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DESIGN AND STRUCTURE OF POWER CABLE MONITORING ROBOT

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Abstract - *Power cable is the critical part of the power system. The power system transmission and distribution is manly depending on the infrastructure of the power cable and it working. Hence damage to the power cable not only effects the economical operation of various industries but the critical infrastructure project like dam and hospital can also be affected. To minimize the power cable damage and enhancing the working efficiency of the system it has to be regular maintained. Hence come the human part for maintains. But operating on the power cable not only risks the human life but also the power cable itself. Hence to done the observation and preventive maintains of the system this robotic system is developed. This robotic system is mainly provided with two all direction robotic arms, a fully controlled sensor ox, and the independent wheel assembly for the operation on the power cable. In this paper we will discuss the electrical and mechanical construction of the system.*

Key Words: **Robotic arm, Sensor box, Independent wheel assembly**.

1. INTRODUCTION

The aim of this system design is to provide the solution for the preventive maintains of the high voltage power cable. Manly this robotic system s provide with the all essential tool to counter the observation problem in the power cable. In tradition system manly the highly train human resources is sued but that create the number of problem for the operator it has the life risk ,it has the human error conation it also has e the time limitation hence this type of solution has manly drawbacks.

Same with the other preventive maintains solution. Use of the helicopter and the flying drone has its limitation. Due to high voltage cable it has to operate at the certain distances from the cable .it also has the time limitation of the system .it can operate for the limited amount of time so that it does not cover the entire system for the observation. Due to its size and limited amount of reach of this system the power cable cannot be observe carefully.

Hence to solve this entire problem a dedicated robot is design so that it can operate on the power cable for long period of time. It will cover the also length of the power cable system. Due to its structure and weigh it has the serve advantages over the other solution. In this paper we the electrical and mechanical assembly is explain. It also explains the detail design of the robotic arm places in the system. It also covers the other components of this system and gives a detail analysis of this robotic system.

This system is mainly including the two robotic arms which have the each three different motor system place in it. This system also provide with the sensor box which has the collation of the all the sensor need for the observation of the system. For the operation of various components this system is provide with the four different controlling units so that each controlling unit can operate the specific task.

2. MECANICAL ASSEMBLY

Following are the various part of the system

2.1 MECHANICAL FREAM

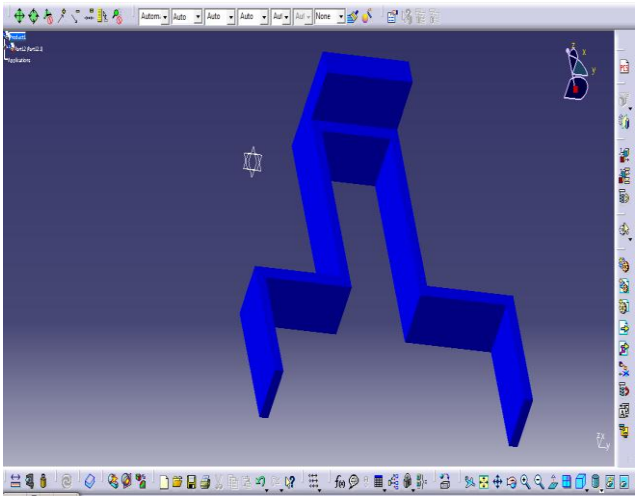

Fig 1-Mechanical frame of system

Mechanical frame is mainly made of the plastic polymer hence it has less amount of weight as compare to the other metallic frame. This system will support the entire system. It mainly design for the compact and small size so that it high dynamic capacity.

The upper part of the system has the less amount of surface contact so that it can engage with the other cable. This frame is manly provided with the two arms so that the external robotic arm can be attached to it. It will provide the balances t the system also give support to the external robotic arm system.

