iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** IV **Month of publication:** April 2019

DOI: https://doi.org/10.22214/ijraset.2019.4268

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 7 Issue IV, Apr 2019- Available at www.ijraset.com

Analysis of Overhead Transmission Line Inspection

Awantika Shrawan[1], Brijesh Kumar Dubey[2], Piyush Agnihotri[3]
[1, 2, 3]*Electrical & Electronics Engineering, Pranveer Singh Institute of Technology*

Abstract: ***This paper depicts structure of a robot that can investigate power transmission lines joined by an administrator arranged in the control room. This self-ruling robot primarily centers around the most continuous issues looked by the power system, hot-lines. In this way making it simple for activity and keeping away from the existence danger of labours, at any rate for certain cases, where they can utilize them effectively and attractively.***
Keywords: Inspection Problems, Inspection Methods, Maintenance, Storage, Obstacles

I. INTRODUCTION

The regular assets for power age are unevenly scattered in India. The Planning Commission of India has set an objective of 80010MW electric power for year 2011-2012. As the innovation is creating transmission of power utilizing HVDC is coming into pattern with many included points of interest over the HVAC. This lead to the expansion of transmission lines and makes it difficult to keep up. The transmission lines can have control misfortune because of numerous reasons. There are four kinds of losses which lead to the significant influence losses that is conductor loss, dielectric loss, sheath loss, intersheath loss. Support of electrical transmission lines is a fundamental action in power system parts. There are principally two kinds of testing strategies in the hot-line systems for upkeeps office, HOTSTICK method and BAREHAND procedure. Mechanical autonomy and computerization are taking an extremely fast development from the previous couple of years. The apply autonomy innovation has even ventured into power lattice field moreover. We have numerous robots which are accessible with their very own working strategy in keeping up the transmission systems. Expliner-a robot running on high voltage transmission lines in Japan (Paulo Debenest, et al.,2008). High electric protecting material must be chosen so as to guarantee for the wellbeing of the robot. Proficient plastic composites that can fill in as great covers at high voltages can suit the best according to the prerequisite required. Robots produced for centering to investigate the blame in the transmission line. The report pursues a similar time-stream as the proposal work. Initially, the issue of transmission line assessment is extended and characterized. This is trailed by taking a gander at the present strategies for taking care of the issue and a snappy take a gander at the proposed novel strategy for the transmission line review robot.

A. The Power Line Inspection Problem

The high voltage transmission lines are all over the place. In the course of recent years, power has turned into a piece of our everyday schedule of life and something the majority of us underestimate. To supply us with great power, there is a requirement for a very much created power system. Electric power should be created, transmitted and furthermore disseminated. A significant part of the power system is currently nearing as far as possible of its life. In spots, structures are initially worked in the 1920's and 1930's are still in activity. Power transmission gear and mechanical assembly are by and large considered having a functioning administration life of 50 years. The fundamental interests in the electric power transmission system were made in the 40's and 60's, and are in this way headed for substitution.

B. Maintenance of the Power Infrastructure

The maturing power transmission system needs both persistent upkeep and recharging. Transmission system administrators (TSO) ordinarily invest more energy in restoring the transmission network as opposed to concentrating on the upkeep of it . Recharging implies that an entire line, or segments of it, is brought down for crude material reuse and new hardware is introduced in the spot of old ones. Support is all exercises which goes for drawing out the dynamic life and great state of gear.
Maintenance activities comes into different categories:

1) Tower maintenance
2) Line maintenance
3) Vegetation control

©IJRASET: All Rights are Reserved

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 7 Issue IV, Apr 2019- Available at www.ijraset.com

C. Inspection

To perform compelling recharging of any hardware, there is a need to know the present status of that gear. Electrical cable framework is the same. Before a TSO settles on a choice around a speculation they direct investigations to affirm the need of the venture. Covers in expected to supplant. Electrical cable investigation is a multi-faceted issue. What is required is data about the status of the electrical cable, so an all around established choice can be made to perform upkeep, restoration or to do nothing. Acquiring this data it's anything but a unimportant undertaking. Electrical cables are worked from multiple points of view. There are distinctive voltages which must go with various models. Indeed, even a TSO working in a solitary nation may have heaps of various gear that are being used. Among nations and mainlands, contrasts are even a lot more prominent. To investigate precisely what the gear looks like when it is this sort of hardware, the auditor has to know in appropriate condition and when it is running a danger of being disappointment.

