EMERGENCY ALERT FOR CAGED ANIMALS

Nalini M., Mathangi A., Jayashri K.R., Nivedha J.K.

Department of Electronics and Instrumentation, Sri Sairam Engineering College, Chennai

ABSTRACT

This endeavor is an attempt to explore the means and tools exclusively invented to protect and preserve caged animals in case of any exigency. With receding wildlife population becoming a huge problem and global crisis, round the clock vigilance and preservation of endangered species especially those that are caged, are of utmost necessity. Besides being dumb, the 'caging-in' is another trauma. Human being, being the society's most developed and privileged animal has the major responsibility of taking care of those that need our helping hands. Carelessness and negligence are the negative traits of humans. So it is obviously not possible to provide 24/7 acute attention. This is the part where instrumentation engineers come in hand. This work utilises various sensors and image sensing cameras to continuously monitor these underprivileged beings of the society. The sensors constantly track and maintain various parameters related with the health, safety and wellness of the caged being. In case of any abnormality, the GPS-enabled alert device immediately notifies the important personal, (say the forest rangers, the veterinarian, the guard, etc.), in-charge of the safety and the well-being of the caged animals.

I. INTRODUCTION

With increased potency of technology, human power is slowly replaced by automated findings. Also, the accuracy and vigilance of automation can never be matched by humans. That is the foremost reason, why instrumentation, robotics and automation are in major demand nowadays. Even if round the clock security is employed, chances are low that the person can perform efficiently throughout the working hours. During those times of sheer negligence many unimaginable mistakes and irrevocable damages can happen. So as to ensure 24/7 security and care for the caged beings, this work is undertaken fig 1 shows the basic block diagram of the system.

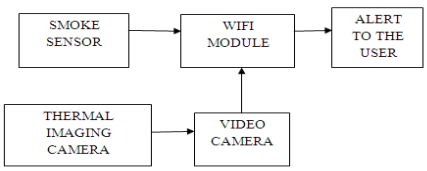

Fig 1 basic block diagram

II. ESSENTIAL REQUIREMENTS

This brings into play, certain distinctive sensors and a unique image sensing camera to constantly track and maintain various parameters linked with the vigor and protection of the caged being. Together with these sensors and cameras, a GPS-enabled alert device is coupled and it immediately notifies the important personal, (say the forest rangers, the veterinarian, the guard, etc.), in-charge of the safety and the well-being of the caged animals. This makes use of a smoke detector and a specialized camera, called thermal camera in addition to normal image capturing camera. Using these, various parameters, both environmental and physical, are keenly noted, monitored and alert activation is done in case of any mishaps.

III.SMOKE SENSORS

A. What is a smoke sensor?

Smoke detector or sensor, as the name suggests is an electronic sensor that detects smoke. Smoke is usually an indication of fire or leakage of gases especially gases that are used as a fuel for cooking. The first generation smoke sensors worked based on the principle of ionisation of gases. There are also other advanced forms of smoke detectors like optical or photoelectric smoke detector, smoke detectors used for specific gases like carbon monoxide, carbon di oxide or other harmful and poisonous gases.

B. Ionisation Diagram

The fig. 2 shows the ionisation process

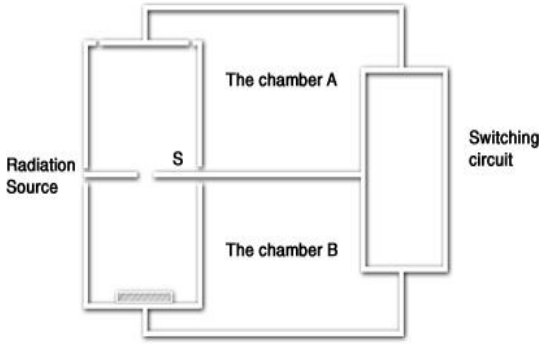

Fig. 2 Ionisation diagram

C. Methadology of the basic type

When there is no hint of smoke in the air, the two chambers A and B at the point S will have equal electrical potential and so there will not be any flow of electric current. But as soon the sensor or the detector comes in contact with the cloud of smoke, due to the molecules present in the smoke there will be ionization of gases at the point C due to which there will be a development of electrical potential between the two chambers, as a result of which electric current flows. This in turn is connected externally to an alarm system which is activated due to the flow of current and thus a sharp ringing sound is let out.