2.2 INTRENAL WHEEL ASSEMBLY

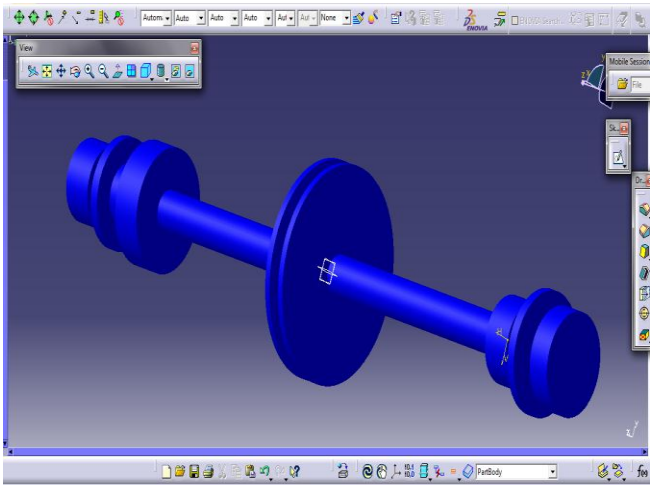

Fig 2- Internal wheel and side motor assembly.

Internal wheel assembly is manly providing for the motion of the system. It will operate in the forward and backward direction so that it can observe the entire power cable surface. This system is mainly provide with the two motor system which are connected to the singe joint rod so that when it perform the rotation motion it will operate in the same direction hence result will be it has the greater power for the mobility of the system.

2.3 ROBOTIC ARM SYSTEM

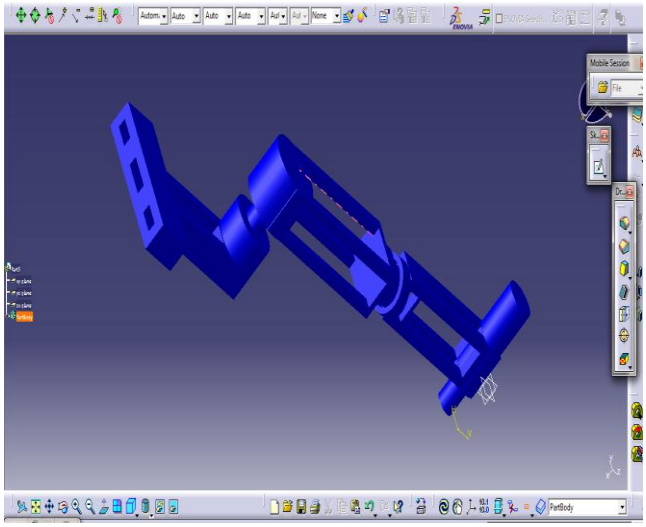

Fig 3-Extrernal robotic arm

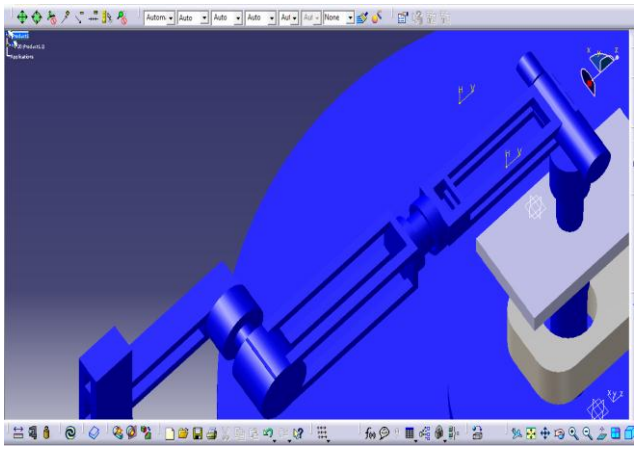

Fig 4 – External robotic arm attach to internal system

This system is mainly provided with the two external robotic arms. This robotic arm can move in all 360 degree so that it can observe the entire sure face of the power cable. This robotic arm is mainly provided with the end product sensor box this sensor box contends the various type of the sensor so that it can measure the various Para mete of the system. The first joint in the robotic arm has the ability to move in vertical and downward direction in 360 degree. The second joint of the robotic arm has the horizontal 360 degree so that it can reach the near conductor for the observation. The joint of this robotic system has the moving sensor box which is place over the end of the robotic arm. This can move the sensor box in the 360 degree.

3. CIRCUIT AEEMBLY

This system mainly consists of the four different controlling unit. Due to various sensor and number involve in the system each unit will control the specific system so that the maximum efficiency can be achieved.

