INTERNET OF THINGS - SMART TRAFFIC MANAGEMENT SYSTEM FOR SMART CITIES USING BIG DATA ANALYTICS

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Abstract:

Smart Traffic System (STS) is a one of the important aspect for future smart city. STS is more expensive and highly configurable to provide better quality of service for public traffic management. This paper proposes a low cost future STS to provide better service by deploying traffic update instantly. Low cost vehicle detecting sensors are fixed in the middle of road for every 500 meters. Internet of Things (IoT) is being used to attain public traffic data quickly and send it for data processing. The Real time streaming data is sent for Big Data analytics. There are several analytical scriptures to analyze the traffic density and provide solution through predictive analytics.

Keywords:

Internet of Things; Big Data; Smart Cities; Smart Traffic Management System.

1. Introduction

Internet of Things (IoT) is a recent communication paradigm that envisions a near future, in which the objects of everyday life will be equipped with microcontrollers, transceivers for digital communication, and suitable protocol stacks that will make them able to communicate with one another and with the users, becoming an integral part of the internet [1]. A smart city is an urban improvement vision to incorporate various Internet of Things (IoT) and Information and Communication Technology (ICT) arrangements in a safe style to deal with a city's advantages and benefits incorporate, yet are not constrained to, neighborhood offices data frameworks, schools, libraries, transportation frameworks, clinics, power plants, water supply systems, waste administration, law requirement, and other group administrations [2].

The objective of building a smart city is to enhance personal satisfaction by utilizing innovation to enhance the proficiency of administrations and address occupants' issues. ICT permits city authorities to communicate straight forwardly with the group and the city base and to screen what is going on in the city, how the city is developing, and how to empower a superior personal satisfaction. Using sensors coordinated with ongoing checking frameworks, information is gathered from nationals and gadgets then handled and broke down. The data and information assembled are keys to handling inefficiency.

2. Literature Review

According to the United Nations Population Fund, in 2025, 64% of the world's population lived in urban areas, approximately 5.2 billion people [3]. By 2035, roughly 66%, or 6 billion people will live in urban areas. This not only represents a massive challenge in how we build and manage cities but significant opportunity to improve the lives of billions of people. Rising to that challenge, engineers worldwide are turning to new technology such as the Cyber Physical Systems, 5G and data analytics searching for new approaches and solutions that will improve city transportation, water and waste management, energy usage, and a host of other infrastructure issues that underpin the operation of cities and the lifestyle of urban citizens [4].

According to the research on Smart Cities, the Smart City market is estimated at hundreds of billion dollars by 2025, with an annual spending reaching nearly 23 billion [5]. On the technical side, the most relevant issue consists in the no interoperability of the heterogeneous technologies currently used in city and urban developments. In this respect, the IoT vision can become the building block to realize a unified urban scale ICT platform, thus unleashing the potential of the STS vision [6−7].

STS vision activity congestion on street systems is only slower speeds, expanded excursion time and expanded lining of the vehicles. At the point when the number of vehicles surpasses the limit of the street, activity congestion happens like metropolitan urban communities. Movement congestion is brought about when the interest surpasses the accessible street limit.

In [8] this paper proposed a strategy for deciding traffic blockage on streets utilizing picture preparing procedures and a model for controlling traffic signals in light of data got from pictures of streets taken by camcorder. Variable traffic cycle and weighted time for every street in view of traffic thickness and control traffic lights in a consecutive way it is very time complex as well as expansive.

Consequently, it is high time to adequately deal with the traffic jam [9] issue. There are different strategies accessible for traffic administration, for example, video information analysis, infrared sensors, inductive circle recognition, remote sensor system, etc. Henceforth another innovation called Radio Frequency Identification (RFID) is presented which can be combined with the current flagging framework that can go about as a key to brilliant traffic administration [10] continuously.

In [11] introduced model called dynamic traffic monitoring system. It using their various parameter factors towards collecting Gathering of high quality travels time and speed. It means that various affecting factors are should counting. In [12] invented that GPS based vehicle tracking system. It provides to decreasing the short distance traveling. As well as same content in [13] focused on various factors are to be considering timely data acquiescing by using VSNs vector distance routing algorithm. It provides the high reliable communication [14].

3. Problem Statement

A Novel Technical support for traffic control system for better emerging traffic management system for smart cities [15]. Deploying booming technologies like Internet of Things and Big data. User friendly App based traffic updates, status of road based vehicle strength etc. interaction provided by using these technologies.

The portability model utilized for regenerations depends on the comfortable driving model (CDM) in [16]. It is a traffic cell robot where space is discredited in units of 0.5 m and time in interims of 1 s. The position and the speed of a vehicle named as n are given by and, individually. The model incorporates expectant impacts by considering the status of the first vehicle's brake light by suspecting its speed and by plan a straightforward activity calculation [17] to execute in the movement framework. The activity focuses are dealt with as autonomous areas. The movement densities of various streets at a specific time as info in light of out information, we have created two yields. Movement Cycle is the aggregate time required for one complete revolution of the sign lights at any activity point.

