



TRANSMISSION LINE INSPECTION ROBOT USING IOT

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ABSTRACT

This project is designed to inspect high voltage transmission lines or overhead transmission wires. This project consists of an inspection robot which is equipped with various sensors for parameter sensing, after sensing the parameters and conditions of the parallel transmission lines, robot moves forward from starting point till the ending point of the parallel line.

This proposed system is an inspection robot and it eliminates the need or intervention of human operator. Thus, any human error is ruled out. In this project microcontroller family (atemega328) has been used as CPU. Whenever the robot starts inspecting on the transmission line it senses three main parameters as current, voltage and temperature and it displays them on alcd display which is mounted on the inspection robot itself. After sensing the parameters of the transmission line it moves further on to the line and hence inspect the total length of the parallel line for any defects and deviations in them. The line inspector then sends all of these parameters to a station which is nothing but a personal computer situated at stations side using transceivers. The station side operator is operating the robot and also receiving parameters as well as video and images of the transmission line. The station side operator would be using a small visual basic based interface in which two operating button with commands like forward and reverse are present and this interface would also be containing space where the parameter readings shall be displayed. The robot is also equipped with a wireless camera device, which captures the whole transmission line inspection process.

Further the project can be enhanced by making this system more advanced by adding more parameter sensor and replacing the wheels of the robot with more grip. Also the robot can be modified by adding propeller to the inspection robot hence increasing flexibility of its travelling process.

Keywords : *RF:Radio Frequency , HV:High Voltage , RPM: Rotations Per Minute.*

1.1 OBJECTIVE

This proposed system is a transmission line inspection robot and it eliminates the complexity of checking and inspecting various parameters of the conducting transmission wires. Thus, any human error is ruled

out. Power transmission line has been usually inspected manually by workers riding in gondolas that travel suspended from the transmission lines or watching with telescope in the ground. In recent years, it has become increasingly necessary to perform inspection work with the autonomous inspection robot in power transmission line.

There is a LCD display for showing various parameters in the both for reference. There are sensors, which are used to show the parameters i.e. current voltage and temperature.

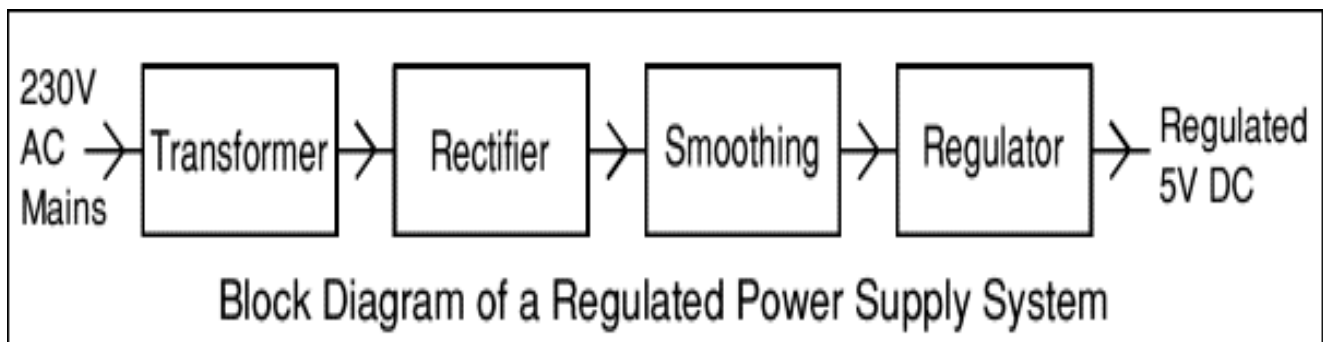
1.2 NESSECITY

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. So this cost can be reduce by designing a robot which can be used for transmission line inspection, at same time when person is inspecting manually it required much time to inspect. At a same time cost of inspection will get reduce due to use of this robot.

