# PARKEZY- An IoT based Smart car parking system promoting Smart cities

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*Abstract*—**Due to the limited number of parking places and the increasing number of automobiles, managing parking in urban areas has grown more difficult. To address this problem, "ParkEZY" presents a cutting-edge automated vehicle parking system using IoT that makes use of cutting-edge technology including online connectivity, IR, ultrasonic, and Arduino microcontrollers. ParkEZY's primary functions include automating the entry procedure and offering users a user-friendly web interface for real-time parking space availability information.ParkEZY's automated entrance technology uses ultrasonic and infrared sensors that are placed strategically at access points to detect the arrival of automobiles. The technology provides drivers with a smooth and hassle-free entering experience by automatically opening the entry gate when it detects a car. This feature reduces traffic at the same time as improving convenience.**

*Keywords — IoT ,Car Parking,Arduino,automated entry, Ultrasonic sensor, IR sensor*

## I. INTRODUCTION

Parking congestion in urban areas is a major problem that frequently causes inconvenience and inefficiency for drivers as well as parking facility managers. In order to tackle this problem, we introduce "ParkEZY," a cutting-edge automated vehicle parking solution made to improve user experience and ease parking administration. Utilizing state-of-the-art technology including web connectivity, IR, ultrasonic, and IR sensors, together with Arduino micro controllers, ParkEZY delivers a complete parking solution that automates the process and gives real-time parking spot availability information.

A modern approach to parking management is required due to the growing demand for parking spaces in metropolitan areas. Traditional parking systems frequently find it difficult to handle the growing volume of cars, which causes traffic jams, lengthy wait times, and wasteful use of available spaceThe automated entrance system that powers ParkEZY is its central component. It uses ultrasonic and infrared sensors that are positioned at key locations at access points to intelligently identify the arrival of automobiles. The entry gate is automatically opened by the system upon detection, saving drivers from having to manually open it

and ensuring a flawless entry experience. In addition to improving convenience, this automated entrance method reduces traffic at entry points, which improves traffic flow within parking lots.

Apart from automatic entrance, ParkEZY provides real-time information on parking spot availability, which may be accessed via a connected website. The system continuously monitors the occupancy status of parking spots by integrating Arduino with web technology, and it updates the data in real-time. With the use of this tool, customers may remotely verify if parking spaces are available, giving them the chance to plan ahead and prevent unnecessary traffic and delays.

The web interface of ParkEZY presents users with an intuitive parking area layout, displaying filled and available parking slots in a visually appealing format. Each parking slot is color-coded to indicate its status, allowing users to quickly identify available spaces. Furthermore, the interface provides real-time updates on the total number of parking slots in the facility, enabling users to make informed decisions about parking availability before arriving at the parking facility

## II. LITERATURE SURVEY

This study examines related current system works that have been done in various Smart Car parking System.

[1] The project portrays the urgent need for a creative outdoor parking system in urban settings, particularly in light of the difficulties experienced by patrons of public spaces including theaters, parks, malls, and temples. The research now in publication emphasizes the shortcomings of conventional manual parking systems, which are unable to effectively accommodate the growing demand for parking spots. There have been recorded attempts to remedy this problem, but many public spaces still lack well-organized parking options, which exacerbates traffic, causes accidents, and irritates drivers. The study highlights how the integration of weighbridge load sensors into IoT-based systems has the potential to completely transform the administration of

outdoor parking. Such a system may provide planned, timely, and safe parking experiences by utilizing IoT technology, which will improve traffic flow and increase urban mobility.

[2] This study presents a thorough analysis of the drawbacks of conventional manual parking systems, such as extended wait times for open spots, expensive labor, and a dearth of parking data. These problems highlight how urgently creative parking management solutions are needed. The article suggests an Internet of Things (IoT) based smart parking system with three main parts in response: an IoT platform, a user-facing application, and a parking management application. Every parking space and the entire parking lot are two different granularities at which the IoT platform functions. While hardware in parking lots monitors vehicle entry and exit, IoT hardware placed within parking slots communicates real-time slot status information. Using feedback from crowdsensing approaches, the system optimizes sensor placement and lowers expenses.