D. Failing Compression Splices

Some equipment is exceptionally hard to investigate. A model is a pressure graft risking disappointment. At the point when two lengths of a conductors are associated, a pressure graft is utilized to hold them two together. Pressure graft by one way or another likewise flops be that as it may, and when they do they require to be immediately fixed or the entire line may fall flat. The opposition over a pressure graft in great condition is lower than that of an over ordinary conductor of equivalent length. At the point when the pressure graft is falling flat the opposition is expanded. The expanded opposition bring about warming in the join, and the status of the graft falls apart considerably further in a descending winding. The present method to identify this is to either quantify the obstruction over the join or to gauge the warmth or temperature of the graft. Both are precarious activities, taking into account that the graft is on extraordinary voltage potential, high over ground and are as a rule subject to winds that chill any temperature contrasts off to the limitless.

E. Corona Discharge

The electrical release which happens because of the ionization of a liquid that is encompassing a transmitter, which happens when the potential slope gets surpassed a specific esteem, in circumstances where starting (arcing) isn't favored .with regards to electrical cables, crown development is viewed as an exceptionally terrible thing as it results in radio impedance, ozone arrangement and hardware weariness. Crown releases are additionally connected with abnormal sounds and can likewise be unmistakable during the evening time, bringing about open worry over electrical cable wellbeing. Crowns structure particularly simple on distensions from a channel, where the electric field (potential inclination) is for the most part engaged. Hardware intended for task on live electrical cables expected to consider. Two, generally practically indistinguishable, parts may cause or not cause crown releases relying upon the shape upkeep and of broadened edges. The smooth and round edges essentially cause less crown issues. Another reason for crown release arrangement is because of defective gear.

II. EXISTING POWER LINE INSPECTION METHODS

Existing power line inspection can be divided into three separate categories; ground inspection, air inspection and also automatic inspection. Out of these, ground and air inspection are till now the most common, but automatic inspection is regarded as the method with the best potential for the future.

A. Ground Inspection

Ground examination is the most established and the most natural electrical cable assessment strategy. A group of working faculty is conveyed on the mission to review an electrical cable. The work force convey gear to help them in their given errand, at the end of the day depend on their faculties to play out the transmission review. In the event that the electrical cable is near the streets or acceptable conduits, these are utilized. In spots with overwhelming snow-fall, snowmobiles can likewise be utilized. On the off chance that there is no likewise advantageous choice is accessible, the administration individual need to navigate the length of the transmission line by walking.

B. Aerial Inspection

Airborne observation is the other legitimate advance after ground assessment. In the event that visual observation gets the job done for the investigation needs, at that point a fly over will be considerably more proficient than crossing the transmission line by walking. Airborne examination is performed from helicopter or via airplane.

©IJRASET: All Rights are Reserved

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 7 Issue IV, Apr 2019- Available at www.ijraset.com

C. Airplane Inspection

Planes have been utilized to investigate electrical cables for extremely prolonged stretch of time. Pilots fly close over the line and a monitor, called spotter, sit beside them looking down at the line. Now and again more than one spotter is utilized to take a gander at various highlights of the transmission hardware.

D. Helicopter Inspection

Helicopter assessment is performed similarly as plane examination, with one pilot and one or might be more spotters. The utilization of helicopters and planes for review contrasts to some degree, as helicopters are considerably less eco-friendly and accompany a higher upkeep prerequisite. Helicopters are utilized when their capacity to float is required. Normally, this is while reviewing little lines or transmission lines in populated regions. While investigating significant lots of high voltage electrical cables, planes are favored. One special case where helicopters are utilized on high voltage lines is in blame territory. At the point when a blame brings transmission line out of administration, helicopters are utilized to find the blame. The reason for a blame is frequently a tree or ranger service gear in contact with the transmission line conductors.

E. Automatic Inspection

Programmed assessment of electrical cables is a gathering of promising new techniques for transmission examination. There are numerous potential outcomes to check the assessment procedure. Current items center around one investigation assignment and resolve it by building up a particular item. As programmed control line transmission review is another and creating business it is difficult to get a decent diagram of accessible innovation and the nature of offered administrations.

F. Fixed Sensor Systems

A sensor is fixed on the transmission line hardware and stays there all through its administration range. Information from such a sensor is transmitted by link or through RF-correspondence. The requirement for power in current sensor frameworks can be made so small that a battery is adequate for a long time of activity. Other transmission control supply choices being used today are sun oriented cells, and hardware mounted on the conductor itself can through enlistment assemble control from the shifting attractive field of the live high strain line. A fixed sensor framework can address numerous essential inquiries for a TSO, for example, how much current move through a particular purpose of the line or the present conductor temperature at a similar occurrence of point. Data given by the sensor frameworks can affect the activity of an electrical cable. For instance, a sensor estimating the hang of a range of an electrical cable gives backhanded data about the separation to ground of that transmission line. Without estimations, this separation will be thought to be a most pessimistic scenario. In the event that a sensor gives genuine numbers, a TSO can permit progressively current through the electrical cable.

