SMART PARKING SYSTEM USING IOT

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ABSTRACT

In the current era of increase in population transportation also is being increased. Due to many vehicles and fewer parking, lots of it takes much time to find an area during busy hours.

So to find a parking space for the vehicle we designed an IoT-based smart parking system. Where one can easily find a parking area using the web application. Through this application, one can check if the parking lot is empty or not in the surrounding, and they can book the area.

By scanning the number plate of the vehicle and the payment details for the duration of time that will be generated
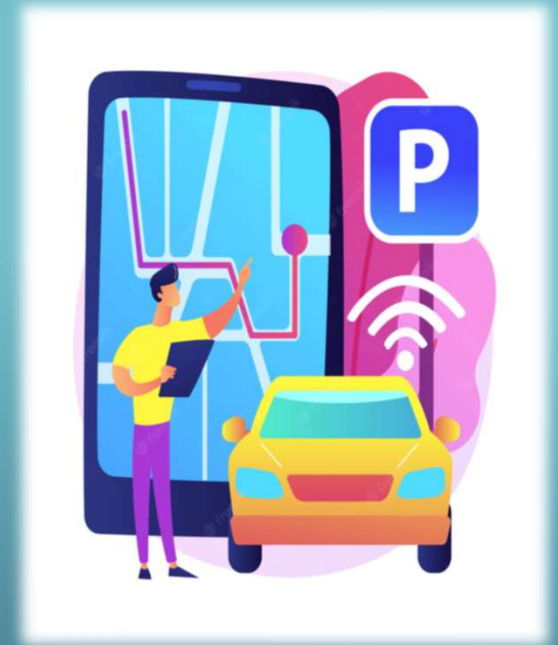
INTRODUCTION

Smart parking development implies an IoT-based system that sends data about free and occupied parking places via web/mobile applications. The IoT device, including sensors and microcontrollers, is located in each parking place. The user receives a live update about the availability of all parking places and chooses the best one.

In order to investigate the technologies behind the smart parking solution, we implemented an internal research project. The main idea was the creation of smart parking using the Internet of Things and ultrasonic sensors, where available parking places could be displayed in a web application.
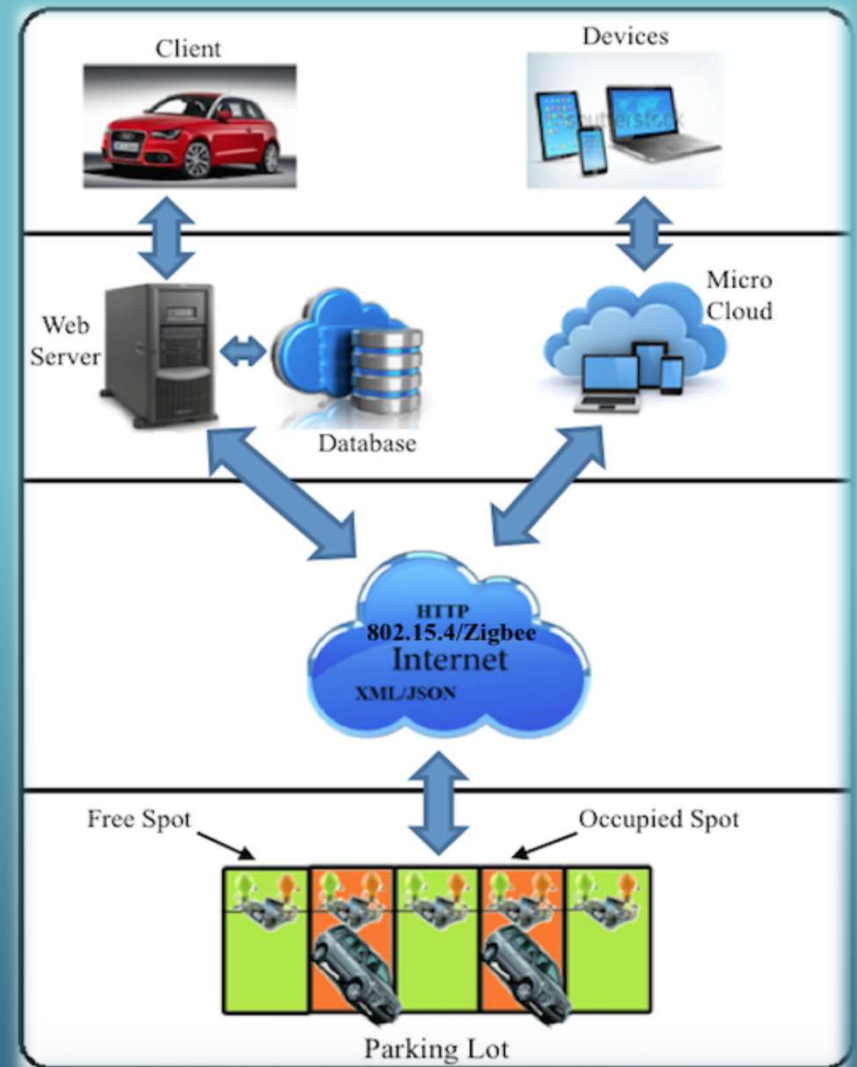
WHY A SMART PARKING SYSTEM?

