

**DEVELOPING INTELLIGENT SOFTWARE INTERFACE FOR
WIRELESS MONITORING OF VEHICLE SPEED AND
MANAGEMENT OF ASSOCIATED DATA**

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Abstract:

The aim of this work is to develop an intelligent wireless system for monitoring vehicle speed, identify speeding vehicles and imposing penalty for the speeding offenders. A prototype system has been developed in a laboratory environment to generate random speed data using a mechanical wheel (acts as a vehicle), measure the speed data with a Shimmer wireless sensor and transfer the data wirelessly to a server computer for further analysis. Software interface has been developed using Java based socket-programming to monitor the vehicle speed in a server computer and to send the data associated with a speeding vehicle to a remotely placed client computer. The functionality of the software has been tested by experimenting different traffic scenarios. If the vehicle speed is higher than the set speed limit for the road, the system automatically detects it and generates a report with the time of speeding, vehicle number, vehicle speed, etc. The report is saved in a central database (client computer) in order to take further necessary actions for the speeding offender. The experimental evaluation results show that the system can measure and monitor the vehicle speeds wirelessly and manage the speeding data automatically.

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Introduction

Human errors, in particular, driver errors are the causes for the most of the road accidents. It is reported that over 80% of all major crashes on Irish roads are caused from inconsiderate driving e.g., vehicle over speeding, driving after consuming alcohol, distraction during driving, non-adherence to traffic signals, tailgating, poor lane discipline, etc. Managing vehicle speed data in an efficient and intelligent way is an on-going issue in modern transportation systems. Furthermore, the existing traffic systems are power hungry and connected through wires in terms of traffic data collection and management. Most of them are very expensive due to complex hardware as well as installation. In addition, some roads have no appropriate monitoring system for identifying the speeding vehicles. Therefore, vehicles passing through these roads and exceeding the maximum speed limits can cause fatal accidents. Although many systems have been developed in order to minimize the accidents, still further work is necessary to improve the situation.

The application of a wireless sensor network (WSN) in vehicle speed monitoring can reduce accidents through wireless sensing and communication. Low cost, efficient and high performance of wireless sensors with integrated computer software can change the landscape of automatic traffic data collection and management. Fuel consumption, air pollution, traffic congestion and travel time can be significantly reduced through the integration of traffic control system with the wireless sensor technologies. Although there are some systems available for wireless communication, the operations of these systems are not in complete wireless mode. Furthermore, the existing

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systems only focus on detecting vehicle and calculating vehicle speed rather than developing a fully automated one in terms of vehicle detection, speed measurement, monitoring and data communication. Systems are also not available to manage and store speeding data automatically in a central database, which can eliminate any need for human intervention.

This research proposes a wireless sensor based framework for vehicle speed monitoring and managing the associated data. In this framework, a sensor (accelerometer-based) and other auxiliary devices are used to detect a moving vehicle. The vehicle speed is calculated by the sensor and the processing unit and cross-checked with a speed limit set for a particular road. If the detected speed is greater than the set speed limit, the device sends the speed data to a central control center wirelessly and generates a report containing the details of time, road and vehicle to implement the speeding penalty.

The aim of the research is to develop a prototype system based on wireless sensor for detecting a vehicle, measuring and monitoring speed and managing the relevant speed data. In order to reach the aim, the objectives of this work are: (1) to develop an experimental setup modelling the generation of vehicle speed in laboratory environment, (2) to design and develop a wireless vehicle speed-monitoring software system, and (3) to simulate real-life traffic-monitoring scenarios using the experimental setup and monitoring system (4) with a GPS and constantly showing in the mobile.

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