A REVIEW OF INSPECTION OF HVDC TRANSMISSION LINE BY USING ROBOT

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ABSTRACT

The High voltage lines need to be inspected regularly, at least once a year Inspections on foot need a lot of time and in some situations are even impossible due to difficult terrain such as mountains or steep valleys As we know inspection of HV transmission line is very risky job The cost if testing is too high due to design of insulation suit of inspection person At a same time cost of inspection will get reduce due to use of this robot.

The Robot is having manual control over substation while moving forward it will inspect the line voltage current & temperature. All this collected data is send to substation through IOT. At same time while inspecting substation will also get video by using the wireless camera which is fitted on the robot. So here we have used IOT to communicate wirelessly between substation and robot.

KEYWORDS: Hardware Module of Arduino, Temperature Sensor of LM35

1. INTRODUCTION

The high-voltage transmission lines connecting electric energy production facilities to large urban centers are vital elements of electrical infrastructure. Any failure in such lines may bring severe consequences to people's daily lives, affecting transportation, health, security and sanitation, to mention just a few. Therefore, the proper maintenance of high-voltage transmission lines is of extreme importance. Preventive maintenance of the lines aims at detecting damages in the case or in the core of the cables, and requires people to walk on the lines – a time-consuming and dangerous job, in spite of all the safety procedures applied. In addition that, when the lines are being checked at that time the transmission of electricity must be temporarily suspended, which means that other lines may be overcharged in order to compensate for undergoing maintenance.

It is essential that preventive maintenance of high-voltage transmission lines be carried out in a safer and more efficient way, ideally without requiring the interruption of the electric energy supply. However, previous attempts to automate this task have been hampered by the spacers, suspension clamps and other devices installed on the lines, which represent formidable obstacles that need to be overcome tens of meters above the ground. High mobility is required in order to negotiate such obstacles.

Power transmission line has been usually checked manually by workers who riding in gondolas that travel suspended from the transmission lines or watching with telescope from the ground level. In recent(now a days) years, it has become increasingly necessary to perform inspection work with the automatic inspection robot in power transmission line.

1.1 NEED OF PROJECT

The cost of testing is high due to design of insulation suit (uniform) of inspection person. So this cost can be reducing by designing a robot which can be used as a inspector of transmission line. At same time when person is inspecting manually it required more time to inspect the line. At a same time cost of inspection and time of inspection will get reduced due to use of designed robot.

The images that are captured from the camera are received by the controller through the IOT. Once the images are receive there have to be compared. At first the images are processed by digital image processing the unwanted noises are being removed. Then the image are authenticated and recognised the original images are saved in the monitoring section .when the captured images are received they are compared. In case if any defect are found then the buzzer indicates with an alarm and the LCD display notify a message saying defect is found and the process is going on. Now the robot may also move forward or

reverse by controlling manually from control room. And the voltage sensing device will also be operated from the control room as well As the operator need.

1.2 OBJECTIVE

The main goal(aim) of this project is to inaugurate a device that moves along the transmission line and traverses the standard mast tip of the Switzerland power industry. This technique now widely used in Switzerland and most other European countries. On every side one can see the ground wire leaving the tip towards the upcoming mast. These cables do not transmit power and are installed on top of the other cables to protect from damages caused by lightning stroke. The main difficulty to deal with to the find a mechanism that can be move on the sloping(sliding) wire (also around horizontal angles) and ride over all the different obstacles on the top. So much, different types of research groups have been developed several robots that can cross obstacles on the wires. Most of these robots use active structures that result in designs with a relatively with high numbers of actuators and sensors – leading to a complex control and resulting in relatively big and expensive devices of slow speed.

