

INTELLIGENT TRAFFIC-SAFETY MIRROR BY USING WIRELESS SENSOR NETWORK

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Abstract: This article is focused on the problematic of traffic safety, dealing with the problem of car intersections with blocked view crossing by a special wireless sensor network (WSN) proposed for the traffic monitoring, concretely for vehicle's detection at places, where it is necessary. Some ultra-low-power TI products were developed due to this reason: microcontroller MSP430F2232, 868MHz RF transceiver CC1101 and LDO voltage regulator TPS7033. The WSN consist of four network nodes supplied with the special safety lightings which serve the function of intelligent traffic safety mirror.

1 Introduction

Traffic monitoring became very important hand in hand with the growing number of registered motor vehicles. Coming out from [1], more than 250 million vehicles are on the European roads and this number still rapidly increasing. And as higher this number is, as higher is the probability of accidents on the roads also. Therefore and mainly in the modern society the traffic monitoring systems are used on the on different parts and parcels road networks, intersections, as well as other intelligent transportation systems (ITS) of nowadays which substitute role of humans. The most used conventional methods utilized for the vehicle's detection are based on the using of video detection cameras or magnetic loops in roadway [2]. These methods have also some disadvantages. Beside that the camera systems are very expensive and the magnetic loops require roadway cut, both methods require external power supply because of their power consumption. Because of it one low-power method for correct vehicle detection is utilization the Earth magnetic field disturbance [3].

frequency to minimize the power consumption of the network during communication and maximization of the network operating range [4].

The place of application can be distinguished by blocked view on actual traffic situation (Fig. 1.) or by specific conditions making the guidance of traffic participants important, as e.g. guidance of blind, visually impaired or elderly people (Fig. 2.).

2 Intelligent traffic-safety mirror

The prototype of a special wireless sensor was developed embedding magnetometer sensor into the particular WSN nodes. The WSN is based on the principle using multi sensing places for sending the information about vehicle's presence into the server station. This approach is in place because of the high power effectivity and low computational requirements of the sensor nodes also. Sub-GHz ISM band was used as the WSN protocol's

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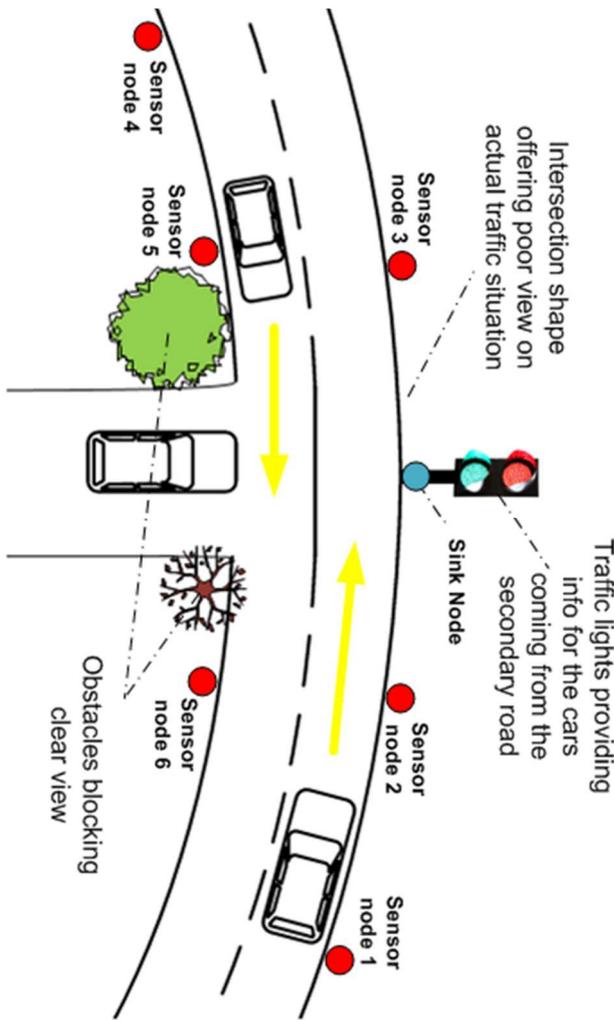


