

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 5, May 2017

Internet of Things Based Smart Vehicular Parking System

Sailza Chauhan, Ashish Chauhan, Chittranjan Pramanik, Avinash Patil, Prof. Soumitra Das
Dept. of Computer Engineering, Dr. D Y Patil School of Engineering, Lohegaon, (Charoli Bk), India

ABSTRACT: A major challenge for modern cities is the way to maximise the productivity and responsibility of urban infrastructure, corresponding to minimising 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: Information Search and Retrieval, Clustering, Information filters. Selection process

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

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 5, May 2017

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. RELATED WORK

S.no	Title	They have proposed	Improved Things
[7]	An Algorithm of Parking Planning for Smart Parking System	The method proposed can give timely and efficient guide information to vehicles for a real time smart parking system.	Time related functionality are improved in this system
[8]	Rapid Development of Smart Parking System with Cloud-based Platforms	in this paper gain rapid development of smart-parking system. Furthermore, the integration of parking sensor with IOT middleware and frontend dashboard is also highlighted in this paper.	Rapid development of smart parking system in cloud computing
[9]	ANDROID BASED SMART PARKING SYSTEM USING SLOT ALLOCATION & RESERVATIONS	System designed the time driven sequence method which solves the problem of parking using slot allocation method. This paper proposes an android application, which is used to implement a prototype of Smart Parking System based on Reservation (SPSR)	Parking system based on reservation is implemented on web application.
[10].	A Smart Parking System Based on IoT Protocols and Emerging Enabling Technologies	Customized software application, installed on a cloud platform, is able to manage alert events (e.g. improper use of a reserved space or expiration of the purchased time).	Improve the functionality like improper use of reserved space or expiration of time
[11]	Automatic Smart Parking System using Internet of Things (IOT)	it mainly focus on reducing the time in finding the parking lots and also it avoids the unnecessary travelling through filled parking lots in a parking area. Thus it reduces the fuel consumption which in turn reduces carbon footprints in an atmosphere.	Provide footprints of an atmosphere & slot to the vehicle owner.
[12]	Online Intelligent Demand Mgmt of Plug-In Electric Vehicles in Future Smart Parking Lots	have shorter parking duration and higher required charging time, the proposed solution outperforms in more robust energy delivery to the PEV and, accordingly, more satisfaction for the owner.	Find shortest parking area for the owner
[13]	Smart Parking: Parking Occupancy Monitoring and Visualization System for Smart Cities	the economical and time costs associated with traffic jams, cost associated with wasted gas fuel, and time looking for an empty parking space that are caused by inefficient parking will be significant reduced.	Cost effectiveness concept is removed by considering the many things
[14]	Smart Parking Management System Using RFID and OCR	This system will purely developed in Java. It is a secure system as it inherits Java properties for security. Java is platform independent so this project could run on any Operating System. This system could be a part of Smart Cities for	Web technology is implemented in java for more security

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 5, May 2017

		security and vehicle identification	
[15]	A Smart Parking System using WiFi and Wireless Sensor Network	In this system, geomagnetic sensors are used to detect the occupation of parking spaces, and WiFi is used for navigation. A prototype system has been developed.	Wireless sensor network is implemented using Wifi module
[16]	Image Processing Based Real Time Vehicle Theft Detection And Prevention System	As the photos are taken in real time, several problems like unequal illumination and changes in the background may affect the system. To overcome this problem DCT normalization and background cancellation algorithms are incorporated along with basic face detection and face recognition algorithm.	Image processing is implemented for vehicle identification

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 steering, Entrance show and client Reservation subsystems.

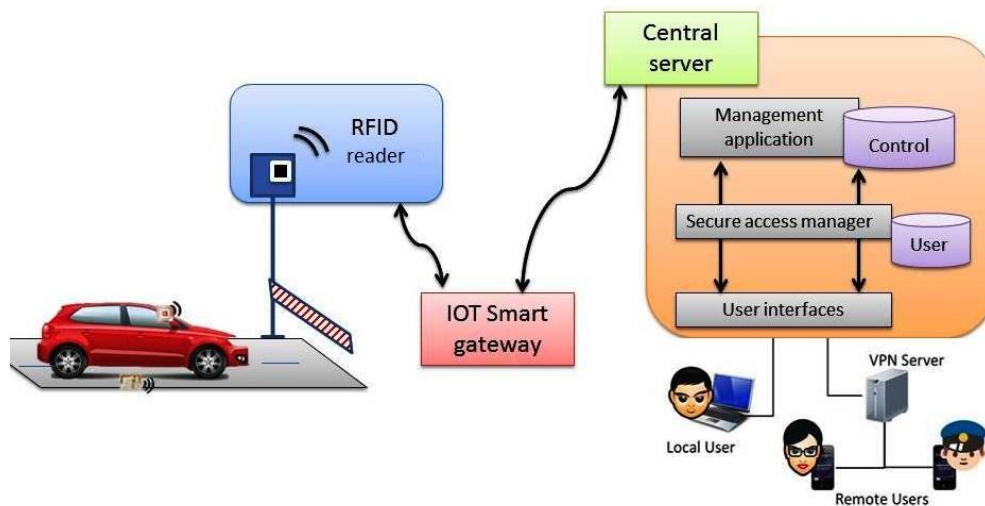


Fig 1. System Architecture

At a look, the system shall be able to diagrammatically show real time data associated with the provision of automobile parking zone 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

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 5, May 2017

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.