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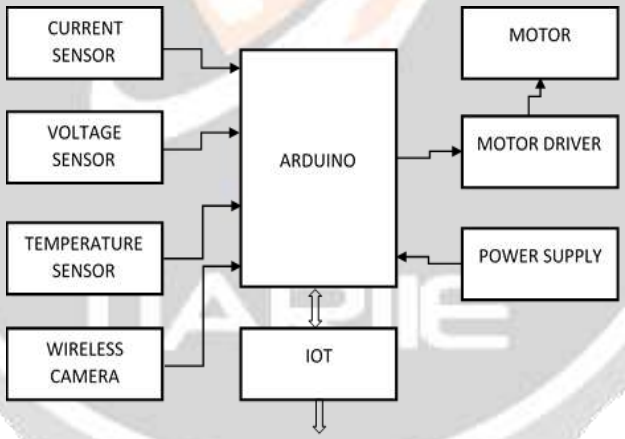
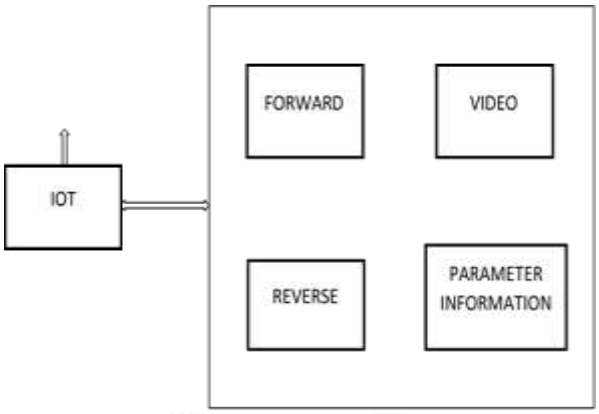
2. BLOCK DIAGRAM

2.1 BOT SIDE:



2.2 RECIEVER SIDE:



3. WORKING

The Robot is mounted on the transmission line to work on the Walk-Stop-Detect principle. It then transmits the collected data to the operator sitting in a centralized location, in a safe place.

It is designed to operate on the live conditions, inspect physical conditions, tackle obstacles and parallely transmit the data collected from the field to the operator in remote condition.

The quantities like Voltage, Current, Temperature and also the image or video captured by the camera are send to the control station through the IOT, means it first give to the Arduino and then upload to the IOT. The sent data can be downloaded at any location but it is required IP address and password to download the data. And with the help of this data the monitoring is done.

4. ARDUINO MICROCONTROLLER:

Common examples of beginner hobbyists added simple robots, thermostats and motion detectors

Fig. Hardware Module of Arduino

4.1 Features of Arduino:

1) AVR 8-bit RISC architecture
2) Available in DIP package
3) Up to 20 MHz clock
4) 32kB flash memory
5) 1 kB SRAM
6) 23 programmable I/O channels
7) Six 10-bit ADC inputs Three timers/counters
8) Six PWM outputs

5. TEMPERATURE SENSOR LM35:

The LM35 is low voltage, precision centigrade temperature sensors. The LM35 does not require any external calibration process to provide a typical accuracy of ±1°C at +25°C and ±2°C over the –40°C to +125°C temperature range. All three devices are considered for single-supply connection from 2.7V to 5.5V maximum. Supply current runs well below 50 μA, providing very low self-heating—less than 0.1°C in still air.

In addition, a shutdown function is provided to cut supply current to less than 0.5 μA. The LM35 is functionally compatible with the LM35/LM45 and provides a 250 mV output at 25°C. The LM35 reads temperatures from 10°C to 125°C. LM35 have an output scale factor of 10 mV/°C. The LM35 are all available in low cost.

Fig. Temperature Sensor of LM35

5.1 Features of LM 35:

- Low Voltage Operation (2.7 V to 5.5 V)
- Calibrated Directly in °C
- 10 mV/°C Scale Factor (20 mV/°C on LM37)
- Stable with Large Capacitive Loads
- Specified –40°C to +125°C, Operation to +150°C
- Less than 50 A Quiescent Current
- Shutdown Current 0.5 A Max
- Low Self-Heating

6. WIRELESS CAMERA:

6.1 Introduction of Wireless Camera:

Ever saw these wireless security cameras that you can buy off the shelf? There are various devices that we can setup sometime somewhere in your home or outside the home, connect to your WiFi network, and then access the video stream from anywhere. However, they are usually using the interface given by the manufacturer, which means you are quite limited with what you can do with your camera. In this project, we are going to build our own DIY version of such devices. The project is based on the Arduino Yun, to which we are going to connect a standard USB webcam and a PIR motion detector to create some cool applications. The first use will be a latest version of standard tasks that you want

for a security camera: taking pictures when some motion is detected. The project will store pictures taken by the USB camera on an SD card inserted into the Yun, but that's not all. Because we are in the world of the Internet of Things(IOT) we also want these pictures to be automatically uploaded on a secure location. And that's exactly what we are going to do by uploading the pictures to Dropbox at the same time. Then, we are going to stream video coming from the camera directly on You tube. At the end, you what is going on in your home. This way, you can also just share the link with your family or friends, so they can monitor your home when you are not there.

