www.ijecs.in
International Journal Of Engineering And Computer Science ISSN: 2319-7242
Volume 5 Issue 11 Nov. 2016, Page No. 18983-18986

A Survey on Traffic Management in Smart Cities

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Abstract

In smart cities, the wide variety of use cases spans from traffic management to water distribution.This is an important issue for managing traffic in an urban environment like smart cities.For solving this, Internet of Things(IoT) should be used.IoT used network of physical objects that feature an IP address for internet connectivity.Reservation-based system,Connected and Automated Vehicles(CAV) and smart parking system are proposed as a part of traffic management by using IoT.Sensing and classifying roadway obstacles provides accident free environment and also a smooth drive to the vehicles.This paper is a survey on traffic management in smart cities which is useful for traffic management in smart cities. Survey involves different traffic management schemes by using IoT.

Keywords:Internet of Things, Smart cities, Connected and Automated vehicles, Reservation based algorithms, Smart parking system

1.Introduction

Smart City is an urban environment that provides a new level of innovative and interactive services for all over the social activites in the urban area such as transportation, energy distribution, health care, environmental monitoring, business, commerce, emergency response and water distribution.From a technological point of view, Smart City uses information and communication technology(ICT) and IoT in a effective and secure manner to access the physical objects roads, buildings, as well as the location and status of city resources.IoT is the network of physical objects that featuers an IP address for internet connectivity, the communication between these objects and other systems that have internet accessability.

IoT has a major role in the traffic control in smart cities.The.IoT have major role in smarter urban management for Cities and counties. In smart cities traffic related problems are controlled by using IoT in right way.Reservation-based system, Connected and Automated Vehicles(CAV) and smart parking system are proposed as a part of traffic management by using IoT.Sensing and classifying roadway obstacles provides accident free environment and also a smooth drive to the vehicles.

2 .Literature Survey

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The 2014 revision of world urbanization prospects ,[1]which contains the latest estimates of the urban and rural populations of 233 countries.Population censuses are the most commonly used sources of data,although estimates obtained from population registers or administrative statistics.Classifyingan area as urban may be based : a minimum population threshold; population density; proportion employed in non-agriculturalsectors; the presence of infrastructure such as paved roads, electricity, piped water or sewers; and the presence of education or health services.In compiling information on city population size, the Population Division has endeavoured to use data or estimates based on the concept of urban agglomeration.The

method to project city populations as the last observed city growth rate converges towards an expected value, estimated on consistent and timely data on global trends in urbanization and city growth are critical for assessing current and future needs with respect to urban growth and for setting policy priorities to promote inclusive and equitable urban and rural development.Successful sustainable urbanization requires competentancy.

K. Dresner[2] propose a reservation-based system for alleviating traffic congestion, specifically at intersections, and under the assumption that the cars are controlled by agents.A custom simulator is created to measure the different delays associated with conducting traffic through an intersection. A precise metric for evaluating the quality of traffic control at an intersection. This reservation-based system can perform two to threehunderd times better than traffic lights and it can smoothly handle much heavier traffic conditions.This system very closely approximates an overpass, which is the optimal solution for the problem.

Current methods for controlling traffic, specifically at intersections, will not be able to take advantage of the increased sensitivity and precision of autonomous vehicles as compared to human drivers. K. Dresner[3] describe an autonomoud intersection management system.Drivers and intersections in this mechanism are treated as autonomous agents in a multiagent system.In this multiagent system, intersections use a new reservation-based approach built around a detailed communication protocol. Demonstrate in simulation that new mechanism has the potential to significantly outperform current intersectioncontrol technology—traffic lights and stop signs. It subsumes the most popular current methods of intersection control. the basis of the city population and the growth rate of the overall urban population in the country.Globally, more people live in urban areas than in rural areas.Levels of urbanization vary greatly acrossregions.Most megacities and large citiesare located in the global South. One in five urban dwellers worldwide lives in a medium-sized city with 1 million to 5 million inhabitants.Some cities have experienced population decline since 2000, most of which are located in low-fertility countries of Asia and Europe with stagnating or declining populations.Diversified policies to plan for and manage the spatial distribution of the population and internal migration are needed.Policies aimed at a more balanced distribution of urban growth.Accurate, This article also presents two extensions to the mechanism,The first extension allows the system to control human-driven vehicles in addition to autonomous vehicles.described the construction of the simulator itself, as well as the communication protocol, the intersection manager, the driver agent, and several intersection control policies. The first policy, FCFS is only for fully autonomous vehicles.FCFS-Light extends FCFS to allow human interoperability using existing traffic lightinfrastructure. The last policy, FCFS-Emerg, extends FCFS to give priority to emergency vehicles without significant increasing delays for other vehiclesThe second gives priority to emergency vehicles without significant cost to civilian vehicles.In this there is no switch among several different policies, learning from reservation histories which policy is best suited to particular traffic conditions, could significantly improveperformance. There is no light model that could react not react to the presence of individual vehicles, might better be able to exploit the abilities of autonomous vehicles, without adversely affecting human drivers.

