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Internet of Things Based Smart Vehicular Parking System

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ABSTRACT: A major challenge for modern cities is the way to maximize the productivity and responsibility of urban infrastructure, corresponding to minimizing road congestion by making higher use of the restricted car parking facilities that are offered.[2]Due to rapidly increase in vehicle density particularly throughout the peak hours of the day, it's a tough task for the drivers to seek out a automobile parking space to park their vehicles.[6] To realize this goal, there's growing interest within the capabilities of the rising Internet of Things (IoT), that permits a wide range of physical objects and environments to be monitored in fine detail by low-cost , low-power sensing and communication technologies. This paper proposes a smart Parking Management System supported wireless sensor network technology that provides advanced options like remote parking observation, automated guidance, and parking reservation mechanism.[5]This system uses IEEE 802.15.4 Wireless Sensor Network (WSN) and Internet of Things (IOT) technology. An acceptable shortest path algorithmic program (haversine formula) is employed to seek out the minimum distance between the user and every lot within the system. Thus, the waiting time of the user is reduced . RFID technology is employed in this system to avoid the human intervention that minimizes the cost.[6] The system is additionally able to collect data regarding the occupancy state of parking areas, and to direct drivers to the closest vacant parking spot by using a customize software system application.[3]

KEYWORDS: IOT, RFID, WSN, Parking Management, Sink Node Management.

I.INTRODUCTION

Around 70% of the world's population is expected to live in cities and surrounding regions by 2050 [1]. Therefore, cities will need to be better managed, if only to survive as platforms that enable economic, social and environmental well-being[2]. Finding a vacant parking space during the rush hours is a common problem in most of the cities. It is estimated that 30% of the daily traffic congestion in an urban downtown area is caused by vehicles cruising for parking space, and that a driver spends on average 5 to 10 min to find a parking spot .[1] This not only causes waste of time and fuel for drivers looking for parking but also increases air pollution and driver's frustration. The recent achievements in the Internet of Things (IoT) enabling technologies open up opportunities to develop innovative smart parking systems, able to significantly reduce the traffic congestion and improve the citizen's quality of life. Among the emerging wireless technologies, the Radio Frequency Identification (RFID) and IEEE 802.15.4 Wireless Sensor Network (WSN) represent two of the most promising candidate to implement a complete smart environment[3]. In particular, RFID is a low-cost and low-power technology consisting of passive devices, called tags, which are able to transmit the stored data when powered by the electromagnetic field generated by an interrogator, called reader. Since passive RFID tags do not need a source of energy to operate, their lifetime can be measured in decades, thus making the RFID technology well suited for many application scenarios .[3] In this paper, we design and implement the prototype of a Smart Parking System not only to broadcast real-time parking information to the drivers as part of a communal application, but also to provide reservation service as part of user-targeted service.[4]We use RFID reader which is a sensor that reads the RFID tag and authenticates the user information. All the car parks in the intended area are connected to form a parking network. Wireless sensor network usually consists of a large number of nodes that are deployed in the sensing area and are equipped with different kinds of sensing, computation and communication

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units.These purposeful units modify WSN nodes to hand in glove collect, process, and transmit info to the sink.[5] Compared with the present parking management systems, this paper proposes smart Parking resolution supported wireless sensor network technology.
Our selection was actuated by the necessity for an automatic, cost-efficient, real time and easy-to-use system for automotive parking. The projected system is capable of observation & managing individual parking areas, providing automatic steering and advanced reservation services still.[5]

II. EXISTING SYSTEM APPROACH

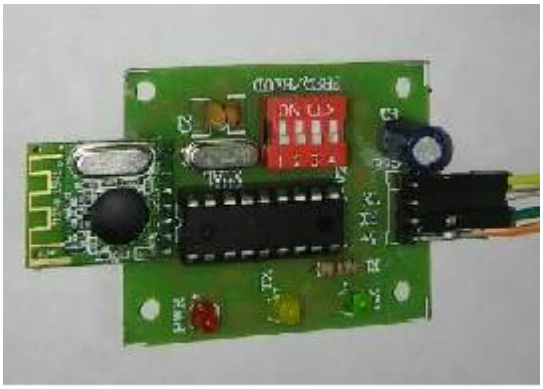
The existing system maintain the low level security for identify the theft as well as the vehicle related information. In this model used traditional observation for monitor the vehicle documentary. License & vehicle documentation is used to get the detail of the vehicle related information which is time consuming task. In recent the mobile apps are implemented for parking system which will give the limited functionality & not more secure for recognize the vehicle & owner related information is not implemented. In model low level wireless sensor s are used to communicate with remote device like GSM modem, zigbee module etc. which have many disadvantage about security as well as the range between the hardware module & remote devices. Remote system is based on android apps which is operated by mobile. Mobile app have ability to reserve the parking slot. System is based on the android application not fully the web application to maintain the security.

