Abstract

Road kill is a problem. In America, there are about 1.5 million car accidents every year from deer alone, according to AAA. With new car technology like radars, thermal and infrared cameras, the car will be able to detect animals and alert driver based on criticality.

Companies like Volvo and Autoliv are incorporating animal detection systems into their models for car safety.

<https://www.fredericksburg.com/news/transportation/drivers-beware-it-s-deer-season-on-the-roads/article_122b0572-2236-54c0-b667-07af4bb95999.html>

Our Solution

**Animal Detection and Collision Avoidance System using Thermal Camera**

Our system allows drivers to see farther than automotive headlights and highlights the animals in or near the roadway that can be in danger of causing a collision. It detects animals instantaneously by matching a detected heat signature with a library of proprietary algorithms (ML). When an animal is detected, an alert is given on HUD based on animal location and orientation, its proximity to road, vehicle speed, steering angle and other factors (stable/moving, direction of movement, type of animal).

It takes about \_\_\_\_ milliseconds for a single reflex blink of the human eye and the system detects pedestrians and animals in \_\_\_\_ms.

**The goal of our idea is to flawlessly detect every potential threat and identify the difference between, say, a deer running toward or away from the car, and alert driver or take precautionary measures.**

Features

* 3 level of HUD alert (animal present, animal moving towards road, animal on road) (Not present in Autoliv based system)
* Can detect animal present in moderate grasslands (Volvo does not have prior alerts)
* Monitors animal activity and prior alerts.
* For Large and small animals (Volvo only for large animal)

Limitations

* Need to work with ADAS team for integration with existing infrastructure.
* Thermal Camera cost may rise. (Alternative will be sensor fusion of night vision camera and radar)
* Animal at other side of road crest.
* Animal type and its activity can’t be detected if it is standing facing against camera line of sight.

Why Thermal camera?

TBD

Business Impact

1. **How quickly and effectively it can be taken to the market**

Animal detection system will be CANbus based ECU to integrate it with existing CAN system. The diagnostic message will take CAN route to HUD.

Navdy needs to accomodate a special alert icon for animal detection diagnostic message.

1. **How different it is with respect to the product/solutions in current market**

Volvo has started delivering car with large animal detection in 2019 that is based on radar system. Our system will take advantage of thermal imaging. This will help us detect animal in roadside bushes. Also our system will work better for small animals.

1. **How it will add value to HCS current offerings**

Our system will help Harman infotainment users at night-time journeys.

It will help to reduce the number of animal collisions which cost the United States alone over \_\_\_\_ billion dollars.

<https://www.fhwa.dot.gov/publications/research/safety/08034/exec.cfm>

Solution Completeness

1. **The amount/quality of thought given to architecture and design**

Thermal Imaging --------| CANBus

|-----------ECU-----------------OBDII---------HUD

Radar ------------------|

1. **How the solution fits within Harman's ecosystem**

**TBD**

1. **How it can be realized in real world**

**TBD**

1. **Roadmap depth**

* Selection of hardware
* Designing ECU for camera/radar data acquisition and processing, and connecting to existing network with CANBus
* Fool-proof animal detection algorithm development and training.
* HUD alert GUI development
* The camera has to be exposed to nearly 100,000 hours of rigorous environmental testing to guarantee the highest quality and reliability of our application.

\*\*\* NOTE: Provide timelines

1. **Benefits to Harman**

Our system will help Harman competitive edge over existing animal detection and collision avoidance system.

Help Harman infotainment user safer journey.

It will help to reduce the number of animal collisions which cost the United States alone over \_\_\_\_ billion dollars.

PoC Completeness

1. **Scope of the PoC and how well it has been implemented**

PoC is done on existing sample road travel videos using ML. It can implemented as shown in roadmap.

Team Collaboration

**TBD**

Demos:

1. **Presentation/artifacts demonstrating the solution completeness based on the evaluation criteria’s.**
2. **Software artifacts demonstrating the PoC.**

Questions to prepare

1. **Who could be potential buyer for a product based on this idea?**

North America and Europe market.

1. **How much do you think would a buyer be willing to pay for this product?**

The average cost of a collision is estimated to be $1,840.

Our system will cost less than $1840.

<https://ruralsafetycenter.org/wp-content/uploads/2018/03/CC1.pdf>

1. **Are there any products of similar nature in the market today?**

Yes. Volvo and Autoliv

1. **Do you see any synergy with any of the existing Harman products? If yes, which product and how?**

Harman's Enhanced ADAS Sensing technologies which was showcased in CES 2019 event.

Sensor fusion of on board radar with help fine tune decision making algorithm.

<https://news.harman.com/releases/harman-announces-enhanced-adas-sensing-technologies-to-improve-safety-at-ces-2019>

1. **Which all (companies) are using such technology in Automotive domain and how they get benefitted?**

Volvo - Radar based.

Autoliv - Night vision based.

1. **How can this be easily adopted in Harman (share it if this idea is already present in HARMAN, then how it differs from what they are presenting?)**

Not found in any of the Harman's system. Moderately difficult to adopt. Need to collaborate with ADAS stakeholders.

1. **How easily this solution can be adopted in different platforms ( Android or Linux based HU)**

The software modules are written in python and some in c++ (future). Hence it can be easily adopted in Linux based system.

Note

If the team is not able to demonstrate in real time, then they should create a Technical Proposal/Design to support their PoC end to end.