SMART PARKING SYSTEM-A SURVEY

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Abstract: Modern world people are facing parking problems due to increase in number of vehicle usage in most metropolitan area. The complexity does not in know where the free parking spaces at any given time, even if this is known; many vehicles may follow a small number of parking spaces which in turn leads to jamming in traffic. This paper discuss on different smart parking techniques developed to overcome parking problems using various technology like Microcontroller, Zigbee and GSM based technology, Wireless Sensor Network technology, Image Processing, Number plate recognition , Automated parking system with Bluetooth access, Sensor Fusion based energy efficient and reliable smart parking system. The systems proposed by various authors help us effectively in reserving as well as eliminates the need for searching of a parking space in parking lot.

Keywords: Smart parking, Zigbee, Microcontroller, RFID

I.INTRODUCTION

In today's world parking lots have become redundant and needs lot of human resource for its maintenance. The current parking lots are not user friendly and do not intimate the availability of free parking spaces. The services that current world requires in terms of parking is saving time to park a vehicle, knowing the direction to reach the parking lot, less cost, reservation of parking space and calculate and pay the charges automatically, best path available to reach the location. The current user requires a smart application which helps in providing the services is to be accomplished. Many researchers are working on this problem and formalized with solution using various methods to optimize the parking lots to meet the needs. The modern technologies like GSM, WSN, Bluetooth, RFID, image processing techniques is been used by various systems to serve the need.

Further the paper is organized to give a insight into the various proposed systems for smart parking.

II. SURVEY ON PORPOSED SYSTEM FOR SMART PARING

A. Microcontroller based multi-storey parking [1]

Multi-storey car parking system plays a vital role in avoiding wastage of parking space. This proposed system enables the parking of vehicles, floor after floor and thus reducing the usage of space in turn making the system modernized. This idea is developed using 8051 microcontroller. Two motors are used in this proposed model. One is stepper motor for horizontal movement and other is DC motor for vertical movement of lift. Obstacles sensor senses the incoming car, headlight senses the outgoing car and stepper motor is used for movement of lifts. Three sensors are used to sense the position of lift on each floor. the current location of lift is displayed on two seven segment display. Other two seven segment display is used by operator to display the location entered by him. The operator should have a indication of empty space. When operator enter the location which is compared by microprocessor with the current position of lift, if both are equal sends signal to the DC motor and stepper motor to stop in particular location. As an advantage multi-storey car parking system offers greater flexibility for the optimum parking solution. The major drawback of this proposed system is that it requires a lot of maintenance and the vehicles have to be configured within the given space.

B. Zigbee and GSM Based Secure Vehicles Parking System Management and Reservation [2]

In this paper, secure parking reservation is provided by using Global system for mobile communication (GSM) technology. As there is increase in vehicle and vehicle theft, parking and security of parked vehicles has become one of the major concerns which lacks in many of the parking system. They are many methods introduced to solve this problem. In this proposed system two modules have been developed, oen to monitor the parking space and other to provide security reservation. Parking lot monitoring is a layout which is used to display the parking status. In security reservation module the user needs to send a sms in order to reserve the free parking space. The main aim of this proposed system is to increase the security of the vehicle at parking lot and improve the performance of the parking system, thus reduce the time of searching for parking. The major drawback of this proposed system is that the sms module makes the system expensive and since sms module contains entry/exit password for reservation due to network congestion it may not be successful.

C. Wireless Sensor Network and RFID for Smart Parking system [3]

A cost efficient solution was proposed to overcome parking problems by making use of wireless sensor network, Radio Frequency Identification (RFID) and Zigbee technology. A wireless sensor has been installed in every area of interest. The information obtained from this sensing nodes is transferred to management centre via Zigbee which is processed to evaluate the time of parking, billing system etc. RFID technology is used for secure, fast and easy checking in and out of vehicles. The major drawback of this proposed system is that the node to node implementation requires more time and also the use of RFID increases the cost.

