Cattle Theft Prevention

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***Abstract*: Cattle theft is a major problem in agriculture sector in several countries nowadays. This scourge causes vital losses to farmers and governments. Confronted with this downside farmers have typically no solutions. Although there have been several techniques to identify cattle and combat stock theft, the scourge has not been eradicated in the farming sector. This paper investigates how we can model cow behavior using global positioning (GPS) wireless nodes to get the expected position of a cow. Internet of Things (IoT) is a true solution to defeat this nuisance by permitting thievery detection.**

***Keywords*: IoT; Stock theft; RFID; Wi-Fi; GPS.**

I. INTRODUCTION

Cattle theft is a recurrent and singular phenomenon that is observed in many countries. In recent years, it is increasingly the main concern of farmers. It is a typically regional phenomenon, but according to the latest observations, it tends to become sub regional. It is for our country, one of the major constraints to livestock development. Indeed the problems posed by this scourge affect both farmers and government. Its impact has a social, safe, and economical dimension. For farmers, the practice of animal husbandry has always been and will remain their livelihood. They derive their incomes in this activity. Economic losses due to this problem is quite significant.

Since then, many visionaries have seized on the phrase "Internet of Things" to refer to the general idea of things, especially everyday objects, that are readable, recognizable, locatable, addressable, and/or controllable via the web, regardless of the communication means that (whether via RFID, wireless LAN, wide- space networks, or different means).In recent time, things that are not just electronic devices or the products of higher technological development but things that we do not ordinarily think of as electronic at all, such as animals and humans are connectable. If they are connectable then the benefit of location identification and other connectivity benefits can be derivable from the interconnectivity. In this paper we propose a design of an Internet of Things application layer that will link with the implanted sensors in their cows and then be easily used by herdsmen on their mobile devices to keep track of their herds. The system will enable them to know when cattle rustlers are attacking and to location they may have taken the cows to, who may have bought the cows and everything about the cows. Our design will provide the layer for the combination of physical mobile interactions with the Internet of Things infrastructure.

The problem has been there for years in the eastern borders of India. Cattle smuggling has been a major problem in those regions where around 25000 cows were smuggled across border every day. On that around half the cows were stolen from their owners. The loss that the farming industry faces because of this is around 2 Billion rupees. The theft of cattle from their owners has been caused because of the sheer number of cattle's they manage and the lack of proper security on their property. There are efforts taken by the government to reduce thefts and smuggling in the parts by initiating thinks tanks. This creates a market for a proper cattle security system.

II. EXPERIMENTAL SECTION

A. Block Diagram

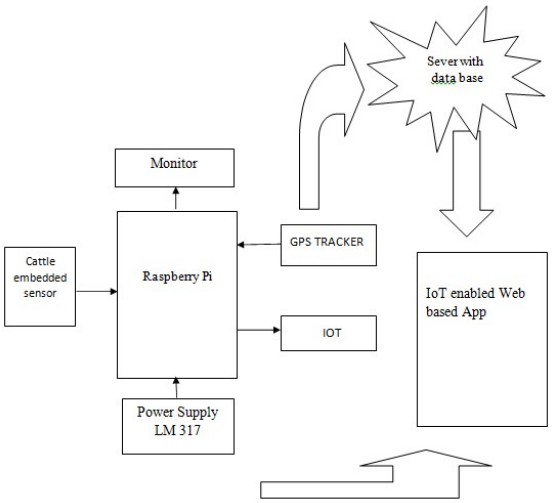

Figure 1: Overall view of Cattle Tracking

For our experiment, a wireless node is attached to a cow in order to collect data about the location of the cow each second. We left the cow in a closed field for three hours while the node is attached to its neck.

B. Working Principle

Basically the system consists of a centralized microprocessor Raspberry Pi connected to internet interfaced with many sensors for making the system smarter. The complete system is controlled and monitored by a multipurpose web app connected to the server. In this design of our system we illustrate how cows will be monitored by herdsmen using the application designed and deployed in the mobile devices. Herdsmen first implant sensors in the skin of cattle. The sensors communicate with the mobile device via the communication systems application layer. The mobile device on the other hand communicates with the cloud via the

internet system which allows the herdsmen gadgets to work effectively with the sensors. The herdsmen can then monitor the cow and track their movements using the application in the mobile devices which we expect will be highly user-friendly. By getting the location of rustler herdsmen will easily find his cow.

III. RESULT AND DISCUSSION

The entry count of the cow is taken by the RFID reader will be stored in the Database as shown in the Figure 2 when we signed in to the website we can know the exact in and out time of the particular cattle. The exact location of the particular cow can be known by its longitude and latitude data available on the server. The longitude and latitude data get the GPS will be updated to the server as it connected to the internet. And the main advantage of saving data to server is we can get the entry and exit time of the cattle can be known by anytime anywhere by just signing into our website. For our experiment, a wireless node is attached to a cow in order to collect data about the location of the cow each second. We left the cow in a closed field for three hours while the node is attached to its neck.

