TRAFFIC MONITORING SYSTEM

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Abstract

Traffic Monitoring System is always being a challenging problem for Traffic Department, especially, speed limit violators. At present, widely, Video Surveillance approach is used which includes undesirable features like high resolution cameras, high computing real time systems and maintaining large database. This paper introduces a new approach for traffic monitoring system which can check the vehicles which crosses the speed limits at squares, highways and at the places where speed limit is imposed by the Traffic Department. It is based on an embedded system which uses wireless data communication. It is consist of two embedded sub-systems- Transmitter module and Receiver module. Transmitter module is microcontroller based system which stores the vehicle information-speed and vehicle number. It will transmit vehicle information to the receiver module after receiving a handshake signal from it. Receiver module is also a microcontroller based system having mainly two components i.e. receiver and transmitter. Receiver is used to receive the data-speed and vehicle no. Transmitter is used for transmitting handshake signal to the transmitter. Received data is sent to the server after checking them for speed violation. This traffic monitoring system is less time consuming and an effective approach for speed violations.

Keywords-Traffic Monitoring System, Embedded Systems, Wireless Data Transmission, Data Compression, Cryptography, Microcontroller based programming.

I. INTRODUCTION

In present day scenario, monitoring of speed violators is carried out with the help of video surveillance and portable speed sensing device. Now days, due to increasing traffic on roads, it is not possible to effectively monitor the traffic with these techniques. In our paper we propose an embedded system which includes two modules- Transmitter (in vehicles) module and Receiver module. Transmitter module will transmit the compressed and encrypted data consisting of vehicle registration number and the speed of the vehicle after receiving handshake signal from the receiver.

Receiver module will decompress and decrypt the received data, and compare the speed with the threshold at which it is set. If it exceeds i.e. speed violation, then it will transmit the received data to the server. This module will also send the handshake signal to enable the data transmission.

II. TRANSMITTER MODULE

Transmitter Module will be installed on vehicle consisting of following functionality:

1. Speed Calculation: Speed will be calculated with the help of IR-slotted sensor mounted on the wheels of vehicle.
Let 1st signal from IR-sensor received to µC at time t_1 and 2nd signal be at time t_2.
Time elapsed in 1 revolution, $T = t_2 - t_1$
Speed = (circumference of wheel)/T

2. Data Compression & Encryption:
Data to be transmitted are:
1. vehicle no. (max 10 bytes)
2. speed (min 1 byte)
total data to be
most important aspect of this system. This can be achieved through any data encryption algorithm.

Data compression and data encryption for this system can be achieved with transmitted=11 bytes

Sending of such large data through wireless communication within a short span of time is efficiently carried out with the help of any data compression technique [2].

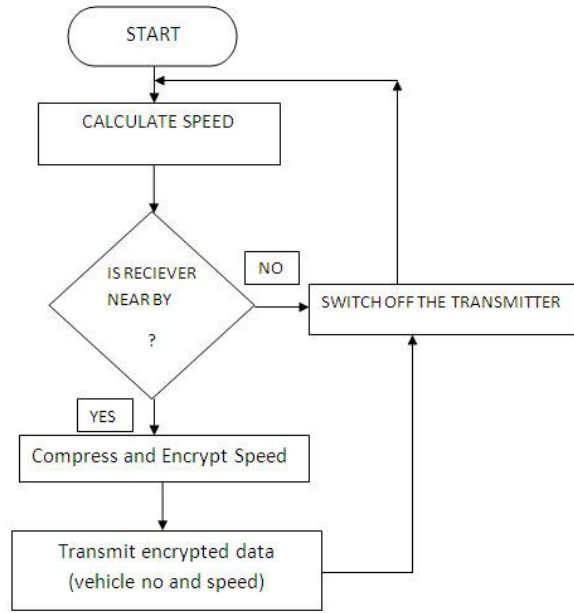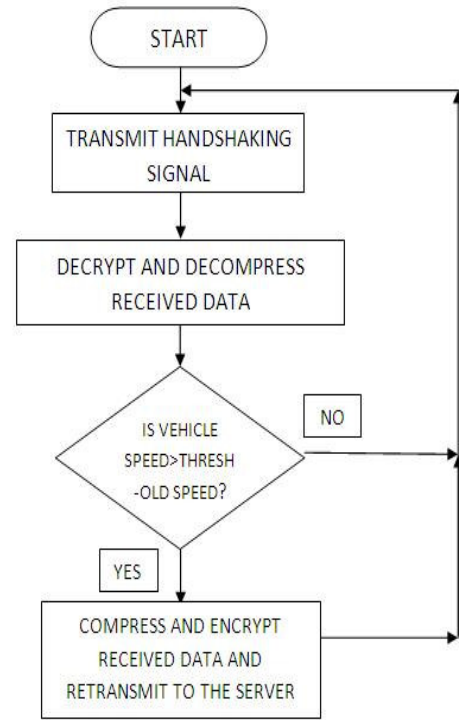Data security is the help of *Polyalphabetic substitution encryption algorithm* [1].

Fig. 2

Fig2.Transmitter module Flowchart

Receiver Module Flowchart

III.   RECEIVER MODULE

Receiver Module is designed to work in coordination with transmitter module. It can be installed at squares and any other places of interest. It has following functionalities:

1.   Enabling transmitters: Transmitter can be enabled, for data transmission, by the handshake signal from receiver.

2.   Data decompression and decryption: Received data is decrypted and decompressed to recover original data.

3.   Checking speed violation: speed of the vehicle, received from the transmitter, is compared with the threshold speed limit. The threshold speed is set to different values as per locality. If speed violation occurs then vehicle information is retransmitted to the server in encrypted and compressed form.

IV.   FUTURE SCOPE

The traffic rule violations are not limited to speed violation. The proposed monitoring system can be further extended to other violations like signal-crossing violation, zebra-crossing violation. Signal violation can be monitored using directional receivers.

REFERENCES

[1] Cryptology and Network Security Principles and Practices by William Stallings

[2] Data Compression by David Salomon