

## VEHICULAR SENSOR NETWORKS FOR TRAFFIC FLOW RECONSTRUCTION



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## VEHICULAR SENSOR NETWORKS FOR TRAFFIC FLOW RECONSTRUCTION



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OMM PRESS, Madrid, 2016. Rustica (tapa blanda). Condition: Nuevo. Dust Jacket Condition: Nuevo. 1. This book presents a dissertation in the field of Intelligent Transportation Systems. ITS is loosely defined as: the application of computers, communications, and sensor technology to surface transportation. A definition like this results in dozens of technical and scientific areas. This thesis focuses in the characterization of road traffic flow using data from a small part of the vehicles that comprise such flow. We propose the use of an ad-hoc wireless network formed by a fraction of the passing vehicles, the probe or sensor vehicles, to periodically recover their positions and speeds. These vehicles, together with wireless bridges located close to the road shoulder, the Road Side Units (RSU), compose the Vehicular Sensor Network. Gathered data are then rearranged in a time-space diagram as a part of microscopic traffic flow representation. Finally, the speed/position information or Space-Time Velocity (STV) field is reconstructed in a Data Fusion Center by means of interpolation techniques. We have used widely accepted theoretical traffic models (car-following, multi-lane and overtake-enabled) to replicate the nonlinear characteristics of the traffic flow in representative situations along several experiments with different traffic-related parameters. In order to obtain realistic packet losses, we have simulated the multihop ad-hoc wireless network with an IEEE 802.11p PHY layer. The interpolation is based on the generation of Triangular Irregular Network, to our knowledge, is the first time such an interpolation is used in traffic context. In addition, we have performed discrete optimization to recover the most relevant time-space regions (cells) and the relation of such cells with traffic flow and the occurrence of probe vehicles. Finally, we have derived a local density-flow diagram from sensor vehicles that occurs in selected cells. This book concludes that a random and sparse selection of wireless sensor...



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