iJRASET
International Journal For Research in Applied Science and Engineering Technology

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 9 **Issue:** VII **Month of publication:** July 2021

**DOI:** https://doi.org/10.22214/ijraset.2021.36275

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429*
*Volume 9 Issue VII July 2021- Available at www.ijraset.com*

# Under Ground Cable Fault Detection & Maintenance Robot Based on ATMEGA 328P Micro-Controller

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***Abstract:*** ***It tells that the problem which will occur during survey is as per the modernization. We are using underground cable getting fault and maintenance of such cables. Show our project AIMS for removing this for and solving this problems. We are trying to build underground robot which is having wireless camera, High voltage shielding. It will have some sensor to detect the environment, it is specially design type of robo, it is universal and it is semi-autonomous. Underground cables are mostly prepare for condensed area where high population is there. Then in that case this cable are underground may be power line cable for communication line as well as ducting are laid underground. in this case when there is a fault or problem occurs in underground system. And service is too much high, it is a very expensive and time consuming to rectify this problem we are going to design robot, a special kind of robot which will be used for the maintenance purpose. So the robot is designed specially with the such a frame which is universally acceptable and design as per the standards. as well as the robot is having some special equipment i.e camera, some sensor for detecting its surrounding condition. as well as some mechanism which are used for maintenance purpose. Robot is capable of up to 66kv.***

***Keywords - Motor driver, Micro-controller, H-Bridge, Servo motor, Lead-acid battery.***

## I. INTRODUCTION

The introduction of our project tells that, the use of underground space has gradually attracted peoples attention. underground cable system is a common practice for load in many urban areas, win any problem occurs in the cable it is very difficult to find exact location of fall due to not moving the exact location of cable. So this robot is used to detect the location of fault. Also we are using high torque motors for better traction control. We are using flash lights for emergency condition, also we are using high capacity batteries for long occurrence. also it is a semi autonomous because repairing and maintenance can be done by robot itself, but in case of maintenance conditions, where human efforts are required in that case human can take manual control. The construction of underground pipe gallery has become one of the standards of modernization of our country.

We are implementing a robot which can travel through the pipe gallery and determine fault in the cable and also other defects in the underground system and also it helps in calculating the exact location of fault which makes it easy for correction. At Mega 32Ap is a latest micro control and actually to fulfill our requirement, it is easy to program and cheaply available. also, we have battery backup lithium polymer battery depending upon the rating, The Robot is designed for operating 66kv of voltage.

## II. LITERATURE SURVEY

The use of underground system for power cables is implemented due to many advantages. Underground cables are not exposed to many dangerous situations, and it also makes some space on the ground for the development of the infrastructure. Underground transmission of electricity is associated with reliability. There are many disturbances involved in the transmission of electricity through overhead cables such as storms, hurricanes, cyclones. The only way to make electric power cables safe and economical to repair is to use underground system. Hence many cities around the globe such as Manhattan, Downtown San Francisco, Toronto, Chicago, Mumbai, are opting for this technique. The disadvantage of underground cables is that it is practically difficult to detect faults and hence maintenance upgrading the cables means installing whole new supply lines. Hence these costs get added up in the actual cost incurred for maintenance of the cables. The second main disadvantage is that workers are exposed to an unsafe environment for the detection and inspection of the power cables. Damage to the live power cables can cause injuries that are related to dangerous effects of arcing current and by associated fire or flames. If the insulation sheathing of the wire is damaged, workers are exposed to direct electric shock. The underground cables fault analysis is done by using a micro-controller. That is why we are implementing a robot to find the exact fault location of cable.

