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A COMPARATIVELY STUDY OF FUZZY LOGIC INTELLIGENT TRANSPORTATION SYSTEM ANALYSIS OF MOVING TRAFFIC CONTROL AND PARKING VEHICLE MANAGEMENT IN URBAN AREA

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Abstract- **It is the time of Social Networking explosion of smart sensors deployed everywhere. According to survey in 2014 more than half of world's population now living in urban areas and growing definitely alerting city planners. Connected cities come out when Internet of Things (IoT) technologies and socially aware network systems aggregate administrations over a whole connected in urban areas. A smart city understanding is a broad concept so the transportation sector using fuzzy logic intelligent system in different architecture. Fuzzy logic is one of the strongest candidate solutions for mathematical based architecture in the world. In this paper fuzzy logic based comparatively study is proposed for transportation problem in urban cities. The objective of this paper is to comparatively analysis key issues and the solutions about traffic congestion in smart cities. Fuzzy initiation used to compute exact traffic, which separates the parking vehicle and moving vehicle both in any conditions. There is an issue of separating parking or non-parking vehicles in the present systems.**

Keywords: **Internet of Things (IoT), Artificial Intelligence (AI), Machine Learning (ML), Advanced Traveller Information System (ATIS), Advanced Traffic Management System (ATMS),**
Research and Innovative Technology Administration (RITA), Small Business Innovative Research (SBIR), Intelligent Transportation System (ITS), Motorway Traffic Viewer (MTV), Fuzzy Smart Parking System (FSPS)

I. INTRODUCTION

Intelligent transportation systems have evolved significantly following the development of AI, ML and computer technology. The vehicle transportation systems are major factors affecting in urban areas which not only control the overall cost of centre of population mobility but also play a key role in society. According to survey two thirds of the worlds approximate 9.7 billion people will reside in urban areas by. This growing urbanization increases the number of vehicles looking for to use the road infrastructure and puts traffic and mobility infrastructures. A best transportation system can therefore support many aspects of life in urban areas and provide better services for road users those are using different vehicle. Promoting the use of public transport can significantly increase infrastructure capacity and improve the phenomenon of overcrowding. The aims of the proposed system are to cut the travel time to promote the use of public transport and to maximize the road network in urban area.

II. SURVEY

The existing studies of transportation system used by different countries using algorithm for ATIS and vehicle detection using IoT for ATMS.

Transportation in Japan: Japan is a technically very advance city and focus on advances navigation systems, electronic toll collection system, assistance for safe driving system, optimization use of traffic system, increasing efficiency in Road, support for public or private transport system, increasing efficiency in commercial vehicles.

Transportation in United States: United States of America developed its system known as RITA. The main role of RITA include as Coordinating, facilitating and reviewing research and development programs and activities in transportation area. Coloration with different academic and industrial partnerships and traffic management system through academic and SBIR programs. Transportation statistics research, analysis and reporting to educating special groups and general public in transportation system for research.

Transportation in Canada: The first ITS system introduced by Canada in 1999. Canada are organized into eight user services like traveller information services, traffic management services, public transport services, electronic payment services, commercial vehicle operations services, emergency management services, vehicle safety and its control systems, information warehousing services in our country to improve

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transportation system. It is very useful for public leave in Canada country.

Transportation in London: This ITS developed by London for personal and commercial use of vehicle for traffic congestions and controlling. Using MTV and the web based online portal of MTV. Using cameras are installed on roads across the country and information centres across town. electronic toll collection system using toll collection and management system in London.

Transportation in Paris: Paris is dedicated to public transportation facility to our people. While the city continues to develop infrastructure for non motorized transport it recognizes that vehicles are a necessity of any city or country. In an effort to become a green city Paris is moving to substitute its entire bus fleet with electric vehicles. Paris is also focusing on road safety system and traffic management system so decreasing traffic losses by 40% since 2010. This is achievement of start-up this type of secure transportation.

Transportation in Berlin: Berlin adapted a smart city plan in 2015 and has continued to progress till present year. It is latest mobility project centers around in ground sensors at roadway intersections. This is a vehicle detection system with use of wireless technology system to deliver traffic data for intelligent traffic management for betterment of traffic system. The city is also focusing on increasing the presence of electric vehicles, and has launched Be Mobility system for transportation.

