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Maner: Managed Information Dispersal Plan for GPRS IoT Enabled Wildlife Monitoring System

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***Abstract*—** In today's world, wildlife is an important factor in maintaining natural balance of any nation's environment. One of the important and vital roles is played by the forest department. There are many concerns regarding the safety of wildlife, so for their security is of main concern for this purpose instrument may be mounted on them to view the present location. Bio-sensor systems comprise various types of small physiological sensors, transmission modules and processing capabilities. Hence, sensor networks can collect, transmit, and store vast volumes of environmental data, which may be used in research or monitoring wildlife.GPS used to log the longitude and latitude so that direction can be known easily. These devices are being added to them will explore the possibility of embedding GPS devices so forest department official can track their animal's movements in real time.So by using these equipment's we are trying to implement the basic life- guarding system for wild life in low cost and high reliability.

***Keywords*- Global Positioning System,Radio Frequency**

I. INTRODUCTION

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. IOT is a network of products that are connected to the Internet, over their IP address that 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. 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 body weight, 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 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 extraction over many years, have continued the demand for high-quality studies of impacts on wildlife and their habitats. Many resource agencies have shifted their management approach to a landscape scale to address issues such as conservation of biodiversity and habitat fragmentation. To overcome some of the limitations of existing technology and 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. RELATED WORK

This paper describes a sensor network designed to automatically, continuously and simultaneously track the locations and activities of radio-tagged wild animals living in a tropical rain forest. The developed system is not an in-laboratory research prototype, but a real-world working system that has been gathering science-quality data for over 6 years. This system is able to monitor the behavior of these wild animals at a much higher resolution than would be possible using traditional observational methods or other tracking technologies, including global positioning system (GPS) tracking.

LoRa is an emerging wireless standard specifically designed for Low Power Wide Area Networks (LPWANs). It provides long range, low data rate, and energy efficient wireless communication and is believed to have high potential for realization of a large number of Internet of Things (IoT) applications [4]. To avoid smuggling and to save the forests around the globe some preventive systems need to be developed. Many wild animals have been killed due to road accidents and speeding vehicles passes through the wildlife protected area. Animals crossing boundaries have led to be killed. The impacts of roads include habitat loss, habitat fragmentation and habitat degradation that affect wildlife and its habitats both directly and indirectly especially on larger mammals [9]. These animals have large ranges or undertake seasonal movements over large areas of mainly natural or semi-natural habitat. There has been less attention overall to animals in more modified landscapes with a long history of intensive land use and land management [3].

Due to active fires many birds and animals have been killed and the valuable trees are destroyed to this active fire. If anyone enters into an area where PIR sensor placed sensor detects the motion and it sends a alert to the server and SMS notification to the forest authorities.

III. METHODOLOGY

In this project design, structured modular design concept is adopted and the system is mainly composed of Renesas microcontroller, GSM module, GPS module, PIR sensor, Smoke sensor, Relay, Accelerometer sensor and AMAZON cloud based database.

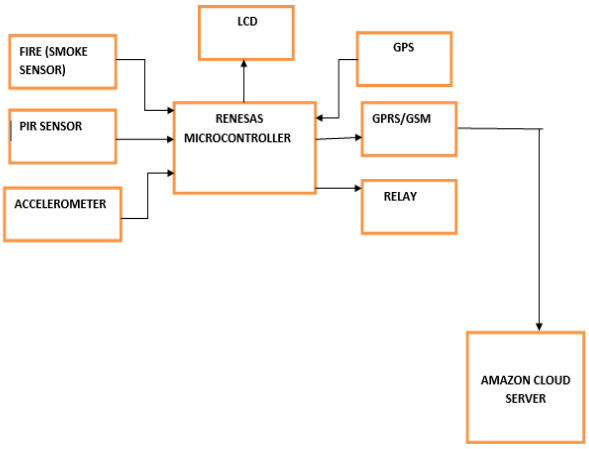


Fig 3.1 : Block Diagram Of Wildlife Monitoring System.

The Renesas microcontroller is the heart of the project it is programmed such that it keeps on commanding and controlling the complete action through peripherals connected. This project is totally regarding forest environment detecting purpose. Here Smoke sensor is used to sense the fire in the forest. PIR sensor is used to avoid deforestation. PIR sensor senses the human presence near the animal boundaries or restricted areas. An accelerometer measures gravitational force or acceleration. GPS is used to track the location of animals and is sent to Amazon.
All these information is collected by Amazon cloud via GPRS and stored in database for further use. Or this information sends through SMS alert.