Fig 2. Zigbee

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 an entrance between wireless sensing element network and external networks. This system additionally forwards the data relating to the modification in parking status received from management system to the guidance system through RF interfaces.

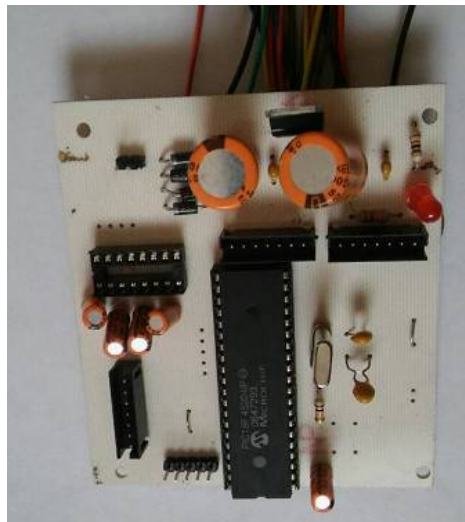


Fig 3. PCB board

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 steering 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

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 5, May 2017

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 running on the management scheme. It'll additionally retrieve information from the sensing element information associate degreed supported the provision of parking lots will forward an acknowledgment to the client.

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.



Fig 4. LCD Display

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 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

IV. EXPERIMENTAL RESULT

The following experimental results illustrate the efficacy and feasibility of the proposed IoT Based smart vehicular parking system in a cost-effective way. We evaluate the effectiveness of reservation policy in terms of following perspectives:

1) Searching for Parking Lot

The driving distance under blind search is the worst, especially during the peak hours(fig 1). PIS and BPIS are better than blind search when traffic flows increase and the reservation policy is the best compared with others. Note that, in this simulation, there is no pricing scheme implemented in reservation policy. An interesting observation of reservation-based policy is that the average driving distance is decreasing at peak time, rather than increasing. That is because, after users learn the states of parking lots, they tend to reserve the nearest parking lot to their destination. During the peak hours, most parking lots are almost fully occupied in central area. Consequently, users have to select the parking lots in surrounding area, which are near to their start points. Therefore, it results in the reduction of average driving distance during the peak hours.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 5, May 2017

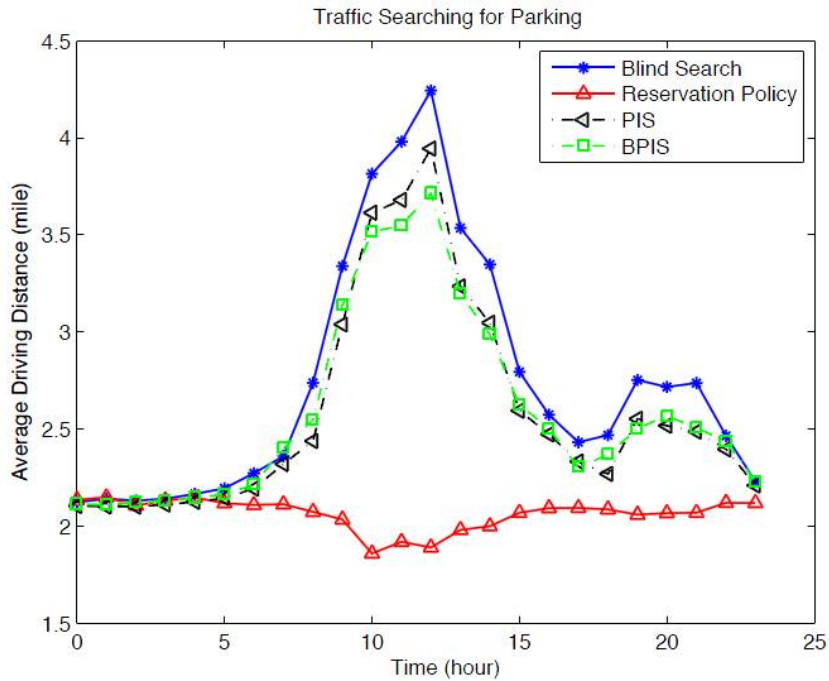


Fig 5. Traffic searching for parking comparison under different parking guidance strategies [17]