G. Mobile Sensor Systems

A portable sensor framework is chiefly characterized as any sensor which isn't fixed to a transmission line structure. Instances of portable sensor frameworks are UAV conveying sensors for electrical cable review, or line-slithering robots for transmission line use. The sensors in this classification are more test in nature than that of fixed sensor frameworks. Research in this field is continuous, quite a bit of it subsidized by the power ventures.

III. STORAGE

The robot must be stored in a convenient manner. This is also important to facilitate maintenance, as maintenance is easier if the robot parts are easily accessible during the storage. The way the robot is stored should also make it possible for the transportation of a robot as standard air cargo.

These two demands are contradicting; a compact case is not so easily accessible. Two separate storage solutions might be developed for facilitating each need. Long term storage and transportation of the robot to the inspection sites might cause harm to the robot. A case for protection, fitting the standard air-cargo dimensions must be used. Placing and removing the robot from this case should be in a rapid process.

For the maintenance purposes a cradle is more purposeful. The cradle could support the robot in such a position where all parts are accessible and maintained. During development the cradle can act as a test bed and allow hardware such as actuators must be easily tested.

©IJRASET: All Rights are Reserved

IV. OBSTACLES

The transmission line inspection robot will climb on the live transmission line wire, and it must be able to pass expected obstacles coming in its way. Power lines come in a multitude of forms and so does the obstacles that the robot must face. But just as there are many differences between different power lines, there are also some similarities. Some common obstacles are listed below**:**

A. Insulator
B. Bundle conductors with spacers
C. Vibration dampers
D. Tension clamp
E. Transposition
F. Aircraft warning spheres
G. Unknown obstacle

There are some standard items that inspectors look for when doing their foot or air surveys of transmission lines**:**
1) Damaged transmission Equipments
2) Foreign objects on transmission Equipments
3) Vegetation within required safety Distances
More exotic items to inspect can be added to this list, such as line integrity, status of compression splices, corona discharges, sagging, and vise-versa. The basic inspection need is covered by the inspection of the equipment and vegetation. The main problem is to assess whether or whether not the equipment is damaged or foreign objects are present. It is hard to distinguish what is a foreign object on a transmission line which the robot has never seen them before.

V. MAINTENANCE

The transmission line review robot should be worked without hardly lifting a finger of investigation remembering. This is maybe not foremost to the last item, yet in the model openness can be especially useful. Issues are probably going to be emerge amid the development and testing of the model, and it ought to be as simple as conceivable to figure out what the reason for this. This applies similarly to the mechanical building and the product building and structure.
A carefully conceived and noticeable troubleshoot board, some demonstrating lights or the capacity to interface a screen to the transmission line investigation robot can spare a ton of time when a mistake happens. On the off chance that an issue emerges it very well may be resolved if the issue is in equipment or in programming, if a microcontroller has failed, if the inside or outer correspondence works, if the working framework booted effectively and if the product application controlling the robot is fully operational. This is an essential territory. On the off chance that an indicative strategies are made into the framework from the begin the time structuring and constructing the main model will be expanded, however the general plan time of the framework must be diminished.