1.3 THEME:

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

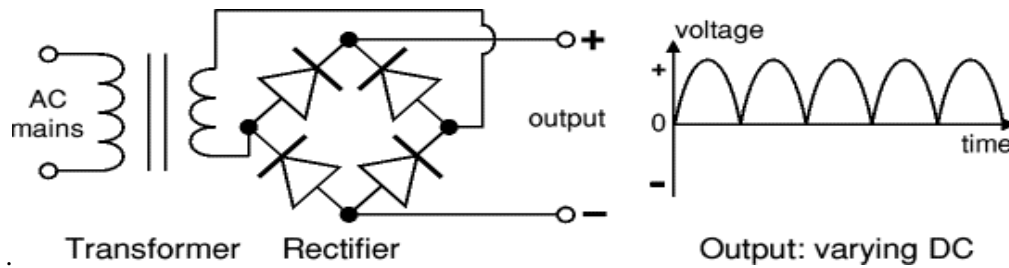
II BLOCK DIAGRAM



This 12V AC is then voltage and provides 5V constant output.

III WORKING

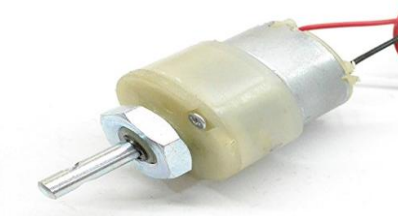
Basically inspection of high voltage transmission line is very risky and difficult work/job. So we have made a robot which will inspect the HV line. This robot works on the supply which will be taken from the line itself. The supply is then stepped down to 12V



To regulate the voltage from the bridge rectifier, capacitors are connected. Capacitors C1 filter the output voltage of the rectifier but their output is not regulated and hence 7805 is connected which is specially designed for this purpose.

Although voltage regulators can be designed using op-amps, it is quicker and easier to use IC voltage regulator. Furthermore, IC voltage regulators are available with features such as programmable output current/ voltage boosting, internal short circuit current limiting, thermal shut down and floating operation for high voltage applications.

This regulated output is given to DC motor.



3.1 Arduino Platform

It is a tool for making computers that can sense and control more of the physical world than your desktop computer. We are using Atmega328 microcontroller. Its pin diagram is given below:

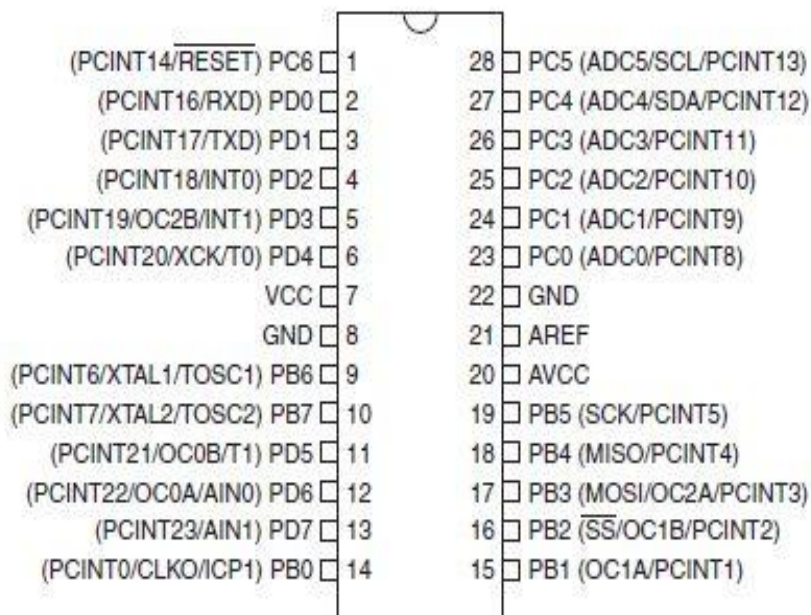


Fig:-Pin Diagram of Atmega328

Then the parameters are being sensed by using the sensors below:

3.2 Temperature Sensor

Temperature sensors are devices used to measure the temperature of a medium.

LM35 is a three terminal device.

Linear output voltage w.r.t temperature.

Optimized for range of 20°C -110°C.

