ISSN: 2366-1313

MODEL FOR PASSENGER WEIGHT MONITORING IN VEHICLES USING BIG DATA : AN APPROACH

KAPPERA RAMESH
Assistant professor, Malla Reddy university, Maisammaguda, Dulapally, Hyderabad, Telangana 500043
ramesh.reddy531@gmail.com

Abstract:-

The work offers a technological answer for the smart city notion. A new generation of control concepts supporting BigData has been created for the smart city paradigm. The proposed unified wireless data transmission idea is used as a weight control mechanism for wireless transport vehicles. This article develops and illustrates the integrated weight sensor. The provided sensor is part of the BigData paradigm and is designed to collect data from primary sources and send it to an Intelligent Transport System (ITS) so that transport flow modelling can be done using that data. The information sent to ITS will be used to acquire and apply the following components of the system: data transmission, traffic flow modelling, sensor technologies, and decision making. The created solution works with both the future generation of smart city control systems and BigData online traffic management systems.

Keywords – sensor development, data collecting, transport system, sensing technologies

I INTRODUCTION

In order to arrange efficient freight transport flow in the very constrained city settings, the freight traffic corridors are highly effective. The current city transport system is often congested, and one common solution to the issue of traffic congestion in cities is to divide private vehicle and public transit flows. For instance, during Riga's peak hours, freight transportation is restricted in the city core and over the Daugava River bridges. Numerous intricate structures, such as bridges, are very sensitive to the weight of a car. The proposed technology would make it possible to automatically locate automobiles that cross bridges without considering weight restrictions. It will simplify the duties of a transport police officer and increase the dependability of transport infrastructure. Getting as much actual data on the cars as possible will be important for future BigData based ITS development, with the goal of better planning the transport flow system. This article discusses the construction of a sensor to gather weight data. The acquired data serve as the foundation for the modelling process. At least four components of the system must be combined: data transport, traffic flow modelling, sensor technologies, and decision-making. Development and testing of the weight sensor have already been completed in a lab setting. Additionally, other services, such as a weight management system, could be added to the system. It would be feasible to provide a thorough understanding of the online traffic control system using actual data.

II BigData APPROACH FOR DATA TRANSFERRING

Embedded sensors are integrated into infrastructure network items to gather consumption data and provide it to central control services. A capability to establish common control opportunities of existing infrastructure systems on various stages of service providing timeline is provided by the transformation of gathered data received from diverse infrastructure objects in the same format. Constrained Application Protocol (CoAP) and the Internet of Things approach, in particular, provide substantial advantages for generalising and reimplementing current protocols and techniques (such as HTTP protocol requests methods and data formats like XML and JSON).

Practically, traffic online monitoring and forecasting programs employ the gathered historical and online data. In typical wireless sensor network settings, the fundamental paradigm of low-power, efficient networks architecture still remains a priority, with limited resources allocated to extending the total systems lifespan. The three primary strategies to extend a wireless network's lifespan are data sending technology, external network feeding, and MESH data transmitting. The growing use of smart sensor [1] devices and their integration into residential and commercial settings provide up new avenues for information flow and adaptive response. Meter readings based on critical infrastructure may be integrated into systems that were previously run separately. A new BigData concept can be implemented using this method; the main challenges are integrating various technologies and applications into a single, cohesive network by offering a reference BigData architecture and a common set of standards for interfaces, protocols, gateways, and backend systems. Among the many potential candidate protocols [4] for BigData are the following: MQTT, MQTT-S, REST API, XMPP, and the previously discussed CoAP:

Low power consumption gadgets that run on batteries. Though not 95% of the time, the device could sleep. All levels of integration, including hardware connections, protocols, and database integration, are used to achieve integration with other network components, including legacy network elements. Network Address Translation (NAT) traversal is a crucial but not essential component of the MQTT-S protocol, which is a variant targeted for embedded devices connected to non-TCP/IP networks like ZigBee. It should be considered an afterthought. Possibility of scaling ten times as many devices as MQTT. In comparison to MQTT, NAT traversal may become a more significant problem, hence it should be handled at the next planning phase. REST API allows for one-way cloud to device connection. Global NAT traversal ranks highly among the priorities. There are no particular restrictions on the traffic, and the devices don't have many resources. For the open development community, "Device Cloud" WLAN routers or home gateways are examples of CPE for the home or office with a strong WAN connection.

