INDEPENDENT PHOTO CLICKER

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Abstract: This paper is focused on capturing images of wild creatures in their natural abode; where there is always the fear of grievous injuries when captured at close range. Also in cases of rare animals, it's really difficult to capture their photos as they are usually reluctant to come anywhere near humans. This system can be used effectively to avoid the likelihood of any accident. The sensors used in this system can also be used to efficiently monitor the body temperature of the creature in the view. According to the body temperature of the creature, if an anomaly is noticed, a rare species of creature could be saved when everyday examination's an issue. This APC is a system that is built on an autonomous board that detects body heat signatures even when the creature is stationary and clicks the picture. A D6T thermal sensor is used to detect body heat which triggers the camera to click photos.

Keywords: Internet of Things, Sensors, Thermal imaging, Light sensing, Camera, Wildlife, Wildlife photographhy, Embedded Systems

I. INTRODUCTION

Wildlife photography is the photography concerned with documenting various forms of wildlife in their natural habitat. It does not require only good skills in photography but as well as knowledge about the various animals. The behaviour of various animals and birds being documented is also necessary. But, it is a very delicate job. A great wildlife photograph can also be the result of being in the right place at the right time and often involves a good understanding of animal behavior in order to anticipate interesting situations to capture in photography.

The job of a wildlife photographer is also very risky. The photographer needs to have good stealth skills and hiding knowledge, and the knowledge to conceal their presence from animals around them. This paper focuses on removing threats towards the life of a wildlife photographer.

The independent photo clicker is completely automated and also reduces the risks to the life of the wildlife photographer. This is achieved by automating the process. This is also good for the animals and birds which are being documented. There is no chance of harm towards them as well or any fear of disturbing them or ruining a perfect moment.

Photographers wait for so many hours, minutes in a single posture to get the perfect click. They need to be very careful and avoid making the animals or birds flee in fear. This paper also removes the chance of animals and birds running away because of a human presence. The independent photo clicker can have other purpose as well and can be used to prevent poaching as well. Poaching is a serious issue and can be reduced through this paper.

The independent photo clicker consists of a raspberry pi board, a storage device and a few sensors, all of which can be bought under a small budget convenient for use of wildlife photographers. The photo clicker is able to detect light and motion along with heat. All this is possible with the help of the sensors mounted on the raspberry pi. The raspberry pi is a lightweight board capable of functioning as a system and can be used to operate the camera. It will then click the pictures when the necessary condition is met. All the conditions of the three sensors need to be met in order for the picture to be clicked.

The three sensors are namely, Ultrasonic sensor, PIR sensor and A thermal sensor. The ultrasonic sensor is used to measure the distance. The PIR sensor is used to measure the infrared radiation from an object. The thermal sensor is used to detect light. The other things that can be done as an extended function include surveillance purpose for protection of wildlife or other things. The paper has high potential and can be further improved in future.
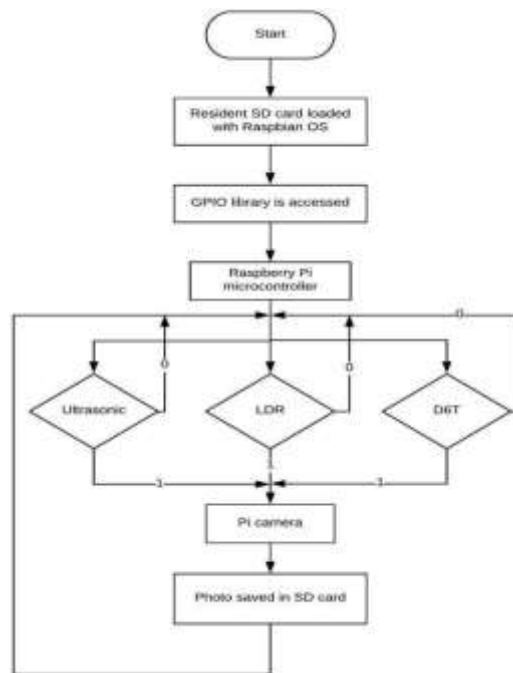
II. *Flow Chart of Proposed System*

Fig. 1 – System flowchart

The Independent Photo Clicker uses an embedded system based on Raspberry Pi board to provide an image capturing technique. The architecture is generally designed in such a way where the Interface board acts as the receiving end rather than being an input end however the transmission of data takes place from the client system to Raspberry Pi module. The connection is established using Wi-Fi network to connect to the main system i.e. Raspberry Pi. For the functioning of photo clicker, all three sensors light, ultrasonic and PIR would have to be triggered. The working first requires booting of system and then loading of basic pin information on the system following the collection of data constantly by the sensor if all three sensors end up having logic 1. The camera mounted on the pie would trigger and click a photo. Then comes the uploading part where the photo will be uploaded to the specific location and eventually it would lead to termination of the program.