## III. BLOCK DIAGRAM

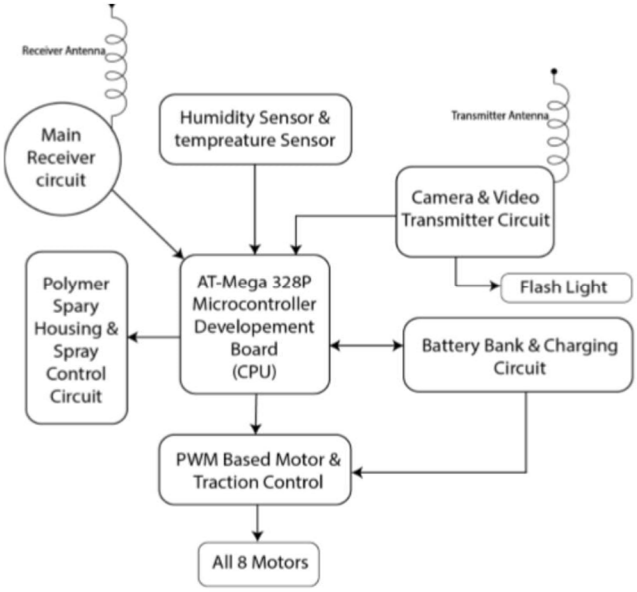



Fig 1 – Block Diagram of the Proposed System

Power supply unit is required to give different power voltages, to each and every module. Micro-controller will require 5V, the motor will require 12V. Hence power modules are required. Power control circuit is required now up to the power control circuit there is a video transmitter system, which is taking data from the camera and telecasting it using video receiver which is going to receive by video transmitter via OTG in a mobile. So, this is the complete system which we are opting for a video transmission. After this we have motor control system in which the data from the user is being received with radio frequency receiver module, data is transported from radio frequency transmitter from user to the micro-controller, then which is processed with the help of written program inside the micro-controller and the command will be compared with the algorithm and command will be initiated to the actuators such as forward direction, backward direction then we also have a maintenance system in which we have a spray controlled by servomotor.

## IV. COMPONENT USED

There are numerous basic electrical and electronic components are normally found in numerous circuits of peripherals like hard disks, mother boards, etc… Several circuits are designed with numerous components like resistors, capacitors, inductors, transistors, transformers, switches and fuses etc. Therefore, this article offers a quick info concerning different types of electronic and electrical components that are utilized in various electronic and electrical projects, Let us see each and every part in detail with diagrams. Resistors, inductors, transformers, battery, fuse.Major Electrical and Electronic Components

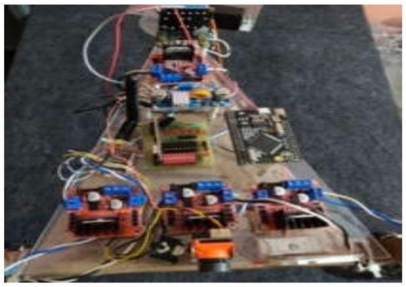
### *A. Lead-acid Battary*


The lead–acid battery is a type of rechargeable battery first invented in 1859 by French physicist Gaston Planté. It is the first type of rechargeable battery ever created. Compared to later types of rechargeable batteries, Lead-Acid batteries have the lowest energy density. Despite this, its ability to supply high surge currents means that the cells have a relatively large power-to-weight ratio. These features, along with their low cost for use in motor.

*B. Geared Motor*

The motors are long duration working motors. It is from the company Johnson's geared motor. The rating of the motor is 100 rpm dc, 12V, 350mA. The stall torque is 26 kg/cm means when maximum torque applied to the shaft the motor stop rotating and steady state torque 8kg/cm means net force is zero.

*C. Main Board*



Central link is showing the maintenance part of robot. This is the main board with all the circuit components. It shows the camera, flashlights, L298 module motor driver, ATMEGA 328P micro-controller, lead acid battery, geared motor, resin spray mechanism, relay module, vedio transmitter, radio receiver, servomotor, buck converter.

*D. Camera*

The camera is 1500 TVL means camera is able to render images of that capacity, 5MP and 10mm wide lens, the camera also has noise reduction audio feedback system means noise cancellation , OSD support is available means the on screen display is available

## V. METHODOLOGY

We designed our special kind of frame we carried that Xframe from copper or aluminium plate and then we shielded it with proper shielding for providing proper protection to our robot. Then we fabricated our main circuit board which is cad software by Auto-cad. We fabricate our frame and we attached the shielding to it, it means whole assembly of Xframe and proper shielding. Then we developed a board using all our modules on it. After this we balanced the robot with equal distribution of weight for better operation of robot. After that we tested our robot in other conditions and try to simulate in original. We rectify error and the area of improvement.

## VI. TESTE AND RESULTS

Robot was successfully run. The bend of frame is tested. Spraying mechanism is working and is tested successfully. All motors are working in front and back direction using video frequency control. Camera is successfully tested. The temperature along the cable is the same, but there is a peak permit to verify the cables and pipes state can contribute significantly to reduce supply fails, leading to more gains and a better service quality. Tests related with sensors, localization and navigation were presented. The visual localization system was tested in a robotic platform, showing good performance.

