

# International Journal of Innovative Research in Science, Engineering and Technology

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## Determining the Distance on the Failure of the Underground Cable in the Base Station

Tmt.S.D.Gayathri, Tmt. A. Rajakumari

Lecturer, Department of Electrical and Electronics Engineering, I R T Polytechnic College, Bargur, Tamilnadu, India

Lecturer, Department of Electrical and Electronics Engineering, I R T Polytechnic College, Chennai, Tamilnadu, India

**ABSTRACT:** The objective of this project is to determine the distance of the failure of the underground cable in the base station using one kilometer of Arduino board. Underground cable system is a common practice in many urban areas. Even if a failure occurs for some reason, at that time the repair process related to this particular cable is difficult because of not knowing the exact location of cable failure. The project uses the classic concept of the Ohms law, when a low voltage at the end of the power supply device is applied across a series resistor the current varies depending on the location of the Fault the cable. In the case of a short circuit (grounded line), the voltage across the series resistors changes accordingly, then input to the ADC constructs the Arduino board to develop accurate digital data for the in kilometer. The project is mounted with a resistance representing the length of the cable in KM and creating defects is executed by a set of switches in each known KM to check the accuracy of it. Failure occurs at a given distance and the respective phase is displayed on an LCD screen connected to the Arduino board.

### I. INTRODUCTION

The purpose of this paper is to determine the distance from the base station's underground cable fault in kilometers. In this project we used a simple concept of ohm's low .When a fault occurs in the system the distance located on liquid crystal display (LCD). Until the last decade, cables were designed to be placed above the head and, at present, there is no underground cable that is higher than the previous method. adverse weather conditions such as storms, snow, torrential rains and pollution does not affect on underground lines But when a fault occurs in underground lines it is difficult to locate the fault in underground cable. We will find the exact location of the fault. Now the world has become digitized so, the project is to detect exact location of the fault in digital form. Underground cabling system is a more common practice in many urban areas. Although the fault occurs for some reason, at that time, the repair process for this particular cable is difficult because of not knowing the exact location of the cable breakdown.

### II. EXISTING SYSTEM & PROPOSED SYSTEM

#### 3. EXISTING SYSTEM

In urban areas, electrical cables run underground instead of running over, because it does not affected by any adverse effect of weather such as heavy rainfall, snow, thunder storm. Whenever a fault occurs within the underground cable, it is difficult to detect the exact location of the fault for the repair process of particular cable. Hence we can detect faults in underground cables using a megger.

#### 3.1 PROPOSED SYSTEM

The proposed system found the point of the exact location of fault. The paper uses the standard concept of Ohm's law i.e. when a low dc voltage is applied at the end of feeder through series resistor (cable lines) then the current will vary depending on the location of the fault. Short in the cable.

This system uses an Arduino microcontroller and a rectified power supply. In this case, the current detection circuit in combination with the resistor is connected to the microcontroller with the aid of an ADC device to