III. *System Hardware Design*
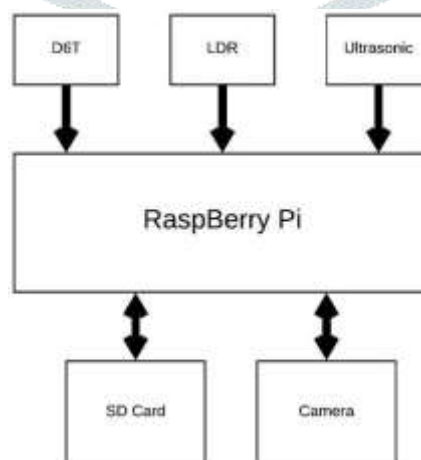
The hardware components are as follows:

Fig. 2 – Block Diagram

Raspberry Pi

Raspberry Pi Model B

It acts as the main module of the photo clicker. The device is of a credit card size which can function like a mini computer. There are lots of interfaces that are contained on the Raspberry Pi board. The presence of GPIO pins counts as one of the main features of the Raspberry Pi which makes it possible to connect the Pi to some custom hardware which is not possible to communicate with it on standard ports. These are general-purpose pins which can be controlled from software arbitrarily.

D6T Thermal Sensor
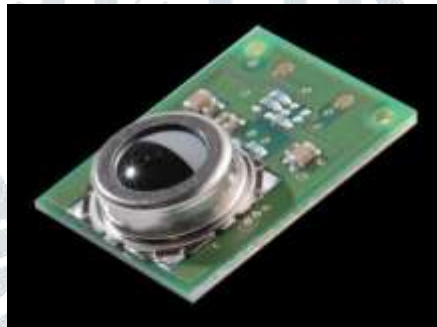
D6T sensor

The D6T thermal sensor is able to detect the presence of stationary humans by detecting body heat, and can therefore be used to automatically switch off unnecessary lighting, air conditioning, etc. when people are not present (regardless of whether they move or not).

Light Sensor

Light sensor

It is a device that is sensitive to light. The triggering of this sensor will only occur if there is enough light available. It ensures the clarity of photograph by stopping the camera from triggering when there wasn't enough ambient light. The proper lighting system can intensify the quality of the photos obtained by the system.

Ultrasonic Sensor

Ultrasonic sensor

It is used to measure the distance to any solid object within a pre-defined distance. If any warm body is found beyond the specified distance, the camera won't trigger. The main objective is to obtain clear and near distance photos. The functioning is done by sending an ultrasonic pulse and listening for its echo. The wide angle of sensitivity gives enough area to detect echo by transducers.

Pi Camera

Pi camera

The camera module used is Raspberry Pi No IR camera board. The camera interfacing is done by Camera Serial Interface(CSI) connector.

IV. *Analysis and Implementation*

Initially, the Raspberry pi microcontroller is configured with a camera module of USB configuration. The SD card is loaded with Raspbian OS. Once these initial stages are completed, the sensors are to be coded for assessing the conditions and determining whether the camera can be triggered. The LDR sensor detects the presence of light, for which the system is coded as below,

In presence of light (state is 1) = Light No light present (state is 0) = Dark

Similarly, ultrasonic sensor is accountable for determining the distance between the sensor and the object. The sensor works via sending sound waves and receiving the echo to and from the object. The distance between is calculated as follows,

Distance=(time*34300)/2, here the maximum distance is 3m, therefore if the distance exceeds it then the output is shown as too far.

The last sensor in the system is the D6T thermal sensor which aids in detecting the body heat of a creature. Unlike the pyroelectric sensor, the D6T sensor can also detect stationary creatures. Once the radiated heat is measured by the sensor, it sends the output via a bus to the microcontroller. Since the output signal is digital, it raises the efficiency and makes the system more user- friendly.

When all the scripts have been coded and tested, they are put up on the raspberry pi. The output of all the sensors is then fed into the main script accountable for the camera trigger. If all the three outputs are positive, then the camera is triggered to click a photo and save it on the SD card.

V. RESULTS

A good picture is the one with a good amount of light. So, to save energy, the sensors need to be used optimally. First, We will select the light sensor as the condition to decide whether the picture is to be clicked or not. If the light sensor says there's enough light, other sensors will be activated and click the pictures. If the light sensor is on, next comes the thermal sensor. The thermal sensor will detect a living object within the set range. Then the ultrasonic sensor will come into play. The Ultrasonic sensor will give us the detail of the distance of the object in motion. The picture will be clicked after all these activities are done.

VI. *Future Scope*

With the help of the D6T sensor, this system can have multiple benefits. The sensor can measure the temperature of the creature and send an alert if there is a variation in it, this can also help in saving endangered species if they are sick. Poaching spots can also be identified via the IPC system, hence saving the lives of a lot of creatures.

VII. CONCLUSION

Independent Photo Clicker is an advanced system that sense lights, measure distance, sense motion and upload the details on public websites, and private drives via raspberry pi module. It takes less power input and can be consist of integrated economical hardware to do the job of capturing the photos with maximum accuracy as presented by our own system. This System can have its presence in various approaches such as traffic rule enforcement, security in public places, wildlife and bird sanctuaries photography, border patrolling and many more. The system is designed and upgraded to achieve the goal in more efficient manner.

VIII. REFERENCES

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