

AIRPORT PARKING GUIDANCE SYSTEMS

Executive Overview

Parking is an ever-growing challenge in airports around the world as the number of travelers is continually increasing. Parking availability, in turn, is one of the most significant challenges that airport officials are trying to address.

All airports have similar needs with regards to traffic and parking, for example:

- Traffic incidents and parking problems cause congestion in the airport access roads.
- The lack of parking guidance results in increased re-circulation and delays while motorists search for a parking space.
- Airports are losing revenue as motorists cannot find a place to park within the airport parking facilities and therefore decide to park off site.
- Travelers miss flights due to not being able to find a parking space at the airport.

All the above needs are met with the appropriate application of Intelligent Parking Guidance Systems technology. This paper presents the important factors to consider when applying IPGS to airport parking environments.

What are the benefits of Intelligent Transportation Systems to Airport stakeholders?

Travelers: Better informed about parking availability before they enter the airport, reduced time looking for parking, and reduced frustration due to congestion.

Facility Operators: Increase in customer satisfaction and more efficient staffing of parking personnel based on more accurate forecasting of parking facility utilization.

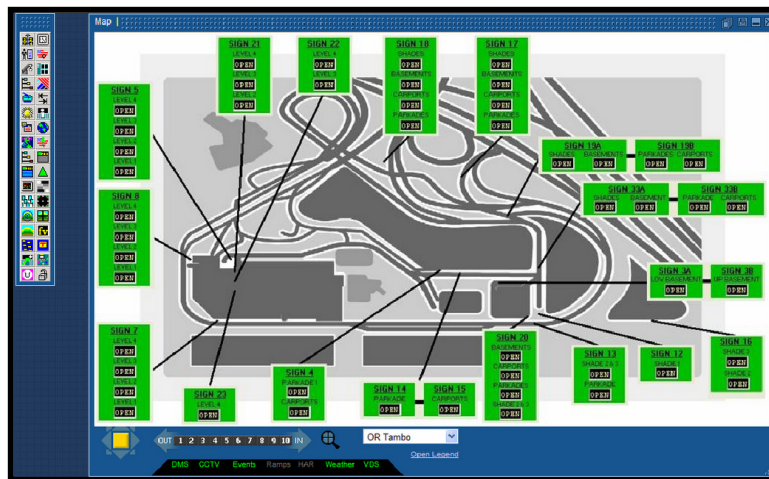
Parking Operators: Increased space occupancy and revenue.

Environmental: Reduced air pollution, reduced congestion, and reduced illegal parking.

Technologies Used in Parking Guidance Systems:

The following technologies are typically used in parking guidance systems. These can be tailored to suit the requirements of the particular airport.

- 1) **Dynamic Message Signs:** Electronic signs are used to provide information on parking availability in the different facilities. These can be used both externally and inside the garage to display level availability.
- 2) **Zone Boards:** Electronic signs that guide users within the parking facility to the correct aisle by displaying the number of bays available in each aisle and directing the motorists with green arrows.
- 3) **Ultrasonic LED Sensors:** Electronic sensors used to detect vehicle presence using ultrasound technology. The sensors display bay availability using colored LED lights.
- 4) **Wireless Outdoor Sensors:** Outdoor sensor that detects vehicle presence using a magnetometer. The sensor can either be surface mounted or embedded in the ground.
- 5) **Central Software System:** Provides an interface for operators to:
 - Manage parking processes and availability
 - Place messages on the electronic signs
 - Log data for reporting and analysis



Case Study: Implementation of Intelligent Parking Guidance at OR Tambo International Airport

Background:

O.R. Tambo International Airport is the largest airport in Africa. This airport has a massive demand on road infrastructure and parking facilities as a majority of travelers get to the airport by motor vehicles. The demand for parking left many people searching for a parking space for 8 minutes or more. Many times this left travelers stranded as they spent too much time looking for parking and missed their flights. This led to a number of complaints to the parking offices from unsatisfied patrons.

