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IoT – Wildlife Monitoring, Virtual Fencing

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ABSTRACT: India has been identified as an ecological blackspot where half of the wildlife is vulnerable to extinction. This is caused due to the destruction of forest areas for farming, logging and construction of new cities and towns. This is forcing the animals to move out of their habitat and into human establishments, which is causing problems to both animals and humans. Recent advancements in sensor technology has the potential to revolutionize our understanding of the natural and man-made environment by providing fine grained spatio-temporal data (moving object databases and real time locating system). Physical barriers cause physical damage to animals which can sometimes lead to death of the very animals we are trying to protect. This can be prevented by using virtual fencing which is a lifesaving improvement from the existing system. This project implements a sensor network, designed to track the location of the animals in sanctuaries and national park without hurting the animals. Forest fire and deforestation (or any illegal activities in the forest) can also be monitored through this system and it helps us preventing the destruction of wildlife.

I. INTRODUCTION

The growth of environmental awareness and public concern for wildlife that began in the 1980s has continued into the 21st century. Large-scale alterations of the landscape such as hydroelectric development, or the cumulative effects of timber provide the detailed information required by studies undertaken to address environmental concerns and evaluate new policies, telemetry systems based on the Global Positioning System (GPS) were developed in the 1990s. Since commercial development of GPS-based telemetry systems for tracking animals began in 1991, a variety of configurations have been designed for use by researchers in different situations. In addition, numerous improvements have been made to the size and performance of GPS systems and their cost has been dramatically reduced. The enormous quantities of data generated by these systems clearly present a challenge to data management and analytical procedures. Given the variety of configurations and features of current GPS systems, researchers must carefully plan and select an appropriate system to address particular biological issues.

II. LITERATURE SURVEY

Internet of Things (IOT) is a very common term nowadays. It's not a second internet; rather it's a network of devices that are connected to the Internet that is used every day to search Google, upload images and connect with friends. It's a network of products that are connected to the Internet, thus they have their own IP address and can connect to each other to automate simple tasks. However, IOT is still in its infancy. It has not been completely developed and is fragmented. For the IOT to be fully realized all devices need to be able to connect to each other, regardless of what company manufactured the product or which companies have business relationships with each other. In technical terms, the Internet of Things (IOT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-tocomputer interaction. IOT is the future of technology that can make our lives more efficient, starting from the most mundane, everyday events to big, world changing ones. Existing research into wireless networks for wildlife tracking has resulted in homogeneous solutions. This is the "one size fits all" approach, where a single type of tracking device has been designed. This has segmented the solution space into animals which can be tracked using wireless networks and those that cannot, due to weight restrictions placed on the tracking collar. The objective of my research is to design a single wireless network-based system that can be used to track and monitor both small and large animals. I argue that the vast diversity in the Animal Kingdom, especially with respect to bodyweight, should not be viewed as a hindrance, but rather something to be exploited. My philosophy is that devices

with low functionality (due to weight or cost restrictions) should use the capabilities of more complex devices in order to result in a powerful network Solution. The paper describes an IOT platform for wildlife monitoring applications, especially on location tracking, habitat environment observation, and behavior recognition. Since the wildlife moves in wide area, satellite positioning receivers such as GPS, Beidou, Glonass, Galileo, etc. have been used to track long distances. For behavior recognition acceleration, gyro sensors have been used. For habitat environment observation, monitoring sensors such as temperature, humidity, height, wind, light, camera, etc. have been used. There are two types of communication components used in here: cellular and capillary. For cellular type, Global Systems for Mobile Communication (GSM), Third Generation (3G), Long Term Evolution (LTE) for long distance communication are used. In habitat environment observation, sensor nodes are set up in the observation area, and are connected through sensor networks.

III. PROBLEM DEFINITION

The system proposed is an advanced solution for monitoring the natural disasters at a particular place and make the information visible anywhere in the world. The technology behind this is Internet of Things (IoT), which is an advanced and efficient solution for connecting the things to the internet and to connect the entire world of things in a network.
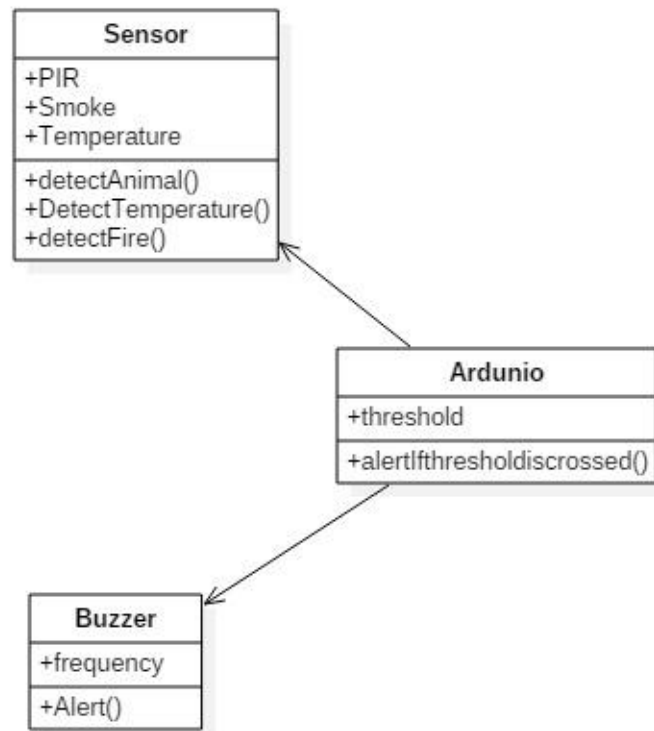
IV. METHODOLOGY

Smoke Sensors: A smoke sensor is a device that senses smoke, typically as an indicator of fire. Commercial security devices issue a signal to a fire alarm control panel as part of a fire alarm system, while household smoke detectors, also known as smoke alarm, generally issue a local audible or visual alarm from the detector itself. Motion Sensors: A motion detector is a device that detects moving objects, particularly people. Such a device is often integrated as a component of a system that automatically performs a task or alerts a user of motion in an area. They form a vital component of security, automated lighting control, home control, energy efficiency and other useful systems.

V. ADVANTAGES

1. Real time data
2. Additional environmental data collection
3. Newer technology provides long range tracking
4. Better understanding of animal ranges and environments
5. Data collection for survival

VI. SYSTEM ARCHITECTURE

```
           Sensor
  +PIR
  +Smoke
  +Temperature
  -----------------------
  +detectAnimal()
  +DetectTemperature()
  +detectFire()

           Ardunio
  +threshold
  -----------------------
  +alertIfthresholdiscrossed()

           Buzzer
  +frequency
  -----------------------
  +Alert()
```

VI. CONCLUSION

The proposed system will provide safety and security to wildlife and help to increase their numbers which are on extinction. Animal tracking system is useful for tracking and monitoring of animals

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