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INTELLIGENT WILD LIFE ALERT SYSTEM

VISEVER

Pol. Industrial C/A # 50
02600 Villarrobledo (SPAIN)
Phone: +34 967 145 162
E-mail: visever@visever.com

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1. INTRODUCTION

The aim of this report is to highlight the most relevant factors of the wildlife deterrent beacon designed by VISEVER specifically designed to reduce or avoid vehicles-animals collision.

Frequently on conventional and inter-urban road, as there is no perimeter enclosure of the infrastructure, there is an existing risk of accident involving vehicles and animals. The main factors of these collisions are, on the one hand, the vehicles driving speed and on the other hand the lack of reaction time of both road users and animals.

In some sections of the roads the vegetation is very close to the road, which reduces visibility and therefore the early detection of possible fauna that may exist. This delays the reaction time of both the driver and the animal itself.

The purpose of this beaconing system is to increase the road safety and to preserve the existing wildlife around our roads, to this end, a warning system has been designed both for the driver attention and for keeping the animals away from the road.

1.1. SCOPE OF APPLICATION

This Intelligent Wildlife Alert System is installed in areas that have been detected as wildlife crossings where, in addition to the intensity of traffic, numerous animal accidents have been recorded.

In most of cases the collision end with animals' lives, in some accidents there are serious human injuries or deaths adding material damages. Our idea was to mitigate these damages and to create a different way of interaction between drivers and animals on the road.

1.2. ROAD CRASHES WITH ANIMALS' DATA

In Spain, in 2022 there were 35,661 accidents involving vehicles and animals, 86% were in inter-urban roads. There was a total of 505 victims, 2 of them mortal victims (both motorbike riders). The most common animals in these accidents were wild boar (40%), dogs (13%) deer (12%). (*1*)

In Europe, animals' collisions are a serious road-safety problem with a significant economic and environmental impact. Most accidents with wildlife are caused by ungulates and can reach up to 500,000 accidents per year, with an average of 30,000 personal injuries and 300 fatalities with costs up to $1 billion. A 2011 study in Great Britain, showed that there are in average 42,500 to 74,000 accidents/year, 550 human injuries and 12 human fatalities per year with cost around €25 million per year(2).

(1) DGT Spain – 2022 Report on Wildlife accidents

(2) ENVEROS EU – 2019 Report on Wildlife Vehicles collisions

2. BACKGROUND AND CONDITIONING FACTORS

2.1. FIELD SURVEY

The Institute for Wildlife Research (IREC), The University of Castilla La Mancha and VISEVER carried out a joint study evaluating the animal's behavior towards our deterrent beacon to avoid accidents on the road. *(Annex 1 – IREC University Research).*

The study was carried out on a farm in Montes de Toledo (Spain), with a medium-high density of fauna, mainly deer (approx. 30 ind· Km-2).

From this survey it can be concluded that:

- Analyses of beacon effectiveness and probability of crossing, as well as habituation, suggest that beacons are activated once the animal has come within 13-17 m of the beacon and only when there are vehicles approaching to its sector.
- The animals react with a probability of deterrence above 60%. The probability of the animal crossing onto the road is significantly reduced.

2.2. OTHER SYSTEMS ON THE MARKET

There are other wildlife detection and deterrence systems on the market, but Visever's system is the only one that acts in two directions, one directed to the road surroundings deterring the animal through light and sound signals and the other in the road platform direction warning the driver of the real point where that movement has been detected, reducing the possibility of an accident occurring.

Another aspect that distinguishes Visever's system is that it is the only one that has been objectively field tested by an external institution specialized in animal's behavior.

Other diverse systems that have been used for many years, such as reflectors, fencings, sound systems, mirrors and underpasses of which there are no tests carried out and according to the facts, of being quite ineffective.

3. SYSTEM DESCRIPTION

This beacon has been designed with the intention of alerting the animals in advance, so that it has time to react and leave the road, thus avoiding its collision.

3.1. WILDLIFE DETERRENT BEACON

This beacon is composed of a motion detector, a red LED spotlight, a white LED spotlight, three ultrasonic speakers, a wireless transmitter, a battery and a solar panel for autonomy.

