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POWER LINE FAULT DETECTION AND RECTIFICATION USING ROBOT

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ABSTRACT: *This paper describes the development of a mobile robot. The mobile robot walks on overhead power line transmission system. Its ultimate purpose is to automate to inspect the defect of power transmission line. The robot with 6 motors is composed of one arms, four wheels and a glue gun mount on the arm. A prototype robot was developed with careful considerations of mobility. The main purpose of this paper is to solve the problems in transmission lines. Out of all problems we deal with the problem, failing of compression line splices. We solve this problem by using a glue gun arrangement in the kit.*

Key words: Microcontroller, *robot,* Bluetooth, *glue gun, transmission line.*

1. INTRODUCTION

Continuous power supply is the symbolism of the developed countries. The transmission lines are posed from remote places to densely populated areas. These remote places include hilly areas, forests, and lakes. Whenever a problem occurs on these transmission lines, it becomes difficult to identify the problem and more overly highly risky one to clear these problems. To eradicate these problems we are introducing a robot that mounts on the transmission lines that inspects the problem and clear these problems.[1]

2. HARDWARE REQUIREMENT

Hardware requirements also include requirements on software in local microprocessors in sensors and other subsystems.

2.1 EMC

Hardware used in the robot shall be designed for electromagnetic compatibility (EMC), to ensure proper operation at the extreme conditions close to live power lines.[9]

2.2 Safety

Any mechanical or electrical system or feature on the robot shall be designed with the safety of people and equipment in mind.

2.3 Climate

The robot shall be able to withstand a smaller amount of rain and wind during normal operation. The robot shall withstand temperatures from -40 - +60 degrees Celsius.

2.4 Mechanical shock

The robot shall be able to withstand a reasonable amount of mechanical shock during operation. The robot shall be able to withstand a substantial amount of mechanical shock during storage in long-term storage container.

2.5 Accessibility

All components, including the batteries, shall be quickly and easily accessible for measurements, repair and replacement.

3.COMPONENTS REQUIRED:

3.1 Power supply

The robot shall be equipped with batteries, providing enough power for at least 30 minutes of robot operation. The device shall deliver enough power for the robot to be able to charge its batteries [13].

3.2 Microcontrollers:

A microcontroller is a small computer on a single integrated circuit. In modern terminology, it is a System on a chip . A microcontroller contains one or more CPUs along with memory and programmable input/output peripherals. Program memory in the form of Ferroelectric RAM, NOR flash or OTP ROM is also often included on chip, as well as a small amount of RAM.

3.3 AT Mega 328P:

The ATmega48A/PA/88A/PA/168A/PA/328/P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. ATmega48A/PA/88A/PA/168A/PA/328/P achieves throughputs approaching 1 MIPS per MHz allowing the

system designed to optimize power consumption versus processing speed[12].

3.4 DC Motor:

Motors take electrical energy and produce mechanical energy. Some examples of large motor applications include elevators, electric trains, hoists, and heavy metal rolling mills. Examples of small motor applications include motors used in automobiles, robots, hand power tools and food blenders. . Electric motors are broadly classified into two different categories: DC (Direct Current) and AC (Alternating Current).

3.5 Worm Gear:

Worms resemble screws. A worm is meshed with a worm wheel, which looks similar to a spur gear. Worm-and-gear sets are a simple and compact way to achieve a high torque, low speed gear ratio. For example, helical gears are normally limited to gear ratios of less than 10:1 while worm-and-gear sets vary from 10:1 to 500:1. Instead, the lead angle, which is equal to 90 degrees minus the helix angle, is give. If medium to high power transmission is desired, the tooth shape of the gear is modified to achieve more intimate contact by making both gears partially envelop each other [5].

3.6 Spur gear

Spur gears or straight-cut gears are the simplest type of gear. They consist of a cylinder or disk with teeth papering radially. Though the teeth are not straight-sided, the edge of each tooth is straight and aligned parallel to the axis of rotation. These gears mesh together correctly only if fitted to parallel shafts. No axial thrust is created by the tooth loads. Spur gears are excellent at moderate speeds but tend to be noisy at high speeds.