III. SYSTEM ARCHITECTURE

In this section, we tend to describe the planning of sensible Parking management system that consists of WSN, Sink, Parking Management, automatic steerage, Entrance show and client Reservation subsystems. At a look, the system shall be able to diagrammatically show real time data associated with the provision of parking {lot|parking zone|automobile parking space|car parking zone}s to the users and would additionally change users to order parking lot from remote locations. The system also will be capable of guiding users to with efficiency find vacant parking areas thus on park their cars quickly and safely. the design is split into six major subsystems as mentioned. The functions of every scheme area unit as follows.

A.WSN Subsystem

WSN system in the main deals with observation of parking status. This system detects the status of car parking zone with hybrid sensing techniques and transmits status info through RF. It additionally receives commands from parking management subsystem to hold out varied procedures. In our system Zigbee is used.



B. Sink Subsystem

The sink system collects the parking status report from WSN system and delivers them to the parking management system. It acts as a entrance between wireless sensing element network and external networks.

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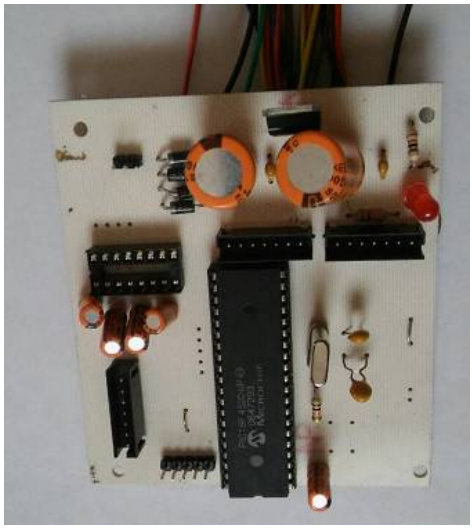
This system additionally forwards the data relating to the modification in parking status received from management system to the guidance system through RF interfaces.



C. Parking Management Subsystem

This subsystem acts because the heart of entire SPS system. Whenever sink subsystem sends information to the parking management subsystem, the entrance transceiver module related to the subsystem receives the info, processes it and forwards to the information module and contrariwise. The information module stores the event primarily based sensing element information and therefore the health info of the sensing element nodes. The sensing element & guiding node info from the information are collected by the parking steerage module and displays the corresponding info on the car parking zone graphical user interface. It conjointly takes the health info from sensing element health watching module & displays on graphical user interface. Parking entrance show module existing on this scheme gets consolidated standing info from the information then processes the knowledge to be sent to the parking entrance display. Whenever the client reserves a car parking zone, the reservation message are forwarded to parking reservation module.

D. Entrance Display Subsystem

As the name suggests, this system is placed at the entrance of the parking. It shows the status of the parking lots to the users before getting into the car park.

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E. Client Subsystem

Client subsystem is that the one that permits the clients to remotely interact with the SPARK system. It accommodates Parking Reservation interface that may be a front-end application running on the people devices permitting the users to relinquish their parking details (License variety + Time of parking) so as to order a parking lot. This info is later processed by client application and sent to the parking management system to allot a automobile parking space.

F. Subsystem Interactions

The WSN subsystem senses the status (occupied/vacant) of car parking zone and transmits messages through RF communication unit to the sink subsystem and changes the show status. The sink subsystem processes the messages received from the WSN subsystem and sends the processed information to the management subsystem through Serial interface.

This info is successively keep within the information module of the management subsystem. The received info is processed and also the standing message is sent to the steering and entrance show subsystem through RF interfaces therefore on modification the show standing. Whenever the user has to reserve a automobile parking space, he can submit the small print through the client subsystem.

Management scheme can successively question the standing of automobile parking space from the information module and check the provision of vacant tons. The management station also will send the standing info to the WSN, guidance and entrance show subsystem to update the parking standing.

IV. CONCLUSION

In this paper, we described the Smart Parking management system using wireless sensor networks. Basedon the requirement analysis for existing car parking management systems, we designed the system architecture and its subsystem level components as part of UCRC project. We implemented a full-fledged prototype model as a proof of concept to realize and understand the real time scenarios in parking management systems. Through our prototype system we demonstrated that the proposed architecture can effectively satisfy the requirements of a car park management system and we believe that wireless sensor networks can be a promising technology to solve future parking hassles.

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