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PEDESTRIAN DETECTION USING THERMAL IMAGE PROCESSING

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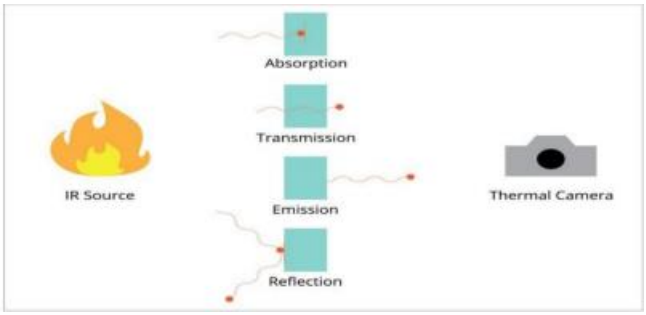
Abstract : Human body has its basal temperature that can be exploited for different uses. Obviously, thermal properties of human tissues allow to retrieve specific characteristics if special attention is paid. Thermal image processing has been developing into one of the most valuable technique in various grounds like industries, medical areas, biometrics. A new method called thermography is being used which is based on temperature variations. Thermal image absorbs the property of the infrared spectrum of light which cannot be viewed by normal eyes and provides essential details in some situation. A method of face identification has been developed by exploiting thermal image processing techniques. The method is based on temperature distribution of the face using infrared rays. The front view face in the input image is normalized in terms of location and size, followed by measurement of the temperature and the shape factors of face. The short coming of visible ray image analysis that the accuracy of the face identifications strongly influenced by lightning condition including variation of shadow, reflection and darkness is considered to be perfectly overcome by the present method exploiting infrared rays.it is used in shops, industries, medical, to test the temperature of humans .it provides real time application thermal image processing i.e. agriculture ,medical diagnosis, detection ,tracking ,recognition of humans along with their facial expressions. Thermal imaging is simply a process of converting infrared radiation into visible images that depict the spatial distribution of temperature differences in a screen viewed by a thermal camera. The imaging camera is fitted with an infrared detector. Infrared radiation is attenuated by the atmosphere and the atmosphere and the degree of attenuation depends greatly on the local atmospheric conditions at the time the imagery is collected**.**

IndexTerms - Image processing, Raspberry pi, MATLAB, thermal camera.

I. INTRODUCTION

Thermal imagers allow users to measure temperature in applications where conventional sensors cannot be employed. Specifically in cases dealing with moving objects (i.e., rollers, moving machinery, or a conveyer belt), or where non-contact measurements are required because of contamination or hazardous reasons (such as high voltage), where distances are too great, or where temperatures are too high for thermocouples or other contact sensors.



Thermal imaging is simply the process of converting infrared (IR) radiation (heat) into visible images that depict the spatial distribution of temperature differences in a scene viewed by a thermal camera. A thermal image (thermogram) is a digital representation of a scene and a measure of the thermal radiation emitted by the pictured objects. Thermal images are captured via thermographic cameras, which are devices capable of sensing this radiation in the form of infrared light. A thermal image allows us to remotely sense the temperature of an object or at least accurately tell its temperature relative to its environment. the engine. A thermal image allows us to remotely sense the temperature of an object or at least accurately tell its temperature relative to its environment. This is useful as it allows us to essentially "see" in the dark as well as perceive the temperatures of many objects remotely.