While there are clearly a lot of benefits to implementing smart parking in cities, it mainly comes down to two things. Smart parking technology is good for people and good for the planet. According to a report from UCLA, 30% of traffic congestion comes from cars looking for a place to park. Park Smart, a certification system that uses smarter parking design and operation to advance sustainable mobility, calculated that this statistic equates to 930 million gallons of gasoline and 18.6 billion pounds of carbon dioxide emissions annually.

Smart parking drastically reduces that number and makes for a cleaner, greener world.

ARCHITECTURE

This parking system is proposed with the architecture consisting of mainly three Layers

- The Sensor layer
- The communication layer
- An application layer

METHODOLOGY & WORKING

Smart parking systems can use various devices such as vehicle counting equipment, cameras, and sensors installed in streets and pavements to gather data about the occupancy of different streets and parking lots. This data is then transmitted in real time via the internet to a database where it's aggregated and analyzed. The information can then be fed into a mobile app. Such an app then guides the driver with a GPS, providing directions to the nearest available parking area. And the payment will be generated according to the duration of parking.

The system increases the accessibility of parking with the use of sensors. The sensors are placed in the pavement of the selected parking spaces to recognize if the parking area is occupied or vacant. Sensors communicate with the gateway and that data will be pushed to the cloud. Sensors then immediately show the availability of parking areas. This can be viewed on the APP or the sensors placed in the parking areas so drivers can easily
identify the space.

Smart Parking uses sensing devices such as vehicle counting equipment, camera, sensors installed in pavements, etc. to discover parking lot occupancy Strong sensing systems are being built to examine and transfer the data to the database in real-time. The system increases the accessibility of parking with the use of sensors.

The sensors are placed in the pavement of the selected parking spaces to recognize if the parking area is occupied or vacant. The data collected from the sensors will be sent to the cloud storage and the user can access the data through the web application. The user can select the parking space accordingly and then the parking space will be shown as booked. Sensors communicate with the gateway and that data will be shown as booked. Sensors communicate with the gateway and that data will be pushed to the cloud. Sensors then immediately show the availability of parking areas. This can be viewed on the APP or the sensors placed on the parking areas so drivers can easily identify the Smart Parking can be utilized in private parking lots, hospitals, hotels, shopping malls, public parking garages, offices, etc.
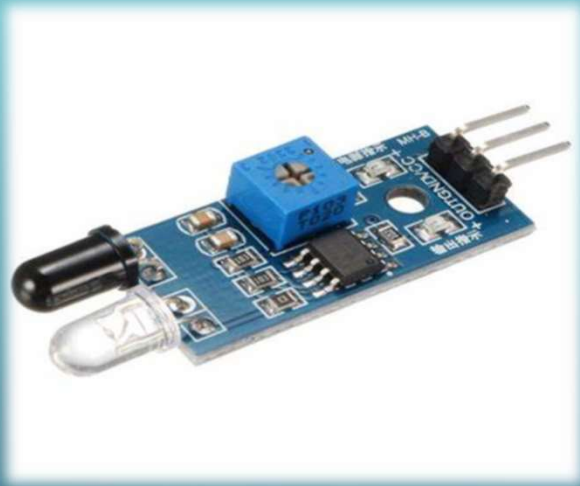
SENSORS USED -

