

# ETHICAL, LAW-ABIDING TAXIS?

By Leigh Yorke-Smith.

**Y**usuf Noordin, solutions architect for MMIV (Multimedia Innovations) together with Fuad Noormohamed, MMIV's managing director, are the brains behind a locally developed Bus and Taxi Monitoring and Fare Collection System that could change the way taxis do business. If, that is, government buys into their scheme that will conform to the NDoT specifications.

MMIV was established in 2005 with the prime intention of focusing on South Africa's public transport sector, a sector that essentially transports up to 70% of the country's population. The black empowered ITS (Intelligent Transport Systems) company specialises in locally developed ITS solutions that can cater for South Africa's unique ITS needs. It specialises in research and development of custom ITS computer hardware and software integrated solutions.

MMIV's ITS vision didn't just begin in 2005. Noordin had already been approached in 2004 by some bus operators in Johannesburg who were dissatisfied with current electronic fare collection systems that were sold in the market. It simply was not working effectively for them. Theft was rife and they needed something more than just a ticketing system. They wanted some sort of electronic monitoring of drivers and commuters.

## APTMS and AFC

"What we've done is bring the concepts of Advanced Passenger Transport Monitoring Systems (APTMS) which is the tracking, passenger counting, CCTV etc., and Automated Fare Collection (AFC) and put them into one box," explains Noordin, who claims that MMIV is one of the few companies in the world to have pioneered this approach.

The product that MMIV uses is called Transport Intelligent Monitoring Systems (TIMS), a bus and taxi monitoring and ticketing solution offering the latest in

electronic ticketing using EMV standards, incorporating passenger counting, GPS tracking, smart card technology (prepaid Mifare or EMV) or cash, printer for paper ticket, wireless data transmission of data, integrated onboard CCTV and fleet management with routing and scheduling software in the back office. With the aid of the advanced fleet management software and hardware, vehicles, depots and routes can be monitored to see if they are profitable, and the hardware and software can be customised to suit the operator.

"TIMS is the future of ITS in public transport," says Noordin, who maintains that intelligent transport systems have truly started to come into their own and will be making a mark in the South African market. In South Africa, theft is rife, whether it is collusion with drivers or individual passenger theft. Solutions are not always so simple because drivers on the take can turn to violence or vandalism if a solution on offer deprives them of the chance for pilfering. Taxi and bus operators and their associations play a delicate game of rules versus appeasement; without the combined effort of driver, operator and associations the system cannot work effectively largely due to the fear of mafia-style outcomes.

"Drivers will often pocket money from unaccounted for passengers. But with our TIMS systems, a count on how many passengers are walking onto the vehicle versus the number of tickets issued can prevent such irregularities," explains Noordin.

On the CCTV side, Axis POE camera technology was used because of the clarity of pictures and also the ruggedness of the cameras. To monitor passengers, a camera will be positioned at the front of the bus near the point of entry, which will enable pictures to be taken of each passenger boarding and also when a ticket



Yusuf Noordin and Fuad Noormohamed are changing the way taxis do business.

is printed. The camera simply acts in conjunction with the passenger counter – as each passenger walks onto the bus, so the camera initiates. The passenger counter on a bus will also warn the driver and control centre of overloading. On taxis, passenger counting is done via sensors hidden under the taxi seats, which monitor if it is full or if seats are available. If the passenger count and number of tickets issued do not match, the central depot will immediately be alerted because the system works in real time. If the number of people on seats does not match the revenue collected, a warning signal will show up at the central depot and an inspector can be dispatched to monitor that bus and check if tickets were issued to all passengers. And better still; the camera footage will support the evidence."

## Breaking ground with Stellenbosch University

It was thanks to the University of Stellenbosch that MMIV was able to give credibility to its taxi business model. In 2007 the university was looking for an ITS partner for a project to create a new taxi business model in line

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with government's thinking regarding the inclusion of minibus taxis in the formal public transport arena. MMIV partnered with the university on the ITS side of this project. Because of this partnership and the type of concepts pioneered with the university, MMIV was in a strong position to explore solutions that would help formalise the public transport system as a whole in South Africa.

Because of this research, MMIV with a local partner and an Italian company won a FP7 tender from the European Union for an ITS pilot using minibus taxis in the Western Cape. The idea of this project is to create a sustainable solution and leave a legacy that works within the minibus taxi industry in South Africa. With up to 70 000 taxis on the road in Gauteng alone, some kind of formal national system needs to be put in place, and urgently," explains Noormohamed. "Too little law and order has left the public transport sector in chaos which in turn has resulted in minibus taxi drivers having scant respect for their vehicles, the dignity of their passengers, safety of their passengers and very little respect for other vehicles sharing the roads with them."

"After the success of our research with the University of Stellenbosch in 2007, we were in a strong position to explore and to help find solutions for the formalisation of the minibus taxi industry into the public transport system as a whole in South Africa."

