

Design Approach of WSN Model for Traffic Monitoring

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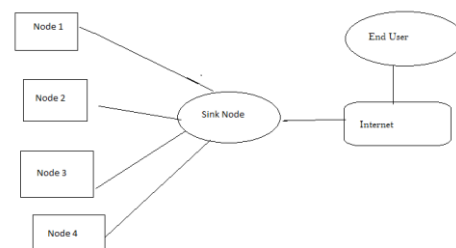
Abstract – Wireless sensor network (WSN) consists of sensor nodes with different abilities, such as different computing power, sensing range etc. With the increase in the number of nodes in the network, it becomes important to measure the traffic efficiently. If these techniques, measure traffic efficiently then it would be helpful for the nodes to find out the best possible route. In this paper, several traffic measurements have been divulged. Comparing these techniques a design approach has been suggested in this paper. This approach is advancement in the already developed algorithm. This improvisation aims 100% accuracy in traffic flow measurement.

Keywords- WSN, node deployment, dashboard camera, traffic flow measurement

INTRODUCTION

Wireless sensor network (WSN) refers to a group of spatially dispersed and dedicated sensors for monitoring, analyzing and recording the physical conditions of the environment and collecting this data at a central location. These networks can measure various environmental conditions like temperature, sound, humidity, pollution etc. The WSN is made up of "nodes". The network may consist of a few to several hundreds or even thousands. In such networks, each node is connected to one or more sensors. Each such sensor network node has typically divided in several parts consisting of a radio transceiver with an internal antenna or connection to an external antenna. It may also be extended with a microcontroller which will be interfaced with the sensors and a battery which generally used as a power source. A sensor node might vary in size from that of a shoebox down to the size of a grain of dust. The

topology of the WSNs can vary from a simple star network to a mesh network.



With the increase in the load, nodes need to be tracked. There are several techniques to track the traffic. One of such techniques works by analyzing the GPS-determined locations transmitted by a large number of cell phone users. Thus by calculating the speed of users along a length of road, a live traffic map is generated.

Due to the increasing of the traffic densities nowadays, a demand for advanced systems that provides the essential traffic information for the drivers to improve the traffic quality and travel optimization is growing. The complete and detailed traffic information is the important aspect in order to govern the roadway network and to provide the navigation service for the road users. The density value measurement is one of the important aspects of transportation management. Intelligent Transportation System is an important developing technology that combines components of information management systems to create better system. Currently, demands on such transportation systems are growing rapidly with an estimated travel demand increase of 30% over the next ten years [1]. The efficient of transportation system can be an alternative to increase

the roadway capacity in order to prevent the traffic congestion at current levels from getting worse.

THEORETICAL BACKGROUND

There are several methods that are used for the measurement of traffic of the nodes. Some of these techniques are as mentioned.

1) Using dashboard camera

Kohai et al proposed a method for traffic measurement using the approach of collecting data from camera device that is mounted on the car's dashboard. The image which is captured by digital camera photo then that image was analyzed to get an estimated value of roadway traffic flow. A traffic measurement using digital camera device installed can be a practical approach and it is low cost solution as compared to the conventional traffic measurement methods.

In moving observer method, there are two common approaches [6]. The first method is the floating car data (FCD). In this method, speed is recorded and travel time is measured as a function of time. The motive of given method is the floating car behaves as an average vehicle within the traffic stream. However, this method does not provide the accurate average speed data. For producing qualitative information about roadway conditions and operations, this is the most effective one. There are several approaches of this method, one form uses a person in the floating car to record speeds and travel times and second form uses a modified recording speedometer which are regularly used in long-distance trucks or buses. While the drawback of this is that it means there are less speed observations than volume observations.

2) Using Wi-Fi signals

Sensors or techniques that can identify individual vehicles such as automatic number-plate recognition (ANPR) or electronic tags allow to measure travel times. Amongst several approaches stated, the vehicle tracking via radio signal emissions is considered a cost-efficient method. Road tolling systems that require the user to carry a transponder in the vehicle are able to deliver travel times at certain measurement points. But also other devices than dedicated transponders emit signals that can be used for road traffic estimation. Most people carry mobile phones, and these help in delivering mobility data via the cellular network [8]. Mobile phones and the hands-free car kits emit Bluetooth signals. These emitted signals are then received by roadside equipment for travel time measurements.

EXPERIMENTATION

The design of a system is an approach having different stages. Each stage has its own technique. In first stage, a WSN model needs to be developed by deploying several heterogeneous nodes. The next stage deals with finding out the best route. This entire system is built with the help of Internet of Things. A local app needs to be developed which would show the accurate traffic load and the best route to travel.

CONCLUSION

This paper focuses on several traffic monitoring techniques. A new approach to traffic monitoring technique is stated in this paper. This is possible with the help of Internet of Things. As stated in previous techniques like camera on dash board, traffic monitoring is not accurate. This technique aims at providing the accurate traffic measurement.

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