Transportation in Singapore: Singapore became the fastest growing country to establish a smart nation minister in 2014, but the city state was original smart traffic management for more than a decade before. As early as 1998, Singapore introduced the electronic road pricing system to manage traffic congestion control in cities. Further investment a huge amount in intelligent traffic management has progress in recent years. This significant expense is in large part due to connected infrastructure capable of with sensors for traffic management and protective maintenance system. The city is also focusing on utilizing connected vehicles with each other with plans to launch automated busses as early as year 2022.

III. TECHNICAL WORK RELATED TO TRANSPORTATION

We analyse relevant studies that use a multi agent system and based on artificial intelligence techniques to perform intelligent traffic signal control systems and priority vehicles management systems.

Urban Traffic Control with priority: These control systems were implemented in many countries to manage traffic control system in urban areas and others have been developed for a review of the self adaptive traffic signal control systems. The Green wave system is one of the opening approaches providing the right of way in these control systems. This approach aims to priority vehicle path by turning all the red signals to yellow signals to green ahead of the vehicle. Thus generating a route map without stop timing to the particular vehicle. The green wave path of the system will track a stolen vehicle when it passes through a traffic light. Moreover, the system will be able to track any type of vehicle. It is also work in emergency work.

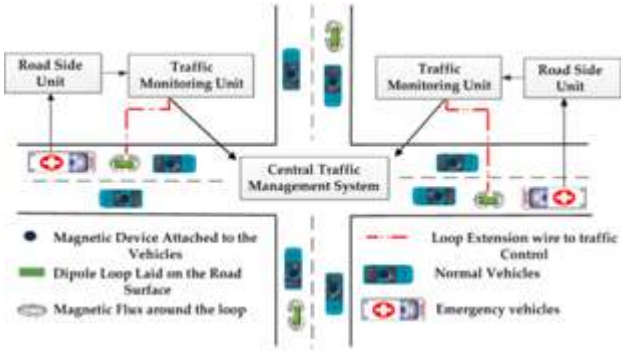

Figure 3.1: Wireless Urban Traffic Control

Multi Agent Systems and Fuzzy Logic for Traffic Signal Control: Multi agent technology work in a complicated system in scattered manner. It divided the complex control system into simple subsystems. Therefore permitting parallel and fast decision making transportation systems. Moreover system can run and learn new contexts and skills and make self-directed decisions in the complete or partial absence of people supervision.

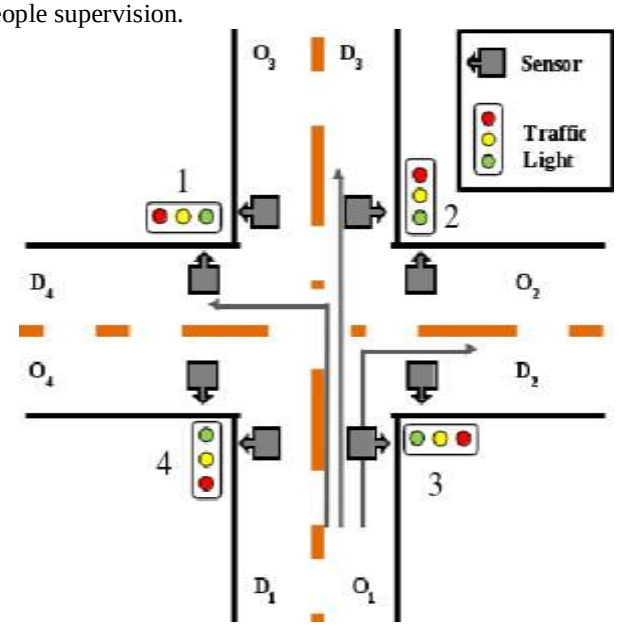

Figure 3.2: Multi Agent Systems and Fuzzy Logic for Traffic Signal

The Technology That Powers Smart City Traffic Management: A smart city traffic management system involves diversity of technologies that include the sensors, cameras and other IoT devices that monitor traffic capacity, movement of vehicle, overcrowding and road conditions. GPS applications on smart phones or other related devices that help

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to track the vehicle like bus, cars, bikes and people also as they moves anywhere in the city areas. An IoT platform with powerful analytics that combines and processes data from sensors and GPS applications with data from urgent situation vehicles and transfer data to automatically route traffic through the city most resourcefully. Interfaces such as smart traffic lights system and digital sensors system that translate the nearby system by vast amounts of traffic data into instructions and recommendations for drivers of vehicle.