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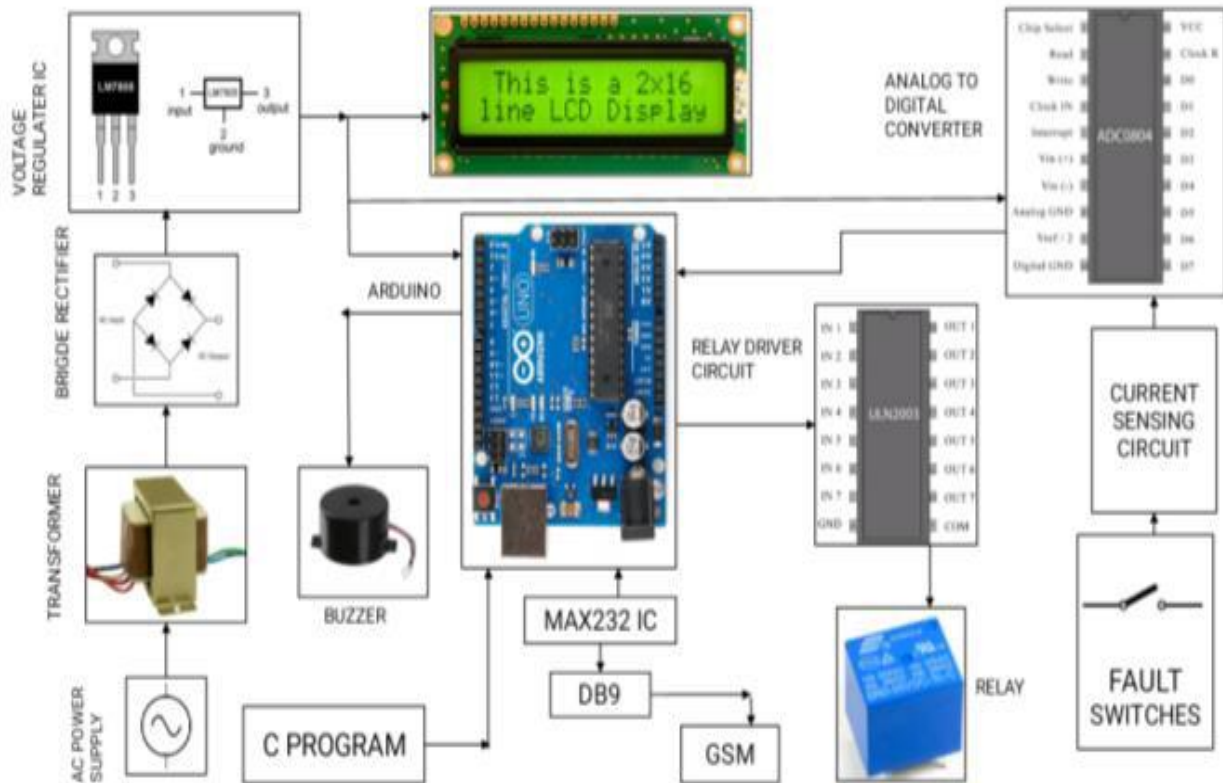
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represent the length of wire in Km. Error creation is performed by a set of switches. The relays are controlled by a relay exciter IC, which is used to check cable line. A 16x2 LCD is used to display information. Also one more feature is that using GSM the message of fault detection, location of fault and distance of fault from base station in kilometers this all information is send to base station. As soon as a fault occurs in a cable the buzzer produce the alarm to alert and to take an immediate action by field workers.

### III. BLOCK DIAGRAM



### BLOCK DISCRPTION

#### POWER SUPPLY

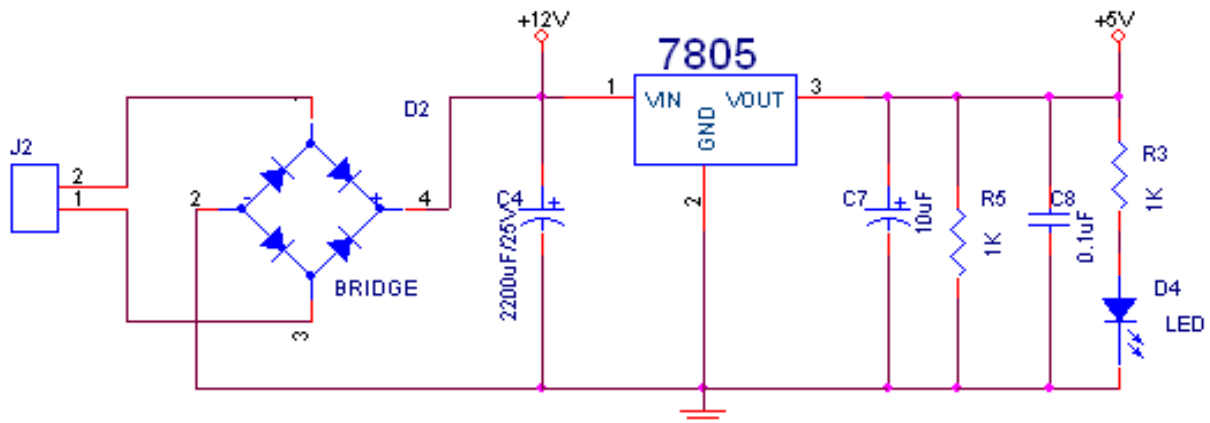
Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

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A 230v, 50Hz Single phase AC power supply is given to a step down transformer to get 12v supply. This voltage is converted to DC voltage using a Bridge Rectifier. The converted pulsating DC voltage is filtered by a 2200uf capacitor and then given to 7805 voltage regulator to obtain constant 5v supply. This 5v supply is given to all the components in the circuit. A RC time constant circuit is added to discharge all the capacitors quickly. To ensure the power supply a LED is connected for indication purpose.