Figure 1 Traffic situation with blocked view

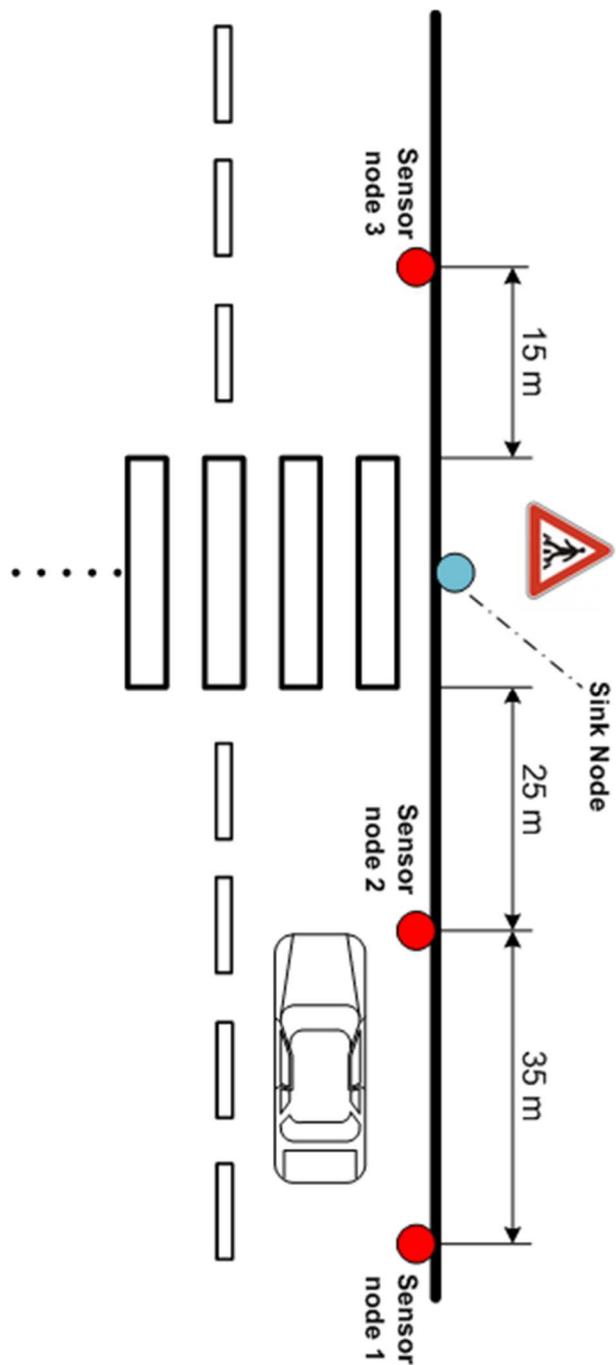


Figure 2 Specific traffic guidance demanding situation

Locations of the WSN sensors are targeted for utilization at the place, where the risks of crash coming out from the blind traffic situation are quite high. Since the placement of safety-mirror is the common method for these kinds of risk direct reduction, the introduced WSN could be then considered as a kind of Intelligent Traffic Safety Mirror since it simulates its functioning by informing the traffic participants about possible crash danger. Developed devices are depicted in the Figure 3.

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Figure 3 Photo of the developed device of solar-energy harvesting system with the lighting signalization

Conclusion

The sensors will be deployed within selected road along the edges of desired testing road with distribution depending up the maximal speed limit applied for vehicles driving within the area. The typical application is situated inside the cities where the maximal speed limit is 50 km/h. WSN consisted of three nodes spaced ca. by 20 meters apart from each other will be sufficient to be implemented for reliable vehicle detection. The network will be able to detect vehicles even exceeding speed limit and driving up to 50 m/s. The WSN could significantly improve traffic safety as the unique platform considering navigation of the drivers at the places where even the usage of traditional traffic safety mirror is unsuitable. Moreover, application of the guidance of physically impaired persons within critical places of city centres is another advantage of the system. It can be concluded that the WSN will provide important mean for the traffic safety improvement necessary for the savings of human lives.

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