An extensible system that integrates heterogeneous infrastructures and smart device environments is made possible by the Internet of Things concept, which reuses existing technologies as RESTful Web Services by implementing the CoAP protocol. This helps with information harvesting, critical infrastructure coordination, and event detection for monitoring and decision support systems. It also suggests machine-to-machine dialogue. The primary benefit of the suggested BigData method is its generally straightforward communication, which facilitates a very adaptable environment. The digital environment must be able to store data into local or distributed cloud environments that can successfully connect with one another, as well as manage many data streams from various inputs (such as sensors and actuators, human input, etc.). This holds true for merging data produced by the asset itself and data from other assets, as well as for defining digital applications that facilitate improved collaboration.

III SOLUTION AND MODELING

Actual data collection requires the integration of a roadside reader, weight station, and static scale into a single system. Arranging the flow of data is crucial for acquiring more knowledge. One may examine the distribution of lost data packets on the timeline using the gathered data. It displays two or more ratio transmitter data packet collisions, which may occur when there is a very accurate frequency coincident between the microcontrollers. The ratio for a 5-second transmission interval would be 1/100, or 1%. Collisions are more likely at short transmission intervals. However, in a real-world situation, the ratio would be 50 ms/60000 ms, or 0.012%, meaning that the collision risk would be very low and hence unimportant for the application that was chosen. The gateway may be instructed to publish received messages to a certain server by the original registration server, or it can redirect users to another registration server. The gateway verifies the telegrams there, prepares them for transmission, and polls its radio interface for received data. If the transmit operation is unsuccessful, the gateway switches to offline mode. If no writable data storage is available, data is saved locally in a database until a network connection is made possible.

The three primary components of an online traffic forecasting tool are data sources, the data processing model (core), and results publication. More specifics of the online traffic forecasting tool are shown in the above figure. This approach supports the creation of future smart city control tools as well as the capability of managing traffic. The BigData strategy supports the critical infrastructure control approach and aids in the integration of various municipal infrastructure services. An asset or system that is necessary for the upkeep of fundamental social functions is known as critical infrastructure [3]. The BigData paradigms provide guidance for defining the self-sustainable and energy-independent region paradigm in addition to enabling the integration of current infrastructure control methods and system of system control needs.

With the ability to regulate critical infrastructure autonomously on a designated territory, this methodological approach, in particular, completely supports the sustainable region paradigm in the development of the data transmission paradigm for large distributed infrastructure systems.

IV CONCLUSIONS

Large-scale dynamical system control is one of the main problems that control engineers have to deal with nowadays. It is feasible to draw the conclusion from the present study that the experimental findings are encouraging and that the provided sensor may be employed in the context of the provided model as well as in other situations. Additionally, gateways of any sort, including Wi-Fi rooters, will be utilised to establish links with partner servers. Ethernet and TCP/IP protocol might be the gateway's output. To guarantee the delivery of sensor measurement to the partner's servers, the gateway interface's specifications, data output requirements, and protocol requirements are required.

V REFERENCES

[1] J. Zeyu, Y. Shuiping, Z. Mingduan, C. Yongqiang, and L. Yi, "Model Study for Intelligent Transportation System with Big Data," Procedia Comput. Sci., vol. 107, pp. 418–426, 2017, doi:10.1016/j.procs.2017.03.132.

[2] Z. Ding, B. Yang, Y. Chi, and L. Guo, "Enabling Smart Transportation Systems: A Parallel SpatioTemporal Database Approach," IEEE Trans. Comput., vol. 65, no. 5, pp. 1377–1391, May 2016, doi:10.1109/TC.2015.2479596.

[3] J. Zhang, F.-Y. Wang, K. Wang, W.-H. Lin, X. Xu, and C. Chen, "Data-Driven Intelligent Transportation Systems: A Survey," IEEE Trans. Intell. Transp. Syst., vol. 12, no. 4, pp. 1624–1639, Dec. 2011, doi:10.1109/TITS.2011.2158001.

[4] M. A. Beyer and D. Laney, "The Importance of 'Big Data': A Definition," Stamford, CT Gart., pp. 2014–2018, 2012.

