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Smart Sensing System to Prevent Accidents Using IOT

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ABSTRACT: Applications based on animal detection have a very important role in many real life situations. Some of these applications are detection and tracking of animals like elephant in forest for understanding their behavior with the environment, preventing animal vehicle collision on roads. In this paper first we will briefly summarize some of the methods used for detection of animals and then the application of our proposed method based on the sensors for identifying the animal. The proposed method has been applied for testing purpose to prevent collisions from human detection also. The results show that our proposed method is efficient and the system has very low false positive and false negative rates. An overall efficiency of 86.25% is achieved for animal detection.

KEYWORDS: AVCs, FIR, IoT.

I. INTRODUCTION

Animal-vehicle collisions are a major issue for traffic safety. Despite the measures applied to reduce the conflict, the numbers of accidents involving wildlife are still increasing in many European countries. Wild ungulates (mainly roe deer and, in Mediterranean countries, wild boar) are often involved in accidents. The road and environment administrations of the regional government of Catalonia (northeastern Spain) are carrying out a project that includes i) data collection on accidents involving animals, ii) the identification by GIS analysis of spatial clusters of accidents caused by animals (Kernel density estimation), and iii) the design and application of measures to reduce accidents at road hotspots. In 2007, an analysis was carried out of data from 3,057 accidents involving ungulates registered in the period 2000-2006. The data have now been updated and 6,123 animal-vehicle collisions registered from 2007 to 2011 have been analyzed. The effectiveness of measures applied at several hotspots that were identified 5 years ago has also been evaluated. Some of the most effective measures to reduce the conflict have been the construction of wildlife passages combined with perimeter fences along main roads. However, these measures are frequently not applicable to secondary roads with low traffic intensities, where signs to raise awareness, speed limits or verge management have been introduced. Nevertheless, there has not been such a great reduction in the number of accidents involving wildlife on secondary roads. A strategy for the management and reduction of the risk of animal-vehicle collisions must focus on stakeholders as well as on measures applied to roads. Traffic police who register accident data could help to improve the collection procedures that are the basis for correct identification and prioritization of the most conflictive points. Environmental administrations dealing with big game species and hunters must also be involved, as the management of deer and wild boar populations can also help to reduce the conflict. Transport and environment authorities take part in the design of local measures to be applied at the most conflictive points. Last but not least, drivers are key stakeholders because their awareness and behavior is a strategic factor in avoiding collisions. A new collaborative approach is the basis for improving practices to mitigate the conflict in the network of secondary roads. Sharing knowledge can help to identify the most innovative solutions. In addition, communication campaigns can contribute to achieving driver cooperation.

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II. RELATED WORK

The proposed system in [1] is trained on more than 2200 images consisting of positive and negatives images and tested on various video clips of animals on highways with varying vehicle speed. As per the two-second rule, our proposed method can alert the driver when the vehicle speed is up to 35 km/h. Beyond this speed, though the animal gets detected correctly, the driver does not get enough time to prevent a collision.

In[2]The main contributions of this paper include: world's first vehicular animal detection system to reach the customer market, an efficient classification approach based on a cascade boosting concept which is robust to occlusion, pose and scale variations, a large database of thousands of hours of far infrared (FIR) video data recorded worldwide including several hundred thousand example images of animals in traffic situations, a tracking approach to handle animal movement and estimate animal states, a validation approach to efficiently reduce the number of false detections and human-machine interface(HMI) and warning concepts to highlight animals at risk of collision.

The detection and tracking of moving pedestrians from near-to-far ranges is investigated in [3]. The proposed system is composed of two identical cameras. The first camera is equipped with a short focal length lens to detect and track pedestrians in near-to-mid range, and the second camera with a long focal length lens is used to detect and track pedestrians in mid-to-far range. The tracking process is applied after the detection, and it is used to track and predict the future motion and direction of pedestrian. To prevent vehicle-target collisions, two algorithms that generate alert and danger warnings are developed.

In [4], Camera sensor systems are attached in the trees which act as a camera-trap to detect the animal motion. A short image sequence of the animal appearance is recorded with the help of sensor data such as moisture, temperature, light level and GPS sensor data.
In [5], Stationary cameras are installed on both side of the road. When the camera senses an animal it alert the driver by flashing sings installed on roadside. The camera can be installed inside the vehicle so that the flashing signs are not necessary.
In [6], Location history finder works by deploying 3efficient methods namely location API, Hardware GPS, Retrieving last known location from the lost phone which will be saved in the device. According to the testing results location API is found to be the more quick, battery efficient and accurate.

In[7], this use the Accidents2014 and Casualties2014 datasets. After cleaning the data, and get rid of the missing values in our datasets have converted them into ARFF format in order to be able to use them in WEKA.

Researchers in [8] tried to discover an animal's presence in the scene (image) affecting the power spectrum of the picture. This method of animal detection was also considered not appropriate since quicker results with this approach would involve massive amount of image processing in a short period.