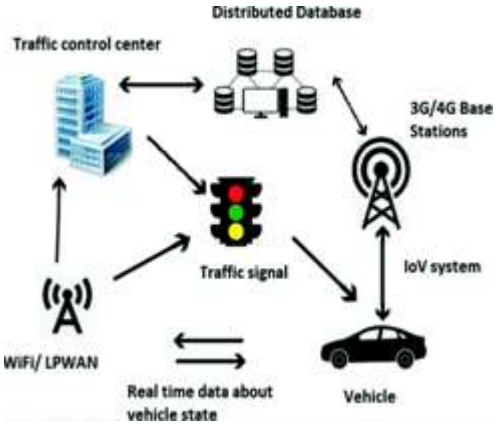

Figure 3.3:

Traffic Density Analysis: Intelligent traffic lights based on radio frequency identification with this system considered the need of various kinds of vehicles and considers the density of traffic in cities on the bases of road convergences. Radio frequency identification is a system that uses radio waves to recognize the object. Here we are utilizing of sensors for making a standard traffic control system. An intelligent traffic control system for instance the traffic depth is surveyed with the help of sensors set on either side of lanes. The traffic depth is seen in three zones – Low, Medium and High traffic density zone separately. The sensor contains transmitter and recipient in it. These transmitter gatherer will be mounted on either roadside at a specific division area of city. As the vehicle encounters these sensors and sensor will see the vehicle and will send the data to the microcontroller system for its position. The microcontroller will compute the amount of vehicles and give as confirmed by the density of vehicles. Data about the essential time will be shown on based upon the thickness of the traffic system in a city.

Differentiate of Parking and Non-Parking Vehicle: Traffic overcrowding prompts to increase in the states of disorder stain, travelling around time and fuel wastage. There are present moment and long haul explanations behind traffic overcrowding. Brief causes incorporate traffic signal problem, inefficient law requirement, lacking road groundwork, mishaps, etc. Long haul causes are credited to economic development of the general public, changes in way of life of people. The executives have ended up being one of the essential zones to be examined. It joins checking of traffic density, correspondence, rerouting of traffic to avoid further delay in city network. Web can help in smooth utilization of traffic the execution system. The sequence of smart vehicles and the coordination of sensors of traffic the executives and road security in tremendous scale IoT systems. By identifying events occurred on roads, vehicles can impart messages to advise others about traffic jams in city.

IV. FUZZY LOGIC BASED SMART PARKING

Time and traffic density parameters play an important role in the low cost of parking in urban cities of any country. Considering all these parameters parking systems are uncertain time altering and complex systems. Fuzzy logic in parking systems is used as a simple and safe solution. The FSPS developed in this study was designed with a modular, multilayered framework technology based on a wireless sensor network. Figure 4.1 shows the general architecture of the system which consists of four layers. These layers are Detection layers, Network layers, Software layers and application layers.

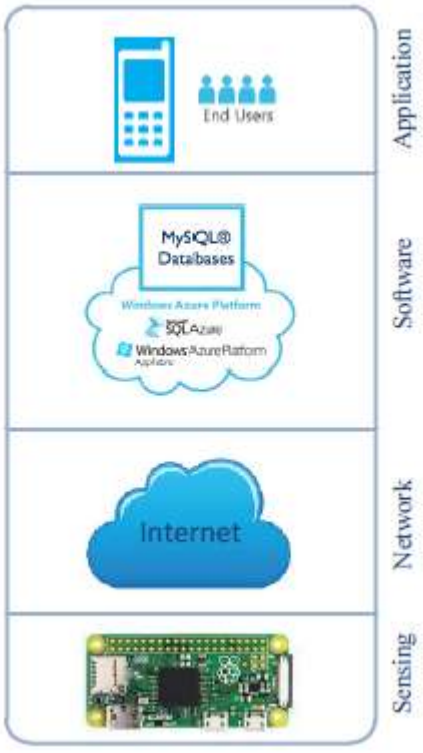

Figure 4.1: Intelligent Parking System Architecture

Sensing Layer: In session layer, vehicle detection is achieved using a Raspberry Pi Zero minicomputer with a Linux Operating System with system configuration of 512 MB of RAM, 1 GHz single core processor, a micro USB power input and a 40-pin I/O device. In addition to these features, the

Raspberry Pi Zero supports 802.11 b/g/n wireless LAN and bluetooth protocols. The motion sensor used for vehicle detection is an E18-D80NK, which is an infrared distance measurement sensor with a measurement range of 3 to 80 cm. The possibility of interference with visible light is very low. The margin of error detection due to external factors is very less

Network Layer: The network layer enables customers to obtain information about the car parking. The entrance or outlet information for the vehicles detected by the sensors is sent to the database with the help of network layer. The Raspberry Pi Zero is connected to the internet via a wireless access point with an 802.11 b/g/n wireless LAN connection.

