

# SMART PARKING SYSTEM



## CLIENT'S OVERVIEW

A start-up company looking to make its mark in Parking Solutions, with an aim to introduce innovative products and solutions for the parking industry.

## CHALLENGES

THE EXISTING PARKING SOLUTIONS WERE FRAGMENTED AND LACKED A UNIFIED SYSTEM. KEY ISSUES INCLUDED:



**NO INTEGRATED SYSTEM FOR MONITORING OCCUPANCY**



**LACK OF VISUAL FEEDBACK OR MONITORING FOR VEHICLE SAFETY**



**INABILITY TO TRACK VEHICLE REGISTRATION NUMBERS**



## SOLUTION

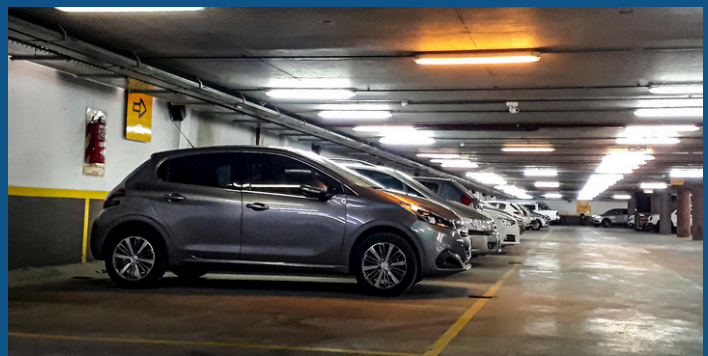
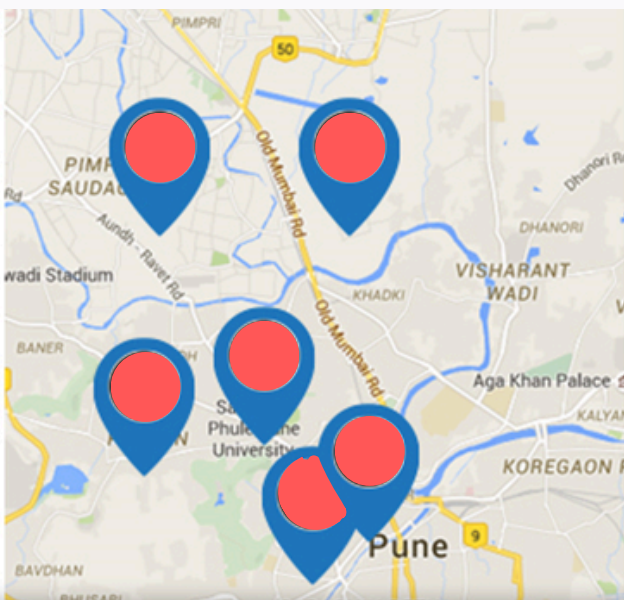
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THE SOLUTION WAS DEVELOPED BY UPGRADING THE EXISTING SYSTEM TO AN EFFICIENT SMART PARKING SOLUTION THAT COULD PROVIDE -

- 01** Single solution automated parking system.
- 02** Tracking of vehicles entering the parking.
- 03** Capturing registration plates using Automatic Number Plate Recognition (ANPR) at entry and exit points.
- 04** Monitoring parked vehicles via images (through wired and wireless IP cameras) – Visual feedback ensured the safety of parked vehicles; keeping tabs on the parked vehicles through real-time images and real-time image analysis to detect occupancy.

- 05 A simple system that is easy to operate and requires minimal intervention by operators.
- 06 An Android and iOS-based app with intuitive UI for advance booking of parking.
- 07 Integrated a cloud solution to host web-based software. It can perform functions like configuring sites, setting billing patterns, providing booking interfaces, generating tickets, maintaining accounts, and giving periodic reports.
- 08 Billing mechanism for both operators and users along with flexible billing plans based on the time of the day and availability detected by historical data from the parking site.



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## TECHNOLOGY AREAS

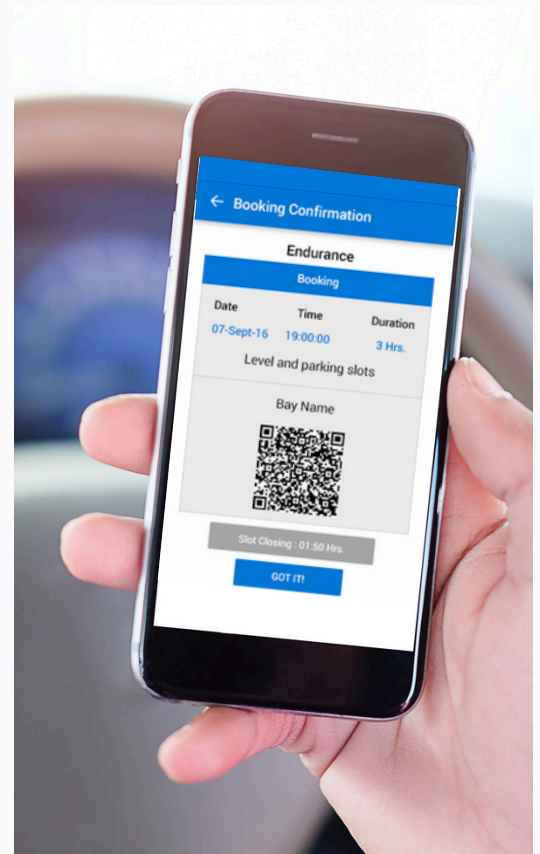
- Parking Assistance/ Guidance System
- IoT
- Mobile Applications
- Web Based Applications

## HARDWARE

- 1.4GHz NVIDIA Tegra 3 ARM SoC
- 4GB NAND Flash
- On-board Interfaces: Ethernet, RS485, WiFi
- Interfaces to Wired and Wireless IP cameras
- 7" TFT LCD panel
- Boom barrier automated control
- Real-time ANPR detention
- RS485 and Zigbee based Ultrasonic sensors for occupancy detection

## FIRMWARE

- C and Python for ARM controller code



## SOFTWARE

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- Native Android & Objective C (iOS) for Smart Phone Apps
  - ASP.NET MVC 5, Entity Framework 6, Java Script, jQuery, OTP Authentication, SMS Gateway for Web Based App
  - Visual Studio, Android Studio, X-Code IDE
  - MS SQL Server
  - Mobile Communication using REST API
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## RESULTS

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The developed solution provided an effective parking assistance and guidance system, resulting in the desired smart parking solution that increased the convenience of users and facilitated easy parking.

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## OUTCOME

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The solution with upgraded and efficient parking assistance and guidance system has been deployed successfully on the field.



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