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Design of Highly Secured Smart Vehicular Parking System

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ABSTRACT

The forethought of being a wise city is that the Smart Parking Facility. Nowadays in every family is maintaining a car and when it comes to weekends or any festive seasons every family likes to go shopping malls, Multiplexes, Restaurants, Airport, Railway station, Bus station. Finding an empty slot to park a vehicle is an annoying issue in recent days as we observe. The usage of vehicles rapidly increasing in our daily life. And the drivers used to struggle to identify a halting duration without considering where the slots are available to park their vehicles. And at the meantime for searching a parking space traffic may increase and loss of fuel. In this review, we constructed a prototype of a smart parkland arrangement in the urban domain of using the Internet of Things (IoT) and Raspberry-pi. In the development of web correspondence with real equipment in commonplace phenomenon. They are fixed with electronic components, web connectivity, and alternative sensors, the above-mentioned gadgets can broadcast and collaborate along excess over the web and they can hold control and observe remotely. So, the IoT is inter-associating with real gadgets, automobile (assigned to as linked gadgets and wise gadgets), apartments (guest parking slots separately), and alternative items linked with electronic components, programming, sensors, actuators, and chain comparability that found out the particular gadgets to save and swap information. We are uploading a data in the cloud (Thingspeak) so that the users can monitor whether the slots are free or not regularly.

KEYWORDS

Smart Car Parking, Raspberry-pi, Ultrasonic Sensor.

INTRODUCTION

Nowadays in every family is maintaining a car and when it comes to weekends or any festive season every family likes to go shopping malls, Multiplexes, Restaurants, Airports, Railway stations, and Bus stations. Finding a space to park our vehicle had become an annoying issue in those busy places nowadays and who goes with their families or friends are used to waste more than half an hour to park their vehicle. And the vehicles especially the cars are taking a lot of space. Most of the traffic occurs only due to excess vehicles within the urban areas thus people are consuming time in searching of areas especially to park their vehicles. And one more issue is also added is pollution while vehicles are in search for slots to park and the engine will be on so the waste fuel has also occurred.

The Internet of things (IoT) is development about web connectivity in the direction of through to real gadgets moreover commonplace phenomenon. They are fixed along electronic component, internet connectivity, furthermore alternative pattern about sensors, the above-mentioned gadgets can get through along with reach out alongside excess done with the web further more can be controlled and observe remotely.

The IoT is the inter-connecting with real gadgets, automation (referred to as connected devices and wise gadgets), apartments, and alternative items implant alongside electronics, software, sensors, actuators, and web connectivity whatever created through the above-mentioned objects to gather and swap information. Everything is particularly encountered through its embedded computing

system still it can interoperate in a period of actual web framework. The linkage about these embedded gadgets hold normal towards adoption in automation is approximately all ranges, while also permissive leading operation related a wise framework along with spread toward fields in the same manner with smart capital.

The IoT get expand as a result of meeting different automation, problem solving-time data, automobile literature, material, sensor, and implant combination. Traditional fields of linked arrangement, wireless sensor system, control systems, automation (including individual home and apartment), and excess everything supply directed toward enabling the internet of things.

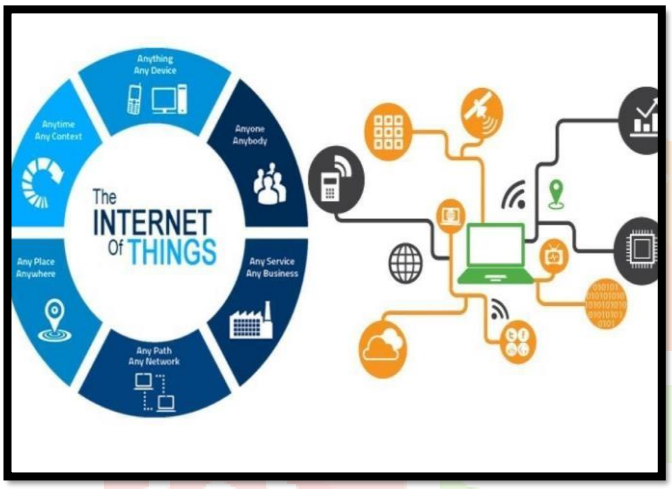


Fig 1

The approach of the Internet of Things (IoT) initiated beside existence of connecting gadgets. The gadgets are often tracked, controlled, or supervise by using remote computers associated over the web.