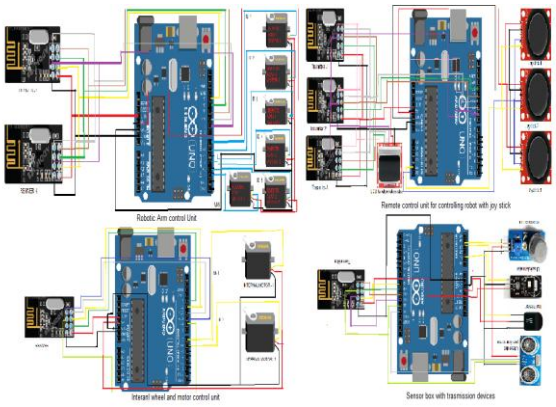

Fig 5-Circute Diagram of system

There are mainly following four control unit of this system.

3.1 INTRENAL WHEEL AND MOTOR CONTROL SYSTEM

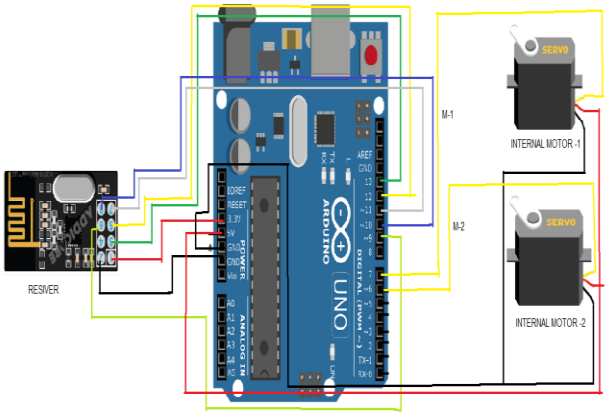

Fig 6- Internal wheel motor circuit

This system mainly consists of the two man motor which is connected to the single rod system so that the motion of the both motor should be same. The internal wheel is mounted in between this two motor. Now when both motor will perform the rotation motion then system has the collective amount of torque so that the net amount of the system has the greater mobility for the system. The control circuit of this system has the two motor connect on the digital port of the controller so that each pulse can control the motion of the robotic system. Where the common ground is provide for the each motor. This unit is mainly attached to the transmission and revising devices so that it can take command from the controller. The main controlling unit of this system is unit remote controller. This remote controller is provided with the joystick and the transmission devise. When system has to operate the operator will give a command by providing motion to the joystick this command then transmitted tougher the transmitter. Then the system receiver will control command and perform the forward or backward motion.

3.2 ROBOTIC ARM CONTROLS SYSTEM

This system mainly consists of the six different motor. Three motor for the each robotic arm. In this controlling unit each motor is to the digital port so that it can revise the pulse for the operation of the system. This motor is provided with common ground system .This unit manly has the two transmissions and revising unit. Each transmission and revising unit controls each one robotic arm. This unit is mainly use for the control the motion of the system.

When operator has the control unit which is mainly connected to the joystick now this joystick are also conned to the two transmissions and revising devise. Hence when operator operates on the system it gives command for the system and the robotic arm unit will resive the command for the operation. By using this system the robotic arm can perform all the operation of the system.