The beacons are installed on both sides of the road with a separation between them of 20 meters and connected each other by infra-red ray. The beacon is activated and emits the signal by the presence of an animal within

the detection field of the motion detector. It opens 160º and has an effective activation radius ranging from 13 to 17 m. With these characteristics, using a separation between beacons of 20 m completely covers the front through which animals can access the roads. It is made of PU material to reduce the damages risk in case of vehicle crashing.

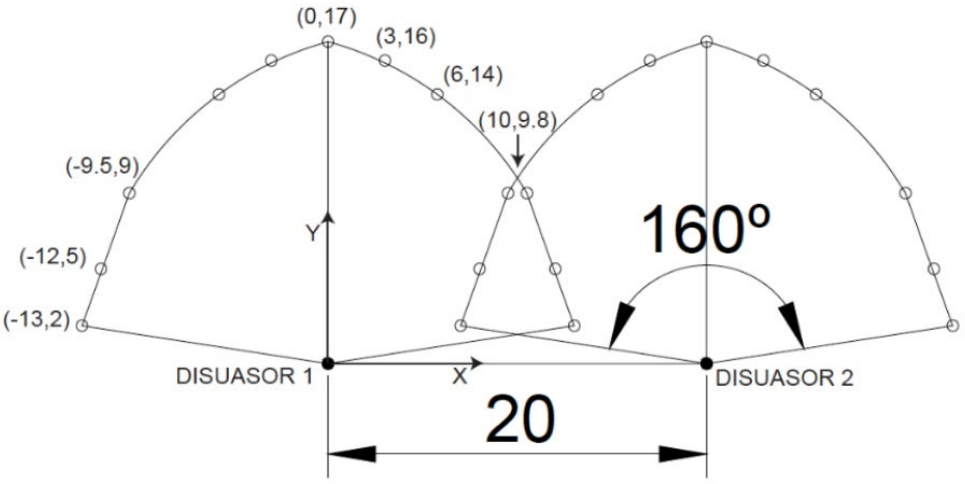


Image 1. Diagram of the activation zone

3.2. MASTER CONTROLLER

Beacon's master controllers are installed at both sides of the section, at a distance of between 150 – 200 m from the first wildlife deterrent beacons. These controllers have wireless equipment to communicate with wildlife alert system, a battery and a solar panel for self-autonomy.

3.3. OPERATION

The master controllers are responsible for vehicles detection, when vehicles are entering the protection section, they will activate the system. These controllers are located at between 150-200 m from the first wildlife deterrent beacons, placed on the warning traffic sign of the wildlife control section.

Once the vehicle is detected and an animal aims to cross the beacons line the controller will activate the wildlife alert system which will generate a sequence of infrasounds and flashes of lights that will scare the animal away whether it is in the road surroundings (preventing it from crossing) or if it is inside the road.

Also in this way, the driver, upon seeing the flashes of lights, will be warned of a potential danger and will take precautions.

Once it has been detected that there is no vehicle within the protection sections, the system will be turned off, allowing the animals to cross the road without risk of collision avoiding animals get used to the warnings and losing its effectiveness.

Image 2. System Operation

3.4. WIRELESS TELEMETRY

The wildlife deterrent beaconing system has a wireless telemetry system which allows its operation to be controlled remotely. To do this, it has a specific app developed by VISEVER to install it on mobile phones and tablets.

Through this app, it is possible to:

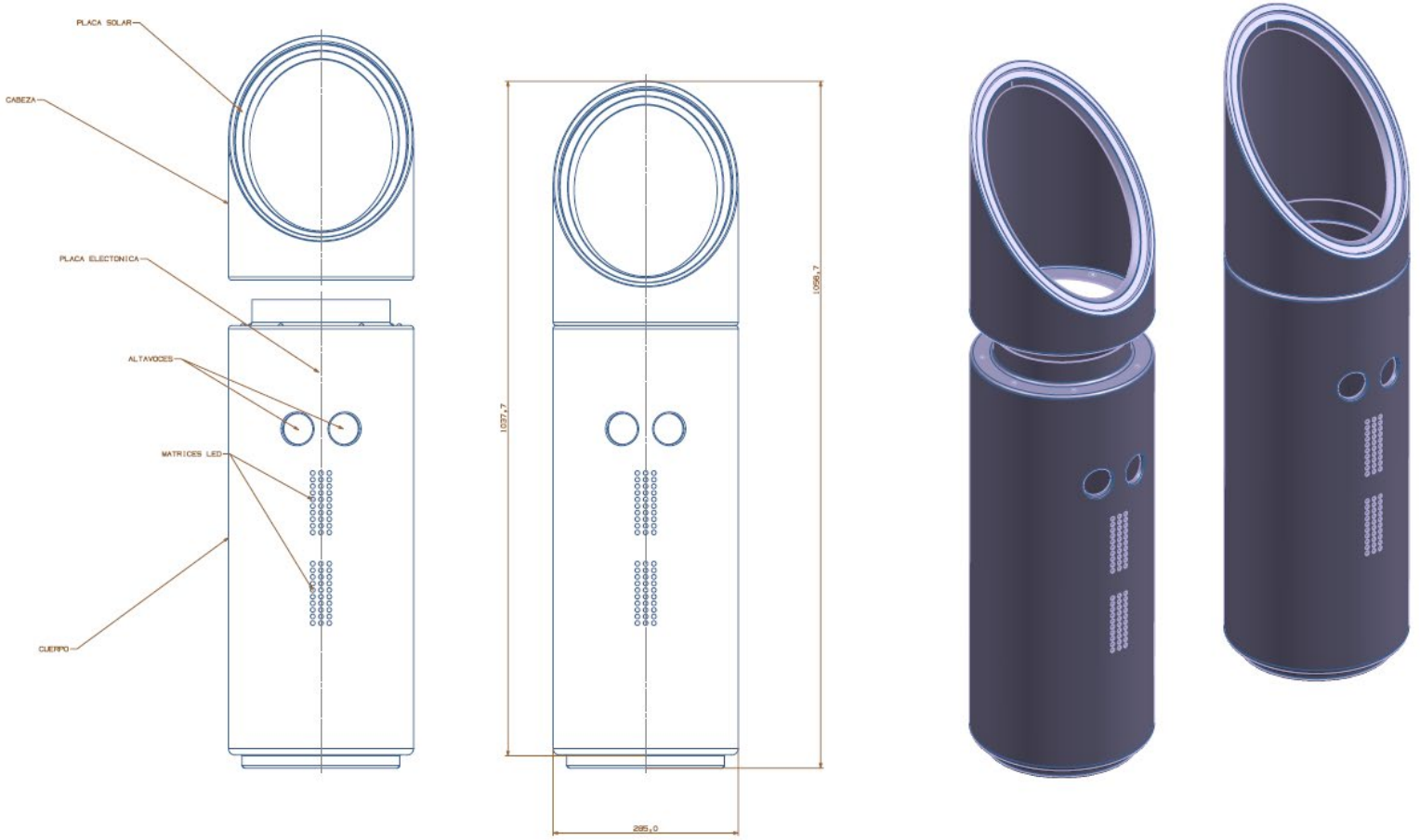
- Monitor the installation in real time.
- Configure system settings.
- Conduct periodic system reviews.
- Check the status of the battery and solar panel.
- View data on operating hours, as well as temperature and humidity.
- Download this data in an Excel file to generate a control database.

