

PROTOTYPE TO IDENTIFY CURRENT LEAKAGE AT ELECTRICAL INSTALLATION FROM SAFE DISTANCE EMPLOYING IR IMAGE ANALYSIS

Prepared by,

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ABSTRACT: The project aims in designing a prototype to identify current leakage at electrical installation from safe distance employing IR image analysis using IOT. The main controlling device of the whole system is a raspberry pi3 processor. IR(Infra-red) cameras are interfaced to the raspberry pi3 processor which is used to capture the images of electrical installation such as transformers and poles. The captured images are further processed for analysis to identify whether any leakage(current leakage, voltage leakage) is present or not. If the identified leakage is above the threshold value then leakage is present. Then finally all the identified images are displayed on the web portal and stored in a database. Thus the electrical person can be notified about the leakage in order to take further necessary actions to avoid any electrical disturbance. To perform this task, processor is loaded with an intelligent program written in python language.

Keywords: Current Leakage, IR camera, Raspberry pi3, Internet of Things.

1. INTRODUCTION

The **Internet of things** is a system of interrelated computing devices, mechanical and digital machines provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. A Recent Survey says that IOT market would hit to 3000 billion by 2022. IOT can also make a big contribution to the following fields like Media, Agriculture, Energy Sector, Marketing etc. Electricity plays an important role in the most critical equipment of transmission and distribution of electric power. In power system, an electrical component such as transformer directly distributes power to the low voltage users and it's operation condition is a criteria of the entire network operation. However life of transformer is significantly reduced if they are subjected to leakage. Overloading or high voltage current results in unexpected failure. Thus effecting on the reliability of a system. A large number of transformer are distributed over a wide area in present electrical system and it's difficult to measure the condition manually of every single transformer.

This proposed system represents the design and implementation of IOT embedded system to identify the current leakage using IR image analysis. This is

implemented by using python. The IR images are analysed using the image processing algorithms and leakages are identified. So this will help to identify or recognize unexpected simulations before any serious failure, which leads to a greater reliability.

2. OBJECTIVE

- The overall Objective is to identify the leakage (i.e Current, Voltage) in electrical installations such as transformer and electrical poles.
- Web based application for displaying and storing the images with leakage or without leakage.
- The objective also involves in reducing the dependency of electrical workers or skilled professionals, by making this prototype to be easily used by unskilled persons to identify leakages.
- The electrical professionals can be notified by setting an alarm in order to take pre-emptive measures to avoid any such accidents during the maintenance of these electrical installations.
- The prototype mainly focuses on consuming of less time.

3. EXISTING SYSTEM

The current leakage in the electrical installation such as transformer can lead to varying of current and voltage supply. Since the transformers are widely distributed it is difficult to monitor them manually. The current leakage is generally identified by the electrical workers who actually involves in the work to identify the leakage physically where they make use of Clamp Meter i.e by connecting the meter in series with ground connection of the device connected. So this system consumes much effort time and the chances of risking the lives is high. Since the physical involvement may not be a good practice. So in order to overtake this, the New System can be proposed to reduce the physical involvement and thus identify the leakage from safe distance.

4. PROPOSED SYSTEM

Proposed system is designed with following objectives:

1. The new system is proposed with the help of IOT which helps in identifying the current leakage from safe distance using the IR image analysis.
2. The raspberry pi is interfaced with the IR camera.
3. The IR camera is attached to the insulation stick for capturing the images of the transformer ,poles or electrical installations from the safe distance.
4. The images captured are further processed and analysed by using Open-CV ,Tensor flow libraries and implemented using the python in order to identify the leakage in images.
5. The images with the leakages are collected, arranged and stored in a database and finally displayed in web portal.
6. Thus this prototype help in determining the leakage without the involvement of skilled persons.
7. Later the electrical professional are intimated and notified using alarm to take the pre-emptive measure to avoid any further damage.

5. ADVANTAGES AND DISADVANTAGES

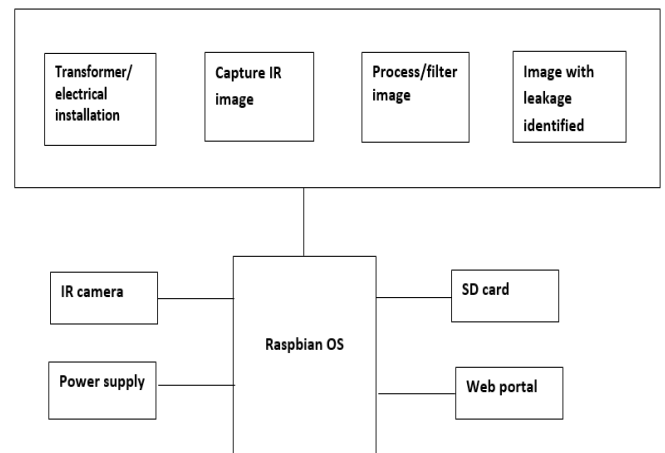
Advantages:

- This project employees in providing more safety to electrical workers by allowing the leakage detection from safe distance.
- Reduces life risk.
- Help in managing and saving lot of time.
- Current leakage can be identified easily.
- Highly efficient, Easy to operate and user friendly design.

