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Design and Implementation of Raspberry PI based Network of Trap Cameras for Wildlife Survey

Samiksha V. Nichat[1], Arti S. Awari[2], Pooja M. Deshmukh[3], A.V.Saywan[4]

UG Student, Dept. of EXTC, PRMCEAM, Badnera, Maharashtra, India[1]

UG Student, Dept. of EXTC, PRMCEAM, Badnera, Maharashtra, India[2]

UG Student, Dept. of EXTC, PRMCEAM, Badnera, Maharashtra, India[3]

Assistant professor, Dept. of EXTC, PRMCEAM, Badnera, Maharashtra, India[4]

ABSTRACT: This paper deals with the study of different species, nocturnal, elusive or lonely terrestrial mammal species using the trap camera. This is done to overcome the obstacles regarding the study of wildlife because it is really difficult to go in the forest and capture the images manually. For example: capturing the image of cheetah. Here we have placed the stationary camera in forest. When the animal is between the areas which are covered by the trap camera network then the animal is detected by the PIR sensor, the camera is automatically fired and the image is captured by the camera. Then this image is sent to the email which is specified within the program.

KEYWORDS: Raspberry PI, Camera, PIR sensor, power batteries etc.

I. INTRODUCTION

Researchers are not available for capturing the wild animals so the trap cameras have been used in ecological research for decades. Zoologists have already used trap cameras for inventories. Those experiences partially met the requirements but as compared to the other sampling methods, such as direct observation, capture and finding signs; trap cameras are more effective for studying the wildlife. By studying about the animals, structure, health and behaviour and characteristics by using the images it is easy to study about animal habitat as well as we can track the animals. By using this trap camera we can study and research about the biodiversity particularly among large vertebrates. Also the analysis can be done on the population density of animals in the particular areas in the forest as well as in the world. Camera traps are increasingly being used to study the wildlife behaviour and to conduct population estimation.

II. BLOCK DIAGRAM

Block diagram consist of USB camera, raspberry-pi. We are using mobile for internet connection. We are also using dongle, laptop for turn on the raspberry-pi kit, one PIR sensor and a simple power supply circuit. USB Camera captures the image and sends it to USB port of the raspberry-pi board.

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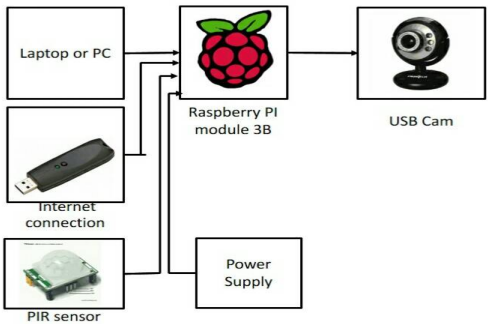

Fig1. Block diagram

III. DESCRIPTION

Block diagram consist of USB camera, raspberry-pi. We are using mobile for internet connection. We are also using dongle, laptop for turn on the raspberry-pi kit, one PIR sensor and a simple power supply circuit. USB Camera captures the image and sends it to USB port of the raspberry-pi board.

RASPBERRY PI: Raspberry pi is a small palm size computer performing various functionalities such as in surveillance systems, military applications, etc. Raspberry-pi works only on Raspbian operating system, Linux. Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware.

PIR SENSOR: PIR sensor is a compact and complete, easy to use pyroelectric infrared sensor module for living thing detection. Incorporating a Fresnel lens and motion detection circuit, high sensitivity and low noise. Output is standard 5 volt active low output signal. The PIR sensor has a range of approximately 6 meter straight and 3 to 4 meter side and angle is 140 degree wide.

CAMERA: As per the user requirement as well as the budget we can use the camera. In this project, we have used the simple webcam but in practical use the professional cameras like Canon, Nikon, Sony, Panasonic& Pentax etc. series can be used.

BATTERIES: On the field we need high power long lasting batteries. Here we have used 9 volt battery the model number of batteries is HW 9V 6F22M. The battery type is zinc carbon. It consist of metal jacket. Weight is 37.00 gram and 5% tolerance.