### ARDUINO UNO

The Arduino uno is a microcontroller board based on the ATmega. It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



### BUZZER

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows.

### RELAY

Relay is an electromagnetic device which is used to isolate two circuits electrically and connect them magnetically.

### GSM

GSM/GPRS module is used to establish communication between a computer and a GSM-GPRS system.

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## IV. SIMULATION ANALYSIS

### 4.1. SIMULATION SOFTWARE – PDS

The software used for the production of a computer model of the proposed system is Proteus Design Suite. The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The micro-controller simulation in Proteus works by applying either a hex file or a debug file to the microcontroller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it. This enables its use in a broad spectrum of project prototyping in areas such as motor control, light indication and message alert as output. The Intelligent Schematic Input System allows the user to experiment with the computer model with animations and the flow of the signals.

### 4.2. ARDUINO IDE

The Arduino integrated development environment is a cross platform application (for windows, macOS, Linux) that is written in the programming language java. It is used to write and upload programs to Arduino board. The Arduino IDE supports the c and c++ using special rules of code structuring. The Arduino IDE supplies a software library from the writing project, which provides many common input and output producers. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program sub main () into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employees the program argued to convert the

executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware. The libraries are necessarily written in c++.

### ARDUINO IDE DEFAULT WINDOW: -

Download Arduino Integrated Design Environment (IDE) here (Most recent version: 1.8.10)<http://www.arduino.cc/en/Main/Software>

This is the Arduino IDE once it's been opened. It opens into a blank sketch where you can start programming immediately. First, we should configure the board and port settings to allow us to upload code. Connect your Arduino board to the PC via the USB cable.

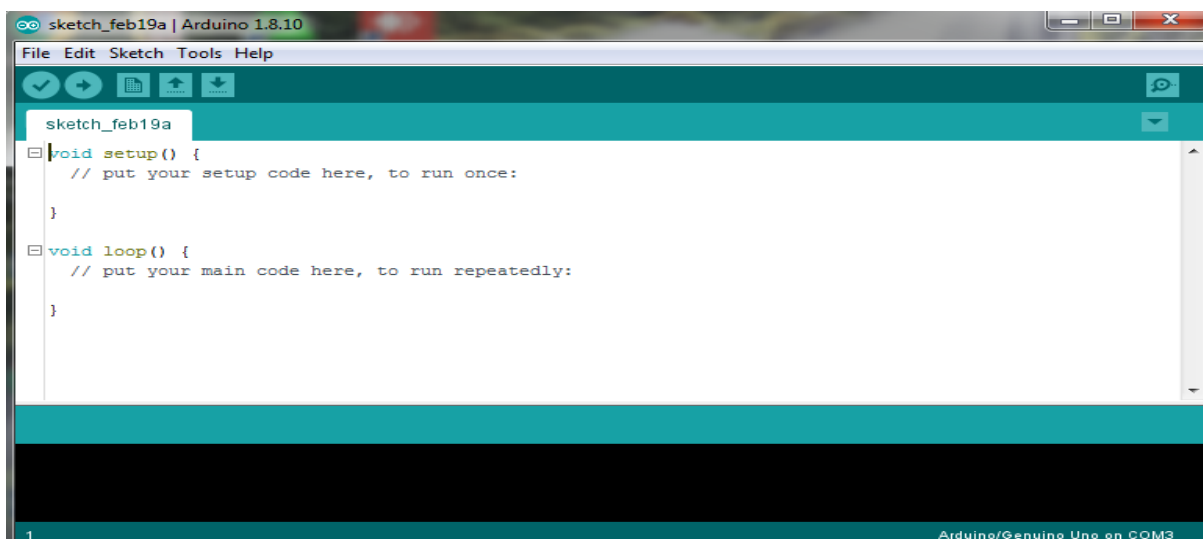


Fig 4.2.1 Arduino IDE Default Window

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### ARDUINO IDE: BOARD SETUP PROCEDURE: -

You have to tell the Arduino IDE what board you are uploading to. Select the Tools pull down menu and go to Board. This list is populated by default with the currently available Arduino Boards that are developed by Arduino. If you are using an Uno or an Uno-Compatible Clone (ex. Funduino, SunSmart, IEIK, etc), select Arduino Uno. If you are using another board/clone, select that board.