Step 1:

The first step that O.R. Tambo Airport took to rectify this problem was by installing a level counting system. This system relayed parking availability information from cash management and access control systems to external electronic signs. The system took information from 5 different parking facilities and displayed this information on 17 external electronic signs.

The electronic signs were installed at all strategic decision making points to guide the driver to the correct parking facility and to the level with the most parking available. This system helped the drivers make decisions about parking way before they reached the parking facility.



This first implementation of parking guidance at the airport reduced traffic congestion on the outlying roads of the airport. Drivers were able to navigate through the airport roadways effortlessly, and thereby reducing traffic and incidents on the road network.

The problem with this system was that the information being displayed on the signs was only 90% accurate. The loop systems that counted the vehicles entering and exiting the facility were not accurately able to count vehicles.

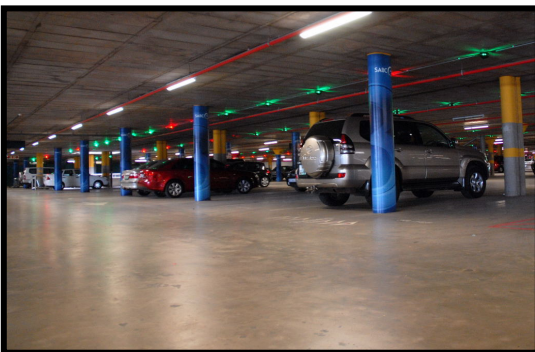
This was due to a number of factors:

- A number of drivers do not drive directly over the loop causing an inaccurate count.
- Drivers reverse over the same loop making the loop count the car twice.
- Some loops are not installed and configured correctly. This leads to loops not detecting some vehicles, for example large SUVs.
- Loops are difficult to maintain in high traffic areas. This leads to the vehicle counts becoming inaccurate.

To counteract these inaccuracies the airport had to employ people to constantly count the number of vehicles parked at the different parking facilities and on each parking level. They had to then recalibrate the system at least twice a day to display the correct information.

Step 2:

To counteract these inaccuracies, the airport decided to implement an individual bay monitoring system inside the parking facilities. The airport wanted to provide users with highly reliable and accurate information. The only way of doing this was by installing a bay monitoring system that monitors each and every parking space. The airport's main objective was to reduce the time that it took for a motorist to find a parking space.





Phase 1 & 2 of the Intelligent Parking system has been successfully implemented with 12,000 individual bay sensors and over 300 internal aisle boards. The stakeholders' (operators and the public) perception and feedback to this deployment has been very positive. As part of this implementation, an integrated software suit has been deployed for the operations room, which includes Intelligent Parking (the parking guidance software), Intelligent NETworks (sign, camera, traffic sensors and device monitoring software) and Intelligent Incident (incident management software). Most importantly, the software and systems that have been installed all conform to the NTCIP open standards. In the future, any additional ITS deployments can be undertaken on a "plug and play" basis.

Findings:

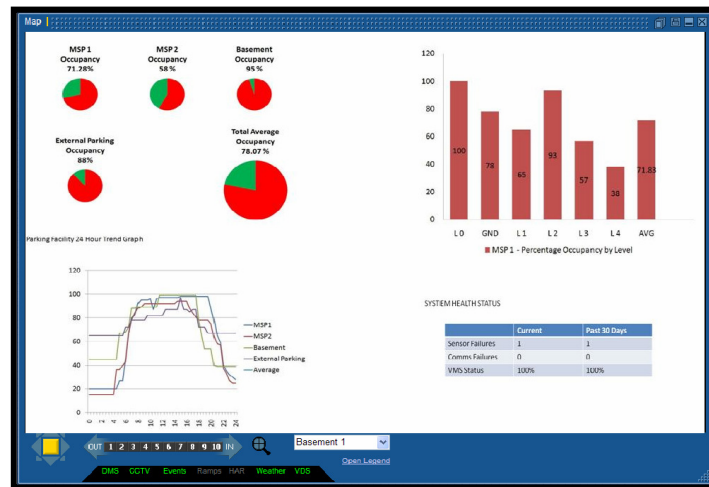
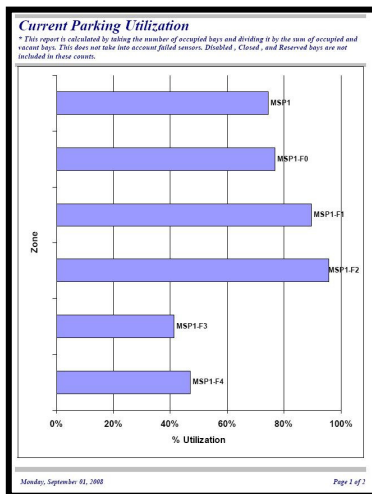
The greatest finding was that the users of the parking facility loved the system. Many people phoned in to say how happy they were with the system and how it had saved them valuable time. Newspapers wrote articles congratulating the airport on such a great project that genuinely helps the public. Airports Company South Africa (ACSA) has said this is the "single most successful project from a customer relations point of view."