IV. PRACTICAL HARDWARE SET-UP

The practical set up for the project is as shown below fig. 2. After running the program the output window occurs on the laptop screen. When the mail is sent, the message appears on the screen. We can say it as a delivery report of the e-mail.

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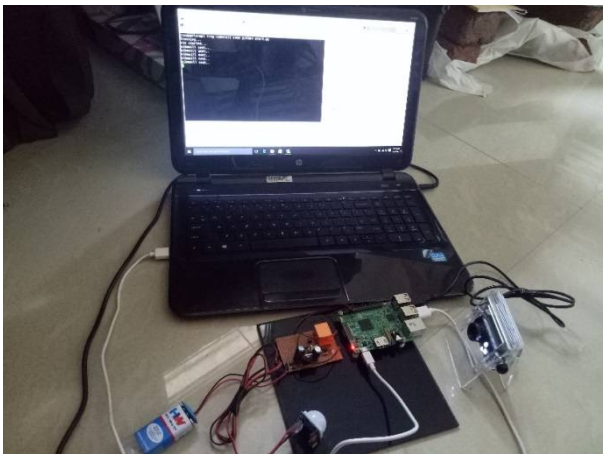

Fig.2.Transmitter side

As shown in below fig.3. the mail is sent to the email ID which is specified within the program. By using this we can access it all over the world. The image captured by the camera is sent through mail to the specified user it is shown in fig 3.

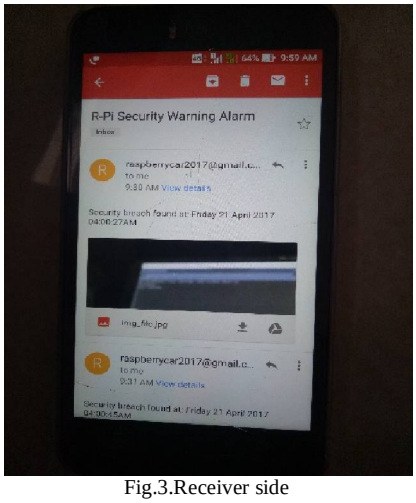

Fig.3.Receiver side

V. PRACTICAL SETUP OF CAMERA

The actual fine set up of camera trap in the forest can be as important as the choice of overall location with regard to the likelihood of obtaining the photo capture of your target. The exact set up is depending on the topography of the surrounding land, camera model and target species.

Following points to be considered while set up the cameras into the field.

1. Camera height from the ground surface.
2. Camera angle.
3. Distance to trail.
4. Vegetation clearing.

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VI. ADVANTAGES

1. NON-INASIVE: By only capturing photographs with invisible IR flashes, camera trap have no animal behaviour.
2. LOW LABOR: camera trap are easy to deploy and can function for weeks with no attention.
3. ROBUST DATA: Photographs are analogous to museum specimens in being a permanent record of data location and species.
4. BONUS MATERIAL: In addition to recording the presence of the species camera can record animal behaviour which can be important for scientific analysis. Critical issue is discriminating between non-detection sites where animals are present but not recorded it can be eliminated by using cameras. First it was done by imaging technology but for replacement they use dome system due to its efficiency and capability.

VII. CONCLUSION

Rather than to walk on miles and behave like gipsy as well as gather the information and studying about animals, trap camera is the best way, it takes less efforts and less workforce once after the implementation, it needs to change its battery after a long period of time and need not a person to monitor a system continuously. Thus we have designed the smart system capable of recording/ capturing the video/image and transmitting it to the smartphones. The output data can be used for scientific research for health monitoring, species research and animal behavior.

In future we can do the following things to improve the performance of the system.

1. Wireless power transmission can be used to replace the use of batteries. The wireless power transfer(WPT) or wireless energy transmission is the transmission of electrical energy from power source to an electrical load, such as an electrical power grid or a consuming device, without the use of discrete human-made conductors.
2. Using raspberry PI, captured image can be stored on cloud to use it at a different locations. Cloud storage is a cloud computing model in which data is stored on remote servers accessed from the internet or cloud. It is maintained, operated and managed by a cloud storage service provider on the storage server that are built on the virtualization techniques.
3. For power we can use the solar panel, charge it for the whole day in sunlight and use it whenever required.
4. Image processing can be done after capturing the image. Scale of color can be changed for the efficient output.

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