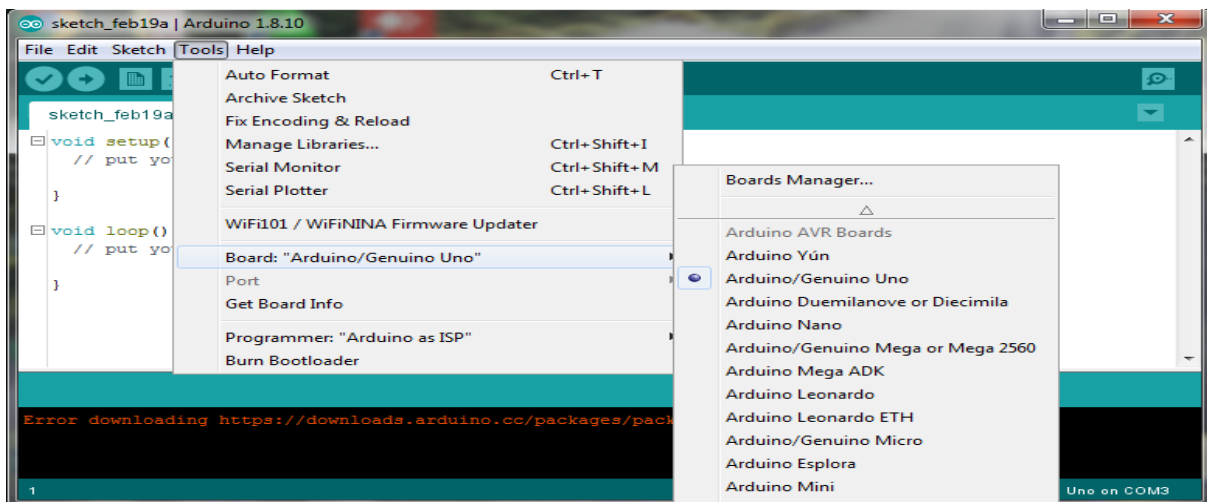


Fig 4.2.2 Arduino IDE: Board Setup Procedure

### IDE: COM PORT SETUP: -

If you downloaded the Arduino IDE before plugging in your Arduino board. When you plugged in the board, the USB drivers should have installed automatically. The most recent Arduino IDE should recognize connected boards and label them with which COM port they are using. Select the Tools pull down menu and then Port. Here it should list all open COM ports, and if there is a recognized Arduino Board, it will also give its name. Select the Arduino board that you have connected to the PC. If the setup was successful, in the bottom right of the Arduino IDE, you should see the board type and COM number of the board you plan to program. Note: the Arduino Uno occupies the next available COM port; it will not always be COM3. At this point, your board should be set up for programming, and you can begin writing and uploading code.

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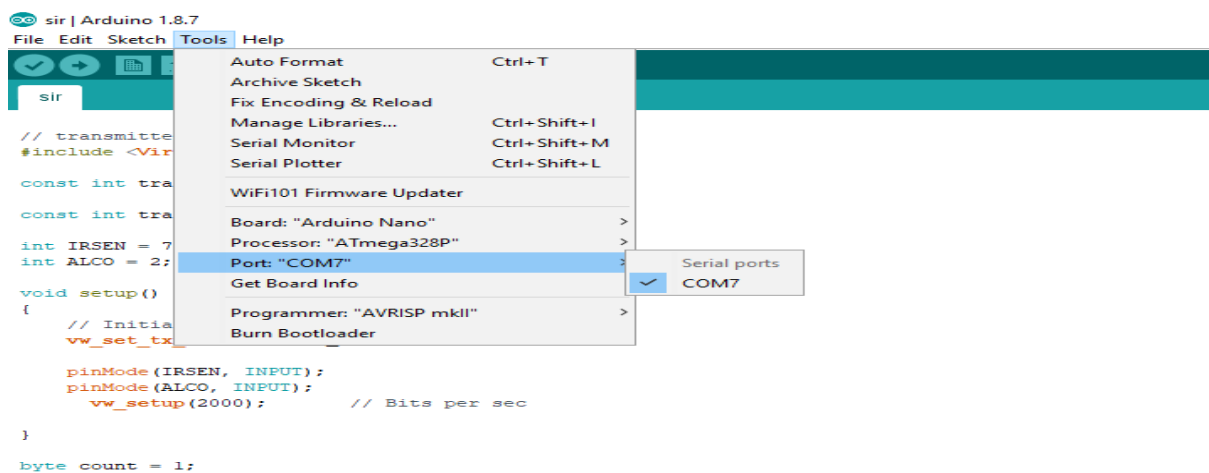


