

Wildlife Animal Location Detection And Health Monitoring System

Kushal Naik¹, Rohit Yadav², Omprakash Verma³,
Dhruv Zanzrkiya⁴, Professor Meenakshi Saraon⁵,

¹(Student, Electronics and Telecommunication, Atharva College of Engineering, Mumbai University, India)

²(Student, Electronics and Telecommunication, Atharva College of Engineering, Mumbai University, India)

³(Student, Electronics and Telecommunication, Atharva College of Engineering, Mumbai University, India)

⁴(Student, Electronics and Telecommunication, Atharva College of Engineering, Mumbai University, India)

⁵(Professor, Electronics and Telecommunication, Atharva College of Engineering, Mumbai University, India)

Abstract : As we know, animals form a big part of the ecosystem. Their existence is very important for the balance of the ecosystem. But nowadays, more and more animals are getting endangered and are on the verge of extinction. So, to save these animals from extinction, humans reserved forest areas (Sanctuaries and national parks) for their safety. However, some animals died due to bad health which couldn't get any attention to. To avoid such casualties, animal location tracking system with a health monitoring system is used. This system uses a pulse radar to keep the track of animal's health and the usage of Global Positioning System, we get the exact location of the animal. So, no time is wasted for the animal to be attended to.

Keyword: Wildlife animals, GPS module, Wi-Fi module, Pulse sensor, Temperature sensor, PIC microcontroller.

I. Introduction

The increase in human population and their needs is leading to building of new homes and growth in industrialization. This is ultimately leading to cutting of trees in the forests, the natural habitats of wild animals. All these things are resulting in less and less of wildlife as years go by. Hence, we need to save these animals especially the ones in the national parks and sanctuaries, which are built for them, meant to keep them safe in their natural habitats. So, these animals have been tracked by the conventional methods such as wireless transmitters and receivers in the past years. Here, the transmitter is attached to the collar of the animal and the receiver is with the forest officer. However, the area of the forest being large, sometimes the animals move out of the range of wireless transmitter-receiver and we are unable to locate it. To avoid this, we need an instrument which will work in these large and dense forest areas. So, for this purpose, we are using GPS (Global Positioning System) to find the accurate location of the animals and overcome the shortcomings of the wireless transmitter-receiver system. GPS module collects data of the location of the animal (In latitude and longitude) from the satellites and sends it to the PIC microcontroller. The microcontroller also receives the data from the temperature and the pulse sensors, giving an idea of the health of the animal. All these data with the help of Wi-Fi module is sent to the android application in the forest officer's phone. This helps the officer in quickly locating the animal and also having and up-to-date information on the well being of that wildlife specie. Section I gives the idea for the need of new animal location detection system by showing the disadvantages of the current system in use. Further, Section II will give the technical explanation of this new location detection and health monitoring system, including a brief on the use of the components. The implementation of this system will be shown in Section III which will be followed by Conclusion, Acknowledgement and References.

II. System Design

The system consists of a PIC microcontroller (PIC 18F452) in the heart of the circuit, connected to the GPS module for the location of the animal and to the Pulse and Temperature sensors for it's health. Also, a battery is connected for the supply of power and a Wi-Fi module which will send data to the Android application on the phone. The block diagram of this circuit is shown below.

