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A WEARABLE FOR CATTLE

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Abstract: As we know that on the west side they are already using IOT technologies like Wearables, Artificial Intelligence in poultry, dairy, farming etc. With the use of IOT people can improve their outcome (increase in milk production and egg production) and the quality (health of animals, milk, low rate of loss). This kind of implementation is not yet being utilized in India, which is among the biggest producers in the field of dairy, poultry, and farming. One of the most commonly seen situations on Indian roads is cattle/Livestock roaming on the road which creates traffic issues and may sometimes be responsible for accidents. In this paper, we are trying to propose a product called "Cattle Wearable" Which is a GPS device for tracking each animal individually. This device can help farmers to find their lost animal easily, it can help to notify farmer whenever there is a road block due to cattle. With this tracking system, we can help Google to notify driver about the condition of a route more effectively to avoid delay or any unknown dangers. By collecting the Realtime location information we can track the behaviour patterns in Cattle and may also be able to get some new unknown information using Machine learning concepts.

Keywords: IOT technology, wearables, Machine learning, Artificial Intelligence, GPS tracking.

I. INTRODUCTION

What is a Wearable?

Wearable's (a device which we can wear on the body as an accessory or as a cloth) are smart electronic devices with microcontrollers that can be worn on the body as implant or accessories. The designs often incorporate practical functions and features.

Wearable devices are best examples of IOT, things such as electronics, software, sensors, and connectivity are attributes that enable objects to share data through the internet with a maker, operator and/or other connected devices, without requiring human intervention.

What is a Cattle Wearable?

While the whole market in wearable technology is focused on producing human wearable devices, there are few people focusing on developing wearable tech for other than human beings. Just like a regular wearable device, a cattle wearable also helps us in location tracking, health monitoring etc.

II. TYPES OF WEARABLE DEVICES FOR CATTLE

There are many types of wearables available for cattle in the market, let us see few of them:

1. E-Tags to monitor body temperature
2. E-Pills to track Health Data
3. Cow collars to detect estrus
4. Electronic identification earrings
5. Solar powered GPS tracker (E-Cow Bell)

Let us discuss the device which can be implemented in countries like India and which can work efficiently.

III. PROBLEM IDENTIFICATION

Every year there is an increase in the number of stray cattle and dogs. Most of these stray livestock cause disturbances on roads and may also lead to accidents mostly in nights.

It is a general scenario in India where stray livestock can be seen grazing in the middle of lanes, city roads, highways. The increase in stray cattle and dogs is only due to lack of a tracking system for each individual cattle or dog. very few NGO's provide shelter to stray dog's but there are no NGO's providing shelter to stray cattle. If we encourage cattle farms to use cattle wearable which can track the location of cattle and monitor the health of cattle, it would be a great initiative in decreasing the number of stray cattle.

IV. HOW IOT CAN HELP TO SOLVE PROBLEM

To avoid an increase in stray animals what we can do is to provide an E-Cow bell which can track the location of a cattle or a pet in real time. As it would be very difficult for farmers to charge the device every time, solar technology will help a lot to automatically charge the device. Making the device water resistant will lead to zero maintenance of the device.

V. E-COW BELL

Why only E-Cow Bell?

In India, most of the cattle farms are not having their own independent graze area/ Farm Land for cattle, generally, we see very little shed where cattle are raised, for food the cattle are sent out in the city for grazing, cattle come back to their shed in the evening along with the herd. In this process, there are many chances of getting lost, when cattle can't make it to return home before the sunset they create a havoc where ever they are. The next day morning they may find their way back to home or else forget the route to home and become stray cattle thereafter. Here is when the importance of E-Cow Bell is known. On top of all these devices are very cheap and need no maintenance one installed.

A) Features

Let Us See the features provided by E-Cow Bell:

a) GPS+LBS+AGPS +WIFI
b) Solar Powered
c) Waterproof IP66
d) SOS alarm, two-way voice
e) WIFI location and anti-lost alarm

f) Quad band,800/8501800/1900 MHz
g) SMS/GPRS (TCP/IP) communication
h) Low power consumption and long standby time
i) Track by time interval
j) Geo-fence alarm
k) Anti-remove alarm
l) Low battery alarm
m) SIM card change alarm
n) Multiple tracking ways, track by SMS, APP, Website
o) A small camera

B) Description of few Highlighted Features:

1) GPS Tracking:

GPS tracking unit is used to track the animal wearing the E-Cow Bell, that uses the Global Positioning System to determine and track its precise location. The recorded location data can be stored within the tracking unit, or it may be sent to a centralized database, or Internet-connected computer, using a cellular (GPRS or SMS) that is embedded in the device. This allows the user location to be displayed on a map in real time, using GPS tracking software. If any animal is lost we can easily track its location.

2) GEO Fencing:

This feature can be used by the farmer to get an alert message when his cattle walks out of the geofence (defined boundary). Through this feature, he can make sure that all the animals are in a safe zone.

3) Solar Powered and water proof:

Since the device uses very low power, the power produced and stored by a solar panel on the device can help the device to handle its functions effectively and since the device is water proof also, the farmer has no need to remove the E-Cow Bell while bathing his animals.

