

IOT BASED CAR PARKING MANAGEMENT SYSTEM FOR SMART CITIES

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ABSTRACT

Background: Present day's car parking has become a major issue in urban areas with lack of parking facilities and increased amount of vehicles, due to this drivers who are searching for parking space they were roaming around the city in peak hours. This causes traffic, waste of time and money. Findings: This system helps user to find parking space availability with the help of Internet of Things (IoT) technology by providing parking free space information. The IoT maintains the database of the parked vehicles through a shared server. So drivers can book the slots in advance and the parking information updated in server. In addition to the parking, theft management will be done i.e. a theft vehicle came for parking then the number plate is checked with theft list in the database, if it is in theft list then a message is sent to the police. Applications/ Improvements: This prototype developed for the parking system with less human interaction, increases flexibility and security. This system is employable in airports and multiplexes parking.

Keyword:- Raspberry pi 3, Sensors, Backend Server

1. INTRODUCTION

Present day's getting a parking space in urban areas is very difficult in peak hours due to lack of parking spaces. Due to this driver stuck in traffic or looking for parking spaces around the location makes traffic congestion. For that we developed car parking management system for smart cities using Internet of things. Parking spaces are large in size for airport or multiplexes, so it's difficult to maintain system manually. The major issue with car parking is that improper parking and damages others cars while parking the car. The car parking system communicates with each and every slot to server.

In urban areas, car parking becomes critical issue with increased amount of cars. A Study showing that 30% of the cars in the traffic jam are looking for parking space and on an average eight minutes' time required to find a parking space. This results wastage of oil or gas, money and time. Sensors are used to get accurate availability of parking spaces. With great revolution in IOT brings flexibility to the user, it will provide parking availability and maintain database can be possible through a web interface.

The user can check slot availability for that IoT developed. It is an environment that transmits and receives data over a network for controlling the devices with or without human interaction. The things provide data storage, processing and collection of data. Here data captured by sensors and transmit data through internet. A survey telling that 70% of the devices in the world are connected to internet by 2020. It involves in taking

control of devices and making objects speak one to other. In this process IoT becomes internet of everything where anything can be connected to any network, anywhere, any time and anybody. IoT uses cloud sources for connecting any networks. For connecting the things to internet we require internet protocol.

Near field communication technology is used to develop the parking systems, also developed a mobile application for parking the slots online. In present days, car sizes are varying and sometimes use more than one parking size, hence beside parked cars are affected. Wireless sensors are placed on parking lot each wireless sensor node is placed on each slot from that we can detect the parking space allotted or not.

2. PROBLEM STATEMENT

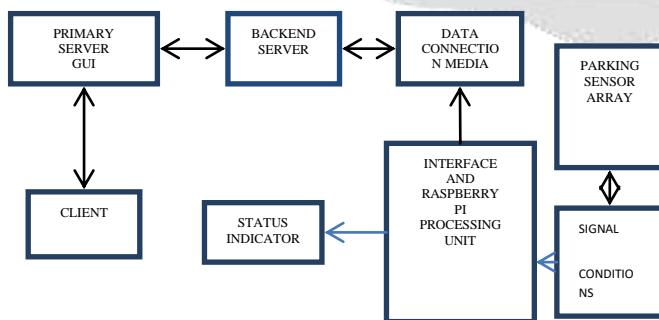
In present parking system parking slots are indicated locally with the help of information display installed at entrance of parking area so if parking slots are available a user can accommodate the nearest slot but this slots triggers the another problem as in case of user is already to arrive to parking area but no empty slots are available in that particular parking zone. So that, fuel and time wasted by the current system and this is the problem for which our proposed system is a solution with advance parking indication system.

3. RELATED WORK

Various methods have been proposed for development of autonomous parking systems. In reference (3) Arduino is used as an embedded controller to interface Ethernet shield with a PC/Laptop to provide IoT over Ethernet. A user can use this parking service in the airport scenario provided by airport authority with user ID and password. Whenever a user need to check the vehicle in the parking lot, uses the ID and password to logon into the airport web link and view the status of the car in the parking lot using IoT. The reference (4) proposed a system that helps users automatically find a free parking space at the least cost based on new performance metrics to calculate the user parking cost by considering the distance and the total number of free places in each car park. This cost will be used to offer a solution of finding an available parking space upon a request by the user and a solution of suggesting a new car park if the current car park is full. The simulation results show that the algorithm helps improve the probability of successful parking and minimizes the user waiting time. We also successfully implemented the proposed system in the real world. In reference (5), Wireless sensor networks provide the possibility to sense the exact occupation of a parking space and potential influences on neighboring parking spaces. However, current solutions focus only on the detection if a parking space is occupied or not. In our work, we present a sensor deployment and a machine learning-based approach able to provide the mentioned more fine-granular detection level. In reference (6), The proposed system captures and processes the rounded image drawn at parking lot and produces the information of the empty car parking spaces. In this work, a camera is used as a sensor to take photos to show the occupancy of car parks. By having this image, the particular car parks vacant can be known and then the processed information was used to guide a driver to an available car park rather than wasting time to find one.

