Application of ICT in Parking System

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Abstract It is of utmost importance to modify all the material which is mostly used for personal and commercial purposes. At a certain instant of time, people are getting annoyed by the present parking system so a new smart technology is introduced which proves to be more economical and eco-friendly in all aspects. This report is presented to highlight the working performance of the smart parking system and the implementation of **Intelligent Transport System**. This report is also presented to analyze the reliability of the smart parking system.

Keywords Smart parking · Smart city · Pollution free · Prevention of car theft

1 Introduction

In transportation system, parking space plays a vital role. Each and every vehicle making a trip is in need of a parking space at the origin as well as at the destination, irrespective of how long the trip goes. There are numerous systems implemented for managing and controlling the parking scenario.

The problem in the parking system is the rapid increase in the motor field but not in the parking spaces. This problem is overcome by the use of smart technologies.

The smart parking system is the biggest change in the world of parking whose responsibility is to make parking system reliable and also helps in saving time and space. Also, this technology is the most convenient when considering the high population. Also, by using this technology, we can use all the different kinds of gadgets for safety, protection and scheduling of the vehicles.

The term smart city is broadly utilizing nowadays as it is turning into the fundamental requirements for the whole world. In this quick and enraged time, we

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require each and everything dependable with the efficient and better outcome. The solid transportation with no issue is the essential needs which can not be satisfied without making the smart urban communities.

One of the important things that are to be considered before designing any system is to make such systems eco-friendly and sustainable. The energy sources that we are using are not completely reliable and eco-friendly as all these sources are polluting the environment. The land and water pollution are due to various schemes like garbage management, pilgrims, deforestations, etc. The concept of smart city proves to be revolutionary for maintaining and managing each and everything rapidly. Smart city is used to discuss the implementation of modern technology in present urban life. This not only includes information and communication technologies (ICT) but also modern transport technologies. New transport systems as "smart" systems that improve the urban traffic and the inhabitants' mobility [1]. However, various other aspects referring to life in a city are mentioned in connection to the term smart city like security/safe, green, efficient, sustainable, energy, etc., as shown in Fig. 1. Mobility or transportation is one of the important needs of the smart city.

For a smart and efficient infrastructure, smart parking system is used. In this paper, a new system app, "***Park ON***" is based on the use of smart phones, sensors monitoring techniques with a sensor's camera to take photos to show the occupancy of car parks. By the image, a particular vacant space can be known and used to guide a driver to a car park. By implementing this system, the utilization of parking spaces will increase. This system uses the vacant parking space for parking purposes and renews the space when vacated by the user when the user leaves the parking area and transfers the billing data to the user with the help of communication module. It also plays an important role in finding the best possible path as per the present location of the user.

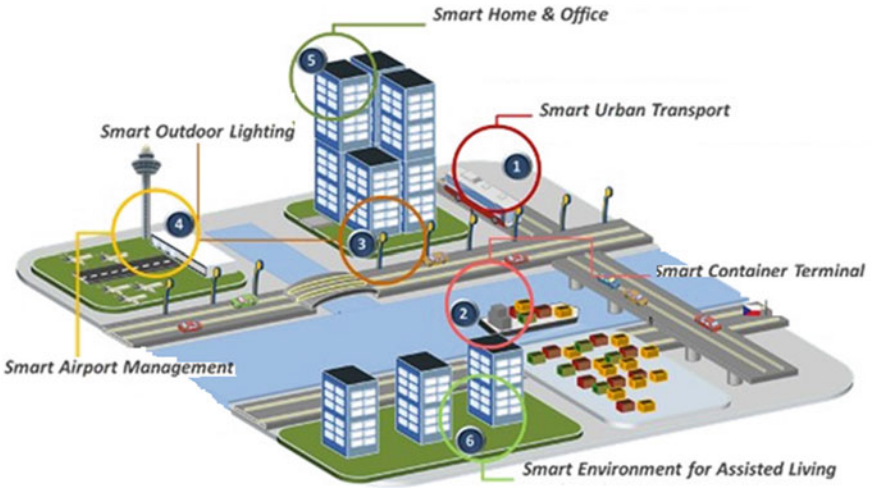

Fig. 1 Smart city requirements

Smart parking technology is one of the efficient ways to overcome the traffic problem and parking issues in city rods and ways. This technology proves to be more reliable and economical.