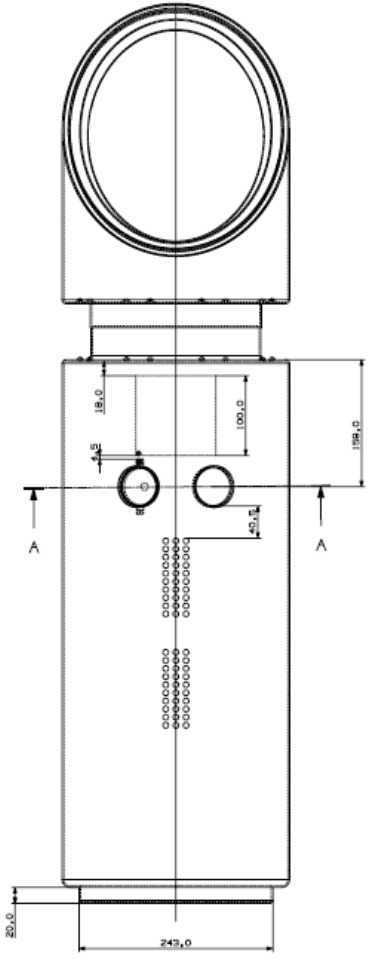
3.5. ADVANTAGES

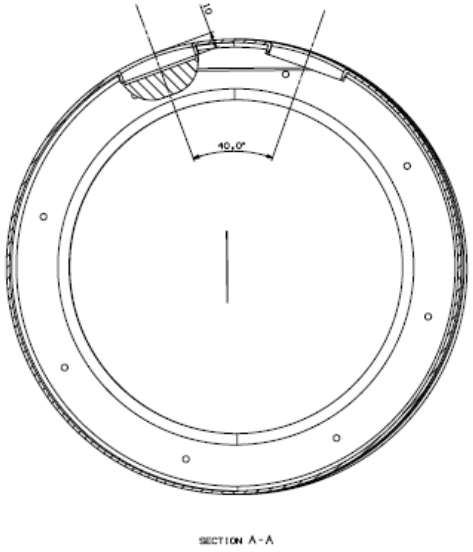
- The system is only activated when vehicle and animal come together in the secured road section. In this way, the transit of the animals is avoided. It is also possible to prevent them from not getting used to the system, avoiding lowering the effectiveness or creating a longitudinal barrier to the road, causing the animals to move to another area to cross it.
- This system has two strategically located speakers which emit a variable sequence in times, frequencies and amplitude that together with the flashes of light make the entire system very effective.
- The system has been tested and an IREC study is available that certifies its effectiveness.
- The entire development of the system is original and has been developed expressly by VISEVER.
- A specific solar panel has been designed for this system.
- An addressable housing has been designed to be able to orient the solar panel in the best direction.
- All the necessary spare parts for maintenance are available.
- System updates and upgrades are guaranteed.
- A specific mold has been designed for this system.
- The electronic system is made up of several state-of-the-art microcontrollers, which means that it is an intelligent equipment.
- The entire system has a wireless telemetry system for management and control. All installed devices can therefore be controlled remotely from a control centre and via an app.
- With this application, the operation and maintenance of each piece of equipment can be monitored daily, in real time.
- If any of the wildlife beacons fail, the rest will continue to operate normally, as the beacons have an independent system.

- The system has two ways of working: "Controlled Mode" and "Auto Mode". Under normal conditions, the system operates in "Controlled Mode", i.e. it is activated and deactivated when necessary. On the other hand, in "Auto Mode", the system is always activated.
- These two ways of operating the system "Controlled Mode" and "Automatic Mode" make the system totally reliable and safe, ensuring that it always works.