4. PROPOSED SYSTEM DESCRIPTION

Block Diagram:

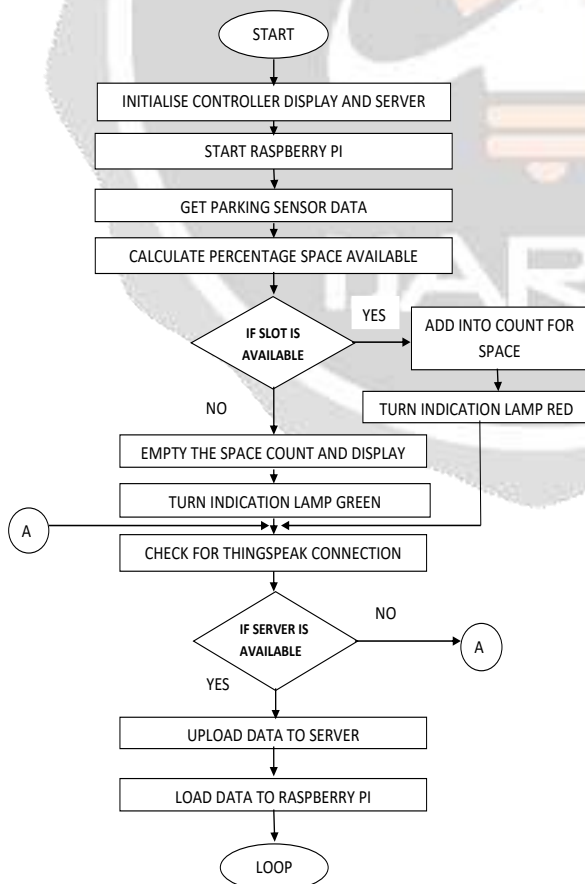


Client: Mobile with wireless connectivity (for e.g. Wi-Fi).
 Primary server & Backend server: Server GUI design.
 Data connection media: Wired or Wireless connectivity between local controller.
 Local controller unit: Raspberry pi controller with predefined code and algorithm.
 Interface and processing unit: To convert physical sensor data from parking array into controller level signal.
 Signal conditioning and Parking sensor array: Distance based vehicle sensor for sensing parking slots status.
 Status indicator: To indicate vacant or occupied parking slots.

Block Diagram Description:

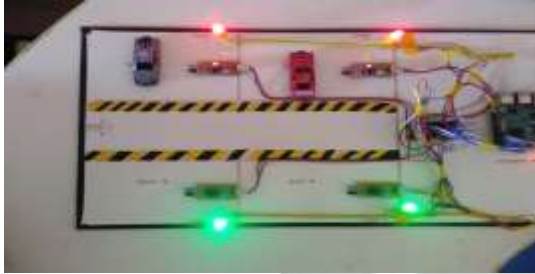
The car parking management system mainly uses the Raspberry pi. The Raspberry pi is used as server and the process controller in the system. The parking sensors are used to detect the vacant space. The IR sensors are used in the system. These are the distance based vehicle sensors for sensing the parking slots status. The sensed data is provided to the Raspberry Pi processing unit through the signal conditioning and the Interface Unit. The Interface Unit is used to convert the physical sensor data from parking array into controller level signal, so that the controller unit can understand the data for the further procedure of the data. The processing unit is nothing but the Raspberry Pi Controller with some predefined codes and the algorithms. In between the local controller unit and the backend server the data connection media is used. It is the wired or wireless connectivity between the backend server and controller unit. The client is the mobile or the laptop with the wireless connectivity for e.g. Wi-Fi. The primary server and the backend server are used to form the GUI i.e. Graphical User Interface. The GUI are formed so the user can easily operate the system. The open source android applications are used by the user to operate the system. The status indicators are the bicolor LED lamps with red and green color to indicate the parking slots status. The red indicate the parked slot where the green color lamp indicates the vacant parking slot. The client gets the information about the availability of the parking slots using the open source android applications.

5. FLOWCHART



6. SYSTEM OUTPUT

Hardware implemented output:



Software implemented output:



7. CONCLUSIONS

The concept of Smart Cities have always been a dream for humanity. Since the past couple of years large advancements have been made in making smart cities a reality. The growth of Internet of Things and Cloud technologies have give rise to new possibilities in terms of smart cities. Smart parking facilities and traffic management systems have always been at the core of constructing smart cities. In this system, the implementation of an IOT based smart Car Parking system commanded by Thingspeak Application is successfully discussed. The components used for the implementation of the system provide efficient output at various stages of implementation. The interfaces established between various components provide an effective communication across the overall working of the system. Thus, the system functioning is efficient and is recommended for commercial implementation. In this system, we address the issue of parking and present an IoT based smart parking system. The system that we propose provides real time information regarding availability of parking slots in a parking area. The

efforts made in this system are indented to improve the parking facilities of a city and thereby aiming to enhance the quality of life of its people.

8. ACKNOWLEDGEMENT

It has been a great pleasure to present this project. The study of this project cleared all our technical concepts and has been great experience. In this paper, main purpose is to help user to find parking space availability with the help of Internet of Things (IoT) technology by providing parking free space information. The IoT maintains the database of the parked vehicles through a shared server. We wish to acknowledge our faculty for their guidance and encouragement.

9. REFERENCES

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