Software Layer: The software layer is also called the cloud architecture layer. This layer is to connect to units such as databases and web services over the internet and to provide communication between the application layer and network layer. This layer is the most important one for the storage of the car parking information and its submission to the user. This layer is to manage the databases with associated servers and all other software for the smart parking system. These services include MySQL and the Windows Azure platform. This layer sits between the application layers where the services provided by the parking systems are requested. All these layers communicate through the network layer.

Application Layer: This layer is where both the mobile users and the car park owner can access the complete system. An android based interface was created so that the customers can get information about the car parking. The number of empty parking space can be obtained by accessing the database in the software layer from this layer.

V. CONCLUSION

In many countries monitoring and controlling city traffic is becoming an important issue. With the progressively increasing amount of road vehicles day by day, the traffic monitoring authority needs to find out about new ways or steps to solve such a problem in current and future. As a moving vehicle, the traffic was assessed as the traffic density and it also calculates the parking space for vehicle. Numerous methods were designing and implemented for adaptive traffic control system. To solve this problem normal vehicle delays are used to determine the efficiency of the Fuzzy Signal Controller system and to identify the parking area and moving vehicle to give the user accurate traffic conditions. When we applied the Relevance Vector Machines algorithm to perform accuracy of traffic density and finally the examinations have been made with certain parameters and it reach better performance.

VI. REFERENCES:

[1]. https://spectrumsmartcities.com/articles/smart-city-traffic-management.html
[2]. https://otonomo.io/blog/smart-cities-intelligent-transportation-systems/
[3]. ITS Canada Website: http://www.itscanada.ca
[4]. Soylemezgiller, F., Kuscu, M. and Kilinc, D. “A traffic congestion avoidance algorithm with dynamic road pricing for smart cities”, IEEE 24th International Symposium on Personal Indoor and Mobile Radio Communications, 2013.
[5]. ITS-U. K Website: http://www.its-uk.org.uk
[6]. B. McQueen, I. Catling; The Development of IVHS in Europe. In SAE Technical Paper Series (SAE No. 911675) Ed. Warrendale, PA: Society of Automotive Engineers, pp. 31- 42, 1991.
[7]. Togrikar, P.S. “Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance, and Stolen Vehicle Detection”, Imperial Journal of Interdisciplinary Research 2 (4), 2016.
[8]. Ghavami, Seyed Morsal. "A Web Service Based Advanced Traveler Information System for Itinerary Planning in an Uncertain Multimodal Network." Geocarto International just-accepted (2019): 1-16.
[9]. Ceder, Avishai Avi, and Yu Jiang. "Personalized public transport mobility service: a journey ranking approach for route guidance." Transportation Research Procedia 38 (2019): 935-955
[10]. Delle Site, Paolo. "A mixed-behaviour equilibrium model under predictive and static Advanced Traveller Information Systems (ATIS) and state-dependent route choice." Transportation Research Part C: Emerging Technologies 86 (2018): 549-562
[11]. H. O. Al-Sakran, "Intelligent traffic information system based on the integration of Internet of Things and Agent technology," International Journal of Advanced Computer Science and Applications (IJACSA), vol. 6, no. 2, pp. 37-43, 2015.
[12]. ITS Xu, Xiujuan, et al. "ITS-Frame: A Framework for Multi-Aspect Analysis in the Field of Intelligent Transportation Systems." IEEE Transactions on Intelligent Transportation Systems (2018).
[13]. T. e. a. Osman, "Intelligent traffic management system for a cross section of roads using computer vision," in Computing and Communication Workshop and Conference (CCWC), 2017 IEEE 7th Annual, 2017.
[14]. Aditi Avadhani, “IOT Based Dynamic Road Traffic Management for Smart Cities”, Jour of Adv Research in Dynamical & Control Systems, 13-Special Issue, November 2017
[15]. Kyriakos Karenos, et al, “Traffic Management in Sensor Networks with a Mobile Sink”, IEEE, January 2010
[16]. N. B. Soni ; Jaideep Saraswat, “A review of IoT devices for traffic management system”, IEEE,2018
[17]. Chandana K , Dr. S. Meenakshi Sundaram, et al, “A Smart Traffic Management System for Congestion Control and Warnings Using Internet of Things (IoT)”, DOI:10.21276/sjeat, Vol-2, Iss-5 May, 2017.