II. LITERATURE REVIEW

1. Detecting dim small targets in infrared images and videos is the main concern of this paper. Support Vector Machine (SVM) algorithm is being used here which is quite efficient to detect and track the infrared dim small objects [1]. Concept used in SVM is based on decision planes that defines boundaries between two objects categories. In the starting Retinex filtering to remove the noise and improve the image quality [1]. Then in the second step, object in infrared image is detected through the support vector machine classifier from the background [1]. Four very important features used by SVM classifier are Discrete Wavelet Transform (DWT), mean, entropy and variance [1]. SVM classifier separates objects from background [1].
2. Identification of Moving objects is the main concern of this paper [2]. And for understanding more about International Journal of Electrical, Electronics And Data Communication, ISSN: 2320-2084 Volume-5, Issue-11, Nov.-2017 http://iraj.in A Review on Object Detection in Thermal Imaging and Analyzing Object and Target Parameters 70 the object's movement, special fusion of visible spectrum and Thermal imaging is used [2]. Visible spectrum and Thermal imaging.
3. In this article [3] continues to develop and refine the electric car technology and the payment method it created. conventional phone charging Wireless charging is now complete. Compared with the traditional payment method, the traditional payment method is complex and must be combined with the socket and charging line at the same time to complete the payment, while wireless charging is to know the special electricity transmission. Operation of electricity is easy and fast.
4. This article [4] is about wireless charging technology for electric vehicle batteries. Design and assemble a Inductive Power Transfer (IPT) system for electric bicycle battery charging. The goal is to create a prototype of the toy car. After the magnetic field of the IPT coil is created, the electronic model of the connected model is obtained and obtained to complete the design of the whole system with the electronic simulation tool.
5. This paper suggest the first thermal image enhancement method -based CNN guided on RGB data [5]. Intelligent video surveillance system (IVS) based on recognition is widely employed to effectively avert crime s and provide public security [5]. High complexity is present in processing real time data and analysis [5]. Many technologies mostly intelligent techniques like neural systems, fuzzy logic, SVM, genetic algorithm emerged out as basis for intelligence in such systems [5].

III. METHODOLOGY

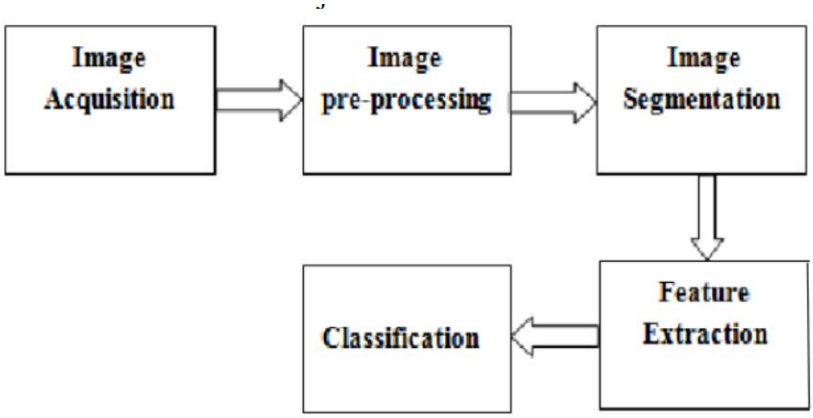


Fig 1. Block diagram of model

Thermal imaging is based on the science of infrared energy (otherwise known as heat), which is emitted from all objects. This energy from an object is also referred to as the "heat signature", and the quantity of radiation emitted tends to be proportional to the overall heat of the object. The first thing to know about thermal cameras is they don't work like regular cameras. Regular daylight cameras and the human eye both work on the same basic principle: visible light energy hits something, bounces off it, a detector receives the reflected light, and then turns into an image.

Thermal imagers make pictures from heat, not visible light. Heat (also called infrared or thermal energy) and light are both parts of the electromagnetic spectrum, but a camera that can detect visible light won't see thermal energy, and vice versa. Thermal cameras capture infrared energy and use the data to create images through digital or analog video outputs. Thermal imaging is a method of using infrared radiation and thermal energy to gather information about objects, in order to formulate images of them, even in low visibility environments. Using thermal imaging pedestrian can be detected in low light.

