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Battery efficient wildlife footage recorder (BEFPi)

Aparna Jayan T
aparna3792@gmail.com
PSG College of Technology, Coimbatore, Tamil Nadu

R. Anusuya
anusuya12@gmail.com
PSG College of Technology, Coimbatore, Tamil Nadu

ABSTRACT

Wildlife footage capturing is very difficult and time-consuming. The photographer has to wait for a long duration in order to get desired footage. In order to solve this, there is a system where we set up cameras in different spots. The limitation of the conventional system is that cameras are to be set in recording mode for entire day and night. Such systems require an expensive camera with long-lasting battery life. The BEFPi saves battery as the cameras are set to recording, only when motion is sensed. The camera is switched off when no motion is detected. Footage recorded will be saved in memory. It is more advantageous than existing methods as it gets rid of unwanted footage being recorded and thus save memory and battery life. It is more cost-effective than the existing system.

Keywords: *Raspberry Pi, IoT, BEFPi, PIR sensor.*

1. INTRODUCTION

The Internet of things (IoT) is the network of physical devices, vehicles, and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to collect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention.

2. EXISTING SYSTEM

Traditional airborne mapping camera uses film to collect image, and lots of films should be carried during the airborne mapping process. The photos obtained should be scanned using the digital scanner in order to obtain digital images which can be processed by a computer. This constrains the development of photogrammetry. The invention of charge coupled device (CCD) provides a new method to get images. The mapping camera using area CCD can immediately obtain digital photos which can be sent back in real time through a wireless connection. The mapping camera can obtain position and orientation information using position and orientation system (POS) equipped, which can improve the efficiency of airborne photogrammetry. Monochromic area CCD [1] which is full frame transfer is selected as an image sensor in this paper. The effect of the exposure process and TDI forward image motion compensation process on the parameters for airborne photogrammetry is studied. Imaging pose control system is designed for the purpose of satisfying the demand for airborne stereo mapping.

Smart camera networks are real-time, distributed, embedded systems that perform computer vision tasks using multiple cameras; they are considered an emerging technology for various applications. But these networks pose problems for a wide range of hardware-, software-, and system-level design issues. For instance, on the hardware side, camera networks require energy-efficient, small computing node design with the ability to capture and process visual information. On the software side, these networks require scalable, robust, and computationally efficient video analysis methods. On the system side, smart camera networks require adaptive control and coordination8 to increase flexibility, ease deployment, protect security and privacy, and manage the middleware that links different sensor control modules9,10 to higher-order data processing and management. Camera networks are a fascinating area

for current research—although a general body of knowledge around many of these issues exists, the nature of cameras and the information-rich data they generate calls for more specialized attention in this area.

In order to enlarge surveillance range, constant speed dome cameras are applied to surveillance camera systems, but this application also makes image recognition of alarm more difficult. Template matching is used to calculate camera's movement distance, renew reference image and segment motion objects by accumulative difference image in the paper. For workload reduction of template matching and interference elimination of camera oscillating, recursive least square method is also applied to estimate the movement of the camera in the paper. The test results indicate that motion objects can be segmented from an image sequence of constant speed dome camera effectively for alarm pattern recognition.

3. PROPOSED SYSTEM

Wildlife footage capturing is very difficult and time-consuming. The photographer has to wait for a long duration in order to get desired footage. In order to solve this, there is a system where we set up cameras in different spots.BEFPi saves battery as the cameras are set to recording, only when motion is sensed. The camera is switched off when no motion is detected. Footage recorded will be saved in memory. It is more advantageous than the existing system as it gets rid of unwanted footage being recorded and thus save memory and battery life. It is more cost-effective than the existing system. The system consists of a circuit where motion sensor with camera and sd card are connected to a raspberry pi. Any input from the sensor can be processed using the pi. The camera is switched off when no motion is detected. The footage captured while motion is detected can be stored in sd card. In this way, it gets rid of unwanted footage being recorded and it saves memory space. It enhances the performance speed. The project reduces the processing time to larger extend. It saves battery. It is very helpful for the photographer. An additional feature that can be added to this project is a smoke alarm. In case if fire accidents occur in the forest, we can give notification to forest guard by in cooperating GSM module.