Cattle Attendance

Cattle Number	Time	Status
3446659	2019-04-10 09:40:01	IN
20147549	2019-04-10 18:01:28	IN
20147549	2019-04-10 18:02:44	IN
20147549	2019-04-10 18:14:45	IN
20147549	2019-04-10 18:16:36	IN
20147549	2019-04-10 18:18:04	OUT
03446659	2019-04-10 18:31:31	OUT
20207074	2019-04-11 06:21:09	OUT
20207074	2019-04-11 06:21:26	OUT
20207074	2019-04-11 06:21:44	IN
20147549	2019-04-11 06:22:39	IN

Figure 2: Cattle attendance table in website.

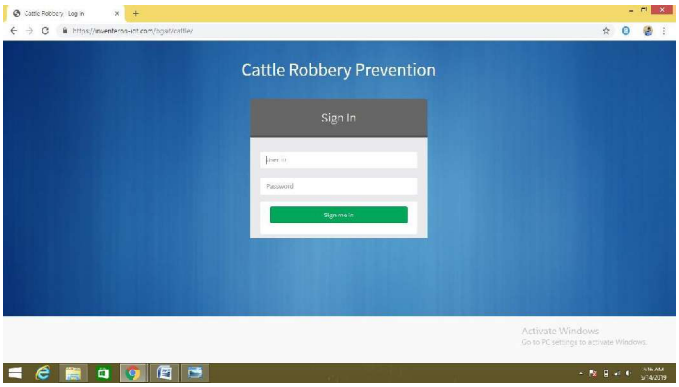

Figure 3: Login Process.

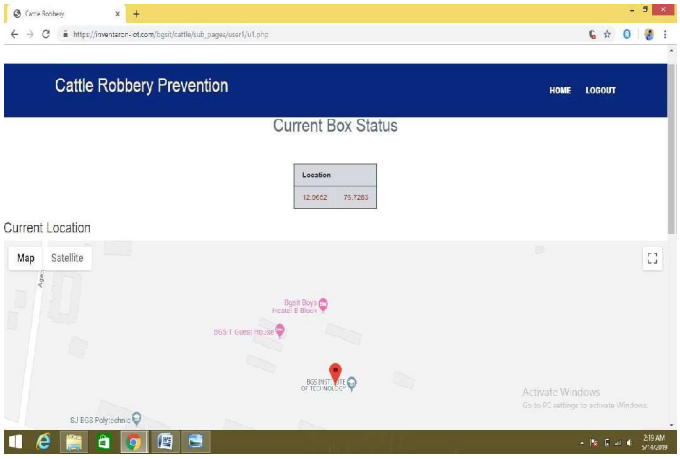

Figure 3: Location of the Cattle.

We mapped the movement data using Google Maps as shown in Figure 4 and Figure 5. Figure 4 shows the movement of the cow within the enclosure, while Figure 5 shows the boundary of the enclosure.

Figure 4: Movement of the cow in the enclosure.

Figure 5: Boundary of the enclosure.

The node shown in Figure 6 placed on neck of the cow has the GPS to find the exact location of a cow using the longitude and latitude data available in our system. This data are stored in the data base available on the server we can find the animals using these data using Google maps.

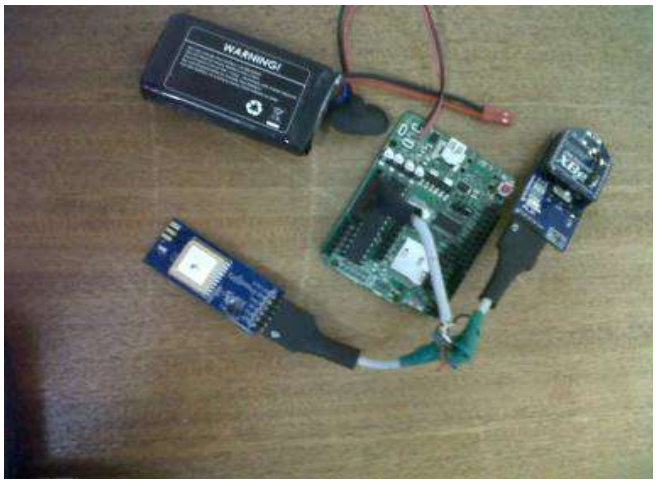

Figure 6a: Node

Figure 6b: Node worn by the Cow

IV. CONCLUSION

In this design we used effective system to monitoring the cow and tracking the exact location using longitude and latitude of the cow. Although the system has been designed to monitor cattle behavior we can extend its application to implement it on other livestock or wild animals, such as rhino which are highly threatened. The node we built can be used in a game reserve as well. In South Africa, rhinos are threatened of extinction. This node will collect the movement patterns of a rhino and can transmit its current location to a central sink. This kind of implementation will necessitate additional nodes to extend the range of the network. Using a combination of the IEEE 802.15.4 protocol with Wi-Fi or GSM depending on the area of deployment may be a viable solution to this problem.

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