IoT could be described in form of:

Real gadget + Controller, Sensor and Actuators + Web = Internet of Things.

The idea of designing a smart city is instantly available including development based on IoT one containing basic concern of smart capital can describe a car parkland efficiency along with transportation executive systems. Depth improvement in sensor automation including low-priced components of their linked connections, we are saying a certain appliance are often constructed adopted IoT.

The IoT is sometimes used to refer the internet of everything (IOE) consisting of all the network set up gadgets that save, circulate and create a information around their background circumstances adopting a linked sensors, processors, and connecting appliances.

REVIEW OF LITERATURE

1. Smart Parkland arrangement adopting optic Wireless Sensor Network:

This arrangement is capable of utilizing the video cameras where they're expanded within the parking spaces and it can capture the license plate of the car and also able to check the parking slots.

Advantages:

1) They are cost-efficient.

2) Optic WSNs are easy to maintain and install.

Disadvantages:

1) In this device failure chances are high and not much powerful.

2) The detection of a license plate is not possible.

3) And, the prediction of vehicle size is not much beneficial.

2. Smart parking booking system using Bluetooth and Zig Bee sensors:

This system works on a Bluetooth communication technique it is used to verify the identity of drivers and also to book a slot by identifying the availability slots.

Advantages:

1) Not necessary for internet usage.

2) It is a decentralized system.

Disadvantages:

1) Limited range of Bluetooth.

2) Difficulties are observed in the Installation and maintenance process.

3) If the driver is inactive or the connection is disconnected then needed to book a new slot.

3. Smart Parking System using IR sensors:

The parking slot availability can be

continuously monitored by using a feedback mechanism. Infrared sensors are able to monitor parking slots.

Advantages:

1) Proper utilization of the slots guided accordingly.

2) This can be done at a low cost.

Disadvantages:

The possibility of a slot could be known only if the vehicle enters the parking slot, so if the parking slots are not vacant it has to return from there and it might cause a traffic jam in the parking lot.

4. Smart Parking System using RFID:

The system used to find the vehicle's unique RFID tag which value of data is stored within the database when it's known by the RFID reader at the entrance of the parking lot.

Advantages:

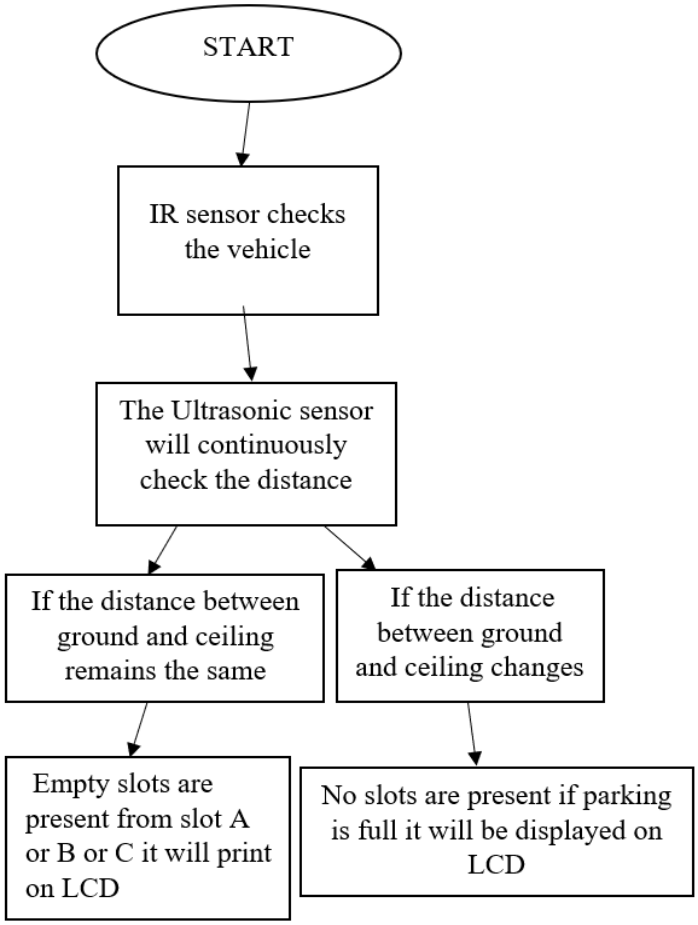
It is the fastest method to identify and for the cost-efficient.