2) Result:



Fig 6. Booking parking lot status

This gives user a Reservation based system using which user can Book a parking lot from a remote location. Yellow region is indication vacant parking lot while the red ones are already booked or occupied. It also provides a facility to detect the stolen vehicle using blacklisted RFID Tag.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 5, May 2017

V. CONCLUSION AND FUTURE SCOPE

In this paper, we described the Smart Parking management system using wireless sensor networks. Based on 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 fully 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. In future work, we have a tendency to introduce this technique that isn't solely employed in a specific parking area obtainable, however may be extended and even be enforced on varied alternative platforms like railway stations, airports, mall parking areas. This may build the management of the parking areas expeditiously, by eliminating need of labor work.

ACKNOWLEDGEMENT

We would like to express our special thanks of gratitude to our guide Prof. Soumitra Das who gave us the golden opportunity to do this wonderful project on the topic IoT Based Smart Vehicular Parking System which helped us in doing a lot of Research and we came to know about so many new things we are really thankful to them.

REFERENCES

- [1] Yanxu Zheng "Parking Availability Prediction for Sensor-Enabled Car Parks in Smart Cities ", *2014 IEEE Ninth International Conference on Intelligent Sensors*.
- [2] Yanxu Zheng, Sutharshan Rajasegarar "Smart Car Parking: Temporal Clustering and Anomaly Detection in Urban Car Parking", *2015 IEEE Tenth International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP) Singapore, 7-9 April 2015*.
- [3] L. Mainetti, L. Palano " Integration of RFID and WSN Technologies in a Smart Parking System ", Dept. of Innovation Engineering University of Salento Lecce, Italy.
- [4] Hongwei Wang " A Reservation-based Smart Parking System ", *The First International Workshop on Cyber-Physical Networking Systems*.
- [5] S. V. Srikanth, Pramod P. J, Dileep K " Design and Implementation of a prototype Smart PARKing (SPARK) System using Wireless Sensor Networks", *2009 International Conference on Advanced Information Networking and Applications Workshops*.
- [6] Vishwanath Y , Aishwarya D Kuchall " Survey paper on Smart Parking System based on Internet of Things ", *IJRTER-2016*.
- [7] Kui Zhao -" An Algorithm of Parking Planning for Smart Parking System -" - Zhejiang University Zhejiang, China, Intelligent Control and Automation Shenyang, China, June 29 - July 4 2014
- [8] Zeldi Suryady, Gopinath Rao Sinniah, -" Rapid Development of Smart Parking System with Cloud-based Platforms"- Wireless Communication Cluster, MIMOS Berhad, Kuala Lumpur, 57000, Malaysia, IEEE.
- [9] Renuka R. and S. Dhanalakshmi -" ANDROID BASED SMART PARKING SYSTEM USING SLOT ALLOCATION & RESERVATIONS"- Department of Electronics and Communication Engineering, Easwari Engineering College, Chennai, India. 2006-2015 Asian Research Publishing Network (ARPN).
- [10] Luca Mainetti, Luigi Patrono, " A Smart Parking System Based on IoT Protocols and Emerging Enabling Technologies"- Dept. of Innovation Engineering University of Salento Lecce, Italy
- [11] Mr. Basavaraju S R -" Automatic Smart Parking System using Internet of Things (IOT)"- Department of Information Science and Engineering, RV College of engineering Bangalore, Karnataka, India. International Journal of Scientific and Research Publications, Volume 5, Issue 12, December 2015
- [12] Elham Akhavan-Rezai, Student Member, -" Online Intelligent Demand Mgmt of Plug-In Electric Vehicles in Future Smart Parking Lots"- E. F. El-Saadany, Senior Member, IEEE, and Fakhri Karray, Senior Member, IEEE , IEEE SYSTEMS JOURNAL
- [13] Danda B. Rawat -" Smart Parking: Parking Occupancy Monitoring and Visualization System for Smart Cities"- Department of Electrical Engineering Georgia Southern University Statesboro, GA 30460, USA
- [14] Samadhan Sonavane -" Smart Parking Management System Using RFID and OCR"- Computer Engineering Sandip Foundation's SITRC, Dr. D. Y. Patil Institute of Engineering and Technology, Pune, India 30 Oct -01 Nov, 2015
- [15] Cheng Yuan, Li Fei, -" A Smart Parking System using WiFi and Wireless Sensor Network"- Nanjing University of Posts and Telecommunications, Nanjing 210003, China, 2016 International Conference on Consumer Electronics-Taiwan
- [16] Pazhampilly Sreedevi-" Image Processing Based Real Time Vehicle Theft Detection And Prevention System"- 2011 IEEE
- [17] Hongwei Wang and Wenbo Hey, "A Reservation-based Smart Parking System" 2011 IEEE