3.7 Relays:

A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contractor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems, these functions are performed by digital instruments still called "protective relays"[14].

3.8 Glue gun:

Hot melt adhesive (HMA), also known as hot glue, is a form of thermoplastic adhesive that is commonly supplied in solid cylindrical sticks of various diameters, designed to be melted in an electric hot glue gun. The gun uses a continuous-duty heating element to melt the plastic glue, which the user pushes through the gun either with a mechanical trigger mechanism on the gun, or with direct finger pressure. The glue squeezed out of the heated nozzle is initially hot enough to burn and even blister skin.

Fig1. Glue Gun

3.9 Hot Melt Specific Properties:

Melt viscosity: one of the most noticeable properties. Influences the spread of applied adhesive, and the wetting of the surfaces. Temperature-dependent, higher temperature lowers viscosity Melt flow index: a value roughly inversely proportional to the molecular weight of the base polymer. Low melt flow index adhesives have better properties but are more difficult to apply. Pot life stability: the degree of stability in molten state, the tendency to decompose and char. Important for industrial processing where the adhesive is molten for prolonged periods before deposition. Bond-formation temperature: minimum temperature below which sufficient wetting of substrates do not occur.

4. PROPOSED METHOD:

This paper proposes the line inspection robot as a solution to the power line inspection problem [3]. The line inspection robot is a line-crawling autonomous robot constituting a mobile sensor system. The robot will be able to clear transmission towers and other reasonable obstacles.

4.1 The line inspection robot:

The robot forming the core of the line inspection robot mobile sensor system must comply with several demands for the system to be useful [7].
The robot must:

• Travel along the conductor of a high voltage power line [8].
• Pass pre-defined obstacles on the power line
• Capture enough power for robot's use, from the magnetic field generated by the conductor (possibly storing power for intermittent operation)
• Inspect pre-defined features on the power line
• Communicate with a base station (or other unit of similar function) The line inspection robot may not cause harm to people or equipment, specifically:
• It must not damage the conductor on which it travels .

4.2 Storage

The robot must be stored in a convenient way. This is also important to facilitate maintenance, as maintenance is easier if the robot parts are easily.
accessible during storage. The way the robot is stored should also make it possible to transport the robot as standard air cargo. These two demands are contradicting; a compact case is not easily accessible.

4.3 Transportation

The transportation of the robot should not put restraints on the construction of the robot in itself. However, easy transportation is essential for the system as a whole to function well and it must be accommodated for. The long-term storage solution described under storage above should suffice for foreseeable transportation needs.

4.4 Mission preparations

When the robot system is to be used, the robot needs to be programmed with information about the current mission[2]. Mission parameters will include initial and target coordinates, how many towers will be passed, what kind of towers will be passed, other known obstacles on the line, what data to gather, etc[11].

4.5 Block diagram:

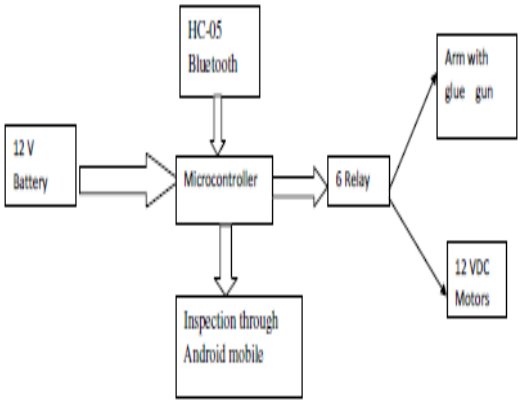

Fig2. Block Diagram of power line inspection

5. RESULTS

In this Paper we choose the Problems of Power Transmission lines and discussed various methods that are in applications. We also discussed the Problems encountered with those methods too. In order to eradicate some of those problems we introduced a "Power line Inspection Robot"[6]. Since this is the prototype model we installed a glue gun along with glue sticks. In this paper we mainly emphasis the problem such as 'Compression Line Splice'.