Disadvantages:

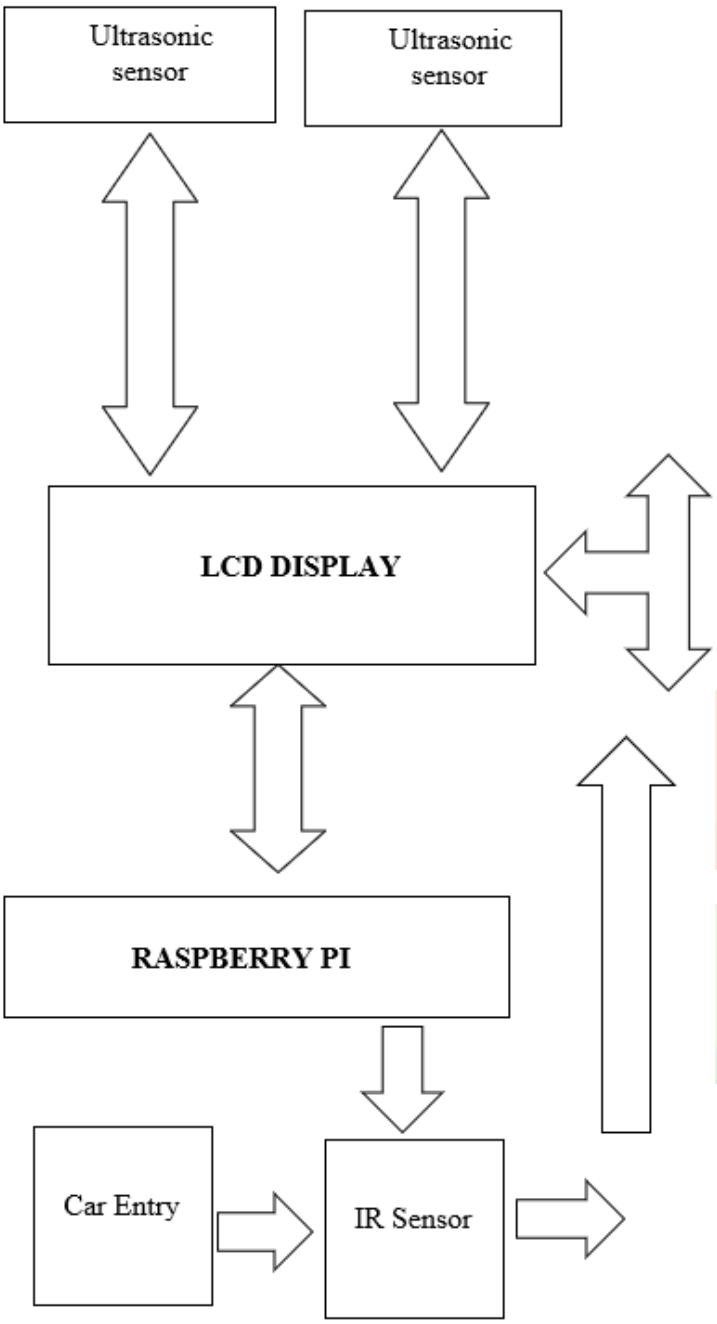
If the RFID tags get broken or more than one tag is interpreted at a time, the system fails to work exactly.

ARCHITECTURE & WORKING OF THE SYSTEM:

System flow chart:



Block diagram:



Initially, when the car enters the parking area entrance where the IR Sensor has located. The IR Sensor continuously checks whether any car is present at the entrance. If any car is present at the entrance it activates the system and sends the report to RASPBERRY PI. It activates the ULTRASONIC Sensor. It continuously checks the gap between the ground and ceiling. If the gap remains the same as mentioned to it, it sends the report to the system and displays the empty slots on the LCD Display that is present at the entrance of the parking slot. If parking slots are available then the gates for parking will open and the car can enter the parking slot. After the car has been parked in the specified slot. It automatically saves the data in the thingspeak cloud platform, His parking time starts. If all the slots are full the display at the entrance shows 'NO EMPTY SLOTS' on the display. Whenever the driver comes back to the car and takes out his car from the parking slot his parking time will automatically end in the cloud. When the driver reaches the exit barricade cloud platform will automatically calculate the parking amount and gives the receipt at the exit barricade. One can pay through his e-wallet or online payment methods or by cash there itself. Then the exit gates will open and a car can leave from the parking area. We can also implement the CAMERA Sensor which checks the car registration number and the driver's identity. By this, we can minimize the thefts and can also save the data in the cloud along with the identity.

