



Caltrans Division of Research,  
Innovation and System Information

# Research

# Results

Modal

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**Project Title:**  
Smart Parking

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## A Proposed Radio-frequency Identification (RFID) Field Integration with Smart Parking

A study to adopt RFID technology into smart parking, to quickly handle peak parking demand and provide transit riders with efficient parking opportunities.

### WHAT WAS THE NEED?

There is great need for automated administration and management of transit parking facilities. In transit stations, drivers demand fast and convenient transition in and out of parking facilities. In university campuses and medical facilities, various parking privileges are assigned to students, faculty, patients, and doctors. In downtowns and other activity centers, drivers want to quickly find an available space in congested traffic.

Parking operators want to efficiently manage parking facility in order to maximize the revenue and utilization of the parking facilities. Despite the advancement of automated vehicle detection technologies, management of parking facilities today is to various degrees done manually. For example, at BART stations, transit patrons need to remember their space number and either pay or register this number at a ticket machine inside the station.

The parking management relies on the parking number entry. Often transit patrons do not remember the parking number and would have to go back to the parking location again to obtain the parking space number. Transit riders may also forget to enter the parking space identification, which would cause inaccurate parking occupancy statistics until enforcement personnel validates the occupancy. Not entering the parking space number also would result in issuing a violation citation to those who use transit.

If vehicle identification technologies are used, this extra step to the process can be removed. It not only helps to reduce the complication of the parking process for transit patrons but also



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makes the parking management system more reliable. A comprehensive parking management system can increase the efficiency of parking facilities and encourage drivers from the car to public transit.

## WHAT WAS OUR GOAL?

Field evaluation project involving investigation of the feasibility of using RFID technology to record vehicle and traveler activities at BART transit parking lots and at the BART station entrance.

## WHAT DID WE DO?

Radio Frequency Identification (RFID) technologies can be used for vehicle identification. One of the important features that distinguish different RFID technologies is the tags. One such tag is the EasyRider card. Examples of RFID tags are active tags such as those that are used for highway toll collections and the passive tags such as FastTrak.. The RFID tags could provide a viable alternative for passenger identification until the EasyRider cards are in full operation.

The research team chose to use passive RFID tags for its low cost and easy for wide spread applications. This small-scale field-testing project is conducted by California PATH Program under the sponsorship of California Department of Transportation (Caltrans), partnership with SoftLogistics, ParkingCarma and BART, to investigate the feasibility of use of state-of-the-art RFID technology to track and manage a parking facility.

The focus of this project was to evaluate through field testing whether RFID technologies can reliably correlate parking events to station entry. Since BART expressed interest in RFID as an interim technology to correlate patrons parking in the BART parking lots to those entering the station and taking the trains. The Lafayette BART station was selected as the test site, which provided a more viable use of the technology in a real application.

## WHAT WAS THE OUTCOME?

This feature enhancement could improve parking utilization and therefore improve congestion mitigation and land utilization. The ParkingCarma PGS ([www.parkingcarma.com](http://www.parkingcarma.com)) is the web and Voice IVR system interface for the parking public and the parking management team. By integrating the RFID system for counts and revenue collection the integrated system can make better use of the limited parking assets at the university.

## WHAT IS THE BENEFIT?

Increasingly, public transit authorities are harnessing advances in sensor, payment, and enforcement technologies to operate parking facilities more efficiently. In the short term, these innovations promise to enhance customer parking experiences, increase the effective supply of existing parking with minimal investment, and increase ridership and overall revenue. Over the longer term, these systems could further expand ridership by generating revenue to add parking capacity and improve transit rider access.