

SMART PARKING SYSTEM

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ABSTRACT

One significant area of smart city technologies is smart parking. The design and execution of a Smart parking is an important use of smart city technologies. This study describes the design and implementation of a smart parking application on a university campus to allow university staff to reserve parking spots quickly and easily. Each parking place contains an infrared sensor and is issued a unique number. The sensors are coupled to an Arduino device to indicate if a spot is busy or empty. The application employs a variety of SQL Database and Android Studio development methods. There is evidence of successful parking space management, which can be expanded to encompass other places and spaces.

Keywords: Online Booking, Sensors, Smart Parking, And Mobile Apps.

I. INTRODUCTION

Finding open parking is growing more challenging, especially in cities, shopping malls, big-box stores, and airports. Busy campuses and events. This also affects King Abdulaziz University (KAU), particularly during peak hours when the majority of students have multiple classes at the same time. Before finding a parking spot, the children must make multiple excursions back and forth. An excellent parking system is essential for saving students time and allowing them to reserve a parking place prior to arriving at the school. In March 2017, 84% of the 337 KAU students polled reported difficulty finding parking at the KAU. survey findings, we suggest a mobile application that uses cutting-edge sensor and mobile communication technologies to allow students to reserve parking spaces before arriving at class. The paper outlines the development and implementation of a mobile application to assist the KAU community in conveniently locating and reserving parking spaces for their automobiles, as well as saving time before classes. The paper presents the development and execution of a prototype system that consists of a smartphone client app and a backend system. Furthermore, the application connects with a network of area sensors It will allow clients to book a hotel, submit their reservation, and then cancel it. The study presents the following innovative contributions: The smartphone app makes real-time recommendations based on sensor data and displays parking availability information. The software provides a simple user experience for Android smartphones, leading users through booking online parking for a specified duration. The system is made up of and a suitable database backend that can perform under a variety of scenarios, such as rates, meeting a wide range of scaling needs. Section 2 investigates the relevant state-of-the-art approaches, while Section 3 addresses the proposed system's analysis, architecture and design. Section 4 discusses prototype, the functionality and screenshots used as examples. Section 5 shows the mobile app's test results. Section 6 includes the conclusion at the end.

• Motivation

Addressing typical parking management issues is the driving force behind a university campus's smart parking project.

This project demonstrates how scalable and useful solutions may be achieved by utilizing smart technologies such as databases, mobile applications, and IOT devices. Despite being used on a university campus, the system's performance shows that it might be used more widely in commercial settings, residential complexes, or urban settings.

• Problem definition

Ineffective parking management on college campuses frequently results in problems including spent time looking for open spots, more traffic, and irritated users. Conventional parking systems don't include real-time monitoring or reservation features, which leads to less than ideal parking space use.

II. LITERATURE SURVEY

Author, Year of Publication	Title	Strength	Weakness
K. C. Mouskos, J. Tavantzis, D. Bemstein and A. Sansil(2004)	Mathematical Formulation of a Deterministic Parking Reservation	Users can save time and effort by finding and reserving parking spaces in advance.	The availability and performance of IoT devices, sensors, or cameras in parking lots determine how effective they are.
Donald C. Shoup (2018)	Cruising for parking	minimizes parking lot congestion by making the most use of available parking spaces.	requires a large financial outlay from parking lot managers in order to integrate hardware.
Yanjie Ji, Weihong Guo, Phil Blythe, Dounan Tang, Wei Wang(2013)	Understanding drivers' perspective on parking guidance information	directs customers to open places, improving traffic flow in congested regions.	Because the program depends on real-time data updates, inadequate network access may cause issues.
Samar Alkhuraiji(2020)	Design and Implementation of an Android Smart Parking Mobile Application	The user experience is enhanced with real-time parking availability updates.	Limited offline capability could make it less useful in places with spotty internet service.
Pranjali D. Jambhulkar, Sejal R. Thaware(2022)	ANDROID APPLICATION FOR SMART PARKING SYSTEM	support for extra features like analytics, loyalty plans, and payment gateways.	It becomes more difficult to ensure compatibility across different Android devices.
Nor Bakiah Abd Warif , Mohd Izzat Syahmi Saiful Azman , Nor-Syhidatul N Ismail, Muhammad Akmal Remli(2020)	IoT-based Smart Parking System using Android Application	able to interface for dynamic data collecting with IoT sensors and smart city infrastructure.	If location and vehicle data collection is not done transparently, privacy concerns may arise.
C. Ajchariyavanich, T. Limpisthira, N. Chanjarasvichai, T. Jareonwatanan,W. Phongphanpanya, S. Wareechuensuk, S(2020)	An IoT-based Car Parking System	By showcasing shared parking choices, it promotes environmentally friendly behaviors like carpooling.	The app may be difficult for those who are not tech-savvy to use.
Riad Kanan,Houssam Arbess(2022)	An IoT-Based Intelligent System for Real-Time Parking Monitoring and Automatic Billing	aids in peak time prediction for more effective resource allocation.	vulnerability to cyberattacks in the absence of strong security measures.
Agustina Ampuni ,Sopater	Smart Parking System With Automatic Cashier	Localization and branding	high upfront costs associated with