IMPLEMENTATION & WORKING

As we have discussed the architecture in the above section as we consider the real-time of the system by using a flow chart.

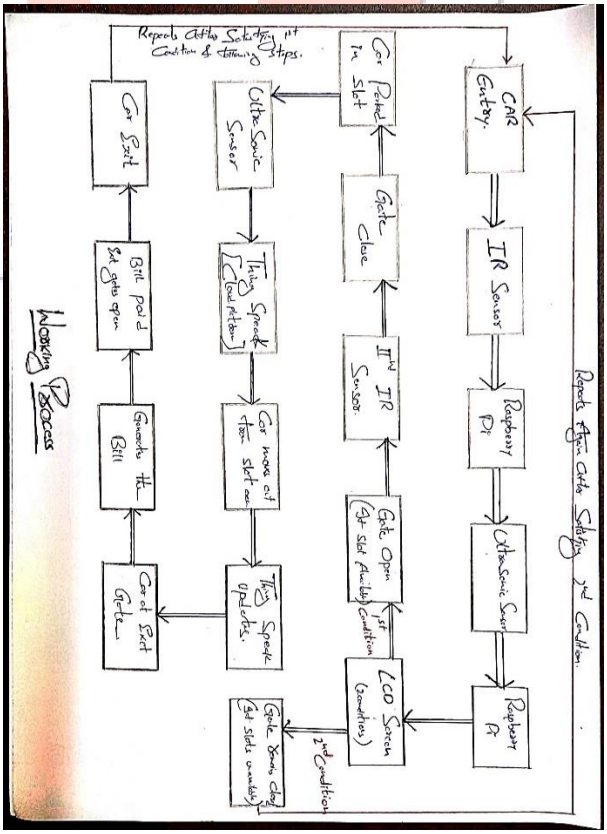


Fig 2 Car Parking System working process

We had materialized the system by working with a toy car, but this process might be implemented in the malls & multi-storeyed buildings. Below are the

steps involved in how to park a car from the entrance and paying the bill at the exit.

Step 1: The car enters the entrance of the parking and activates the IR sensor present at the entrance.

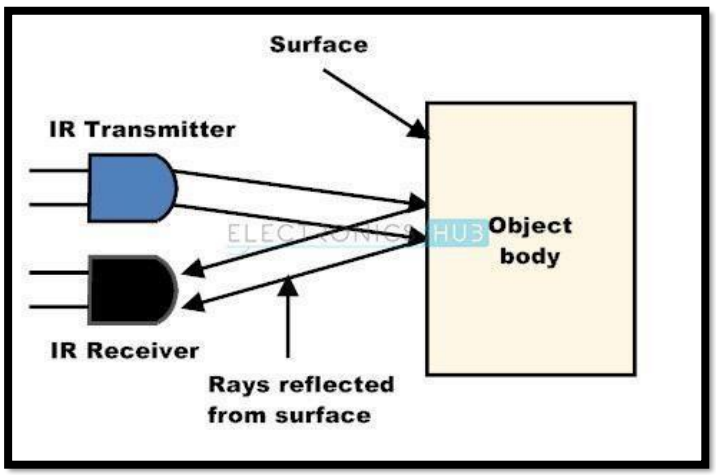


Fig 3 IR sensor detecting object (car)

Step 2: IR sensor sends the report to the raspberry pi.

Step 3: Raspberry pi seeks the information from the ultrasonic sensor which continuously checks the distance from the ceiling to the ground in the parking slot.