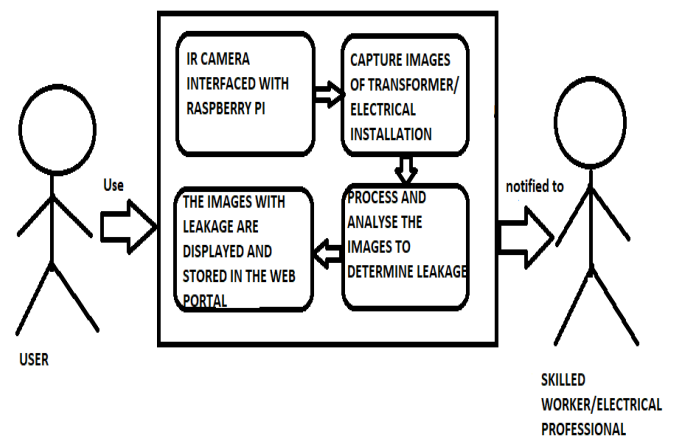
Disadvantages:

- Leakage identification can be performed but further measures cannot be taken.
- Poor network signal can decrease the performance of the system.
- May reduce the reliability or dependence on the electrical workers. Since skilled workers are not necessary to identify leakage.

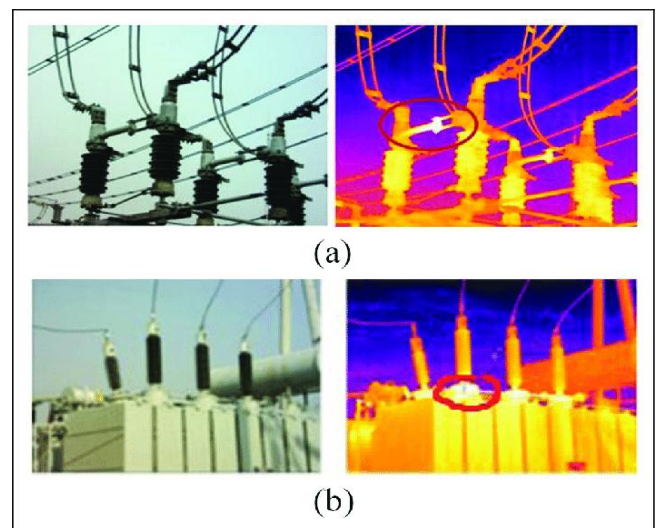
6. BLOCK DIAGRAM



7. USE CASE DIAGRAM



6. IR IMAGES



7. CONCLUSIONS

- The conclusion of this system is that it could be intelligent in detecting faults in transformers and it could take some preventive measures to cool down the transformer.
- It also helps to intimate the amount of transformer oil present in it but counter action couldn't be done to solve it.
- Firstly the Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully ,thus contributing to the best working of the unit.
- Secondly ,using highly advanced IC's with the help of growing technology .Thus the project has been successfully designed ,tested and implemented.

8. ACKNOWLEDGEMENT

We would like to place our regards and acknowledgement to our HOD Dr.Dayanand Jamkhandikar who helped in making this project possible. We also express our heartfelt sincere gratitude to our Project Guide i.e Dr.Dhananjay M for his constant assistance, support ,patience, endurance and constructive suggestions for the betterment of the project. Last but not the least we would like to thank God for giving us this opportunity to do everything in the appropriate time to finish this project.

9. REFERENCES

- [1] RaspberryPiDocumentation:<https://www.raspberrypi.org/documentation/>
- [2] Python3.6.4Documentation:<https://docs.python.org/3/>
- [3] Internet of Things: A Hands-On Approach Paperback – 2015 by ArsheepBahga (Author), Vijay Madiseti (Author)
- [4] Opencv:<https://en.wikipedia.org/wiki/OpenCV>
- [5] ImageSegementation:https://en.wikipedia.org/wiki/Image_segmentation.
- [6] ObjectDetection:https://www.tensorflow.org/lite/models/object_detection/overview