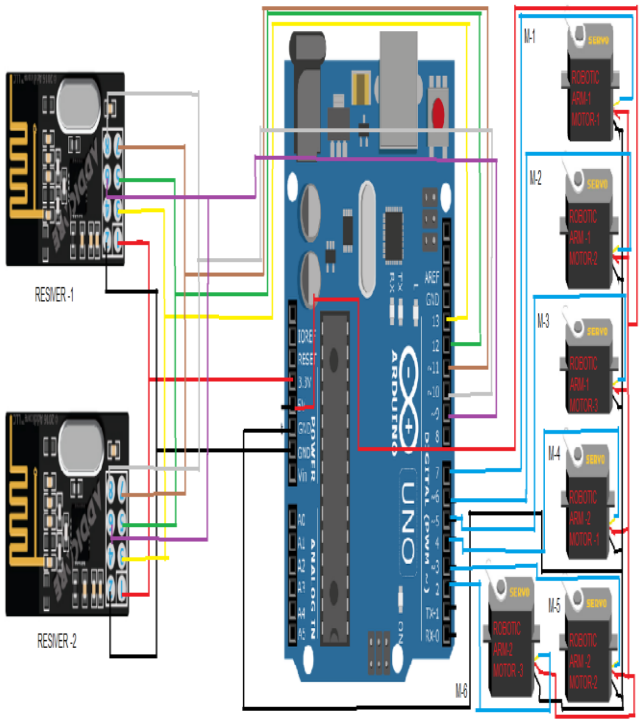

Fig 7- Robotic arm circuit

3.3 SENSOR BOX CONTROLLING UNIT

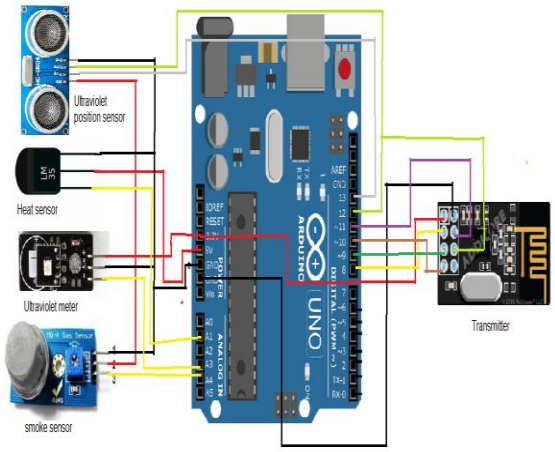

Fig 8- Sensor box circuit

This system mainly consists of three different types of the sensor. Each sensor is connected to the analog port so that it can provide data to the system. This unit is also connate to the transmission and revising unit so that it can transmit the measured data. This system mainly works for the transition of data only. This system in also connected to the main controlling unit. This system in mainly connected with the

heat sensor, smoke sensor and the ultra meter for the measurement of the power cable system.

3.4 MAIN CONTROLLING UNIT

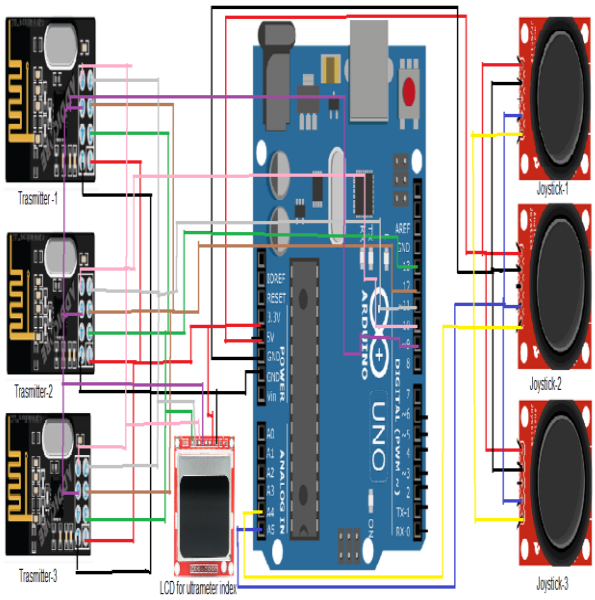

Fig 9- Main control unit circuit

This unit is manly located in the hand of the operator. This system mainly consists of the three joy stick. This each joy tick will provide command for the motion of the system. The first joystick will provide the motion for the robotic arm one. Then the second joystick will provide the motion for the second robotic arm. The third joy stick will provide command to the internal wheel assembly system. This system is also providing with the digital display system so that it can provide data for the ultra meter and the heat and smoke senor of the system.

This system manly has provided with the three transmissions and resiving unit for the communication to the robotic system. With the each detail connation system will work independently but in synchronous way.

4. ADVATAGES

This system mainly consists of the two different robotic arms so that it has the greater observation capacity as compare to the other system. This system is also including four different control units so it can operate in more efficient way. This system also has the specially design robotic arm so that it can perform the very dynamic movement. Due to its compact size and design it will operate efficiently on the power cable system

5. CONCLUSION

This system has provided with the all components need for the operation of observation. Due to number of sensor and the various motor system include in this robot it has the great number of advantages over the other system. Hence by using this system the operator can boost their observation capacity. It is also more economical and safe for the operation point of view. Hence this system should be use for the preventive maintain of the power cable.

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