[5] A. Mehrabi and K. Kim, "Using a mobile vehicle for road condition surveillance by energy harvesting sensor nodes," in 2015 IEEE 40th Conference on Local Computer Networks (LCN), Oct. 2015, pp. 189–192, doi: 10.1109/LCN.2015.7366303.

[6] J. Contreras-Castillo, S. Zeadally, and J. A. Guerrero-Ibanez, "Internet of Vehicles: Architecture,Protocols, and Security," IEEE Internet Things J., vol. 5, no. 5, pp. 3701–3709, Oct. 2018, doi:10.1109/JIOT.2017.2690902.

[7] C. Anda, A. Erath, and P. J. Fourie, "Transport modelling in the age of big data," Int. J. Urban Sci., vol. 21, no. sup1, pp. 19–42, Aug. 2017, doi: 10.1080/12265934.2017.1281150.

[8] E. Al Nuaimi, H. Al Neyadi, N. Mohamed, and J. Al-Jaroodi, "Applications of big data to smart cities," J. Internet Serv. Appl., vol. 6, no. 1, p. 25, Aug. 2015, doi: 10.1186/s13174-015-0041-5. M. M. Rathore,

A. Ahmad, A. Paul, and S. Rho, "Urban planning and building smart cities based on the Internet of Things using Big Data analytics," Comput. Networks, vol. 101, pp. 63–80, Jun. 2016, doi:10.1016/j.comnet.2015.12.023.

[9] R. Kitchin, "The real-time city? Big data and smart urbanism," GeoJournal, vol. 79, no. 1, pp. 1–14, Feb.2014, doi: 10.1007/s10708-013-9516-8.

[10] Q. Hao and L. Qin, "The Design of Intelligent Transportation Video Processing System in Big Data Environment," IEEE Access, vol. 8, pp. 13769–13780, 2020, doi:10.1109/ACCESS.2020.2964314.

[11] J. Guerrero-Ibáñez, S. Zeadally, and J. Contreras-Castillo, "Sensor Technologies for Intelligent Transportation Systems," Sensors, vol. 18, no. 4, p. 1212, Apr. 2018, doi:10.3390/s18041212.

[12] Li Zhu, Fei Richard Yu and Yige Wang, "Big Data Analytics in Intelligent Transportation Systems: A Survey", J. King Saud Univ. Inf. Sci., vol. 30, no. 4, pp. 431–448, 2018. (Volume:20 Issue:1).

[13] M. Altarawneh, M. Qatawneh, and W. Almobaideen, "Overview of Applied Data Analytic Mechanisms and Approaches Using Permissioned Blockchains," Int. J. Adv. Sci. Eng. Inf. Technol., vol. 12.

[14] Cynthia Harvey, "What is Big Data Analytics&What are the Benefits?", July27, 2017.

[15] L. Zhu, F. R. Yu, Y. Wang, B. Ning, and T. Tang, "Big Data Analytics in Intelligent Transportation Systems: A Survey," IEEE Trans. Intell. Transp. Syst., vol. 20, no. 1, pp. 383–398, Jan. 2019, doi:10.1109/TITS.2018.2815678.

[16] M. Chowdhury, A. Apon, and K. Dey, Data analytics for intelligent transportation systems. Elsevier, 2017.

[17] Big Data Analytics: Big Data Analytics | CYBERTEC", CYBERTEC, 2022. [Online]. Available:https://www.cybertecpostgresql.com/en/data-science/big-data-analytics/. [Accessed: 08- Jan2022].

[18] Dr. Yi Pan, "Big Data Mining and Analytics", Coursera, "What Is Big Data Analytics? Definition,Benefits, and More", Jlu 16.

[19] Y. Sun, H. Song, A. J. Jara, and R. Bie, "Internet of Things and Big Data Analytics for Smart and Connected Communities," IEEE Access, vol. 4, pp. 766–773, 2016, doi:10.1109/ACCESS.2016.2529723.

[20] L. Qi, "Research on Intelligent Transportation System Technologies and Applications," in 2008 Workshop on Power Electronics and Intelligent Transportation System, Aug. 2008, pp. 529–531, doi:10.1109/PEITS.2008.124.