Fig 4.2.3 IDE: com port setup

### Blynk application and Arduino IDE Preparation and Running

This project is running by Blynk application. Download the application to a smart phone from Google play store and then create a project on it with four switches and one gauge to be as a temperature scale. Set buttons to be switches on D1, D2, D3 and D4. Then set gauge on A0 because the sensor output is on A0 in NodeMCU board. Figure 5 shows screenshots from Blynk application

#### Methodology and flow chart

- Step 1: Start the process
- Step 2: insert key lock
- Step 3: Check fuel level
- Step 4: Is fuel below the range? If "YES" then go to Step 5. If "NO" the message will not be sent to owner.
- Step 5: Send text message to owner
- Step 6: Buzzer is "ON".
- Step 7: Check the buzzer is stopped within 2 minutes.

### V. PCB & SOLDERING DETAILS

#### SOLDERING

This is the operation of joining the components with PCB after this operation the circuit will be ready to use to avoid any damage or fault during this operation following care must be taken.

1. A longer duration contact between soldering iron bit & components lead can exceed the temperature rating of device & cause partial or total damage of the device. Hence before soldering we must carefully read the maximum soldering temperature & soldering time for device.

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2. The wattage of soldering iron should be selected as minimum as permissible for that soldering place.
3. To protect the devices by leakage current of iron its bit should be earthed properly.
4. We should select the soldering wire with proper ratio of Pb & Sn to provide the suitable melting temperature.
5. Proper amount of good quality flux must be applied on the soldering point to avoid dry soldering.

### Construction:

#### Step in PCB designing

1. The circuit to be fabricated out is board through carbon paper on PCB sheet.
2. The carbon print is covered using permanent marker.
3. Make a solution of ferric chloride ( $FeCl_3$ ) in tray.
4. Dip the PCB neatly in step 2 in the solution and mounting in continuously.
5. Continue step 4 until the copper (except under permanent marker).
6. Wash PCB with water, PCB is ready.
7. Drill the hulls so that the component can be mounted.
8. Mount the components.
9. Soldering in done make the final circuit ready.

### Tips in follow while soldering

1. While soldering ics always keep temperature b/w 150-250c.
2. During the soldering of component keep the temperature B/w 250-350c.
3. Always take care that form does not get shorted while soldering.
4. Soldering should be thinner to be diameter.
5. For soldering use a soldering station is 10-25 watt.

## VI. ADVANTAGES & APPLICATIONS

### ADVANTAGES

1. Provides precise accuracy in determining the location of fault.
2. Consumes low power in Nano watts.
3. Compact size, Easy to handle.
4. Serial on board programming.
5. No external programming voltage needed.
6. Less maintenance cost.
7. It has higher efficiency.

### APPLICATIONS

1. Locating the cable faults in the urban areas.
2. Industrial based underground cable fault location systems.

## VII. CONCLUSION

Finally ,we have done this project for location of fault in underground cable In the rural areas where underground transmission system is used. it is difficult to find the fault in the cable . So this project is beneficial to use to detect the fault location. So the fault can easily locate and extinguish. The Arduino has several advantages over the microcontroller so use of arduino is more useful arduino based underground fault detection is more advantageous than microcontroller based underground fault detection.

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### BIOGRAPHY



S.D.Gayathri  
Lecturer, Department of Electrical and Electronics Engineering, I R T Polytechnic College-  
Bargur  
gayathrivenkatesh2013@gmail.com



A.Rajakumari  
Lecturer, Department Of Electrical And Electronics Engineering, I R T Polytechnic  
College , Chennai-44.  
rajakumari1996@gmail.com