[18]. Broggi, Alberto, et al. "Intelligent vehicles." Springer Handbook of Robotics. Springer, Cham, 2016. 1627-1656.

[19]. Bhokarkar, Renuka P., Sandeep V. Gaikwad, and K. V. Kale. "Development of ATIS-web based system for Aurangabad city." (2018).

[20]. Bhokarkar, Renuka P. et al. "Advanced Traveler Information System for Aurangabad City." (2018).).

[21]. Renuka Bhokarkar Vaidya1, Dr Sonali Kulkarni2, Vaibhav Didore3, Intelligent transportation system using IOT: A Review, © 2021 IJRTI | Volume 6, Issue 9 | ISSN: 2456-3315

[22]. Mary N Peter, Pushpa Rani, Advanced Traffic Management System using a Fuzzy Logic Controller to Differentiate Parking Vehicle and Moving Vehicle International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-9 Issue-5, March 2020

[23]. Novotný, R., Kuchta, R., Kadlec, J. (2014). Smart city concept, applications and services. Journal of Telecommunications System & Management, 3(2): 1-8. https://doi.org/10.4172/2167-0919.1000117

[24]. Talari, S., Shafie-khah, M., Siano, P., Loia, V., Tommasetti, A., Catalão, J.P.S. (2017). A review of smart cities based on the internet of things concept. Energies, 10(4): 421. https://doi.org/10.3390/en10040421

[25]. Lotlikar, T., Chandrahasan, M., Mahadik, A. (2016). Smart parking application. International Journal of Computer Applications, 149(9): 32-37.

[26]. Hanif, N.H.H.M., Badiozaman, M.H., Daud, H. (2010). Smart parking reservation system using short message services (SMS). 2010 International Conference on Intelligent and Advanced Systems, Manila, Philippines, pp. 1-5. https://doi.org/10.1109/ICIAS.2010.5716179

[27]. Villanueva, F.J., Villa, D., Santofimia, M.J., Barba, J., Lopez, J.C. (2015). Crowdsensing smart city parking monitoring. IEEE World Forum on Internet of Things, Milan, Italy, pp. 751-756. https://doi.org/10.1109/WF-IoT.2015.7389148

[28]. Araújo, A., Kalebe, R., Giraõ, G., Filho, I., Gonçalves, K., Neto, B. (2017). Reliability analysis of an IoT-based smart parking application for smart cities. 2017 IEEE International Conference on Big Data (Big Data), Boston, USA, pp. 4086-4091. https://doi.org/10.1109/BigData.2017.8258426

[29]. Abdelouafi Ikidid, Abdelaziz El Fazziki, Mohammed Sadgal, A Fuzzy Logic Supported Multi-Agent System For Urban Traffic And Priority Link Control, Journal of Universal Computer Science, vol. 27, no. 10 (2021), 1026-1045 submitted: 5/6/2021, accepted: 23/9/2021, appeared: 28/10/2021 CC BY-ND 4.0

[30]. https://www.mdpi.com/sensors/sensors-16-00157/article_deploy/html/images/sensors-16-00157-g010.png

[31]. https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.semanticscholar.org%2Fpaper%2FUrban-traffic-control-using-a-fuzzy-multi-agent-Jamshidnejad-Schutter%2F89bfbb07c59a47ed9cabd2dcad7b4e2abb53622a&psig=AOvVaw1nJ49E-SyIg0F_DkhtHmI0&ust=1647410217558000&source=images&cd=vfe&ved=0CAsQjRxqFwoTCMiO98S3x_YCFQAAAAAdAAAAABAL

[32]. Image:https://media.springernature.com/original/springer-static/image/chp%3A10.1007%2F978 - 3-030-36167-9_6/MediaObjects/482537_1_En_6_Fig2_HTML.png

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