[3] This study presents a novel strategy for combining cloud-based and Internet of Things technology to transform urban automobile parking services. The suggested solution, which attempts to improve conventional parking systems by combining IoT with cutting-edge electrical sensors and computers, is briefly described in the study. In particular, the paper presents an IoT-powered intelligent auto parking system that provides real-time information and parking management improvements. A range of software options, including cloud-based storage, PHP web gateway with MySQL database, and Python, are suggested to provide mobile customers with a smooth parking experience. The study also emphasizes the use of data produced by image recognition cameras, mobile apps, and sensors. This data will be stored in cloud foundries and examined using Hadoop and other Big Data analytics methods.

[4] This study presents the sensor technologies used in smart parking systems installed in urban and academic settings are thoroughly examined in this paper. Parking shortages in highly populated metropolitan areas lead to longer search times and more traffic congestion. Parking is often navigated by cars alone, which exacerbates the problem. That's why, in the context of smart cities, anticipating parking availability ahead of time is really important. Although several smart parking systems have been studied in previous research, this study focuses on current implementations and sensor technologies used. It provides a thorough analysis of the benefits and drawbacks of different strategies, illuminating how well they work to solve parking-related issues. The research also emphasizes how crucial it is for consumers to get parking information as a basic feature of smart parking systems

[5] This study presents a modernized approach to parking management with its novel Smart Car Parking System (iSCAPS) coupled with e-Valet technology. Incoming guests may be guaranteed parking lot availability using the e-Valet feature, which functions similarly to traditional valet parking. Customers may plan ahead and reserve parking spaces using Android apps on their cellphones, making parking easier. By using Near Field Communication (NFC) technology in cellphones as parking tickets, iSCAPS facilitates simple payment and entrance procedures via approved NFC readers. The primary processing units of the system are Arduino microcontrollers, which manage input and output functions. In order to help users find their parked cars, iSCAPS also has a veh`icle searching feature. This feature does away with the need for paper tickets and RFID cards, which lowers expenses while also increasing convenience and encouraging environmental responsibility

## III. SYSTEM ANALYSIS

Existing System:

Research explores challenges faced in urban parking, solutions offered by IoT-based systems, and user preferences. Previous studies on sensor-based parking systems, entry gate automation, and real-time data visualization inform the development of Parkezy, guiding its design and functionality to address current shortcomings and meet user needs effectively.

The major issues of existing system that the application should capable of situations like

➢ *Existing System has a lot of limitations such as lack of real-time data on parking slot availability, manual entry gate operations leading to delays, and inefficiencies in resource allocation.*

➢ *Traditional systems often suffer from inaccurate occupancy information. Moreover, the absence of user-friendly interfaces hampers the overall parking experience.*

Proposed System:

ParkEZY is an automated car parking system designed to revolutionize the parking experience in urban environments. It employs Arduino, IR sensors, ultrasonic sensors, and web technology to create a seamless and efficient parking management solution. The system includes an automated entry system that detects vehicle arrivals and opens entry gates automatically, ensuring a smooth entry process for drivers. Additionally, ParkEZY provides real-time parking slot availability information through a connected website, allowing users to remotely monitor the status of parking slots. The web interface features an intuitive layout that displays the occupancy status of parking slots, making it easy for users to find available spaces .

Advantages
➢ By providing real-time information about parking space availability, the system allows drivers to quickly locate and occupy vacant spots, leading to better utilization of parking facilities and reduced congestion.

➢ The mobile application offers a user-friendly interface for finding parking, making reservations, and navigating to available spots, improving the overall parking experience for drivers

➢ With improved navigation assistance and reduced time spent searching for parking, the system helps decrease traffic congestion in urban areas, leading to smoother traffic flow and shorter travel times for drivers.

➢ An advantage of having a display showing the number of available parking slots with relying on a particular software application is that it provides immediate and accessible information to all drivers.