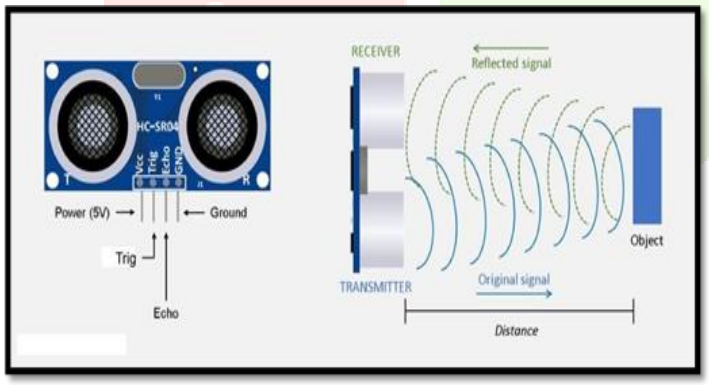


Fig 4 Ultrasonic distance measurement of car

Step 4: The ultrasonic sensor sends the report to the raspberry pi.

Step 5: The raspberry pi now activates the LCD that is present at the entrance of the parking area.

Step 6: The LCD shows the message that which slot is empty on the display. If all slots are full it displays no empty slots on the LCD.

Step 7: now the barricade at the entrance will open and the car will enter inside the parking area. Once the car has crossed barricade will automatically close.

Step 8: When the car is parked in the slot the cloud will automatically save the data of that particular slot

Step 9: Whenever the car is taken out of the slot, the cloud will again notice the changes and saves the report.

Step 10: Then the car is reached at the exit barricade the cloud calculates the amount and gives the receipt at the exit barricade.

Step 11: When the car driver pays the amount the exit barricade will open and the car can exit.

KEY APPEARENCE CONSIDERING ACCESSIBILITY IN THE EXPECTED MODEL

1. Improvement about mobile application considering drivers

It is accessible toward handling app are often inbuilt one and the other platforms Android and iOS. This model pleasures the driver toward and save their daytime under management in the act of interest create the maximal support through get rid of stress in consideration of a comfortable parkland location found in the nearby and driving towards it. He is able to register the authorization fine points along with the deposits process handling routinely. The above-mentioned fine points are going to be gathered within the cloud index.

Important understanding is a particular parking slots sooner arriving the parking area. Already stated to authorize enough favourable toward disabled along with senior civilian. Again they keep set up payment updated if car taken away from the parking slot the driver could settle right away over computerized payment approach as long as duration based on particular automobile last placed.

2. Entrance along with Exit

Already a car is placed in a vacancy, the driver's identification needed to be verifiable. Assuming that a slot is vacant, it will be displayed on LCD. Above mentioned will generate the entry of the car in the parking space and it actually make customers feel more convenient. Simultaneously at exit, a chain of vehicles are less count aside of formulation of parking fee done with automated e-payment that benefits for drivers and will be experienced for their upcoming use of parking slot.

3. Use for Familiar and Commercial

1. Benefits currently identifying traffic pollution aside decreasing exhalation rise off vapor.
2. Preserving some certain unit of fuel worth keep appear an extensive difference among civilization and commercial.
3. Observing traffic jam beside IoT set up benefits keep grant the better resourceful city.
4. Automated money transactions keep redeem while customers directed towards bulky amount.
5. Large number of paper misuse might last replace by computerized bill rather printed paper bills.
6. After all paper slips are skipped in the present planned ideology and never use of any attendant for collecting slips.

RESULT AND DISCUSSION

With the help of this project, we can continuously check the slots of parking places whether they are vacant or not. IR sensor is used to detect the arrival of vehicles and an ultrasonic sensor placed in the parking slots used to detect the slot is full or vacant and if a slot is vacant it will be uploading the data in the cloud(Thingspeak) so that the officials can continuously monitor whether the slots are free or not regularly.

CONCLUSION

A smart parking system will be a quick fix to the prevailing traffic jam to scale back driver's irritation within the look for vacant parking slots by giving instruction about the current situation of parkland slots. The smart car parking system goes to possess a high demand within the forthcoming days. Still the smart parkland arrangement previously remains, our estimate is to form the arrangement less expensive and convenient which will help to extend its acceptance within the advertise. The propose was outstanding and less expensive and convenient.

FUTURE SCOPE

This appliance is a basic step for attaining an active result in the regular interest.

We can develop this project in many ways by:

1) By providing to a central management system that confirms only validate instruction is directed to the client that is handling with the security issues.

2) Also inquiry are often done using the previous parking data by which users can get instructions or idea on parking slots and their opportunity in upcoming days.

3) According to this analysis can be used while booking a parking slot by a user or while lease slot to set the price of the parking slot.

4) We can create a mobile application that will be useful for drivers to know the available parking slots at particular shopping malls or multiplexes.

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