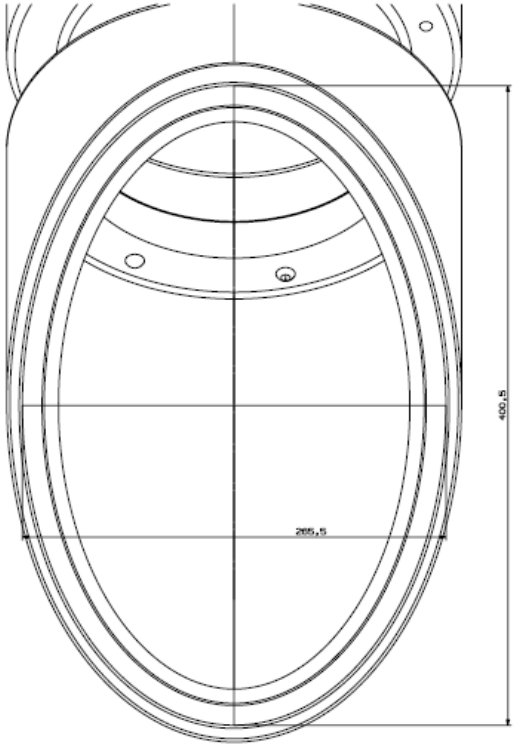
4. DRAWINGS


PLACA SOLAR
CABEZA
PLACA ELECTONICA
ALTAVOCES
MATRICES LED
CUERPO
1037,7
1059,7
295,0



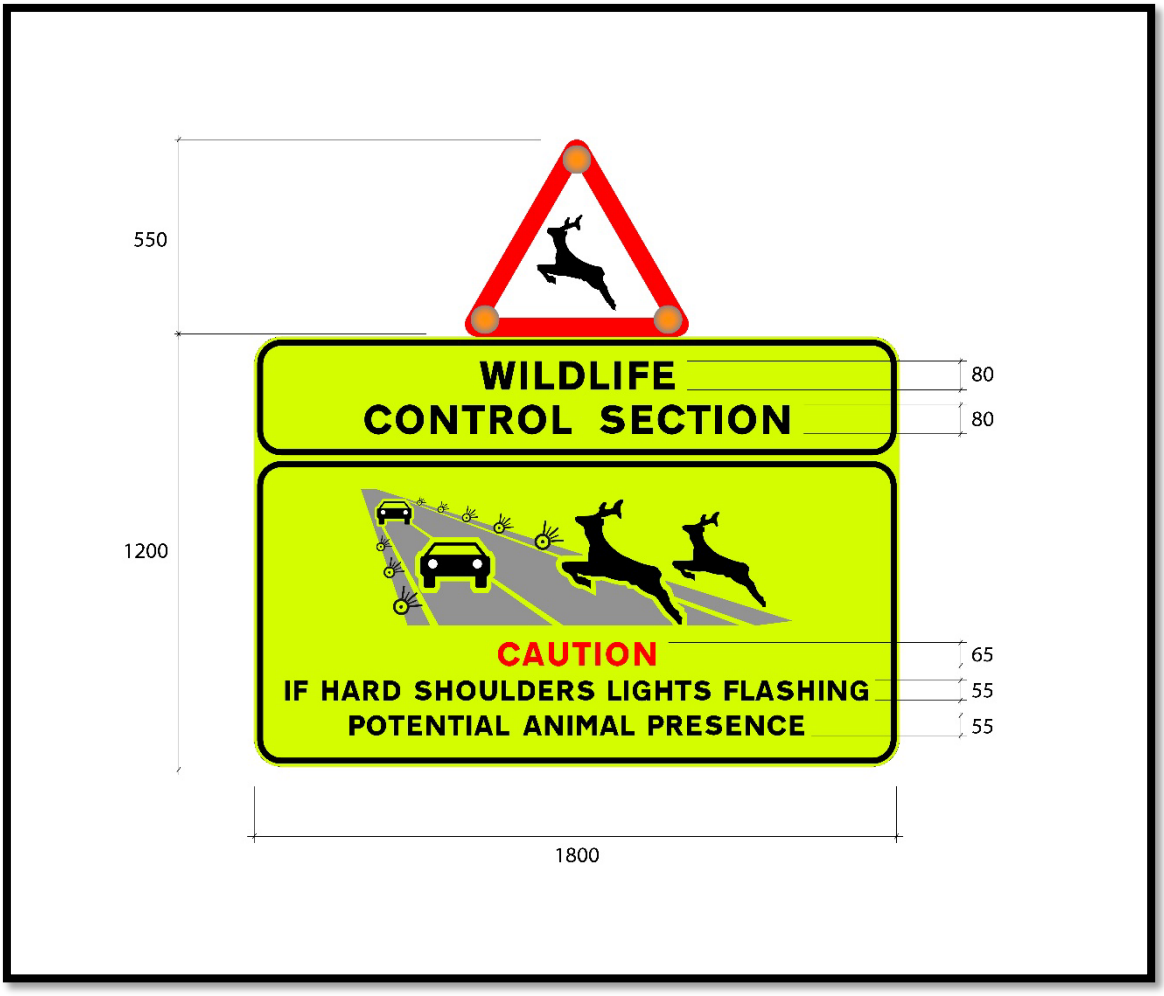


SECTION A-A



PROYECTO :	Cartel flúor - proximidad animales salvajes. Pedido Carlos (15-07-21)
CARTEL :	Cartel 001 - Modelo 007
DIMENSIONES :	1800x1200
COLOR FONDO :	Flúor 2,160m²
ALFABETO :	CCRIGE
Hb :	80
ANCHO ORLA :	17
RETRORREFLECTANCIA :	RA3-za
SOPORTE :	2 x 3300mm - IPN 100
ZAPATA :	2 x 400x1600x400 - Hormigón HA25
ESCALA :	1 : 20

Visever


550
WILDLIFE
CONTROL SECTION
80
80
1200
CAUTION
IF HARD SHOULDERS LIGHTS FLASHING
POTENTIAL ANIMAL PRESENCE
65
55
55
1800