Smart parking management systems have been implemented predominantly in Europe, the United Kingdom, and Japan since the early 1970s to reduce congestion, vehicle travel, and fuel use, and to increase transit travel. Early systems provided parking guidance information (PGI) to drivers in central city areas on available parking locations, including information that ranged from “lot empty” to the number of spaces available via VMS signs. Later PGI systems provided the exact location of a space in a large facility. A major objective of these systems is to minimize parking search traffic and travel in central cities and in large parking facilities. It can ignificantly reduce parking facility queues, and may produce relatively modest overall isystem-wide reductions in travel time and vehicle travel.

More recent smart parking applications provide real-time information to motorists about the number of available parking spaces in park-and-ride lots, the departure time of the next train, and downstream roadway traffic conditions (e.g., accidents and delays). PGI systems are also sometimes used to efficiently guide drivers to open spaces in park-and- ride lots.

Advances in smart payment systems (e.g., smart meters, smart cards, mobile communications, and e-parking) can improve parking payment convenience and reduce operation, maintenance, and enforcement costs to parking facility operators. E-parking is an innovative-business platform that uses advanced technologies to allow users to inquire about, reserve, and pay for parking, all without ever leaving their cars.

In general, smart parking technology allows people to dynamically reserve and pay for parking. Such technology may facilitate the introduction of parking pricing policies and significantly reduce auto travel and increase transit ridership. The broader advantage of smart parking is that it permits an optimization of existing parking spaces. By serving as a virtual parking broker, smart parking technology can aid drivers in locating available parking, and facilitate parking pricing.

**Patents**

**1. Smart Parking Meter System**

US 6791473 B2

**Abstract**

* The system uses a wireless communication protocol which may be of the type known under the trade mark “Bluetooth” and provides the portability of embedded systems and the convenience of personal digital assistants with the powers of the C and Java programming languages.
* There are two main components to the Smart Parking Meter System, the handheld device, or the PDA, and the actual parking meters. Each device has the Smart Parking Meter System application installed in it, as well as the wireless modules, such as Bluetooth to use as a communication medium. The parking meters also have a motion sensor to detect any movement within it view range.
* The handheld device is able to extract all the parking states for each parking meter within a block or street depending on user configuration of system.

**How's our system better**

* No need of hand held devices or meters to find out which slots are free
* The use of Human resource is minimized

**2. Smart parking space allocation system and method**

US 20130132102 A1

* The license plate ID got at the entrance of the parking lot s used to get the information such as

1. user preferences
2. shopping histories
3. scheduled events

from the server.

* Allocation of the parking slot is based on atleast one of the three parameters mentioned above.

**How's our system better**

* Show's the users the parking slots available in the vicinity and need not wait after reaching the slot
* Prebooking of slots would mean more relaxed scheduling and comfort

**3. Smart Parking Advisor**

WO 2003005323 A1

**Abstract**

* A parking advisor images scenes of a parking area and identifies free spaces using image processing techniques.
* The advisor then makes recommendations as to which areas a driver should go based on the locations of free spaces.
* Means of outputting the recommendations is to display them on a terminal at an entry gate or to print them on a ticket, receipt, or other piece of paper.

**How's our system better**

* The recommendded spot is shown to the user via a virtually guided tour
* Prebooking through an application
* Keep track of timings and manage all the payments

**Publications**

# **1. Smart Parking Applications Using RFID Technology**

* In this study, a solution has been provided for the problems encountered in parking-lot management systems via RFID technology.
* RFID technologies include RFID readers, RFID writers, RFID barcode scanners, RFID smart sensors and RFID controllers.
* The software has been handled for the management, controlling, transaction reporting and operation tasks for parking lots located on various parts of the city. Check-ins and check-outs of the parking-lots will be under control with RFID readers, labels and barriers.
* Personnel costs will be reduced considerably using this technology. An automized income tracking system, a car tracking system for charging and a central parking-car tracking system have been developed and utilized. Instead of cars' parking on streets, a more modern and a fast operating parking-lot system have been developed.

**How's our system better**

* Image processing is used instead of RFID technology which results in cost reductions
* Opportunity to collect user data is also made possible includinng number plates and car type
* Keep track of timings and manage all the payments

**2. Transit-Based Smart Parking in the San Francisco Bay Area, California: Assessment of User Demand and Behavioral Effects**

* Pretrip information and, perhaps, en route information on parking availability at transit stations may increase transit ridership.
* Regular commuters are most likely to use parking information when it is linked to transit, because that information may be critical to their catching or missing a train during peak hours. This will mean increase in revenue.
* The smart parking system includes traffic sensors that count the number of vehicles entering and exiting the parking lots at the station.
* A reservation system allows travelers to reserve spaces by Internet, personal digital assistant (PDA), phone, and cell phone.
* The real-time information obtained from the sensors and the reservation system is displayed on variable message signs (VMS).

**How's our system better**

* Special offers and facilities for people in transit
* Image processing is used instead of sensors which results in reduction in cost

**Advantages of our system**

* Reduces searching time
* Helping the urban environment
* Reduces accidents
* Allows the development of pricing strategies
* scalable,robust and reliable
* reduces non payment
* Increases revenue by the number of tickets purchased
* Reduces searching time and fuel
* optimizes the use of human resources
* Reduces traffic congestion
* shows real time information
* The carbon emissions contributed by drivers looking for parking spaces has a major impact on the urban environment. Specifically, urban traffic is the cause of 40% of CO2 emissions and 70% from emissions of other pollutants arising from road transport. These pollutants are often the cause of severe allergies and respiratory diseases.
* By significantly reducing parking time, we would play a major role in creating a better urban environment.
* On average, commuters spend 15 min looking for parking every day.
* Not only can itreduce the frustration experienced when trying to locate aparking spot, it will also allow drivers to save time, fuel and associated costs.
* Furthermore accidents can be significantly reduced with our product. A driver who is focused on looking for a parking space may not pay full attention to the road and therefore can be at risk of being in an accident.
* Via a custom tablet app, enforcement staff can monitor the occupancy and payment.
* Allows you -the local authority- to monitor and manage the parking spaces,getting real time information 24hours/7days a week
* Such information is invaluable for pricing strategies such as the promotion of certain commercial areas or the establishment of a dynamic parking price (e.g. increasing/decreasing the price on some days of the week or during special events such as football matches).
* Cities need to constructively manage the consequences of an increased pace of life (such as traffic density, pollution, stress...)
* Our designs are based on reliable, robust, small, light and affordable machine-to-machine systems for stringent industrial and comercial requirements.
* Better traffic management and routing based on the data collected