D. Other types and their working

The optical or photoelectric smoke detector contains an optical source (infrared, ultra violet, visible), lens and a photoelectric receiver (photodiode, photo-transistor). The light form the source is made to fall onto the space being monitored and if there is presence of smoke, the intensity of light received by the receiver will vary from that of the intensity obtained while passing through air. This is due to the absorption if light radiation by the smoke or dust or other particles.

This difference in the intensity of the light generates electric current which in turn triggers an alarm. Also in other cases, detectors are placed at several places and when the reflected light by the smoke or dust or other air-borne particles hit these detectors, alarms are triggered. The specific sensors like that of carbon monoxide, carbon di oxide or other harmful and poisonous gases, they detect hiked levels of these gases but do not detect fire and hence their accuracy is high.

IV. THERMAL CAMERAS

Thermal cameras are mainly used for the purpose of thermal imaging. Thermal imaging is a method by which an object in a dark environment is brought to visibility by making use of the infrared radiation reflected from the body and processing the information and creating an image based on that. Infrared energy is radiated from all objects as a function of their temperature. This emitted radiation is known as the heat signature of the object. In general, the amount of radiation emitted by an object is directly proportional to the hotness of the object. A thermal imager, also referred to as a thermal camera is typically a heat sensor that detects even tiny differences in temperature. This device collects the infrared radiation from objects in the surrounding and based on the information obtained about the temperature differences it creates an electronic image. Since no two objects in a particular place can have the same precise temperatures, this thermal camera can easily detect them and form a unique thermal image. Thermal images are normally greyscale in nature. Each object will be represented by a unique colour depending upon their temperature. For example, black objects are represented to be cold, while white objects are hot. The depth of grey obtained in our resultant image indicates variations between the two. Some thermal cameras, nowadays, add colour to images for objects at different temperatures, aiding in easy identification.

A. Parts of the thermal imaging camera

- A special lens is employed to focus the infrared emission emitted by objects.
- A phased array of infrared-detector elements is used for scanning the focused light. The detector produces a much elaborated temperature pattern termed as a thermogram. It usually takes the detector array ,one-thirtieth of a second to obtain the data about temperature to produce the thermogram. This data is obtained as a result of many thousand points within the field of view of the detector array.
- The thermogram that is produced by the detector elements is transformed into electrical impulses.
- These impulses are then analysed by passing them onto a signal-processing unit, which is a typical circuit card with a passionate chip that produces the display by interpreting the information from various elements.
- The signal-processing unit sends the information to the display wherever it seems as numerous colors depending on the intensity of the infrared radiation. The image is created by the combination of all the impulses from various elements. It is quite straightforward to examine everything throughout the day, but at nighttime we will have the ability to see only little or nothing.

B. Camera interfacing Circuit

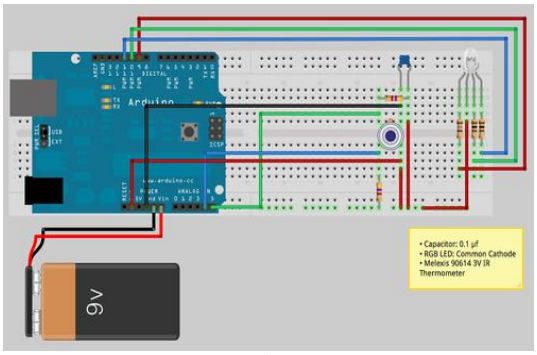

Fig. 3 thermal camera interfacing Circuit

C. Advantage

The main advantage of thermal imaging over normal methods of image sensing techniques is the possibility of night vision. The thermal image sensor is a temperature sensor that detects temperature and hence it is possible to acquire even night vivion of these objects, making use of the infrared energy that is being emitted by the object. Thermal imagers are entirely different. They produce the images as a result of heat, not visible light. Heat (also termed as infrared, or thermal energy) and light are both parts of the spectrum; however a camera that may detect visible light won't see thermal energy, and the other way around. Thermal cameras observe quite simply heat though; they observe small variations in heat – as little as 0.01°C

