Vehicle sensor node for smart parking's of the future
Poster Extended Abstract

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Abstract. This project presents a hardware and software design of a vehicle sensing node. The hardware design of the sensing node and used AMR magnetic sensor can be used in very different environments with great accuracy. Vehicle detection technology has evolved in the last couple decades. We want so much more information; information such as speed and direction of traffic, the quantity of vehicles per time on a stretch of pavement, vehicle classification or just presence or absence of a vehicles on a parking place. The earth's magnetic field is around a half-gauss in magnetic flux density and "low field" magnetic sensors can be used to pickup this field and field disturbances that nearby vehicles will create. The most commonly used sensor type is Anisotropic Magneto - Resistive (AMR) where the sensor resistive elements are oriented as a resistive "Wheatstone bridge" that varies resistance slightly as the magnetic field changes upon each element. For best performance the combination of the two axis is possible and such algorithms are developed. Analog and digital part's of hardware design is based on HMC 1001 Honeywell's AMR sensor and NXP ARM7 LPC 2368 microcontroller. Sensor node is manufactured on two layer's PCB, 50 x 100 mm, width 1,6 mm (FR4 tg130), HAL-PB Free finish, with on board micro SD card and ultra low power 2Mbps RF transceiver IC for the 2.4 GHz band. The detection algorithm uses state machine and threshold scheme in order to detect moving vehicle. After successful vehicle identification the sensor node records the event in its memory and passes info to the node controller for further processing. Since the frequent up-and-down fluctuation of the magnetic signal is not a desirable characteristic for the vehicle detection algorithm, a smoothing filter, which takes a running average of the signal, is used to smooth out the signal. Tests the system in real conditions and creating next gen. applications with particular emphasis on smart parking's of the future is work in progress.

Keywords: vehicle detection, smart parking's, expert system, classification, traffic surveillance.