The parking guidance system drastically reduced the time motorists spent driving around looking for parking. The average time a user spent looking for parking before the system was installed was 8 minutes. The average search time once the system was installed dropped to 2.5 minutes. This was a drastic improvement.

This had a number of effects:

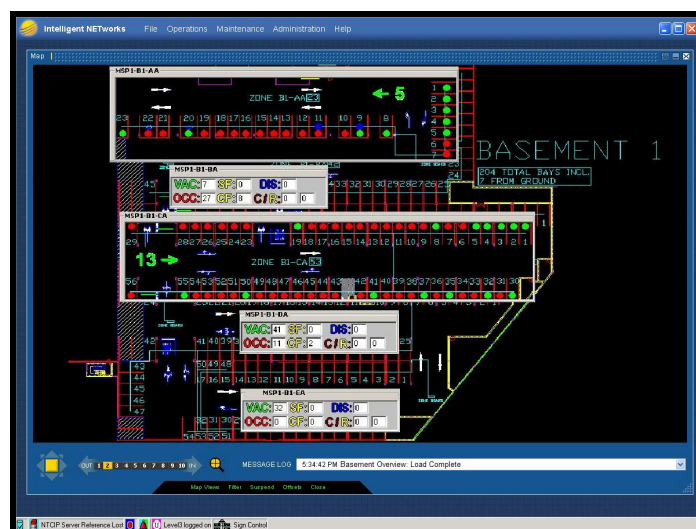
- Reduced congestion in the parking facilities.
- Reduced pollution in the facility as cars circulate for less time and produce fewer emissions.
- Potentially stressful situations are minimized as the customers find parking in a timely manner.
- Fewer people missed their flights.
- Fewer incidents and accidents in the parking facility occurred because congestion was minimized.

The system provided real-time capacity management that allowed for better auditing capabilities and tracking of customer behavior. Parking management was able to monitor and change practices to increase revenue and better serve the customer base to encourage parking loyalty. This led to higher customer satisfaction for old and new customers.



It was found that the average utilization and occupation of the bays increased significantly because drivers were directed to an open space more efficiently. As soon as a bay became available it was displayed on electronic signs. Drivers were also able to find spaces that were hidden by obstruction and generally not utilized.

The Intelligent Parking Guidance System provided a significant advantage to garage operations, particularly when parking was at a peak. Management was also able to see the peak operation hours and could schedule staff accordingly.



It was shown that the parking revenues collected at the airport were increased significantly because of better utilization and occupancy of the facility. Management was able to monitor and change practices to increase revenue in certain areas. The airport increased their revenues by 5-6% due to the parking guidance system.

Conclusion:

It was found that the airport benefited greatly from the parking guidance system. Step 1 of the project helped reduce the traffic on the roads to bring the patrons into the airport. Step 2 of the project increased the accuracy of the system and reduced the time spent trying to find parking in the facilities. The system also contributed to an increase in revenue. The greatest benefit to the airport came from the many unsolicited comments from patrons saying how extremely satisfied they were with the new system.