Fonataba(2020)	Machine Utilize the IoT Technology	potential.	deployment, testing, and development.
Ilhan Aydin , Mehmet Karakose , Ebru Karakose(2017)	A Navigation and Reservation Based Smart Parking Platform Using Genetic Optimization for Smart Cities	To safeguard payment information and personal information, employ secure user authentication.	Established solutions might be preferred by private parking operators or local governments.

III. SYSTEM REQUIREMENT

Software Requirements:

- System : Intel I3 Processor and above.
- Hard Disk : 20 GB
- Ram : 4GB\
- Monitor : 15 VGA Color
- Mouse : Logitech

Hardware Requirements:

- Operating system : Windows 7.
- Coding Language : Java, Kotlin, ANDROID
- IDE : Android Studio

IV. SYSTEM ARCHITECTURE

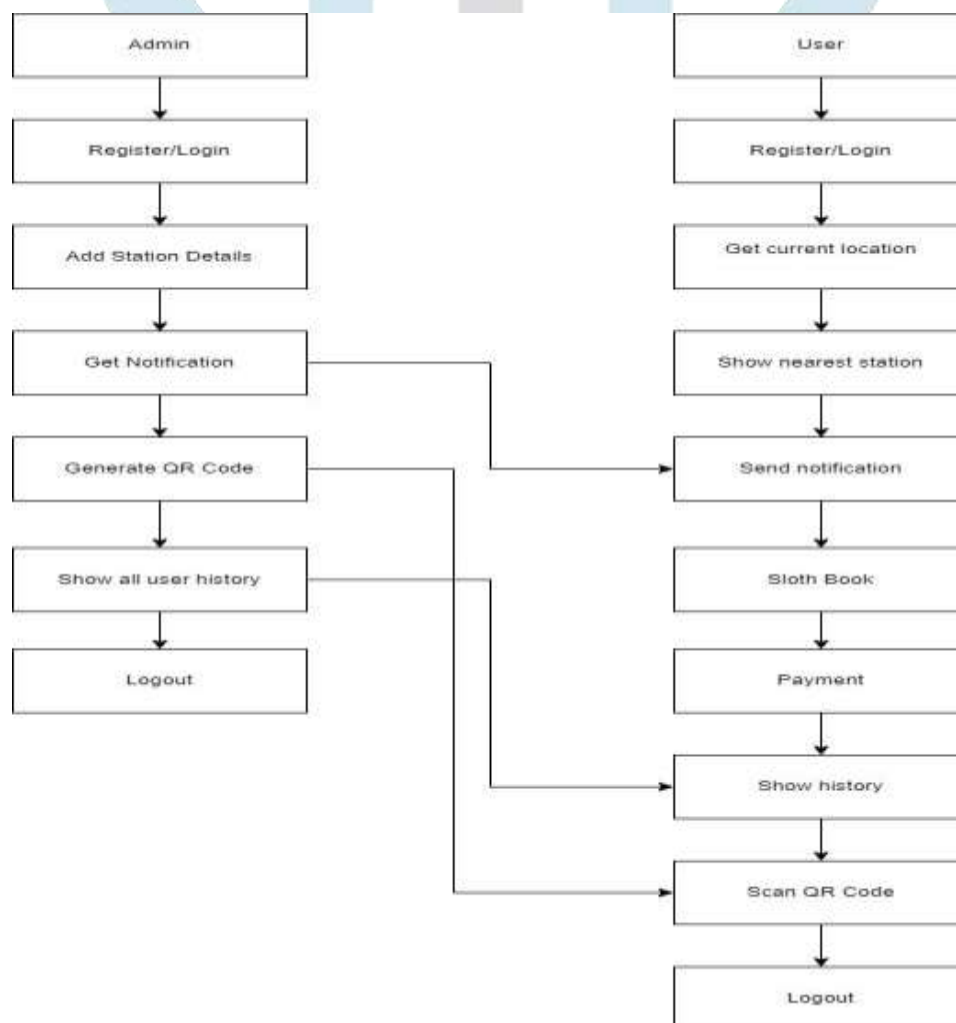


Figure 1: System Architecture

• RELATED WORKING

This flowchart purports to portray a system having two key users: an administrator and a user, and it details their interactions with the system. This is an overview: Admin Workflow Register/Login: The administrator logs into the system. Add Station Details: The administrator adds station information (such as locations or services).Get Notification: Receives alerts from other users or system events. Generate QR Code: Produces a QR code (perhaps for station identification or access).Show All User History: View the activity history of all users .Logout: Ends the session. User Workflow Register/Login: A user logs into the system. Get Current position: The system retrieves the user's current position (often via GPS).Show Nearest Station: Displays the nearest station to the user's location. Send Notification: Sends a notification (perhaps to the administrator or station).

• KOTLIN AND XML GUI:

For a Kotlin-based application, you can pick among numerous databases depending on your project requirements:SQLite is ideal for local storage in mobile applications (Android).MySQL or PostgreSQL server-side database that is widely used in web and enterprise applications. Firebase is a NoSQL database for real-time applications that is widely utilized in mobile apps.Assume we're utilizing SQLite for a local mobile app written in Kotlin, or PostgreSQL/MySQL for a server-side application.2. Kotlin Database Integration. To communicate with Kotlin, you will require an ORM (Object Relational Mapper) or a database driver. For a server-side application, you can utilize Exposed (a Kotlin SQL framework) or Hibernate for more complicated applications. Room (SQLite-based) is suitable for Android applications.