A. FLOW CHART :

First Insert the SIM card to the GSM Module and then connect the Serial cable –RS232 to the PC via DB9 pin connector on the GSM Module. After that we need to give the power supply. The power supply indicating LED will be ON continuously. Another LED on the Module starts blinking to indicate the availability of network. If the network is available then the delay between the blinking is less. If the network is not available then the delay between the blinking is more. Each GSM modem will have a unique id called IMEI.

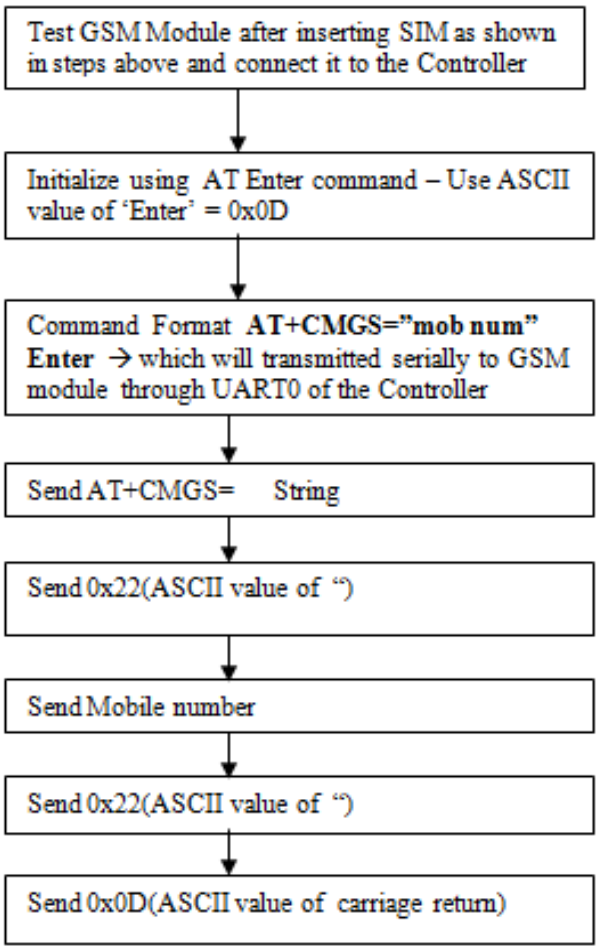


Fig 3.2: flow chart for GSM for sending message.

IV. SYSTEM DESIGN

1 . Renesas microcontroller : The Renesas microcontroller is the heart of the project it is programmed such that it keeps on commanding and controlling the complete action through peripherals connected.

Fig 4.1:Renesas microcontroller [R5F100LE]

Features of renesas Microcontroller: General-purpose register: 8 bits × 32 registers (8 bits × 8 registers × 4 banks).The size of ROM: 512 KB, RAM: 32 KB, Data flash memory: 8 KB. It is also called as On-chip single-power-supply flash memory (with prohibition of block erase/writing function) and On-chip power-on-reset (POR) circuit and voltage detector (LVD) and On-chip watchdog timer (operable with the dedicated low-speed on-chip oscillator).

2. LCD [Liquid crysal display] : LCD screen is an electronic display module. It has wide range of applications. **LCD** consists of rod-shaped tiny molecules sandwiched between a flat piece of glass and an opaque substrate.

3. Smoke sensor: Smoke sensor is device which is used to detect smoke. It is mainly used to detect the fire so that prevention can be made. The smoke detector consist of two basic parts: a sensor to sense the smoke and a very loud electronic horn to wake people up. Smoke detectors can run off of a 9-volt battery or 120-volt house current.

Fig 4.2 :Smoke sensor.

4. PIR Sensor: A passive infrared sensor (**PIR**) is an electronic sensor. It can be used in measuring infrared (IR) light radiating from objects in its field of view. When a warm body like a human passes by, it first intercepts one half of the PIR sensor, which causes a positive differential change between the two halves. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected.

Basically PIR sensor is used to detect human motion, here suppose if the person is trying to kill the animal then alert will be send to forest officers along with the locations and also we are going to avoid deforestation.

Fig 4.3 :PIR Sensor.