## IV. METHODOLOGY

### A. System Architecture

The architecture designed here is very simple and effective, the IR sensor unit is placed at the entrance of the parking area,where it detects the vehicle presence and occupancy of the parking slots.Whereas we also use Ultrasonic sensors which are placed at each parking slot it gives the status of the slot whether it is filled or empty. The overall system is controlled by Arduino microcontroller ,a LCD display is connected to it where the no.of slots available are displayed on the lcd.When a car arrives the IR sensor dectects it and opens the entry gate ,Once the slots are fully occupied the entry gate does not allow any more vehicles.
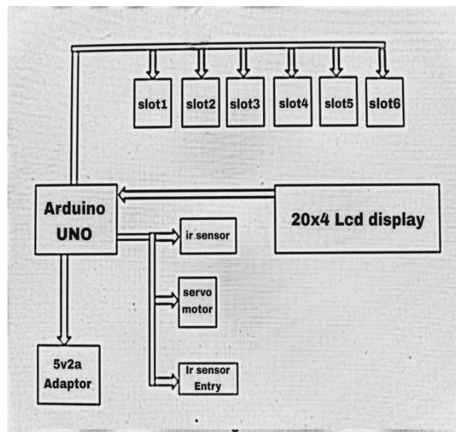


### B. Hardware Design

The complete hardware design consists of an Arduino UNO,  Ultrasonic sensor, a 2x16 LCD Display,  IR sensors, Servo motor ,the model of Ultrasonic sensor is HC-SR04, it has four pins namely GND, VCC, Trig and echo, the GND is connected to the GND pin of Arduino .
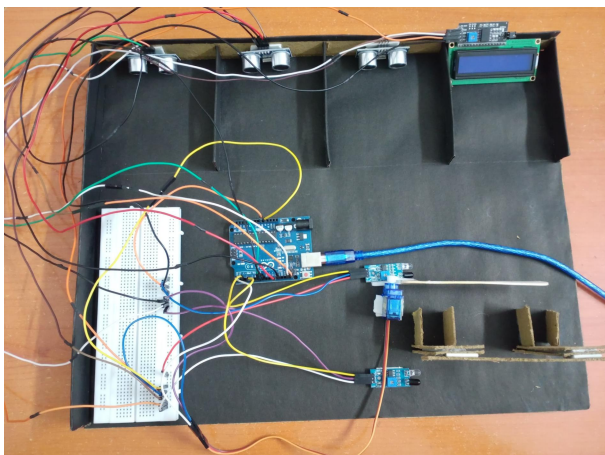


All the GND pins of  sensors,lcd and servo motor are connected to the GND of Arduino and all the VCC pins are connected   to   the 5V of Arduino.And all the pins are connected accordingly to the Pin numbers mentioned in the code,they are connected  to the digital pins of Arduino.

## V. RESULTS

1.It guarantees snappy and automated parking solutions, ensuring a smooth experience for drivers.
2. Up to 4 cars can be effectively and securely parked in the outlined model.
3. Most reasonable for parking in workplaces, shopping centers and comparable spots.
4. Low support levels are required by the framework.
6. Sensors utilized IR sensor and Ultrasonic sensor have high affectability and are  high sensitivity and easy handling, ensuring accurate detection and operation.
7. Minimal effort framework, giving most extreme computerization. LCD display accurately shows the slot occupancy ensuring easy parking.

## VI. CONCLUSION

ParkEZY is a ground-breaking development in the administration of urban parking. ParkEZY revolutionizes parking by combining web technology, IR, ultrasonic, and Arduino technology in a seamless manner. This allows for real-time accessibility, efficiency, and ease. Drivers may enter the lot without difficulty thanks to the automatic entry system, and users can get useful real-time information about parking space availability on the website that is connected. Furthermore, the user experience is improved by the user-friendly online interface, which makes it easier to locate parking spots. In addition, the creative feature that blocks access when all available slots are occupied enhances system efficiency by reducing traffic and maximizing parking space use. ParkEZY offers a contemporary and intelligent solution to handle parking difficulties in metropolitan areas, resulting in a parking experience that is more smooth and easy.

## VII. FUTURE SCOPE

In future works, this framework can be enhanced by including different applications, For Example, we will implement a QR code system where onec the user scans the code ,his parking slot will be allocated.And we also can implement a map navigation system,where we provide a map of the parking area and the user can be anvigated to the empty slot allocated to him through this map navigation.

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## VIII. ACKNOWLEDGEMENT

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