Arduino

This system can easily find empty parking slots available for parking automatically. If the slot is empty in the automated car parking the new vehicles are allowed to enter the parking else the entrance is blocked by using the servo barrier in case no empty slot is found by the system. Where the Arduino is the main microcontroller that controls the whole system.
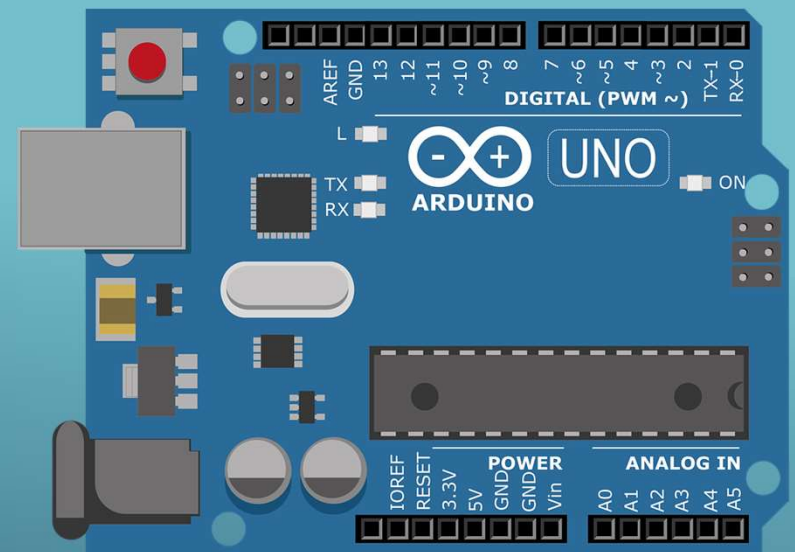
IR Sensor

The IR sensor is used to detect the absence or presence of a car when it enters the parking slot, and the LCD screen is then used to display the vacant parking slot to the driver. The parking slots are continuously monitored, and the data is continuously updated on the LCD screen.

Two IR sensors are used at the entry and exit gates to detect vehicle entry and exit in the parking area. And other four IR sensors are used to detect the parking slot availability

Ultra Sonic Sensor

An ultrasonic sensor is placed after the gate ramp to determine whether the vehicle has passed. The ultrasonic sensor alerts the system to close the gate ramp once more and change the RGB led color to red when the car passes through it.

LoRaWAN,

which is designed to enable devices with power limitations to connect with internet-powered applications over long-range wireless connections is a preferred choice for a Smart Parking Solution, because of the following reasons – It provides a long range of 10-30 km

In-ground sensors Smart Parking's unassuming yet highly innovative in-ground sensors monitor individual parking spaces and relay occupancy status to our Smart Spot gateways, which in turn send this live status information to the Smart Cloud platform, allowing real-time parking information to be viewed on multiple