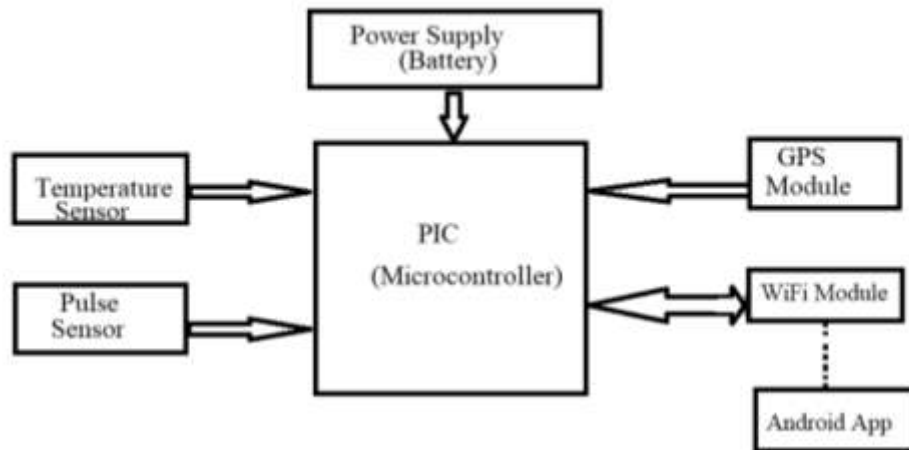


Fig.1: Block diagram

2.1. GPS Module Global Positioning System module is used to locate the animal. It uses a satellite to extract the information of the position and sends it to the GPS devices. Earlier, after its invention, it was used only for military purposes by the U.S. defence as they were the ones to send those satellites in the orbit. However, in 1980's it was made available for the civilians to use it as well. In our project, this GPS module receives a string of characters from the satellites which send it to the PIC microcontroller. This device from the given information, identifies the latitude and the longitude of the animal.



Fig.2: GPS Module

2.2. PIC Microcontroller PIC stands for 'Peripheral Interface Controller'. It is a family of microcontrollers. Early models of PIC had only ROM for storage but now they use flash memory for storage. Some of the new PIC's can reprogram themselves as well. For this project, PIC 18F452 is used. It is a 10 MIPS yet easy to program CMOS FLASH based 8-bit microcontroller pack. This chip receives the string of characters from the GPS module and sends the location in latitude, longitude to the WiFi module.



Fig.3: PIC 18F452 Microcontroller

2.3. Temperature Sensor LM35 is used for sensing the temperature of the animal. It is a precision integrated-circuit temperature sensor. It measures the temperature value in millivolts, which is converted into degree Celsius by the microcontroller. Using this, we get a good idea about the health of the animal.



Fig.4: Temperature Sensor

2.4. Pulse Sensor Like the temperature sensor, pulse sensor is also added to monitor the health of the animal. The body temperature of the animal can sometimes be maneuvered by the surrounding weather. Hence, to double check it, the pulse sensor has been added, which detects the heartbeat of the wildlife. This sensor sends an analog signal according to the heart pulse to the PIC microcontroller. This then gets converted into a digital signal in beats/min.

2.5. Wi-Fi Module ESP8266 wi-fi module is used here. It is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. It is capable of hosting an application. It collects the data from the PIC microcontroller and sends it to the Android application on the forest officer's phone.



Fig.5: Wi-Fi Module

III. Implementation Of The System

This is a light-weight device which will be attached to a belt worn around the neck of the wildlife animal. The temperature sensor and the pulse detector will give the information of its health to the forest officer and if the officer finds it to be unusual, he can locate the animal with the help of GPS module in this device. All this information will be converted from the characters or analog signals into digital values with the help of PIC microcontroller. Then with the WiFi module attached, the information is sent to the android application. This will allow the officers to monitor the animals' health and location live.



Android Application

The android application will be written with the help of embedded C language. It will gather the information sent over by the Wi-Fi module and show in the forest officer's phone. Also, it will send notifications when the temperature of the animal rises above 38-degree C and the beat rate is more than 80 BPM. The location will be shown in the form of latitude and longitude, which can be detected in the google maps application with ease. The application will look like this:



Fig.6: Android app.

IV. Conclusion

This is the best possible way to keep the track of the animals' location and their health 24 hours-a-day. It overcomes the limitations of the previous method used in locating the wildlife creatures. The only disadvantage is if the battery dies but that can be dealt by using low power consuming batteries and by checking them monthly. This new system can find the animal over large, dense forest areas with the help of GPS system. It also gives a live update of their health through the temperature and pulse sensors. The android app in the phones of forest officers will allow them to keep the track of the wildlife from anywhere and at all times. The notification system will alert them immediately if anything is wrong with the specie and they can reach there soon as they will know the exact location. So, this project will help us save the wildlife by a much better rate thus achieving our aim.

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