This strategy is connected for more cycle span when there is more movement so that more vehicles can breathe easy. At the point when there is less movement, the activity cycle is abbreviated with the goal that vehicles don't need to sit tight for a drawn out stretch of time in sign moves. The second parameter is weighted time portion shown in Fig.1.

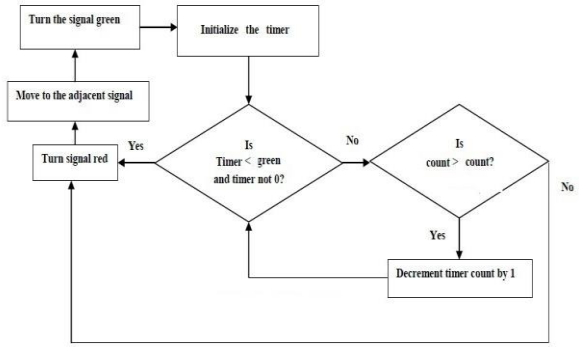

Fig.1 STS Architecture

4. Evaluation Model

In practical approach it consists the three different modules are adding.

4.1. Experimental Setup

For experimental setup three different modules are there for overall application designing. Based on below Fig 1 shows deploying technologies on root phase.

4.2. Internet of things module

Approach is to completely IoT based vehicle information gathering system. Intel IoT kit with all latest features and vehicle detection sensors. Connected the sensors based on our criteria deploy on road ½ km or 1 km and more it depends best is to deploy very near distance for getting better results.

At least 5 sensors are connected in each other and it communicates to the single IoT kit. All kits are connected to the network access sharing information among the Internet. It continues monitoring for vehicles and updates are sending to the big data storage and analytics.

4.3. Big Data Analytics Module

It receives the sensors information with sensor Id. Compute all the information performing analytics operations. Various factors are considering for calculating individual sensor strength and add each other sensor entry and leaving vehicle details road capacity. Etc. factors are considered compute analyzed report are to be produced it make ready through access by using internet either mobile APP or internet browser. Here apply various forms are approaches [18] are connected with latest real-time streaming data processing mechanisms are used shown in Fig.2.

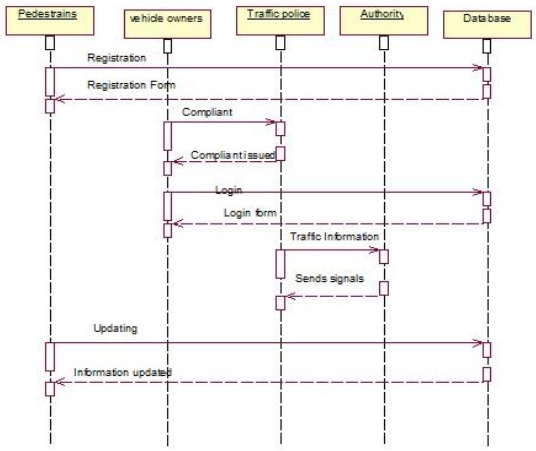

Fig.2 Big Data Analytics Module flow

5. User Interaction Modules

In this module consists of the latest analytics and decision tools are providing for travelers. Capacity of road number of vehicles are there status everything shown accessing internet. Multiple way's user wants to access the information example mobile APP, internet browser throw enabling GPS on Device, etc. In user point of view very faster interaction and fast data processing are to be done by using background as big data stream analytics.

5.1. STS Algorithm

Input:

- Red - maximum time of congestion.
- Green - maximum time for congestion free network.
- Count - minimum frequency of vehicles passing per second stored statically in controllers.

Algorithm:
Signal turns green.

While (Timer< green and Timer is not 0)
do
If (
Count> count)
Keep the signal green.
-- Count by 1.
Else
if (
Count<= count)
Goto 2.
End
Signal red.
Turn the adjacent signal green.
Go to 1.
Output:
Effective congestion management

6. Conclusion and Future work

The proposed system discussed about a low cost STS to provide better service by deploying traffic indicators to update the traffic details instantly. Low cost vehicle detecting sensors are shown in the middle of road for every 500 meters. IoT are being used to acquire traffic data quickly and send it for processing. The streaming data is sent for Big Data analytics. There are several analytical scriptures to analyze the traffic density and provide solution through predictive analytics. Moreover, our approach is provided a better result while comparing to the existing systems. In future advanced sensors used for detecting nature of capacity of vehicle using big data analytics to create more flexible to travelers.

Acknowledgements

This paper was supported by the National Natural Science Foundation of China (Grant No. 61370073), the National High Technology Research and Development Program of China (Grant No. 2007AA01Z423), the project of Science and Technology Department of Sichuan Province, and Chengdu Civil-military Integration Project Management Co., Ltd.

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