devices.
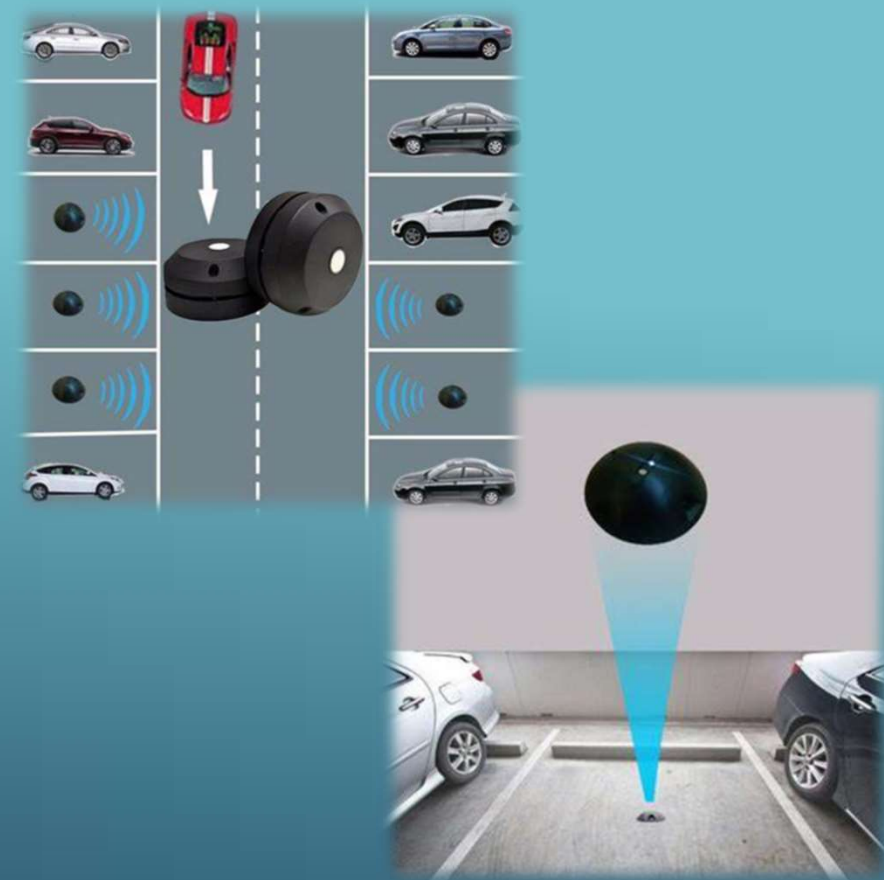
RFID Sensor

Sensors and RFID System. RFID is short for "radio-frequency identification" and points to a technology whereby a reader catches
digital information encoded in RFID tags or smart labels via radio waves. Like barcode technology, RFID Scanner recognizes locations and
identification of tagged items — but instead of reading laser light reflections from printed barcode labels, it leverages low-power radio frequencies to collect and store data

BENEFITS OF SMART PARKING

- Smart Parking involves the use of low-cost sensors, real-time data, and applications that allow users to monitor available and unavailable parking spots.
- **Optimized parking** – Users find the best spot available, saving time, resources, and effort. The parking lot fills up efficiently and space can be utilized properly by commercial and corporate entities.
- **Reduced traffic** – Traffic flow increases as fewer cars are required to drive around in search of an open parking space.
- **Enhanced User Experience** – A smart parking solution will integrate the entire user experience into a unified action. Driver's payment, spot identification, location search, and time notifications all seamlessly become part of the destination arrival process.

- **Increased Safety** – Parking lot employees and security guards contain real-time lot data that can help prevent parking violations and suspicious activity. License plate recognition cameras can gather pertinent footage. Also, decreased spot-searching traffic on the streets can reduce accidents caused by the distraction of searching for parking

- **New Revenue Streams** – Many new revenue streams are possible with smart parking technology. For example, lot owners can enable tiered payment options dependent on parking space location. Also, reward programs can be integrated into existing models to encourage repeat users.

- **Real-Time Data and Trend Insight** – Over time, a smart parking solution can produce data that uncover correlations and trends of users and lots. These trends can prove to be invaluable to lot owners as to how to make adjustments and improvements to drivers.

- **Decreased Management Costs** – More automation and less manual activity save on labor costs and resource exhaustion.

CONCLUSION & FUTURE ENHANCEMENT

In the current generation, smart car parking is very useful. Over the past few years, smart parking systems have gradually increased. This is the main part of smart cities because it minimizes traffic congestion This project focuses on the implementation of car parking place detection using the Internet of things. This system benefits its smart parking go well beyond avoiding time wasting. Also, most of the functionalities are needed in a parking area. This can be applied everywhere due to its usage and effectiveness.

REFERENCE

1. International Conference on Emerging Trends in Information Technology and Engineering
2. Web-based framework for smart parking system using IoT
3. https://all3dp.com/2/tinkercad-Arduino-how-to-design simulate-circuits/
4.https://www.packettracernetwork.com/ internet-of-things
5.https://ieeexplore.ieee.org/document/943219

Thank you