4. HARDWARE REQUIREMENTS

4.1. Raspberry Pi

Fig .1 Raspberry Pi

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated, selling outside its target market for uses such as robotics.

Processor speed ranges from 700 MHz to 1.4 GHz for the Pi 3 Model B+; on-board memory ranges from 256 MB to 1 GB RAM. Secure Digital (SD) cards are used to store the operating system and program memory in either SDHC or MicroSDHC sizes. The boards have one to four USB ports.

4.2 PIR sensor

Fig.2 PIR sensor

Passive infrared (PIR) sensors are sensitive to a person's skin temperature through emitted black body radiation at mid-infrared wavelengths, in contrast to background objects at room temperature. No energy is emitted from the sensor, thus the name passive infrared. This distinguishes it from the electric eye for instance (not usually considered a motion detector), in which the crossing of a person or vehicle interrupts a visible or infrared beam

4.3. Light sensor

Light sensors or photodetectors are sensors of light or other electromagnetic energy. A photo detector has a p–n junction that converts light photons into current. The absorbed photons make electron-hole pairs in the depletion region. Photodiodes and photo transistors are a few examples of photo detectors. Solar cells convert some of the light energy absorbed into electrical energy.

5. IMPLEMENTATION

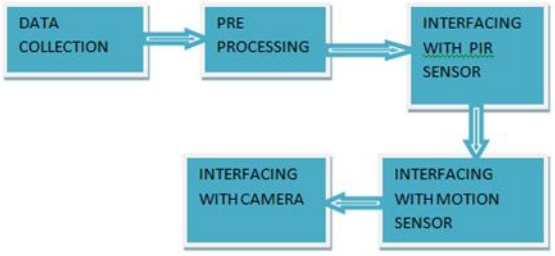

Fig.3 Block Diagram

In data collection phase literature survey is conducted to learn more about the methods that has been used for capturing footage in efficient manner. It helps garner more knowledge about current trends used in surveillance. Moving towards the pre-processing the main objective is to interface the Pi to laptop. For that Advanced IP Scanner and MobaXterm has to be installed. Advanced IP scanner is used to obtain the IP address of the raspberry pi. This IP address has to be used as Ethernet's IP address on the laptop. Raspbian os will be in the form of SSH, for enabling this in laptop either putty has to be installed or another option to do it is by installing MobaXterm. It enables to create a secure shell in the sd card were software is written. Once pre-processing is completed interfacing with PIR sensor has to be done. PIR sensor is used to detect the body temperature of live objects. The motive is to detect the presence of animals and capture the footage. This is used in the prototype to avoid unwanted power wastage. Formatting bulk amount of footage to find minimum useful data is very tedious. Hence the system is setup in such a way that it will be switched on only if it senses presence of live objects. This helps in reducing the memory usage as well. The integration of motion sensor is done so as to increase the efficiency prototype. It enables to capture the motion of live objects. The last module includes integration of camera. Hence the entire system is setup in such way that it will be switched on only when it senses motion of live objects with predefined body temperature.

6. CONCLUSION

Thus in the proposed system BEFPi is found more efficient than existing methods of capturing footage while sensing motion. It has greater efficiency since the processing speed is higher .It has ability to save power to a greater extent when compared to conventional system. Footage recording is tedious task. The processing of the long footages take large amount of time. The important data will occupy only small space in memory. For obtaining the useful data processing of entire footage has to be done manually. The prototype has made it easier to the end users.

7. FUTURE WORK

Attaching a smoke alarm to the prototype along with a gsm module adds up two more features, one is, enables the prototype to detect fire accidents in forest and send an automated machine generated message to indicate the danger.

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