

The Future of Urban Surveillance using IOT Based 4th Gen Parking Systems

Valentine B

Dept. of Computer science and Engineering
Cambridge Institute of Technology K.R.Puram Bangalore 560036

Abstract – Vehicle parking occurs at the intersection of urban space system and mobile management. The first gen or era, or Parking 1.0, hardly had any service offerings except for a simple space-renting model that was managed and operated manually. Then Parking 2.0 offered electronic services such as parking meters that partially automated the fee collection and auditing systems. The present generation, Parking 3.0, provides basic automation that allows users to independently navigate the complete parking life cycle – from knowing the parking occupancy status to ticketing, parking, and fee settlement. In this we are focusing on an eco-friendly system called Automated Valet Parking along with Pollution based parking fees, wireless charging slots and parking lifts provides additional weightage to this system, which uses hybrid robotic valets in smart parking and helps optimizing parking space.

Keywords– space-renting model, smart parking etc.

I. INTRODUCTION

Technology aims to improve the quality of life and provide the happiness and health of the citizens. The idea of IoT (internet of things) is for describing a smart world where everyday objects and embedded systems have interaction with each other and human beings. Therefore, they need to be connected by wire or wireless technologies to Internet-based networks and also need real-time low-cost sensors and actuators [5]. It turns them into smart devices that can compute, communicate and manipulate like a human. as a matter of fact, in the future, incrementally the number of smart devices will be more than their users. Like people's lives, IoT has found its way to cities. Moreover, IoT-based devices are becoming a part of smart cities. They can control and manage environmental issues, traffic congestion and make better public safety and save more energy. By the increasing number of vehicles and drivers, Transportation and Parking have become frustrating problem for people and government.

The organization of the paper is given as follows: Section I deals with introduction, section II reviews the existing work for smart parking system. Section III outlines the system architecture and section IV describes the modules developed. Experimental results are discussed in section V. Section VI gives the summary of the smart parking application.

II. LITERATURE SURVEY

Markets and Markets; Smart Parking Market worth 5.25 Billion USD by 2021; Jan. 2019; <https://www.marketsandmarkets.com/PressReleases/smart>

-parking.asp The passenger car smart parking market is projected to grow at a CAGR of 17.94% during the forecast period, to reach a market size of USD 5.25 Billion by 2021 from USD 2.13 Billion in 2015. Favorable government policies are also encouraging the market growth of passenger cars equipped with smart parking system.

IEEE Xplore® Digital Library; A Survey of Smart Parking Solutions; April 2017; Jan. 2019; <https://ieeexplore.ieee.org/document/7895130>

It involves the deployment of smart parking solutions in conjugation with other city applications such as smart street lighting. Such integrated solutions are expected to lower the deployment cost and increase the city parking revenue.

IEEE Xplore® Digital Library; Parking Sensor Network: Economic Feasibility Study of Parking Sensors in a City Environment; June 2010; Jan. 2019;

As the larger parking ecosystem matures into an integrated landscape, many of the routine operations are expected to migrate into in-car systems with parking apps, thereby alleviating the burden of deploying parking systems. This could be augmented with ubiquitous or rapidly growing mobility infrastructure (such as the electronic toll collection [ETC] transponders) to achieve the desired scale and density at affordable costs, instead of relying on the massive deployment of custom sensor networks .

IEEE Internet of Things; Research Challenges in the Internet of Mobile Things; March 2016; Jan. 2019; <https://iot.ieee.org/news/letter/march-2016/researchchallenges-in-the-internet-of-mobile->

things.html As with all new innovation paradigms, these 11 possibilities come with their own research challenges . There have been numerous large-scale systems in the past (such as 12 location-based services) that bear a strong resemblance with the overall smart parking philosophy. Hence, learning from their initial failures and subsequent successes is crucial to better articulate workable technology and business roadmaps.