5.1 Tabular Results:

Table1 describes the commands that we give through the android mobile and their respective movements of the robot.

Table1. Android operating commands for the movements of the robot.

Bluetooth Command	Movement
1	Forward
2	Backward
3	Arm Moved to right
4	Arm Moved to left
5	Glue gun Downwards
6	Glue gun Upwards

5.2 Robot Moving Forward:

The supply to the robot given from a battery of 12 V and that supply is step down to 5V DC and is given to Microcontroller in the aurdino board.HC-05 Bluetooth is connected to the Microcontroller and is also paired up to the android mobile. Now we give commands to the Microcontroller through Bluetooth. For the command 1 robot move forwards. If we give 1 1 at a time it take two steps at a time. The robot moving forward as shown in fig 3.

Fig 3 robor moving forward direction

5.3 Robot arm moving towards right side:

The supply to the robot given from a battery of 12 V and that supply is step down to 5V DC and is given to Microcontroller in the aurdino board.HC-05 Bluetooth is connected to the Microcontroller and is also paired up to the android mobile. Now we give commands to the Microcontroller through Bluetooth.. For the command 3 robot arm move towards right side. If we give 3 3 at a time it take two steps at a time. The robot arm moving towards right side is as shown in fig 4 .

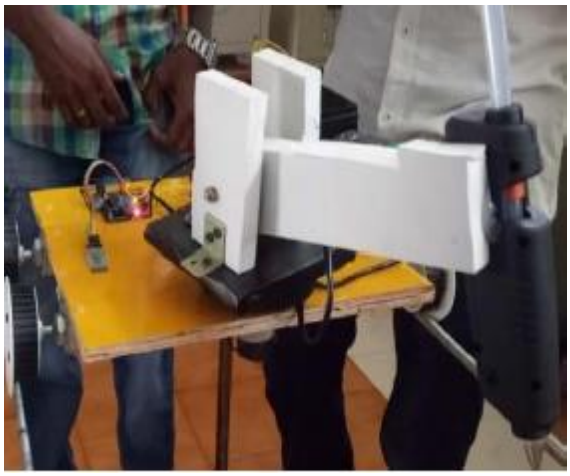

Fig 4 robot arm moving towards right side

5.4Glue gun moving downwards:

The supply to the robot given from a battery of 12 V and that supply is step down to 5V DC and is given to Microcontroller in the aurdino board.HC-05 Bluetooth is connected to the Microcontroller and is also paired up to the android mobile. Now we give commands to the Microcontroller through Bluetooth. For the command 5 glue gun moving downwards. If we give 5 5 at a time it take two steps at a time. The glue gun move downwards is as shown in fig 5.3.

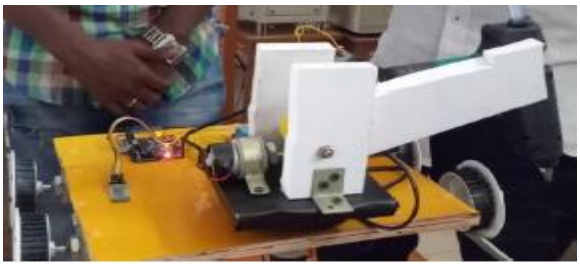

Fig 5.3 glue gun moving downwards

6.CONCLUSIONS

This paper has described the power line inspection problem. The report has also presented and analyzed a novel solution to it: the line inspection robot. If the line inspection robot is to work, it needs to master the following key technologies:

- Climb on Energized Line
- Inspect Equipment
- Autonomous operation .

Those above technologies are all vital to the completed line inspection robot. The technologies were analyzed for relevance in a first, simplified prototype. The report presented previous solutions to the problem, and then went on to describe the solution developed for the new line inspection robot.

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