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Detection of Wildlife using Thermal Camera and Passive Infrared Sensor by Smart Hybrid Robot

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***Abstract*: UAVs are an emerging technology, and in modern agriculture, it can be utilized for many purposes. The UAV technology is capable of performing advanced and high precision tasks, due to the flight capabilities and the possibility to equip the aerial vehicle with computers and sensors, including thermal cameras. Thermal imaging has become an interesting technology in outdoor surveillance, pedestrian detection and agriculture, due to the invariance to illumination and the lowered price of thermal cameras. Detection of wildlife within the agricultural fields is important to reduce wildlife mortality and, thereby, promote wildlife-friendly farming. And also including PIR sensor results of capturing wild-life can improve.**

***Keywords*: UAV, Hybrid Drone, Wi-Fi Control, Thermal Camera, PIR Sensor**

1. Introduction

Drones have been around for years, and they are used for different purposes and can be of help in numerous occasions. However, these devices have become more popular in recent times and their application increases rapidly in various fields. Drones are defined as "An unmanned aircraft or ship that can navigate autonomously, without human control or beyond the line of sight". Another frequently used definition is: "Drone is any unmanned aircraft or ship that is guided remotely". No doubt, drones are among the most advanced devices in today's aeronautics, electronics and robotics alike. The use of drones has grown quickly in recent years because unlike manned aircraft they can stay aloft for many hours. In this paper, we introducing a device (UAV) which will locate people or poisonous creatures at very small places where the intervention of human is not possible. We can also use wireless camera with it to do different types of tasks. And also by adding PIR sensor latency of getting reply is reduced.

2. Literature survey

Automated Detection and Recognition of Wildlife Using Thermal Cameras [1]

This paper authors show that thermal imaging can be used to detect roe deer fawns based on aerial footage. However, the detection is performed manually and should be automated to increase efficiency. They conclude that the thermal imaging strategy is sensitive to the detection of false positives, meaning that objects that are heated by the Sun are falsely labelled (manually) as roader fawns. However, this approach is not suitable for our UAV-based application with non-stationary cameras, as the background changes rapidly over time, and it is not possible to construct a background image. Another approach is the detection of hot spots based on a fixed temperature threshold. In, a probabilistic approach for defining the threshold value is presented; however, it is still a fixed value.

Autonomous UAVs Wildlife Detection Using Thermal Imaging, Predictive Navigation and Computer Vision [2]

This paper describes Remote sensors (thermal camera), advanced path planning and image processing algorithms can be placed on unmanned aerial vehicles (UAVs) to provide a low cost approaches to determine critical requirements for spatial and spectral distribution of wildlife. The system proved that it is possible to detect wildlife using a thermal sensor and GPS on an airborne platform, and send the detected data (images, GPS location) wirelessly to a GCS to be analysed.

Low-Cost Drone System for Analysing Elevation [3]

This paper describes the preliminary design of an unmanned aerial vehicle integrated with a sensors package to collect elevation data at a resolution below one meter. Drones allow a person to fly an aircraft remotely or autonomously. Because drones and sensor components have been decreasing in cost and size, this

Kind of approach could be used to provide information to coastal communities at lower cost compared to traditional methods. This paper describes the preliminary design of a sensor package integrated with a drone for collected data for creating a digital elevation model. There are new opportunities for collecting environmental data using drones because of their decreasing cost and design improvements. Using drones could help reduce resources needed for creating digital elevation models, which can be helpful for understanding the spatial distribution of risk associated with flooding.

3. Proposed system

In Proposed system we are developing mini hybrid Drone. Which can fly as well as walk so, in this project the User can control Drone via Application and the communication between Drone and Mobile APP is done by using WI- FI. Once Connection is established User sends signal to Drone and Drone will act according the signal. These Signal are received by the Arduino. According to that signal Arduino will perform the action. On Arduino Thermal camera & PIR sensor we are going to install. As well as for Fly the vehicle using 4 Motors and for walking 2 Motors. As Sensor generates high temperature then Threshold immediately Buzzers will be on. Also by using Thermal Camera Output of the heat can be seen on Mobile App Which help to find that Animal effectively. By using Hybrid vehicle it will help in such scenario where we can't able to fly vehicle. And by using amg3388 Thermal camera we are reducing cost of thermal camera.

4. System architecture

Following diagram is our system's architecture diagram:

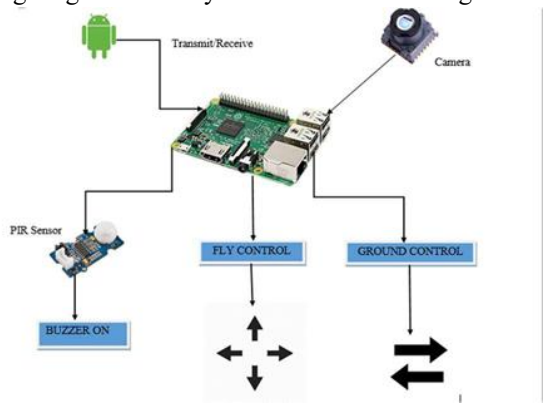

Fig. 1. System architecture

In System architecture user can control the vehicle via Android application and by using Arduino we control the vehicle with respect to signal come from user. And also by Thermal Camera through Arduino we transfer the output at mobile application and Sensor also helps to get result immediately.

A. Methodologies

In this system some methods and various algorithms are used Generally KNN algorithm is used for achieving the desired output. Along with KNN algorithm we used path planning algorithm for animal path detection. Dijkstra algorithm is used in case of path planning. Robotic device is controlled using an android app. This device is hybrid, it can walk as well as fly in air. Thermal camera is installed to get output in infrared. This output can be seen in android app. The animal can be seen with the help of thermal camera in app. PIR sensor senses and helps to detect presence. Of animals.

5. Application

1. Detection of animal via robotic device.
2. Detection of reptiles in places where human intervention is impossible.
3. Security purpose
4. Military surveillance

6. Conclusion

Using Thermal Camera and PIR sensor, we can easily detect wildlife and will receive result more accurately. Hybrid smart robot helps us in tracking of exact location of animal or human. In future, GPS module can be added to get exact location and also by using Image processing, recognition of wildlife is possible.

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