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# Use of Innovative Device for Controlling Wandering Animals to Enhance Road Safety

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**Abstract:-** One of the important aspects of vehicular security is controlling the wandering animals on highways to avoid road accidents. The proposed invention provides wandering animals controlling system that consists of sensors such as cameras and infrared detectors strategically placed along the roads. These sensors detect the presence of wandering cows within their range. The information collected by these sensors is then transmitted to a central control unit. The central control unit processes the sensor data and triggers appropriate actions to prevent accidents. It communicates with warning signs equipped with LED lights and audible alarms, placed at strategic locations along the road. When a wandering cow is detected, the warning signs are activated to alert drivers of the potential hazard ahead. Additionally, the control unit can interface with barriers or gates that can be automatically activated to restrict animal movement and prevent them from entering the road. By employing this device, the aim is to enhance road safety by providing timely warnings to drivers and implementing measures to control the movement of wandering cows, ultimately reducing the risk of accidents caused by encounters with these animals.

**Keywords:** IoT devices, Vehicular Security, Road Safety.

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## 1. Introduction

The problem of stray animals, causing traffic blockades and accidents on city roads, is increasing day-by-day due to the lackadaisical attitude of the administration towards the issue. Stray cattle roaming around freely in the cities have become a serious problem. The research survey indicates that so many human animals have lost their life and many of them are injured due to accidents involving stray cattle [1]. In the rapid increase in construction of the road in between forest and wild animal dense areas, it became very difficult for the driver to ride. Various animals cross the road. Sometimes the driver may not be able to spot the animal, which sometimes leads to a fatal accident [2]. Herds of cows can be easily spotted on various roads and inner parts of the city. The situation turns all the worse at night when it becomes difficult for the drivers to spot the stray animals due to darkness.

The road side infrastructure consists of sensors such as cameras and infrared detectors strategically placed along the roads. These sensors detect the presence of wandering cows within their range. The information collected by these sensors is then transmitted to a central control unit. The central control unit placed at appropriated location or traffic control unit then analyzes the sensor data and triggers appropriate information or actions to avoid accidents.

The innovative device is in the form of belt that can be worn to the neck of the cow and it has a small image sensor like a camera which can continuously track the place where the cow is and once it starts to move. When the camera sensor identifies that the animal is near the approaching road side, it detect the same and trigger it to Central Control Unit for further action or to give intimation to driver. At the same time the belt release a sound frequency in an intermittent gap which will cause the cow to move away from the road and not to move ahead. The belt can be used for farm animals and other types of animals which can cause road accidents.

This innovative belt has multiple sensors including temperature sensors, skin response sensors, blood volume pulse identification, image sensors which tracks the movement of the animal along with the mechanism if the animal is in a normal mode, whether it is agitated or angry such that it can make a run on to the road and cause an accident. At night, all the LEDs in the belt will light up, so that it helps the vehicle driver to identify the animal and he/she can control the speed of vehicle to avoid further accidents.

## **2. Literature Review / Background**

Wandering cows and stray cows are a frequent cause of road accidents in cities, where they crowd roads. Cow attacks on pedestrians and vehicles often become deadly. Stationary cows on the road are a cause of frequent deadly road accidents in India. In Tiruvallur city which is an Indian state of Tamil Nadu., in 2022, emergency braking by a semi-truck driver to avoid a collision with stray cattle on the road caused a multiple-vehicle collision which killed one driver. Most of the accidents related to stray cattle on the roads occur at night, when it is harder to see the animal on roads with insufficient lights.

A stray cattle grid or cattle guard, or cattle grate or vehicle pass or stock gap are the different synonyms used for these wandering animals; Texas gate in western Canada and the northwestern United States; are types of obstacle which causes the road accident. The wandering animals such as cattle, sheep, horses, pigs, are passing along a road or railway which crosses the boarder or fencing applied on the roadside. It consists of a depression in the road covered by a transverse grid of bars or tubes, normally made of metal and firmly fixed to the ground on either side of the depression, so that the gaps between them are wide enough for an animal's feet to enter, but sufficiently narrow not to impede a wheeled vehicle or human foot. This provides an effective barrier to animals without impeding wheeled vehicles, as the animals are reluctant to walk on the grates.

Cattle grids are usually installed on roads where they cross a fenceline, often at a boundary between public and private lands [3]. They are an alternative to the erection of gates that would need to be opened and closed when a vehicle passes, and are common where roads cross open moorland, rangeland or common land maintained by grazing, but where segregation of fields is impractical. Cattle grids are also used when otherwise unfenced railways cross a fenceline. Cattle grids are common worldwide and are widespread in places such as Australia, the Scottish Highlands, or the National Parks of England and Wales. They are also common throughout the Western United States and Canada. In the United States, they are often used on Bureau of Land Management and Forest Service land, but are also used on paved roads and entry and exit ramps of the Interstate Highway System in rural areas.

However, there still exists a dire need to provide a system that controls the wandering cow, monitors the wandering cow and triggers an appropriate action for/against the wandering cow to enhance road safety which otherwise is a cause of frequent deadly road accidents

## **3. Methods**

The proposed system is made regarding a belt that can be worn to the neck of the cow and it has a small image sensor like a camera which can continuously track the place where the cow is, once it starts to move. If the camera sensor identifies that the cow is near the approaching road side, it will release a sound frequency in an intermittent gap which will cause the cow to move away from the road and not to move ahead. The sound will try to generate fear in the cow with sound in intermittent gap such that it does not harm the animal, and in addition, it will keep the cow away from the road. The camera sensor will only start once the cow starts to move. If it is stagnant in a sleeping or standing position, it will not be activated, thus saving power.