2 Merits of the Smart Parking

- This system is much safer and secure because of the faster response and digital system implementation.
- The reliability of this type of system is much higher than the traditional parking systems.
- The area requirement of smart parking system is lesser as compared to the traditional system.
- The utilization of GPS technology makes the smart parking system more accurate and also helps in allocating the vacant spaces.
- Due to the centralization of power, a connection is always established between the owner and the staff (Fig. 2).

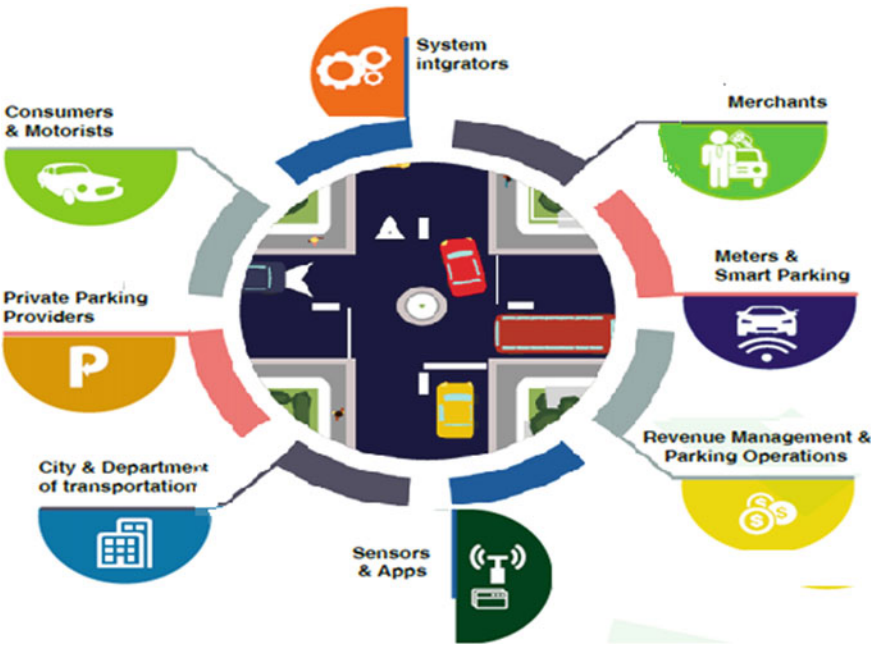

Fig. 2 Coordination of various stakeholders to perform a unique task

3 Module for the Parking Management App

Different modules are implemented in parking management app. The modules are as discussed below with the help of figures.

a. **User Interface Module**

This module is responsible for establishing a bond between the user and the parking authority which is the main reason this module is highly recommended.

b. **Communication Module**

This module is responsible for making all the SMS services that are required for conveying the information regarding the parking schedule between the user and the parking system (Fig. 3).

c. **Function Module**

This is the main module of the smart parking as it has the ability to cover all going things in the parking. The main responsibility of the function module is to look after the entire database system which is going on in the parking like communication, reserve parking, ongoing parking, etc.

d. **Parking Space Controller Module**

This module covers all the hardware communication and the sensors as it is necessary to know about the current status of parking machinery and system.

4 Methodology

The smart parking technology is the key solution to many problems regarding parking space, parking spots, long and irritable cues and much more. This is the only solution that handles cue system into a professional way and solves the

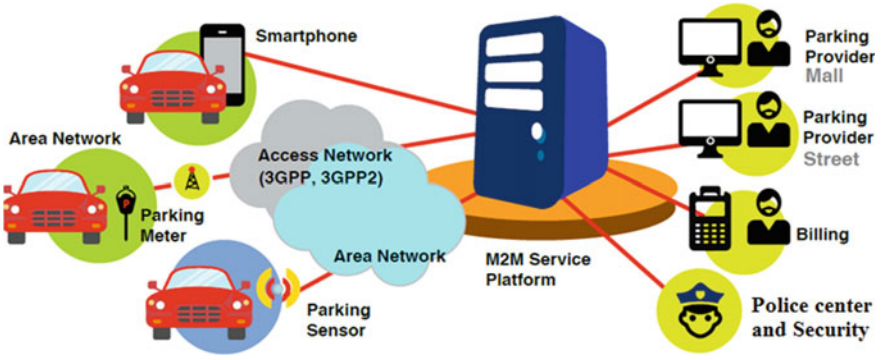

Fig. 3 Using procedure of "Park ON," android app

problem without any disturbance and interruption. A database system is used in the smart parking to increase the reliability of the system at all the time. Various apps like Park ON system are always connected with the parking system in the best possible way (Figs. 4, 5, 6 and 7).