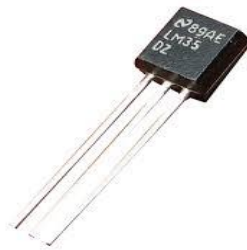


Photo: LM35 sensor

3.3 Current Sensor

The Winsor WCS1800 current sensor provides economical and precise solution for both DC and AC current sensing in industrial, commercial and communications systems. The unique package provides easy implementation without breaking original system and makes current sensing possible. Typical applications include motor control, load detection and management, over-current fault detection and any intelligent power management system etc...

The WCS1800 consists of a precise, low-temperature drift linear hall sensor IC with temperature compensation circuit and a diameter 9.0mm through hole. Users can use system's own electric wire by pass it through this hole to measure passing current. This design allows system designers to monitor any current path without breaking or changing original system layout at all. Any current flowing through this hole will generate a magnetic field which is sensed by the integrated Hall IC and converted into a proportional voltage.

The terminals of the conductive path are electrically isolated from the sensor leads. This allows the WCS1800 current sensor to be used in applications requiring electrical isolation without the use of opto-isolators or other costly isolation techniques and make system more competitive in cost.



Photo: Hall Effect sensor

3.4 Voltage Sensor

Ideal for situations where power quality is an issue, Voltage Watch sensors facilitate monitoring of supply voltage levels



3.5 Voltage Sensor

They identify under voltage or overvoltage concerns and help protect critical motors and electronics. Because they have an industry-standard 4–20 mA output, they are easily coupled to a data logger, panel meter or PLC for real-time monitoring and reporting. Here a step down transformer is used for converting high voltage to low voltage for further measurement. GSM

Module:-It is used with a SIM card to upload the sensed parameters on internet. So that we can monitor it from any location



IV ADVANTAGES

- i .Risk of HV lines inspection will get reduce
- ii .Cost of inspection will get reduce
- iii. Less time required for inspection

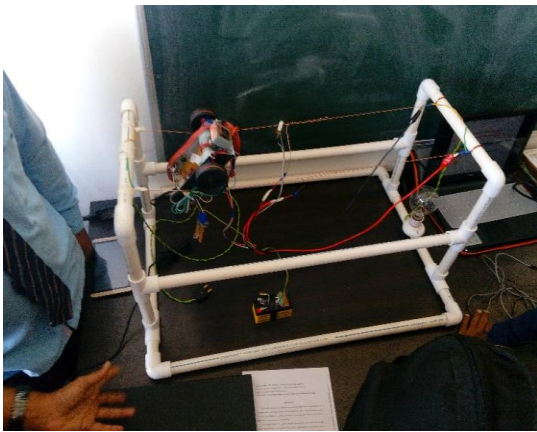
V APPLICATIONS

- It is used to detect faults in high voltage transmission wires
- It can be used for reducing the human work
- It is used for sensing current, temperature and voltage of the HV transmission lines.

VI FUTURE SCOPE

- As the transmission line inspector robot has to pass the obstacles which is the only drawback thus creates the necessity of installing high end driver motors and well gripped wheels with accurate balance
- This project can be also modified for inspecting single lines instead of parallel transmission lines
- To avoid all accident the robot can be thus manipulated and modified with adding nodes with self lifting mechanism with the help of propeller

VII PHOTO GALLERY





VIII CONCLUSION

This project aims at reducing the complexity underlying in inspection of the overhead high voltage transmission lines by inspecting the main parameters of the parallel transmission lines by balancing the forward and reverse moving robot.

The main aim of the is project is to make an account of the various parameters timely and then report it to the server or system which is a computer, it sends the parameters and its values through RF links through transceivers, as there would be two transceivers, one on the robot and another on the personal computer which is affixed to a USB connector which can be inserted into the computer therefore sending the parameters successfully.

IX RESULT

This transmission line inspection robot would be eliminating the requirement of human power and thus providing efficiency and accuracy. This project will give current ,temperature and voltage readings. It will help to manage the robot to move forward after sensing the parameters and also record and capture images and videos of the transmission lines.

This project will also assure the safety of human operators by balancing its own machine body totally on the parallel wires and it would not result in any harm to the environment and surroundings.

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