrastructure and ad-hoc networks.
- Reduced overhead in key derivation during the wireless LAN authentication exchange.
- Support for opportunistic key caching to reduce the overhead in roaming between access points.



> **INIT provides automatic and continuous passenger counting** with the most advanced and secure data transfers.

- Support for pre-authentication, where a station completes the IEEE 802.1X authentication exchange before roaming.

You can count on INIT.

INIT is the leader in the US market equipping APC systems on LRV's using a combination of active and passive sensor technology from IRIS, and utilizing WPA2 for the most secure data transfers. INIT has installed more than 9,000 automatic passenger counting sensors since 2001 on projects in the US and Canada including over 300 LRVs and 2,500 buses in North America. The accuracy of INIT's combination yields results above the stated 95% accuracy, and the customer benefits from the accuracy with immediate data available for evaluation.

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APC Success in Santa Clara – A word from one of our customers:

"It was very refreshing to work with a quality vendor like INIT. Our contract was to equip 20 light rail vehicles with APCs. From beginning to end, the project went smoothly. Installation, testing, training and acceptance were all performed as scheduled. INIT staff were very professional and knowledgeable about their products. When presented with technical questions, they could usually answer them on the spot. Last, but not least, is system performance. Their hardware and software have proved to be extremely reliable and accurate. Adding APC technology to light rail has allowed Valley Transportation Authority to complete its transition from a manual passenger data collection program to an automated one, thus reducing operating costs."

Bill Capps

Manager, Service & Operations Planning

Santa Clara Valley Transportation Authority (VTA)

Deploying state-of-the-art technology on VIVA Bus Rapid Transit in the York region.

INIT provides advanced technology with ITCS.

Continued from page 1

> **York implements best use of advanced technology** ensuring passenger mobility and comfort.

Viva is spear-heading the implementation of innovative technologies and has installed some of the state-of-the-art technologies currently available in the market. The following briefly describes the various technologies already in place or to be implemented on the system:

Computer Aided Dispatch and Automatic Vehicle Location System.

The system provides real-time monitoring and tracking of buses from a control center, as well as schedule adherence and dispatch-related functions. The system includes the following:

- Automatic Vehicle Location (AVL) — through the AVL system the actual real-time position of each Viva bus is measured, using the global positioning (GPS) technology, and its location is relayed to the control center.
- Computer Aided Dispatch (CAD) — the CAD system provides a comprehensive centralized tracking and dispatching system for Viva operations. Data transmitted from the Viva buses are assimilated by CAD software that enables bus status, condition, position, schedule adherence, operator, and incident information to be displayed on computer screens at dispatcher workstations in the control center.
- Voice and data communications — the system allows the control center staff to send or receive text messages to and from buses. The system also allows voice communications between the control center and drivers.
- Automated stop announcement — using the AVL information, the on-board computer automatically announces the next stop information 200 meters in advance of every stop.
- In-vehicle variable message signs (VMS) — using the AVL information, the VMS displays the next stop information on a continuous basis inside the bus.
- Destination signs — all destination signs (front, side and rear) are automatically controlled by the on-board computer and refreshed depending upon the route/trip operated by the bus.
- Automatic Passenger Counters (APC) — the on-board APC equipment counts the number of customers entering and exiting a bus. This data is used to analyze service utilization and patterns.

> **Exact counting and the automated** processing of recorded data makes MOBILE-APC the most reliable APC-system in the industry.

- Emergency alarm and covert microphone — all buses are equipped with emergency alarm and covert microphone systems. When activated by the driver, control center staff can listen to the incident in progress on the bus.
- Supervisor laptops — all field supervisors are provided with a laptop through which they have access to some important components of the Computer Aided Dispatch and Automatic Vehicle Location system.

Automated Fare Collection.

The Viva fare payment is based on Proof of Payment (POP), which requires that the customer retains a ticket, pass, or other form of proof that a fare has been paid. The customers can pay fares using the ticket vending machines/ ticket validators installed at all stops and terminals. When using the Viva service, the traveller is required to show this proof, typically on a random basis to a roving enforcement officer.