5. Accelerometer: An accelerometer is an electromechanical device used to measure acceleration forces. The forces may be static or dynamic to sense movement or vibrations. By tilting an accelerometer along its measured axis, one can read the gravitational force relative to the amount of tilt. Most accelerometers available today are small surface mount components, so you can easily interface them to a microcontroller.

There are three axes that can be measured by an accelerometer and they are labeled as X, Y and Z. Each measured axis represents a separate Degree of Freedom (DOF) from the sensor—thus a triple axis accelerometer might be labeled as 3 DOF.

So by this we can easily detect the movement of animals.

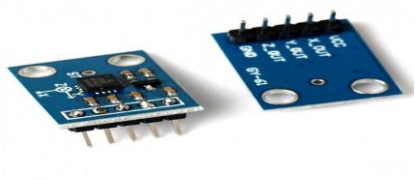


Fig 4.4 : Accelerometer.

6. Peltier : It is used as a muscle heat stimulator device and is placed on the animal body which is used to detect whether the animal crossed out of the particular limiting area or not, if crossed then animal gets the body pain that is due to heat stimulator device which is placed on animal body.

7. Amazon Web Services : AWS is a managed cloud service which helps in connecting the devices easily where it is secure to interact with the cloud and other applications. With AWS, your applications can keep track of and communicate with all your devices, all the time, even when they aren't connected.

In this project the information that are collected from the sensors is are passed on to the Amazon cloud via GPRS and stored in database for further use. Or this information sends through SMS alert.

V. RESULTS AND DISCUSSION

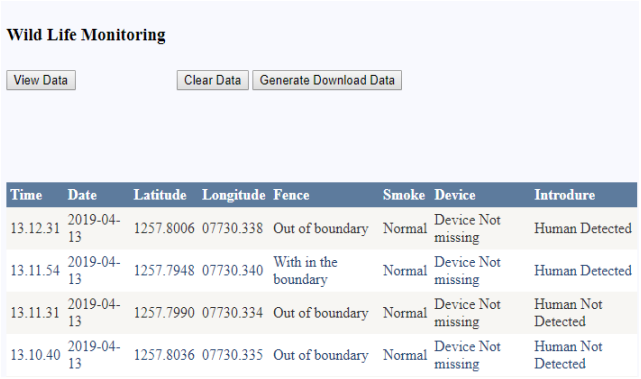
An analog-to-digital converter (ADC) is a system that converts an analog signal into a digital signal. An ADC also provide an isolated measurement such as an electronic device that converts an input analog voltage or current to a digital number representing the magnitude of the voltage or current. The Mathematical Equation for converting Analog to Digital Converter is given by

ADC = ((Vref*%V)/(2^n-1))*100

Where, Vref is the Analog voltage, ADC is Analog to Digital Converter, V is Voltage(Volts), N is the number of bits.

The above equation is used in this project, because the sensors used in the project like accelerometer reading will be in the analog form which cannot be displayed on the liquid crystal display which is of 16X2 display. So that ADC convertor is used so that it can be easily displayed.

The below fig shows the data that are collected from all the sensors are passed on to the Amazon cloud via GPRS and stored in database for further use. Or this information sends through SMS alert.



Wild Life Monitoring

View Data | Clear Data | Generate Download Data

Time	Date	Latitude	Longitude	Fence	Smoke	Device	Introdure
13.12.31	2019-04-13	1257.8006	07730.338	Out of boundary	Normal	Device Not missing	Human Detected
13.11.54	2019-04-13	1257.7948	07730.340	With in the boundary	Normal	Device Not missing	Human Detected
13.11.31	2019-04-13	1257.7990	07730.334	Out of boundary	Normal	Device Not missing	Human Not Detected
13.10.40	2019-04-13	1257.8036	07730.335	Out of boundary	Normal	Device Not missing	Human Not Detected

Fig 5 : Data stored in AWS.

VI. CONCLUSION

This project will provide safety to wildlife and help to increase their numbers which are on extinction. Animal tracking system is useful for tracking and monitoring of animals. So they can be protected from illegal hunting, killing or capturing of wild animals. GPS used to log the longitude and latitude so that direction can be known easily**.** So by using these equipment's we are trying to implement the basic life- guarding system for wildlife in low cost and high reliability. This project provides an accurate information about the location of the animal**.** The project is user friendly and durable, we need to make it compact and cost effective.

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