Fig. Wireless Camera

7. INTERNET OF THINGS (IOT):

7.1 Definition of IOT:

The term Internet of Things generally refers to scenarios where network connectivity and computing capability extends to objects, sensors and everyday items not normally considered computers, allowing these devices to generate, exchange and consume data with minimal human interaction. Therefore however, no single, universal definition.

7.2 Enabling Technology:

The concept of combining computers, sensors, and networks to monitor and control devices has existed for decades. The latest confluence of various technology in market craze, however, is bringing the Internet of Things(IOT) closer to all-inclusive reality. Widespread Adoption of IP-based Networking,

7.3 Connectivity Models:

IOT implementations use various technical broadcasting models, each with its own characteristics. These models highlighted the plaibility in the ways that IOT devices can connect and provide value to the user.

7.4 Transformational Potential:

If the projections and trends towards IOT become reality, it may force a shift in thinking about the implications and issues in a world where the most common interaction with the Internet. Five key IOT issue areas are examined to explore some of the most pressing challenges and questions related to the technology. These include plight, secretion; interoperability and standards; legal, regulatory, and rights; and emerging economies and development.

7.5 Security:

Rarely secured IOT devices can be support as potential entry points to cyber-attack and accord user data to theft and by leaving data streams inadequately protected.

This challenge is elaborate by the other various considerations like the mass-scale deployment of homogenous IOT devices, the ability of some devices to automatically connect to other devices, and the likelihood of fielding these devices in unsecure environments. Accordingly, a joint approach to the security will be needed to develop effective and appropriate solutions to IOT security challenges that are well appropriate to the scale and complexity of the issues.

7.6 Privacy:

The full speed (potential) of the Internet of Things(IOT) depends on the method that respect individual privacy choices across a broad spectrum of expectations. The data butn and user specificity swing by IOT devices can unlock incredible and unique value to IOT users, but concerns about privacy and potential harms might hold back full adoption of the Internet of Things. This means that privacy precise and respect for user privacy expectations is the integral to ensuring user trust and confidence in the Internet, connected devices, and related services.

Indeed, the Internet of Things(IOT) is redefining the disagreement about privacy problem, as many implementations can dramatically change the ways personal data is collected, analyzed, used, and protected. While these are important challenges, they are not forgatable. In order to experience that the opportunities, strategies will need to be developed to respect individual privacy choices across a broad spectrum of expectations, while still fostering innovation in new technology and services.

7.7 Intropelability:

A fragmented environment of proprietary IOT technical implementations will inhibit value for users and industry. While full interopelability through the products and services is not always feasible or necessary, purchasers may be hesitant to buy IOT products and services if there is integration inflexibility, high ownership complexity, and concern over vendor lock-in.In addition, poorly designed and configured IOT devices may have negative consequences for the networking resources they connect to and the broader Internet. Appropriate standards, reference models, and best practices also will help to barrier the proliferation of devices that may act in disrupted ways to the Internet.

8. ADVANTAGES

- The monitoring of HV lines is easy

Several electrical quantities are measured at a time.

- The cost required for this type of monitoring is very less compare to conventional method of monitoring.
- The risk is very less to human because there is no need to climbing at each tower for inspection.
- The time required for this process is less.
- History of the previous record is available due to storage at IOT.

9. APPLICATION:

This type of robot almost used in all overhead HV lines, AC as well DC but after being small changes in the robot.

10. CONCLUSION

This study report has described the power line inspection problem. The report alsopresented and analysed a novel solution to it: the line inspection robot.The report presented previous solutions to the problem, and went on to describe the solution developed for the new line inspection robot. Focus was placed on mechanical design and many details were given on individual design choices and their motivation.

- By adopting this system inspection of transmission line will get safe and time which required for manual testing can reduce
- Inspections on foot need a lot of time and in some situations are even impossible due to difficult terrain such as mountains or steep valleys by using this inspection system we can overcome these disadvantages.
- Human Interaction And Human Error Can Reduce.

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