D. Intelligent Parking management system based on Image Processing [4]

This paper uses image processing technique to present an smart parking space detection system. The proposed system captures and processes the 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 if a particular space is available or not. The advantage of using camera as sensors is because using a picture captured by camera the presence of many cars at once can be identified and also the camera can be easily moved in any direction. The user uses the information processed using picture as a direction to the free available parking lot instead of wasting time to find one. The proposed system has been developed in both software and hardware platform. An automatic parking system is used to make the whole process of parking cars more efficient and less complex for both drivers and administrators. The major drawback of this proposed system is that the weather conditions affects the system and also the camera should be positioned where it can see all the car parks without any destruction by objects.

E. Automatic parking management system and parking fee collection based on number plate recognition [5]

The main aim of this system is to increase the convenience and security of parking lot as well as collecting fees without any human intervention. The system takes the picture of car and uses image processing for extracting the number plates for operation of parking and billing system. This paper presents algorithm which uses image processing technology and character reorganization based method for license plate extraction from car images. Once the image is extracted the characters in the image is recognized and used for collection of fee based on number plate information. For electro parking bill time and date of car arrival is recorded along with Car number plate. When a car arrives at exit the fee is calculated by recording exit time automatically by mapping number plate. The proposed system run with pre-programmed microcontroller with less human intervention and ensures access control in restricted places. The major drawback of this proposed system is that different algorithm has to be applied for different type of number plate and also the number plate vary in size, color and type from country to country.

F. Automated parking system with Bluetooth access [6]

This proposed system enhance the security features and automating the parking process in the existing system thus eliminating the need for human recourses. For verification and identification of the user the parking system has an inbuilt Bluetooth reader. The user has to start his/her mobile's Bluetooth for identification and registration. The Bluetooth reader fetches the user's Bluetooth number and transfers it to database. The owner has to start his Bluetooth device at the time of exit which in turn eliminates the use of tokens or paper bills. The space management and automation is performed with the help of an ARM microcontroller which controls the mechanical motors to park the vehicles at an appropriate parking location. The proposed system has various advantages. One is each and every Bluetooth device as a unique registration number which helps to overcome redundancy. Other is Bluetooth device is very cheaper than other devices. The major advantages are The major drawback of this system is that the entire parking lot is designed with a mechanical components such as rack and pinion mechanism.

G. Sensor Fusion based energy efficient and sustainable smart parking system [7]

The main aim of this proposed system is to provide an efficient management of parking both in terms of energy and space. In this system it integrates the image recognition techniques for license plate recognition, infrared sensor for group control and wireless sensor network (WSN) for light emitting diode (LED) lighting and displays the guidance of directions. The image processing techniques and grid based algorithm is used to recognize the vehicles in the parking space. The algorithm of zoning or lighting group control is incorporated with moving object tracking algorithm to control the array of lights. The proposed system is cheaper as it uses ZigBee which is less cost and implementation is easy. The major drawback is that the motion detector can be affected by environmental changes.

H. ***A Cloud based smart parking system based on Internet of things technologies. [8]***

In this proposed system user has to login to search for the parking space with the less cost and minimum distance. Once logged-in the user will choose required parking location and system provides the status, if parking space is available along with direction to reach the place, meanwhile the status of the parking will be shown as pending so only registered user park the vehicle. If the car is not parked at the specified location by time then status will change to available. If the required parking space is full the user is provided with alternative best parking space with the direction to reach the location. To monitor the parking space Wireless Sensor network consist of RFID technology is used because of its less cost. The system consist of three components Cloud based server, client, local unit. Local unit consists of RFID reader, RFID tag to verify the user information and calculate the availability of free space

and screen to display the status of car parking. The server is based on cloud which stores the information provided the local unit. The system as an advantage reduces the average waiting time.

III. CONCLUSION

In this paper various Smart parking systems is discussed. These systems can help to overcome from parking problems which arise due to the huge number of vehicles and lack in reliable, efficient Parking system. This survey highlights on use of various techniques such as Wireless Sensor Network, RFID technology, Bluetooth, image processing, use of microcontroller which help in smart parking. The systems discussed also deals with security, cost and time aspects of society. The drawback of proposed system is also discussed so the researcher works on it for further improvement in system.

Future work can be done by integrating various modern technologies in order to accomplish system which is the most efficient in terms of security, time and cost. [9].

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