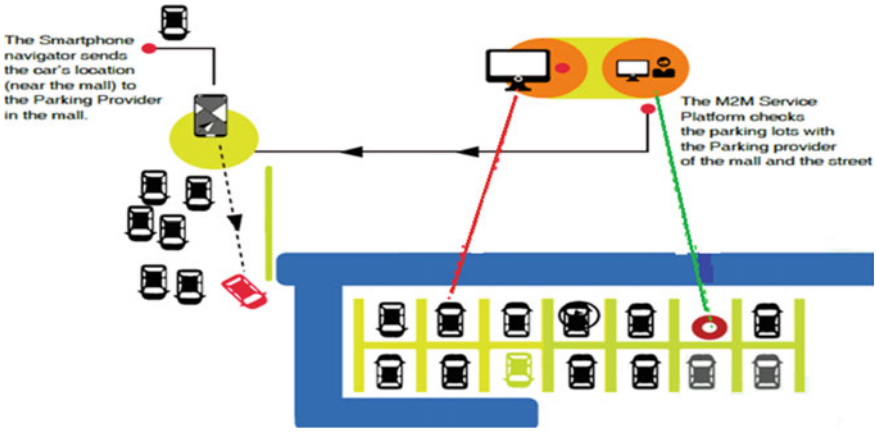

Fig. 4 Response of parking availability and reservation of parking

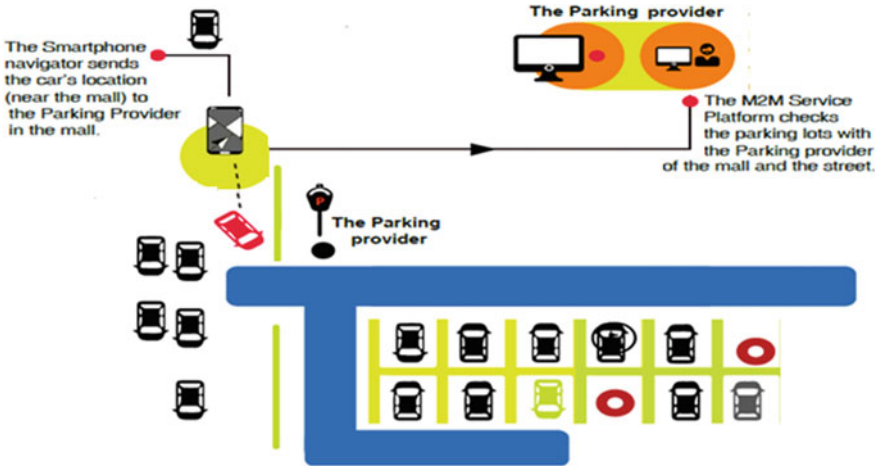

Fig. 5 Procedure of detecting of parking spaces

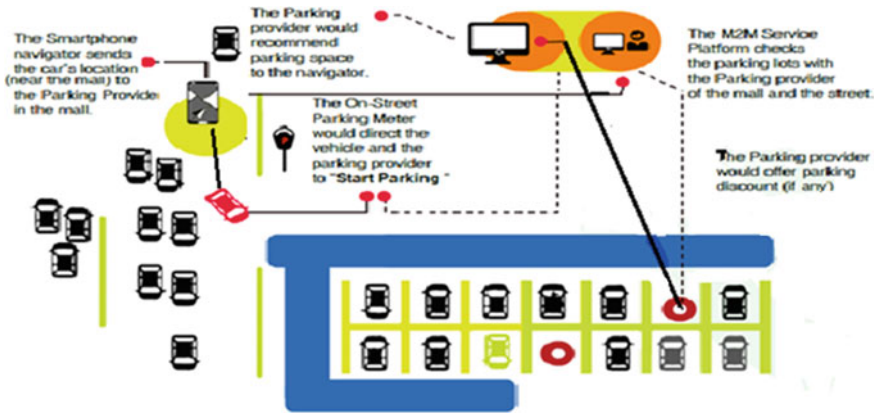

Fig. 6 Service procedure

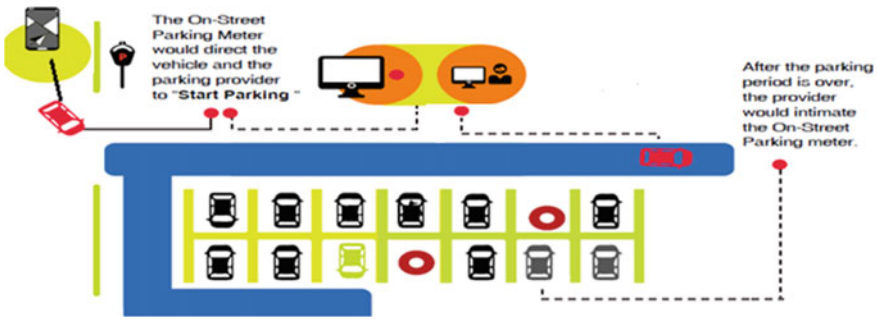

Fig. 7 Final stage of the parking service

5 Authorization for the "Park ON" App

- Only the authorized person has the right to get the reservation slot for parking with a confirmation number.
- A grace period is allotted for the reservation which has the time limit of 15 min. The reservation will be canceled if the customer is coming after the allotted grace period. There is no relaxation after the grace period even for that customer who demanded the reservation.
- One customer can avail more than one reservation.
- There will be an increase in rate if any customer increase the time slot reserved for him and the billing will be sent to that customer automatically with the help of communication module.

- Complete automation is done for car detecting and information is sent to the customer through messages.
- At the final level, the user will receive a final printout showing all the information regarding the timing and the user data.

6 Conclusion

The basic necessity of a smart city is smart parking as the rate of traffic is increasing day by day with a range of approx. One of the basic needs to make the smart city is smart parking as the traffic is increasing at all 20–40% globally. The key point considered in this report is the management of traffic by using Park ON app and smart parking. With the help of this report, it is concluded that both the technologies Park ON app and smart parking proves to be economical and eco-friendly by solving the issues related to traffic and parking.