IEEE Internet of Things; Past Mistakes, Present Opportunities: Location-based Service Lessons for Consumer IoT; Sep. 2018; Jan. 2019; Striving to rectify all the mistakes that have occurred and simultaneously maintaining the purpose of the system. Location services and subsequent requirements are the major concern for the cause. Electric vehicles, which add another dimension to parking management with the need for charging. Autonomous vehicles, which will fundamentally change the usage of cars and their parking modality with self-parking features and robotic valet parking. Uberization of parking, which will create a highly reactive and real-time ecosystem.

III. SYSTEM ARCHITECTURE

The system architecture defines the essential design features such as location of sensors, required number of sensors and LEDs for each level, and indoor and outdoor display boards. Mobile app would allow the users to register for the service and if the destination and estimated arrival time is specified, app need to find the free parking space and send the location to the user. User makes the online payment to book the parking slot. Figure shows the System architecture and the processes to be carried out.

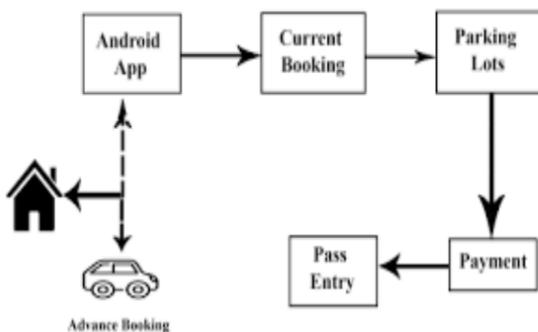


Figure 1: Efficient system architecture.

IV. IMPLEMENTATIONS

In the previous section we discussed about the architecture and technical stack related to the smart parking system. In this section we talk about the implementation and working of the system in a real world scenario. The complete process of booking a parking slot, parking a car in that slot and leaving the parking area is explained with the help of the following flow chart.

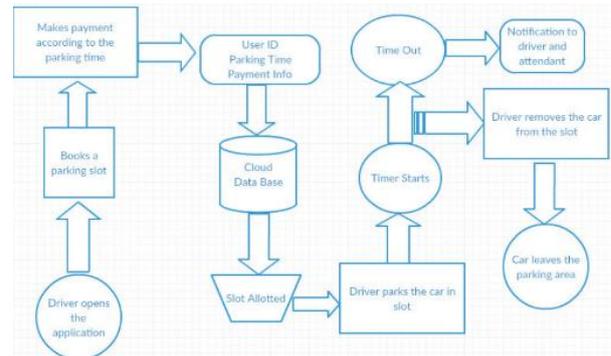


Figure 2 Implementation details on a flowchart.

V. CONCLUSIONS

Business 4.0, which is integral to Parking 4.0, works on the principle of ecosystems and a sense of abundance. In this context, the future of parking will emerge as an ecosystem play, comprising individuals, parking operators, automotive OEMs, solution integrators, and other stakeholders. The sense of abundance will come from the provision of 'right parking at the right place at the right price'. We believe that Parking 4.0 has the potential to be a major game-changer not only in the smart parking segment, but also in the overall mobility ecosystem of present cities and smart cities of the future.

REFERENCES

- [1]. Markets and Markets; Smart Parking Market worth 5.25 Billion USD by 2021; Jan. 2019; <https://www.marketsandmarkets.com/PressReleases/smart-parking.asp>
- [2]. IEEE Xplore® Digital Library; A Survey of Smart Parking Solutions; April 2017; Jan. 2019; <https://ieeexplore.ieee.org/document/7895130>
- [3]. IEEE Xplore® Digital Library; Parking Sensor Network: Economic Feasibility Study of Parking Sensors in a City Environment; June 2010; Jan. 2019;
- [4]. IEEE Internet of Things; Research Challenges in the Internet of Mobile Things; March 2016; Jan. 2019; <https://iot.ieee.org/newsletter/march-2016/researchchallenges-in-the-internet-of-mobile-things.html>.
- [5]. IEEE Internet of Things; Past Mistakes, Present Opportunities: Location-based Service Lessons for Consumer IoT; Sep. 2018; Jan. 2019;