V. VIDEO CAMERA

A. Why a video camera?

Sometimes there might be situations when thermal imaging might need false-proofing. In such cases, the video camera is activated and image is captured. This camera works on visible light. The optical component of the camera is the lens. Light rays enter the glass piece and will get split into two parts. One part will be at a greater speed then the other. Hence, light tends to get bent at the entrance, as it enters at certain angle and there is a change of medium from air to glass, and also at the exit, as a result of change of medium from glass to air. One or both sides of a typical converging, or convex lens, curves out. This means rays of light passing through, tends to get bent towards the center of the lens on entry. The focus is found as follows:

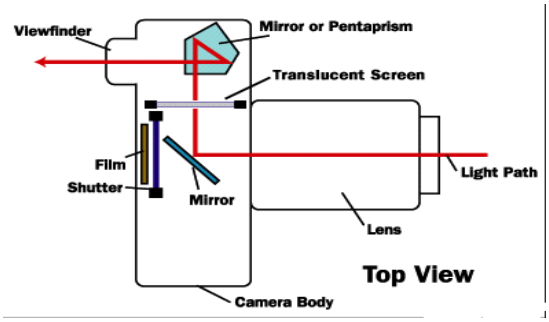

Fig. 4 Video camera

B. Schematic view

Figure 5 shows the schematic view of the proposed system.

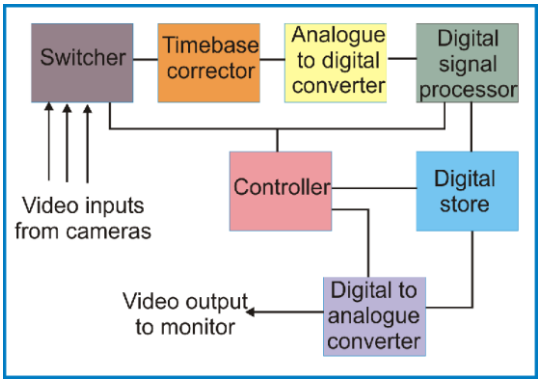

Fig. 5 schematic diagram

C. Working

Many DVRs support additional features like motion detection or video transmission. The switcher is the one that selects which camera is to be activated for recording at any moment and passes it onto timebase corrector. The time base corrector guarantees that pictures are recorded rapidly in sequence without having to synchronize the cameras by gen lock or other means. The analog to digital converter (ADC) converts the voltages corresponding to light into an array of binary digital numbers. These binary digital numbers are a representation of the brightness and colour. A digital signal processor takes in, this large amount of data and compresses it so that an acceptable number of pictures can be stored on the limited space available in the digital store. The store takes this information and holds it, usually under a reference related to the time and date of recording. At any time, this archived information can be retrieved and routed through a DAC (digital to analog converter) to re-create the video signal required to play back the recording on a conventional video monitor. In the place of a digital recorder, if a PC (personal computer) is used, then the playback pictures may stay in digital form for display on the PC monitor.

VI. GPS BASED ALERT SYSTEM

GPS is Global Positioning System. It utilises the satellites for the use of communication. Various parameters like body temperature, pressure etc. are taken note of. Threshold values are set for different animals routed from their physical characteristics. And when the obtained value crosses the threshold value, the camera is activated and image is obtained. This image is then sent as an alert message to the users or officials or people. A module is set up in such a way that the image file or video file is sent as an alert message to the veterinarian, ranger or guard.

VII. OVERALL WORKING

The caged animals are constantly monitored for various physical or environmental hazards or ailments. The smoke sensor ensures safety in case of fire. Other parameters are monitored using the thermal imager and incase the threshold or set value is crossed, the video camera is activated and images or videos are taken. This is then sent as an alert message to the chosen recipients.

VIII. **CONCLUSION**

Thus the safety and well- being of the caged animals are ensured using the various electronic gadgets and the prescribed people are notified in case of any mishaps. Using this technique, 24/7 safety of the caged animals can be ensured.

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