The automated fare collection system provides the following benefits:

- Less total boarding time at stops and terminals.
- All money and transactions are handled at the stops and terminals.
- Time based transfers (120 minutes) — Allowing customers to travel on any YRT or Viva bus in any direction for a two-hour period with just one fare.

Transit Signal Priority (TSP).

TSP facilitates quicker movement of Viva buses through busy signalized intersections. It reduces the delay and travel time and improves Viva service reliability, thereby improving quality of service. All buses and the intersections through which Viva

service operates are equipped with TSP equipment. Priority is provided only to the vehicles which are behind schedule. An advantage of this type of priority is that only a small percentage of buses will request priority, therefore, minimizing the effects on side streets and intersection operation in general.

Traveller Information System (TIS).

The TIS is an integral component of the Viva system. TIS enhances customer mobility, safety and the productivity of Viva system. The TIS includes the following:

▪ Stop variable message sign (VMS) — all Viva stations are equipped with a variable message sign advising customers about the "Next Bus" information on a real-time basis.

▪ Web-based trip planning — the York Region Transit (YRT) website allows the customers to plan their trip by selecting start and end locations. The software allows trips to be planned covering Viva, YRT and other transit services operating in the Region.

▪ Interactive Voice Response (IVR) — the IVR system front ends the call center and allows the customers to obtain schedule information about the bus stop of their choice. The YRT/Viva information is available 24-hours-a-day, 7-days-a-week through IVR system.

▪ Short Message Service (SMS) - York Region Transit is in the process of implementing a SMS service through which customers can send text messages and obtain schedule information about the bus stop of their choice.

▪ WiFi - York Region Transit is in the process of implementing an on-board WiFi service which will enable a customer with a wireless-enabled computer or personal digital assistant (PDA) to connect to the Internet while travelling on Viva buses. The 60 Viva buses are equipped with a table for the customers to use for the computer/laptop.

> **Viva bus sets high standards** providing quality service to passengers in York.

On-board Security Camera System.

The primary purpose of an on-board security camera system is to improve driver and passenger safety and security. In addition, the system will also assist in resolving fare related disputes and helps investigate fraud and passenger complaints. All Viva buses are equipped with four to six security cameras per bus and a digital video recorder. The video will be downloaded only in response to an event or accident, otherwise it will be overwritten in sequence. An upgrade is planned for the future which will allow a few pictures to be sent to the control center in response to driver activating the emergency alarm.

Advertising/ Marketing Screens.

All Viva buses are installed with a LCD monitor mounted behind the driver. The monitor provides news, weather, sports, celebrity news, and other text-based data to the customers. Update is done through a wireless GPRS network.

Operations Reports.

The system allows different types of operational performance reports to be generated on a monthly basis. This provides valuable insight into the actual operations of the service thereby providing an important tool to management for service improvement decisions.

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INIT provides for VIVA:

> Intermodal Transport Control System - ITCS (former CAD/AVL) with city map display, forms management and Intranet access for mobile supervisors

> Planning System MOBILE-PLAN

> Real time passenger information at all stops and terminals

> TSP (Traffic Signal Priority) for 141 intersections

> GPRS for data communication

> GSM for voice communication

All vehicles are equipped with on-board computer COPILOTpc, data terminal PRESSit, APC, Vehicle diagnostic interface, data bus network PAmobil, and next stop displays PIDmobil.

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New INIT employees:
The INIT family continues to grow.

Alfred Burger
Field Service Manager (APC)

Leo Bernard
Project Manager

John Blount
Network Administrator (IT)

Kevin Canney
VP of Operations

Ann Derby
Marketing & Events Manager

Brian Everett
Software Engineer

Glenn Gonzalez
Senior Field Service Technician

Todd Woodward
Field Service Technician

Interesting Events

November 25 - 27, 2007 **"1st MENA Public Transport Congress and Showcase"** in Dubai, United Arab Emirates

December 10 - 12, 2007 **"Gulf Traffic Exhibition and Conference"** in Dubai, United Arab Emirates

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