III. EXISTING SYSTEM

In the existing system the drivers are able to identify the animals by using the night vision infrared cameras. And to prevent the collision we are manually using the break system to avoid hitting from animals. In this existing system accidents may occur sometimes if the driver is not in proper condition.

IV. PROPOSED SYSTEM

In the proposed system the sensors in the cars will identify automatically and it prevents the collision by the help of relay driver it makes the car to slow down.Accidents due to animals will become less. Animals will not be hitting while crossing the roads.

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V. BLOCK DIAGRAM

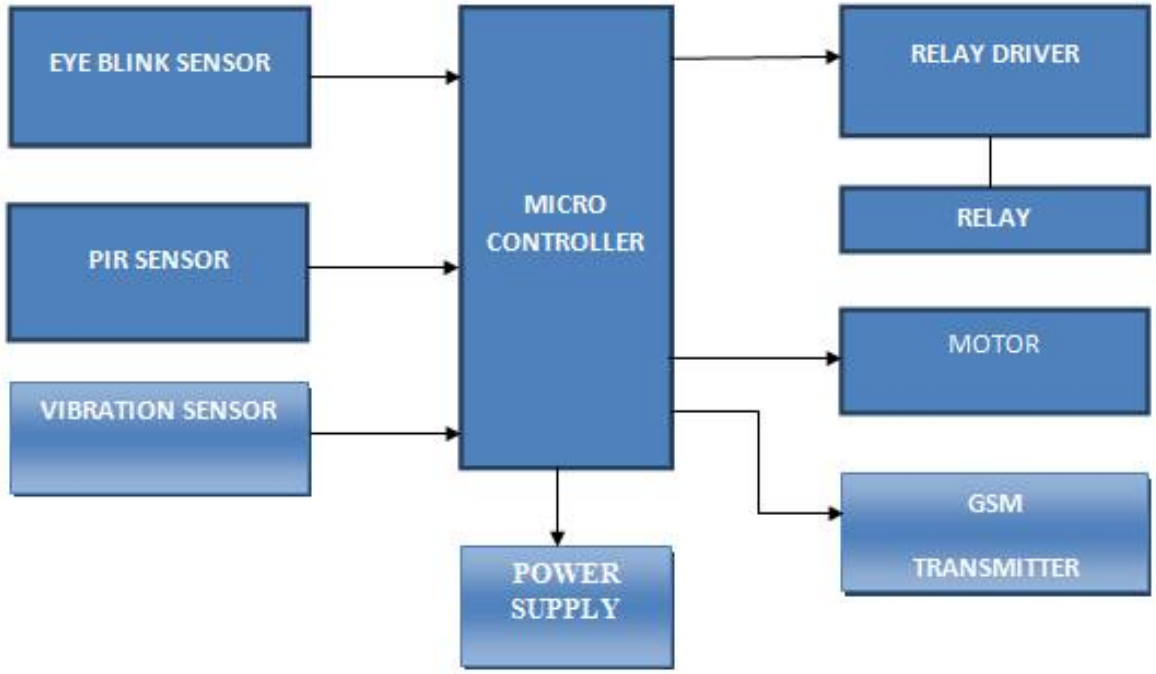

FIGURE 6.1 TRANSMITTER

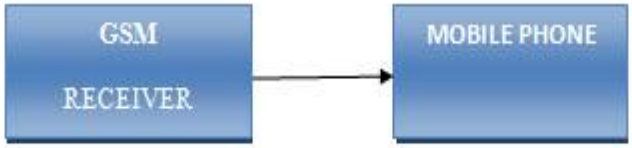

FIGURE 6.2 RECEIVER

VI. CONCLUSIONS

Animal Vehicle collisions on highways can be reduced by improving or installing suitable perimeter fences, and constructing wildlife crossings or adapting existing structures. However, a cooperative strategy is essential to achieve the goal of reducing the number of accidents involving wildlife on secondary roads, where the magnitude of the conflict is greater. A crucial step for success is to integrate the positions of road, traffic and policy managers with those of big game managers and hunters. Drivers and insurance companies are also important stakeholders who should be involved in action plans to reduce the number of AVCs. Working together will contribute to better understanding of the problem

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and to sharing knowledge to identify the most effective measures. The improvement and integration of data collection is a key step in the whole process, as it is the basis for determining which stretches are most conflictive. Mitigation measures can then be focused on these stretches to ensure that the actions are cost effective. Data collection is also the basis for evaluating the effectiveness of implemented actions. Road managers are responsible for leading the process and coordinating the actions of the stakeholders. Periodic workshops must be organized to exchange information, improve data collection and identify the most effective mitigation measures. This is essential for the process of adaptive management of the conflict and continuous improvement, which will help to achieve the common goal of increasing road traffic safety and reducing wildlife mortality.

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