Bibliography

1. Giuffrè T, Siniscalchi SM, Tesoriere G (2012) A novel architecture of parking management for smart cities. In: 5th international congress—sustainability of road infrastructures. Elsevier, pp 16–28
2. Wootton JR, Garcia-Ortiz A, Amin SM (1995) Intelligent transportation systems: a global perspective. Math Comput Model 22:259–268
3. Kafi MA, Challal Y, Djenouri D, Doudou M, Bouabdallah A, Badache N (2013) A study of wireless sensor networks for urban traffic monitoring: applications and architectures. In: 4th international conference on ambient systems, networks and technologies (ANT 2013). Elsevier
4. Faheem, Mahmud SA, Khan GM, Rahman M, Zafar H (2013) A survey of intelligent car parking system. J Appl Res Technol 11:714–726
5. Qian ZS, Rajagopal R (2013) Optimal parking pricing in general networks with provision of occupancy information. Procedia Soc Behav Sci 779–805
6. Ahad A et al (2016) Intelligent parking system. World J Eng Technol 4:160–167
7. Happiest Minds Technologies Pvt. Ltd. Smart parking
8. Ahad A et al (2017) Smart, sustainable infrastructure development. In: International conference on urbanization challenges in emerging economies. IIT Delhi, New Delhi, pp 769–774
9. Zhang X, Wan D (2010) Economic analysis of regional parking guidance system based on TIA. In: 2010 WASE international conference on information engineering (ICIE), 14–15 Aug 2010, pp 401–404
10. Al-Kharusi H, Al-Bahadly I (2014) Intelligent parking management system based on image processing. World J Eng Technol 2:55–67
11. Al-Kharusi H (2014) Intelligent car parking management system. Thesis, Master of Engineering