This innovative belt has multiple sensors including temperature sensors, skin response sensors, blood volume pulse identification, image sensors which tracks the movement of the animal along with the mechanism if the animal is in a normal mode, whether it is agitated or angry such that it can make a run on to the road and cause an accident.

The invented belt has multiple sensors and LED to indicate whether the emotion of the animals is normal or not. All the LED will light up if the animal is in anger mode and it is about to make a run such that the vehicle users can control the speed of the vehicle to Avoid accidents. The belt has a tracker to keep track of its movement and surveillance of the surrounding area and the cow's location

Further the belt is equipped with LED to glow using Solar powered to notify the vehicle drivers on the road about the cow's movement near the road. It use a Global Positioning System (GPS) to find out the location or position of the animal. The end user can monitor the location or position of the animal and the different devices are used to prevent the animal from entering on the road or restricted area. The animals can also be trained to control their behaviour and should not enter on the road. It provides a wandering cow controlling system that consists of sensors such as cameras and infrared detectors strategically placed along the roads. These sensors detect the presence of wandering cows within their range. The information collected by these sensors is then

transmitted to a central control unit. The central control unit processes the sensor data and triggers appropriate actions to prevent accidents. It communicates with warning signs equipped with LED lights and audible alarms, placed at strategic locations along the road.

When a wandering cow is detected, the warning signs are activated to alert drivers of the potential hazard ahead. Additionally, the control unit can interface with barriers or gates that can be automatically activated to restrict cow movement and prevent them from entering the road. By employing this device, the aim is to enhance road safety by providing timely warnings to drivers and implementing measures to control the movement of wandering cows, ultimately reducing the risk of accidents caused by encounters with these animals.

The system includes one or more sensors positioned along a street, wherein the one or more sensors are configured to detect presence of at least one cow in its nearby proximity; and a central control unit communicably coupled to the one or more sensors, the central control unit is configured to retrieve data associated with the detected presence and processes the retrieved data associated with the detected presence and trigger the at least one action based on the processing performed.

It includes the one or more sensors are selected from any or a combination of a camera, an infrared detector, or a light detection and Ranging (Lidar) sensor. One or more sensors of the system transmit the detected presence, to a central control unit. The central control unit communicates with one or more warning signs equipped with LED lights or audible alarms positioned along the street to activate at least one of the LED lights or the audible alarms to alert drivers of the potential hazard ahead.

The central control unit communicates with one or more barriers or gates positioned along the street to activate at least one of the one or more barriers or gates to restrict cow movement and prevent the at least one from entering the road. The main use of central control unit is to communicate with one or more electronic devices located on body of one of the cow that is configured to provide a stimulus to at least one cow to reduce the relative position. The device used having the ability to provide vibration, an electrical shock, and a noise. The proposed device can use other types of devices or sensors to provide the monitoring feature of animal and controlling them to cause the road accidents.

#### **4. Results**

The proposed innovative device or belt for controlling wandering animals consists of the sensors and electronic devices for monitoring the movement of animal's equipped with battery saving feature as shown below.

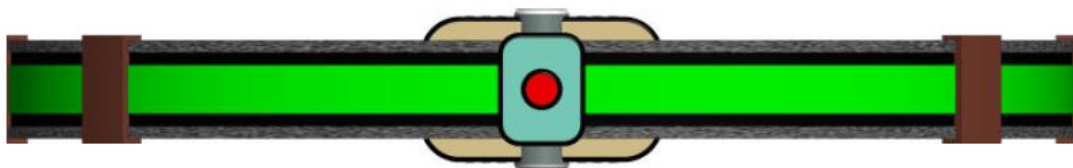


Diagram A: Top View of belt

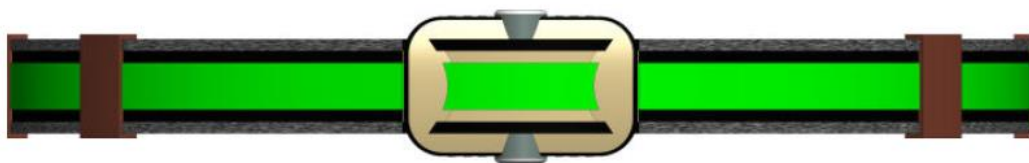


Diagram B: Bottom View of belt

The above two diagrams A and B shows the Top View and Bottom View of the wandering animal controlling device belt.



Diagram C: Front View



Diagram D: Rear View

The above diagrams C and D shows the Front and Rear view of the wandering animal controlling device belt. It shows the use of camera sensors used from both the sides of belt front view as well as rear view making these views of similar kind.

## 5. Conclusion and Future Work

The proposed system provides a wandering animal controlling system that consists of sensors such as cameras and infrared detectors strategically placed along the roads. These sensors detect the presence of wandering cows/animals within their range. The information collected by these sensors is then transmitted to a central control unit. The central control unit processes the sensor data and triggers appropriate actions to prevent accidents. It communicates with warning signs equipped with LED lights and audible alarms, placed at strategic locations along the road. When a wandering cow is detected, the warning signs are activated to alert drivers of the potential hazard ahead. Additionally, the control unit can interface with barriers or gates that can be automatically activated to restrict cow movement and prevent them from entering the road. By employing this device, the aim is to enhance road safety by providing timely warnings to drivers and implementing measures to control the movement of wandering cows, ultimately reducing the risk of accidents caused by encounters with these animals.

In future, the work can be extended so that the invented belt can be used for farm animals and other types of animals which can cause road accidents. In addition, it can also be programmed to restrict the animal from moving towards different farms to stop the damage. The proposed device and method can be used with any type of animals like pet animal such as a dog, a cat, or a bird. It can also be used with farm animal such as bulls, a cow or a horse. It can also be applicable to zoo animals or a child or a person with mental disabilities.

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