4) Alert System:

This feature enables user to keep track of all his animals, the user gets alert when his animal is stepping out of the geofence, if his animal is causing traffic problem, if his animal is in trouble or if his animal doesn't get home back home after sunset, the animal location is immediately sent to his phone, if someone tries to remove the device then also the farmer gets an alert message.

5) Camera System:

The camera in this tracking device can help to locate the animal more easily because, sometimes in the case of small size animals they tend to get stuck in pipes, under derbies or trees etc. Even though the GPS system will provide you the exact location of the device, it only gives you the hint of the locality where the animal is present, with the camera system we can see the surrounding area of the animal to track it more easily. The owner can also check how an animal is trying to escape or which route and animal are taking daily to gaze.

C) Working of the system

In the following block diagram, we can observe how the device sends an alert message to the farmer when the cow is out of geofence or when it is low battery or when the collar is broken or when the collar is being removed.

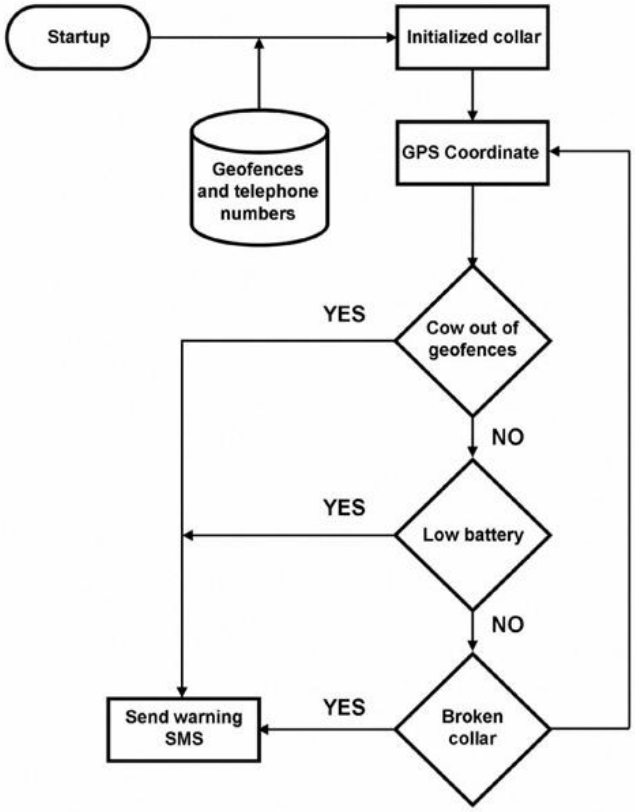

Figure 1- Block diagram displaying working of alert system

Let us discuss the diagram in two steps:

Step-1) Startup:

1) In this step, the device is started for the first time.
2) It tries to get the information related to geofence and telephone numbers of the user.
3) After which the device is finally initialized.
4) After the initialization process, the device continuously tracks the GPS position of the animal.

Step-2) Sending Alert Message:

1) Once the device is setup, it continuously checks the state of the device.
2) If an animal is out of geofence it immediately sends a message to the user.
3) Else If the battery is low then it sends the alert message.
4)Else If the device is being removed from the animal an alert message is sent.

VI. STATISTICS

According to the Indian government statistics in 2014, there were nearly 1892 accidents caused due to "stray animals and dogs" out of which nearly 40% animals are said to be pet once. This number can be decreased easily with the help of smart tracking devices like "E-Cow Bell"

VII. ROLE OF AI AND ML

There is a continuous collection of data of each individual animal through the tracking device, the location is tracked in real-time as well as the camera footage is also collected in real-time, when we have the collection of this much data every single second, we have the advantage to develop a machine learning system. Since the whole concept of machine learning and Artificial Intelligence is based on DATA, the more data we provide to the system, the more accurate predictions can be made by the system.

What kind of AI System can be developed?

We can develop a deep learning system which will track down the navigation pattern of each individual kind of animal, with this we predict how an animal travels from point A to point B in different road conditions, weather conditions, obstacles etc. Because every day a route may not look the same in the rainy season the route may be filled up with water at that situation what are the possible alternative routes an animal can think of. How an animal protects itself from the heat in Hot Summer.

How can the system help?

All the readings and out comes from the AI/ML system will give us insights into the understanding of animals and their navigation techniques, which makes it easy to simulate the behavior and decision-making system of a cattle.

Other possible Developments:

Intelligent Mapping System:

The real-time tracking feature can help Google to alert its users using navigation about the presence of any stray animals on the road to avoid accidents.

Security and Crime:

Since the device have a camera and it is capturing the image in real time, if a crime or accident occurs in the place where these animals wearing the device are there in that place at that incident time then we can get the footage of the incident possibly, which can be a key asset in solving cases.

VIII. CONCLUSION

Technology is available to everyone in every sense, its outcome depends on how we utilize the technology to help us make our lives better. There are many possible usages to which can be utilized for the betterment of society with this Solar Powered E-Cow bell tracking device. On one hand, we are able to provide security for every individual animal and making the rescue operations easier. On the other hand, we able to provide assistance and help to mapping systems and security systems.

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During the process of writing this paper, I have learned to be updated with the technology and also started exploring the new possible areas for implementation of technology

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