Chapter 18

Wireless Sensor Network Enabled Vehicle Parking System

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ABSTRACT

Wireless Sensor Network (WSN) has many applications and its application in vehicle parking systems is increasing as finding parking space for four wheeler and two wheeler vehicles is a growing challenge in many fast growing cities. Consumers are indeed looking for automated parking systems with reservations being made online so as to save time that is spent finding parking space. Vehicle Parking Systems are adopting wireless sensor networks for monitoring and also create possibilities of online bookings using sensor clouds when connected to the internet via the sink node, however maneuvering vehicles into the parking slots is challenging. Users can download and use mobile application of this parking system to book their parking slots which may be available due to a sensor cloud. These possibilities have many constraints which are multi objective as well. The chapter explores these dimensions.

INTRODUCTION

In many developing countries commuting is one of the top most priorities of its citizens. The necessity of cars is not just for easy and comfortable commutation but also for status symbol in society. In India the number of car owners is increasing day by day and thus the problem of car parking is also increasing day by day. In cities like Bombay (Mumbai), Delhi and other metros parking is a severe challenge and this problem will only magnify in the years to come. According a data available with MAP OF INDIA, car density in India is increasing more than China. Municipal Corporations of Indian metro cities and of other fast growing cities are left to tackle this problem. Some of the Solutions currently being extensively used are underground parking and vertical parking. Aalsalem,M.Y., et.al(2015) discuss this severe parking concern that the Jazan University is facing as the number of faculty, staff and student members owning cars is increasing. A survey was conducted by the researchers in the University and found that

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people in the university really seek help from parking concerns. Figure 1 shows the plight of parking in Mumbai, India. Such parking not only blocks roads and causes traffic jams but is also not safe.

Figure 2 below is one of the proposed Vehicle Planning System of the Bombay Municipality Corporation (BMC) as reported in one of the leading newspaper. Six such Parking Towers are proposed in one of the busiest areas of Bombay where parking two and four wheeler vehicles is a very serious challenge. The proposed tower definitely saves a lot of space than other parking system design as explained in Figure 3. However operating Parking Towers as in Figure 2 is more tedious and unsafe compared to the parking system as in Figure 3. Be whatever type of parking system made available, knowing the free space to park is itself a challenge. Currently a vehicle owner requires driving around to locate a free space to park. Even the deputed personnel in the parking space are unaware of how many vehicles are parked and in which manner. Vehicles are also vulnerable to theft in such scenarios. An approach where a vehicle owner learns of an available space to park when entering into a parking space is what the paper proposes. This approach is safer and efficient than current existing techniques.

Some solutions for parking scarcity in such fast growing cities could be:

1. Improving accessibility and pedestrian paths around parking spaces to make it more convenient to walk from parking space to the destination. This reduces the inconvenience of parking in a space that may not be very close to the desired location.
2. Parking management, it can be done by more usage of public transportation than private transportation as it entails both cost and monetary.
3. Charge motorists directly for using parking space. This will facilitate immediate recovery of cost and will also act as a tool of demand management.
4. The parking spaces in commercial districts should be priced higher to ensure the space of priority users-customers and clients of the particular stop/building.
5. Time variable pricing if employed can increase charges, reduce demand and manage parking during peak hours.
6. Progressive prices can be charged to discourage long term parking. Long term counting must not be discounted.

Figure 1. Car parking at Mumbai
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