IV. FLOW CHART

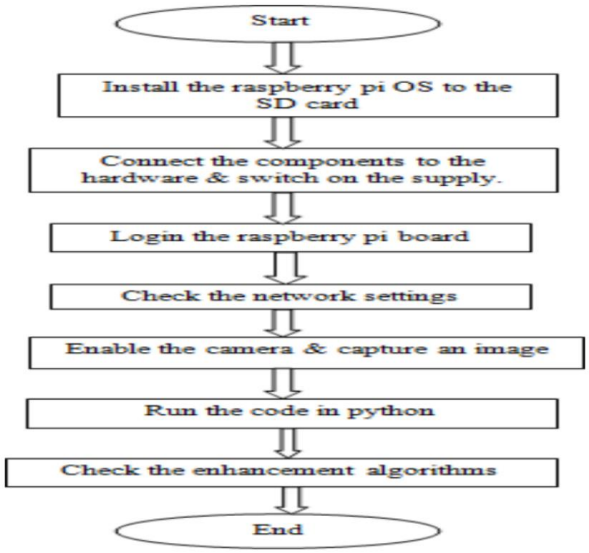


Fig 2:- Flow chart of Agriculture Robot

V. MAJOR TOOLS USED

- **Raspberry pi 4.**
- **5inch touch display Raspberry monitor.**
- **thermal camera.**
- **jumper wires.**
- **Right angled Header connections.**

Software used

- **MATLAB.**
- **Python (3.8).**

Objectives of the project work

- Improving visibility of objects in a dark environment by detecting the objects infrared radiation and creating an image based on that information.
- Using thermal imaging pedestrians can be detected in low light.
- Temperature of the specific object can be detected by the thermal camera and it can be seen in the raspberry monitor.

VI. APPLICATIONS

• Electrical maintenance.
• Mechanical and building construction technicians.
• Healthcare and medicine.
• Electrical Wiring maintenance.
• First responders & Security.
• Animal health & Mechanical Installations.
• Gas Detection & many other applications.

VII. ADVANTAGES

This technology has created more efficient and safer method of measurement.
• Regular predictive maintenance using thermal imaging products help in saving money and consecutively lower the costs. This is due to less downtime, power outages, production losses, fires etc.
• Thermal imaging products provide fast and accurate measurements of objects which are difficult to touch/ to reach such as high altitude power lines.
• It can help in identifying air leakages, documenting irregular heat dispersion and identifying possible irregularities in insulation.

VIII. RESULTS AND DISCUSSION

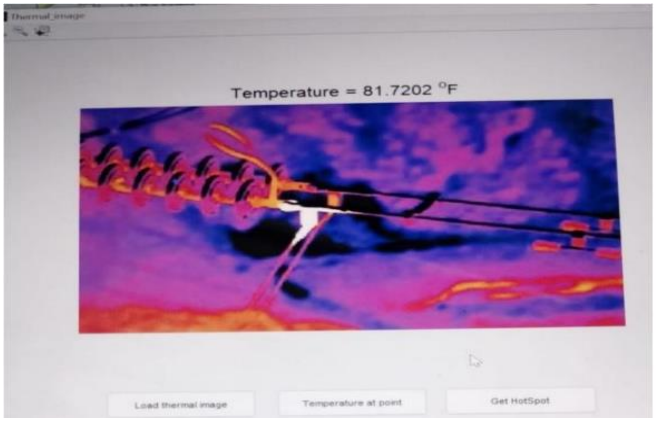


Fig.3 thermal image of Electrical Wiring

Fully functional thermal camera with high precision and FPS is developed which is then used for several functions like circuit verification, pedestrian detection, temperature detection.

Fig 4:- captured thermal images

The images captured shows the different pattern of colors which means the more heat the more the red color. By using this thermal image processing we can find the temperature of the things and animals too.

IX. CONCLUSIONS

It deals with the individuals see what the naked eye cannot. However helping you see even when there is no light only a fraction of what thermal imaging used for with the use of special cameras and lenses this technology offers benefits ranging from industrial advantages, down to enforcement.

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