A.de La Fortelle[4]present a framework designed initially for cybercars (fully automated cars) but that could also be applied -though with major differences -to human driven cars. It is a world where vehicles have to reserve pieces of roads to cross a junction. This work is an enhancement of a previous work that demonstrated the feasibility of such a reservation algorithm.

S. Huang[5] designs and evaluates a reservation-based approach to intersection control that is designed to take full advantage of the unprecedented connectivity that the connected vehicle initiative promises to provide. To design and evaluate the “intelligent intersection,” a novel simulation test bed for connected vehicle applications is developed. The test bed integrates a microscopic traffic simulator with a network simulator and an emission analyzer. Using the integrated simulator, the

mobility and environmental benefits : of the intelligent intersection approach, compared with those of traditional control methods, are evaluated on two case studies1) an isolated intersection 2)a real-world transportation network with multiple intersections. proposed control approach offers significant mobility and environmental benefits.using observed traffic volumes, the intelligent intersection reduced the average vehicle delay by 85%, fuel consumption by 50%, and emissions by 39%-50%.

Autonomous passing-through intersections has been becoming one important research problem , especially with the real emerging of driverless vehicles. Including the lane, path, critical section and vehicle, are modeled with considering relations among their physical and kinetic characters. Abstract some basic actions of this passing procedure, and K. Zhang[6] propose a universal state-based action model.The procedure will be equal to the switching between these actions and their states. Propose a new centralized scheduling algorithm that is reservation-oriented, and can guarantee the higher request to be responded preferentially. Finally, this algorithm is simulated , especially for vehicles with high priority.

Address the problem of coordinating online a continuous flow of connected and automated vehicles (CAVs) crossing two adjacent intersections in an urban area.Y. J. Zhang [7] Present a decentralized optimal control framework whose solution yields for each vehicle the optimal acceleration/deceleration at any time in the sense of minimizing fuel consumption. The solution allows the vehicles to cross the intersections without the use of traffic lights, without creating congestion onthe connecting road, and under the hard safety constraint of collision avoidanceThe effectiveness of the proposed solution is validated through simulation, coordination of CAVs can reduce significantly both fuel consumption and travel time.

Y. Geng[8] Propose a novel “smart parking” system for an urban environment.The system assigns and reserves an optimal parking space based on the driver's cost function that combines proximity to destination and parking cost.Solves a mixed-integer linear programming (MILP) problem at each decision point defined in a time-driven sequence. The solution of each MILP is an optimal allocation based on current state information and is updated at the next decision point with a guarantee that there is no resource reservation conflict and that no driver is ever assigned a resource with a cost function higher than this driver's current cost function value. Based on simulation results, compared with uncontrolled parking processes or state-of-the-art guidance-based systems, our system reduces the average time to find a parking space and the parking cost, whereas the overall parking capacity is more efficiently utilized.where a new light system scheme is proposed to guarantee user reservations.

Address the traffic light control problem for multiple intersections in tandem by viewing it in a stochastic hybrid system setting and Y. Geng [9] developing a Stochastic Flow Model (SFM) for it.This includes roads with finite vehicle capacity, which may lead to additional delays due to traffic blocking.Using Infinitesimal Perturbation Analysis (IPA), we derive on-line gradient estimators of an average traffic congestion metric with respect to the controllable green and red cycle lengths.The IPA estimators obtained require counting traffic light switchings and estimating car flow rates only when specific events occur. The estimators are used to iteratively adjust light cycle lengths to improve performance and, in conjunction with a standard gradient-based algorithm, to seek optimal values which adapt to changing traffic conditions.

3 Conclusion

This survey has been performed for collecting the traffic management methods in smart cities which are useful for smooth drive to the vehicles.The ubiquitous availability of wireless devices can enable the development of effective infrastructure-free approaches for solving problems in Smart Cities,this is done by using IoT.Smart city spans a wide variety of use cases, from traffic management to water distribution.IoT solutions in the area of Smart City solve traffic congestion problems.The sensing and classifying roadway obstacles is the one of the main method gives

smooth drive to the vehicles.This survey helps in identifying all possible traffic management methods in smart cities.

Acknowledgment

We are grateful to our project guide and seminar Coordinator Asst. Prof. Lakshmi S for her remarks, suggestions and for providing all the vital facilities like providing the Internet access and important books, which were essential. We are also thankful to all the staff members of the Department.

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