## VII. CONCLUSION

This work is based on study and development of robotic system that has sensors to verify the cables and pipes presented in the network. A set of experiments validates the robot mechanical structure, providing its capacity to adapt in different situations that can occur during inspection. The visual localization system was tested in the robotic platform, showing good performance associated with robot localization. We intend to show the user interface for remote control of the robot. The interface will allow the automatic online inspection of the obtained data from the robot. The current system of detecting faults involves the digging of roads, which is not only a waste of human resources and money but also cause inconvenience to the general public. Hence the proposed model solves this problem to get extent and is also coefficient. As the proposed system is autonomous, it reduce the human interference involved in manual underground cable fault detection making the system more efficient and less time-consuming.

## VIII. ACKNOWLEDGEMENT

With profound feeling of immense gratitude and affection, we would like to thank our guide **Dr. SHUBHANGI S. AMBEKAR,** Department of Electrical Engineering, her continuous support, motivation, enthusiasm and guidance. for. Her encouragement, supervision with constructive criticism and confidence enable us to complete this work.

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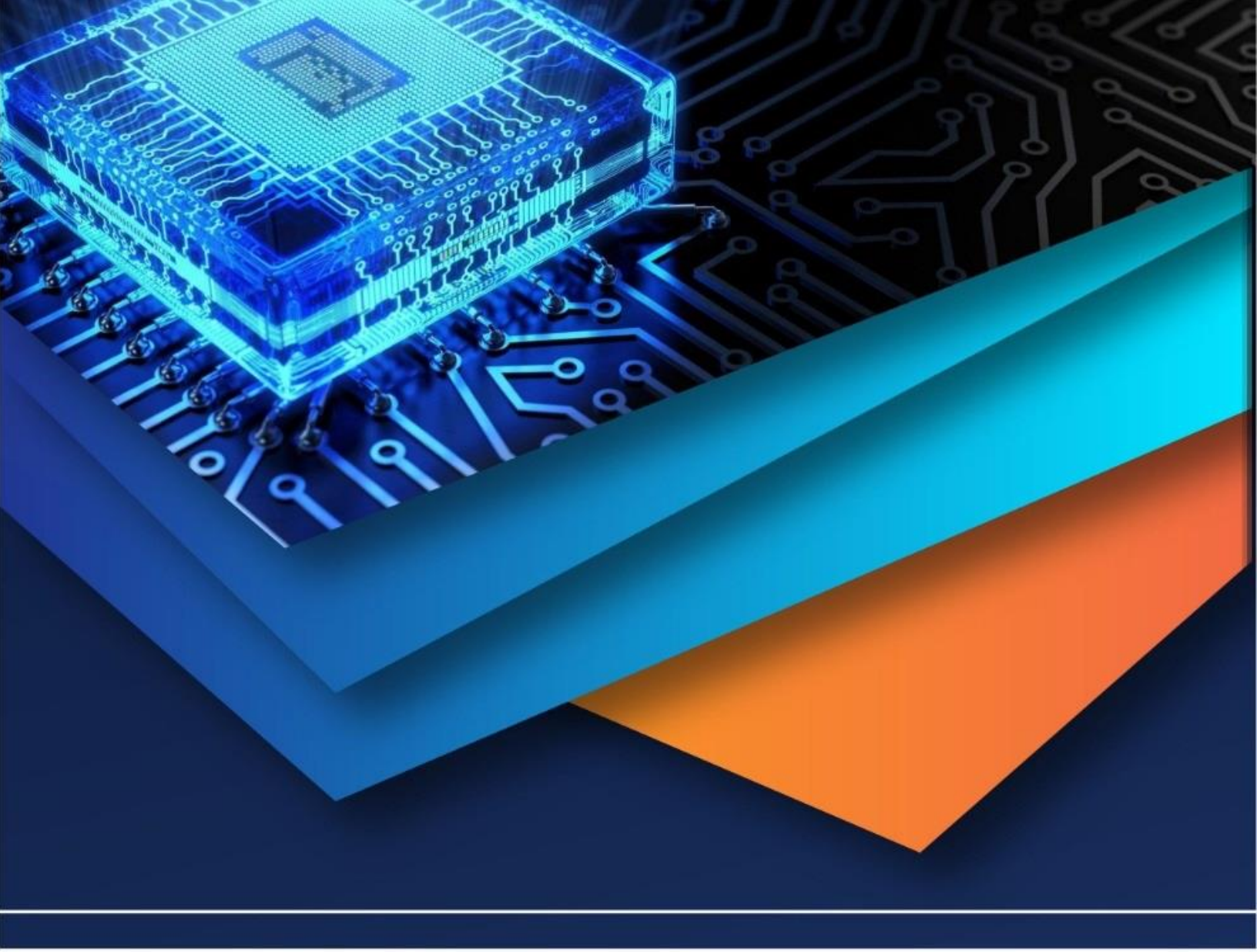

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