"What the post graduate researchers of the civil engineering department of the University of Stellenbosch did was to approach us with the taxi side of the argument," explains Noordin. "Very quickly we saw a different picture emerge."

For too long, the team argued, critics have attacked the taxi associations and their drivers for their ruthless road and vehicle tactics. Quite rightly so, but, had anyone ever really analysed the reasons behind this behaviour, they said. Was it fair to simply attribute the slovenly behaviour to the drivers' lack of concern and care for their vehicles and passengers?

Stellenbosch argued that the taxi problem was much deeper than portrayed. The taxis are actually owned by operators who own the permits issued by local and provincial government. Some taxis are driver owned, but the permit is borrowed from another operator for a monthly fee. From the day's takings, the driver has to give the operator a fixed amount. The balance is for petrol, some maintenance and lastly the take home pay of the driver. All fines, accidents etc. are for the driver's account.

"These taxi drivers are expected to meet a certain target in a day. If they don't meet this target, they don't get to take home pay for that day," Noordin says. "These are the rules of the taxi associations which are operator run. So what happens is that these drivers will do whatever it takes to reach their target. If the driver doesn't reach his target, then he is unable to earn enough to maintain his vehicle in a roadworthy state. Hence the problem of overloaded taxis, vehicles falling apart due to poor maintenance and a

## What does a unit comprise?

1. Vehicle Management Unit (VMU) T1000+ - The idea of this VMU is that a vehicle will only need one central computing device for controlling multiple end-point devices. This VMU has huge storage capability for passenger data and CCTV storage. The end point devices that can be linked to this VMU are as follows:
  - a. 7-inch driver display;
  - b. Card readers – Mifare and EMV;
  - c. Thermal ticket printer for physical ticket, airtime etc;
  - d. Cameras, caters for up to four POE cameras;
  - e. Passenger counters, up to three infrared counters can be accommodated on buses and pressure pads for each individual seat on a taxi;
  - f. GPS/GPRS Modem;
  - g. 3G Modem;
  - h. Outboard LED displays, can be linked to change with GPS coordinates for next stop;
  - i. Inboard LCD or LED displays, passenger information, onboard CCTV footage, advertising;
  - j. Second battery for clean power;
  - k. FM tuner, controlled via driver display;
  - l. Driver microphone for passenger communication if required.

The above items can be added as required by the operator on a need to have basis. The system is modular and can be adapted to the relevant operator in terms of functionality and cost.

cutthroat attitude to the rules of the road; because at the end of the day, these drivers are simply trying to stay in the game and make money. Also the number of taxis on the road has made the business tough. In the taxi industry, this is called the Penny Wars."

And the passengers? They are ultimately the most compromised because they don't have much choice as to how they get to work, hoping and praying that the taxi driver gets them to work in one piece. The only person who really benefits without losing is the taxi operator (the person who owns the permit). He is assured of a fixed amount daily in cash without the hassle of operational problems such as breakdowns, complaints, operational budget etc. The taxi associations are there to protect the operators' current business model, which is lucrative especially if the permit is rented out to a third party.

## A new business model

So what was the solution? How was the team to initiate a system that would get the taxi driver to cooperate willingly and effectively via their taxi association and bring respect, pride and honour to the industry?

To date, 20 vehicles have been fitted with the TIMS equipment. Getting the buy in of the 20 pilot taxis meant getting the cooperation of a particular association whose outlook differs from most of the associations that MMIV has spoken to. This association realises that the way forward is to formalise. This

taxi association, which is run as a company, bought into the various business models proposed, which would ultimately bring in more profit and less pain.

"First and foremost we had to understand the difference between a taxi association and a taxi company. The Cape Town company with whom we are piloting the scheme (name withheld for security reasons), is run according to company rules and this ultimately will determine the success of the new formalised business model. The company knows that with competition of the BRT (Bus Rapid Transit Systems) on the horizon, if the taxi business is not organised it will ultimately lose business. And the business model has to be a sustainable one incorporating a whole new business relationship between the taxi driver, the taxi company, the municipality, the BRTs and ultimately the commuter."

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"Our system requires the adoption of a fresh approach to the taxi revenue stream. Drivers must get a salary, fixed working hours and fixed routes. They must also get a taxi that is monitored, maintained on a regular basis and safe. With these ground rules in place, you will automatically see a shift in the way the taxi driver treats his taxi and his passengers. We have seen it already with our 20 piloted vehicles," explains Noormohamed. "Because these taxis are monitored, they are not being abused. Female passengers feel more secure because of the CCTV monitoring.

