

Radar Integration on WSN Nodes for Road Crossing monitoring

M. Vuong

Abstract

The negative effects of roads on wildlife are well documented and the animal mortality because of vehicle collisions is constantly increasing. The problem of crossing-event also constitutes a major public safety concern for transportations especially in mountain regions. Many solutions have been introduced in road facilities to minimize the wildlife-vehicle collisions, mainly based on fencing and crossing structures that prevent ungulates to access the road. Unfortunately, the costs of road upgrades limit a wide diffusion of preventive structures. Therefore, finding reliable and cost-effective methods for collision prevention represents a challenging objective for many wildlife management agencies. The alternative proposed solution deals with a prevention system for wildlife-vehicle collisions based on a sensor/actuator network able to detect the presence of animals in the proximity of the road and to immediately alert the drivers. More specifically, a wireless sensor network (WSN) infrastructure is exploited as a powerful platform for processing data collected from the environment and for the event signaling. The nodes are equipped with radar-based sensors able to effectively detect the presence and the movements of animals (e.g., ungulates) approaching the road proximity. The direction and the velocity of wildlife are estimated by exploiting the Doppler effect to enable a reliable and real-time false alarm detection. Each radar-based device identifies a finite-size warning area along the road path.

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Supervisors: Prof. Andrea Massa, Dr. Fabrizio Robol, Dr. Federico Viani.*