• REALTIME DATABASE:

One database that is hosted in the cloud is the Firebase Real time Database. Every connected client receives real-time synchronization of the JSON-stored data. All of your clients share a single Real time Database instance and get updates with the most recent data when you create cross-platform apps using our JavaScript SDKs, Android, and Apple platforms. By providing safe access to the database straight from client-side code, the Firebase Real time Database enables you to create complex, cooperative apps. The end user has a responsive experience because data is locally stored and real-time events continue to occur even when offline. The Real time Database immediately merges any inconsistencies between the local data changes and the remote updates that took place while the client was offline when the device reconnects. To specify how your data should be organized and when it can be read from or written to, the Real time Database offers a sophisticated, expression-based rules language called Firebase Realtime Database Security Rules. Developers can specify who can access what information and how when Firebase Authentication is integrated.

V. CONCLUSION

This article provides a summary of a modern, effective method for parking a car. Unlike the conventional approach of physically checking out several parking locations, this software gives the user control over the parking choice. Even if a user is in a new location, using this application extensively would be advantageous to them. The application is The idea of a smart parking system, which can lessen traffic congestion and enhance citizens' quality of life, has been made user-friendly and convenient. A driver can search available parking spots in a specific region and obtain parking rates with the help of the Car Parking Android mobile application.

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VI. REFERENCES

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