"We are now busy working with the operators on how best to formalise the concept and are confident that with the new business model the driver will pick up more business because his taxi is properly maintained while ensuring the trust of his passengers. He will drive his vehicle with more respect, not pushing speed limits, overloading for more money, or avoiding maintenance costs. It is a total shift in the way minibus taxis do business," Noormohamed continues. "We will also be investigating if subsidies can be implemented by municipalities if they formalise in this way."

### *The technology*

*What does the new system entail?*

The system is very easy to use. The system can print cash tickets and cater for weekly or monthly travel cards. MMIV has opted for an EMV smart card solution, which incorporates a contactless smartcard reader (Mifare and EMV bank certified). Noordin says the National Department of Transport (NDoT) wants to ultimately introduce a one-card system for the country's public transport network.

The bulk of people using public transport in South Africa don't earn a lot of money, so the EMV card is intended to enable passengers to buy one transport card and use it for any mode of transport. The NDoT idea for one card for any mode of public transport is to identify those people who use public transport the most in order to reduce the fares they pay by monitoring card usage across all public transport modes. This concept (the EMV standard) has still to be adopted in public transport by most First World countries. There are very few cities in the world that have adopted this EMV technology, Beijing being one of these cities.

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The EMV standard worldwide is still in the pilot stages.

Included with the new technology comes the CCTV video surveillance, vehicle tracking by GPS and GPRS, thermal ticket printing, electronic passenger counting, card reader, speed monitoring, location monitoring and passenger door monitoring. The system at depots is operated via a wireless LAN for upload of route, fare and driver information and download of fare and passenger information. An Axis 203 POE camera designed specifically for vehicles is installed in each taxi at the front of the vehicle near the point of entry (on buses, up to four cameras can be installed). The control box is hidden behind the driver or for a bus in the bulkhead or the roof of the vehicle. A sun-readable 7-inch touch colour screen for the driver is installed on the dashboard, through which all the passenger transactions are made visible.

Another 17-inch display is installed near the roof of the vehicle, for the passengers. This is used for entertainment, advertising, information about the taxi company and services offered and also to display the CCTV footage within the vehicle. Included in the package is also an MP3 player and FM tuner. Airtime can also be sold to passengers using the touch screen and printer, all within a 4-second response time.

All the ITS equipment installed in the taxi can be paid for by the 17-inch advertising screen with advertising revenue. Because of formalisation, an advertising company only has to deal with one company for multiple taxis. This advertising screen will keep the passengers entertained and is an extremely effective form of direct marketing for the advertiser. People who use this model can earn additional money per month just from advertising revenue.

All CCTV footage can be downloaded if required with recorded data being stored in the unit for up to seven days.

"The beauty about the system," says Noormohamed, "is that it records in real-time. If a bus or taxi driver arrives at his prescribed stop, and the camera monitors 10 people getting into the vehicle, but only seven tickets are printed, the information will immediately sound alarm bells at the central depot. It automatically flags a problem. At the end of the day, evidence can be downloaded, and the matter dealt with."

Noordin says we must be mindful that given the nature of the public transport business, there will always be a degree of unaccounted monies between the driver and the public transport company. This is to maintain a degree of cooperation between the two parties, and is part of the turf. "The system is not designed to entirely stop the pilferage. It is designed to reduce it significantly."

### **Government – the make or break**

In Cape Town, where MMIV has been doing a lot of work, taxi operators are seeing the sense in the new business model. "Our studies have shown that if operators formalise, the life of these vehicles could be increased by a factor of 30% because the vehicles are not being abused. Equally, evidence has shown that passengers are opting for the secure vehicle as their preferred mode of transport. "From the 19 vehicles that we have fitted statistics indicate that the ladies prefer using the vehicle that is monitored," he says. "In fact we are going to use this as one of the marketing elements of the system."

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Nevertheless, despite the sense in the system, it seems that government is not buying into MMIV's offering. "Our product is locally developed and this just hasn't washed well with government," laments Noordin. "They want international accreditation and international systems that have been proven overseas. Where is the faith in local? We have invested millions into developing this solution so that it is equal to if not better than any internationally recognised ITS systems. But it just isn't good enough."

Because of the local content of the system, we were the only company who could respond to outfit the first REA VEYA station as a pilot with five days notice.

Roy Alves from Axis Communications, supplier of the vehicles' CCTV cameras and advocate of the model, says unfortunately South Africans don't like using local products because they think our technology lags behind the rest of the world.

"This is a total misconception," argues Noormohamed. "Our Italian partners have asked us to get European Certification of our product. They are interested in marketing this product in Europe. In this way we hope to get local buy-in and product approval by the South African ITS Establishment," says Noordin. MMIV has worked closely with the Department of Trade and Industry (DTI), the CSIR and the Department of Science and Technology (DST) in order to get funding, while using the University of Stellenbosch and Technical University of Tshwane as research and manufacturing partners.

According to Noormohamed, there have been others in the local ITS market who have tried to introduce similar public transport models, but not to this level or this cost.