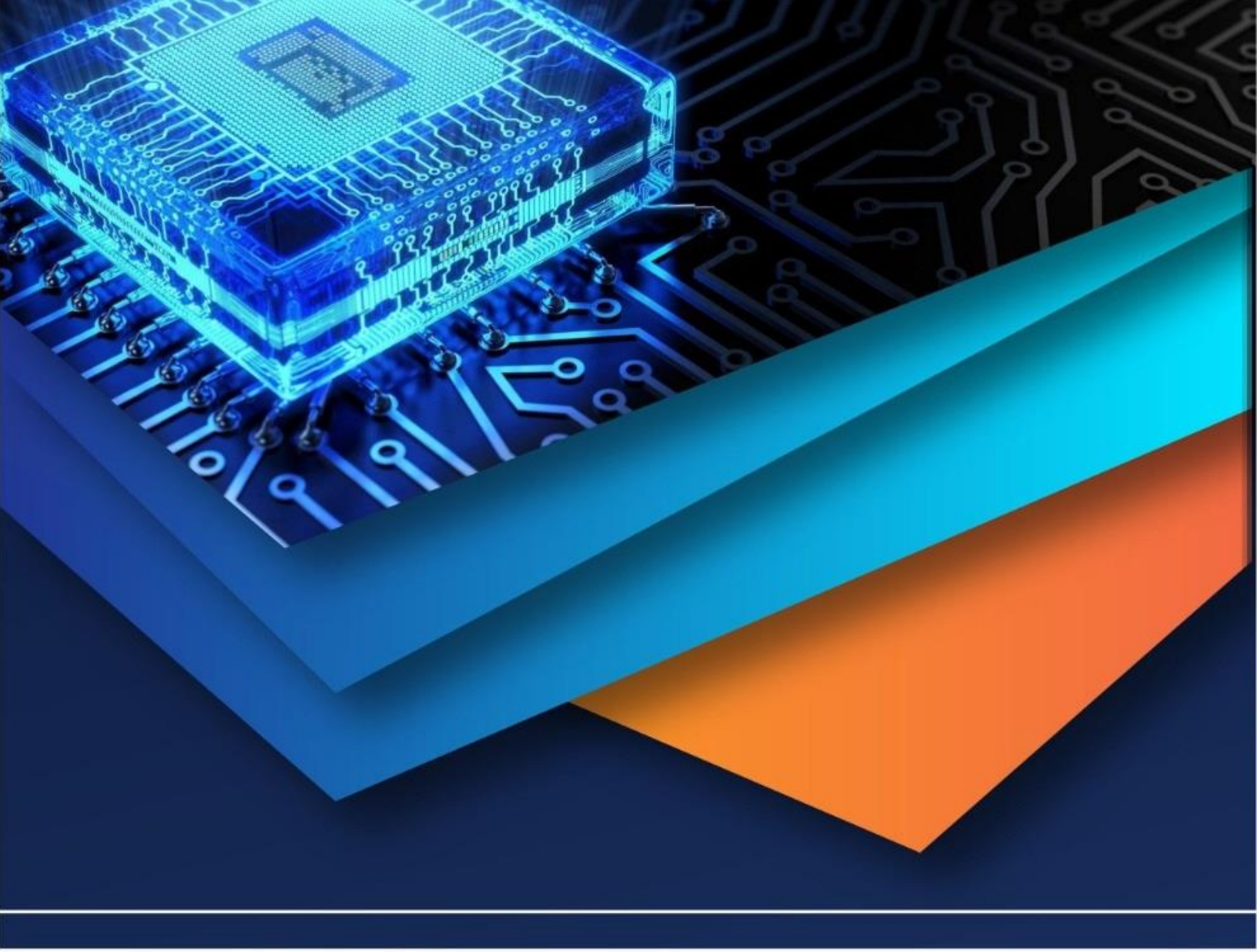
VI. CONCLUSIONS

This pre-consider report has portrayed the electrical cable investigation issue. The report has likewise exhibited and dissected the novel answer for an electrical cable examination. this paper speaks to the workplace of the investigation robot in detail. As indicated by the extraordinary normal for the overhead ground wires, the impediments are grouped by the grapple tower, the torsion tower, and damper. The investigation robot is made out of two arms, two wheels, two hook, two wrists, and so forth. The report speaks to the past issues happened and after that proceeded to portray the arrangement created by the line investigation robot.

REFERENCES

[1] Qin F. The Market Share of Power Transmission Line Inspection About CSG and Market Development Strategies for H Company. Beijing University of Technology, (2014)
[2] Long T, Shen L C, Zhu H Y, et al. Distributed Task Allocation & Coordination Technique of Multiple UCAVs for Cooperative Tasks. ActaAutomaticaSinica, 33, 731-737 (2007)
[3] Bellingham J S, Tillerson M, Alighanbari M, et al. Cooperative path planning for multiple UAVs in dynamic and uncertain environments. Decision and Control, Proceedings of the IEEE Conference on. IEEE, 3, 2816-2822 (2002)
[4] Kim J W, Chan W Y. Analysis of ground control system for a Smart UAV. Systems Conference. IEEE, 90-94 (2009)
[5] Zeng Z P. Analysis of Application of UAV Inspection Transmission Line Technology (in Chinese). Science and Technology Innovation, 86-87 (2016)
[6] Chandler P, Pachter M, Rasmussen S, et al. Distributed Control for Multiple UAVs with Strongly Coupled Tasks. AIAA Guidance, Navigation, and Control Conference and Exhibit. (2013)

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)