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"UNDERGROUND CABLE FAULT DISTANCE LOCATOR USING MICROCONTROLLER WITH GSM"

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Abstract- *The objective of this project is to determine the distance of underground cable fault from base station in kilometres. The underground cable system is a common practice followed in many urban areas. When a fault occurs for some reason, at that time the repairing process related to that particular cable is difficult due to not knowing the exact location of the cable fault. The proposed system is to find the exact location of the fault. The project uses the standard concept of Ohms law i.e., when a low DC voltage is applied at the feeder end through a series resistor (Cable lines), then current would vary depending upon the location of fault in the cable. In case there is a short circuit (Line to Ground), the voltage across series resistors changes accordingly, which is then fed to an ADC to develop precise digital data which the programmed microcontroller of 8051 family would display in kilometres. The project is assembled with a set of resistors representing cable length in KMs and fault creation is made by a set of switches at every known KM to cross check the accuracy of the same. The fault occurring at a particular distance and the respective phase is displayed on a LCD interfaced to the microcontroller. In addition to this a new technique called GSM Mode is also installed in this system.*

I. INTRODUCTION

PROBLEM SUMMERY

PROBLEM DEFINATION

- NOW A DAYS MOST CABLES ARE UNDERGROUNDED.
- SO WHEN ANY DEFECT CAUSE IN UNDERGROUND CABLE WE ARE NOT ABLE TO FIND THE EXACT LOCATION OF DEFECT.
- AND ALSO WE ARE NOT ABLE TO FIND WHICH TYPE OF FAULT IS CAUSED.

PROBLEM SOLUTION

- When a fault occurs for some reason, at that time the repairing process related to that particular cable is difficult due to not knowing the exact location of the cable fault. The proposed system is to find the exact location of the fault.
- The project uses the standard concept of Ohms law i.e., when a low DC voltage is applied at the feeder end through a series resistor (Cable lines), then current would vary depending upon the location of fault in the cable.

Aim and objective of the work

- The objective of this project is to determine the distance of underground cable fault from base station in kilometers.
- The underground cable system is a common practice followed in many urban areas.
- When a fault occurs for some reason, at that time the repairing process related to that particular cable is difficult due to not knowing the exact location of the cable fault. The proposed system is to find the exact location of the fault.
- The project uses the standard concept of Ohms law i.e., when a low DC voltage is applied at the feeder end through a series resistor (Cable lines), then current would vary depending upon the location of fault in the cable.

  In case there is a short circuit (Line to Ground), the voltage across series resistors changes accordingly, which is then fed to an ADC to develop precise digital data which the programmed microcontroller of AVR family would display in kilometers.

The project is assembled with a set of resistors representing cable length in KMs and fault creation is made by a set of switches at every known KM to cross check the accuracy of the same.

The fault occurring at a particular distance and the respective phase is displayed on a LCD interfaced to the microcontroller. In addition to this a new technique called GSM Mode is also installed in this system, with the help of which the Information regarding the fault can be obtained onmobile.Various components used are Rectifier,LED,12vTtransformer,Diodes,Regulator,Switch Relay, BASCOM Software, GSM Module.

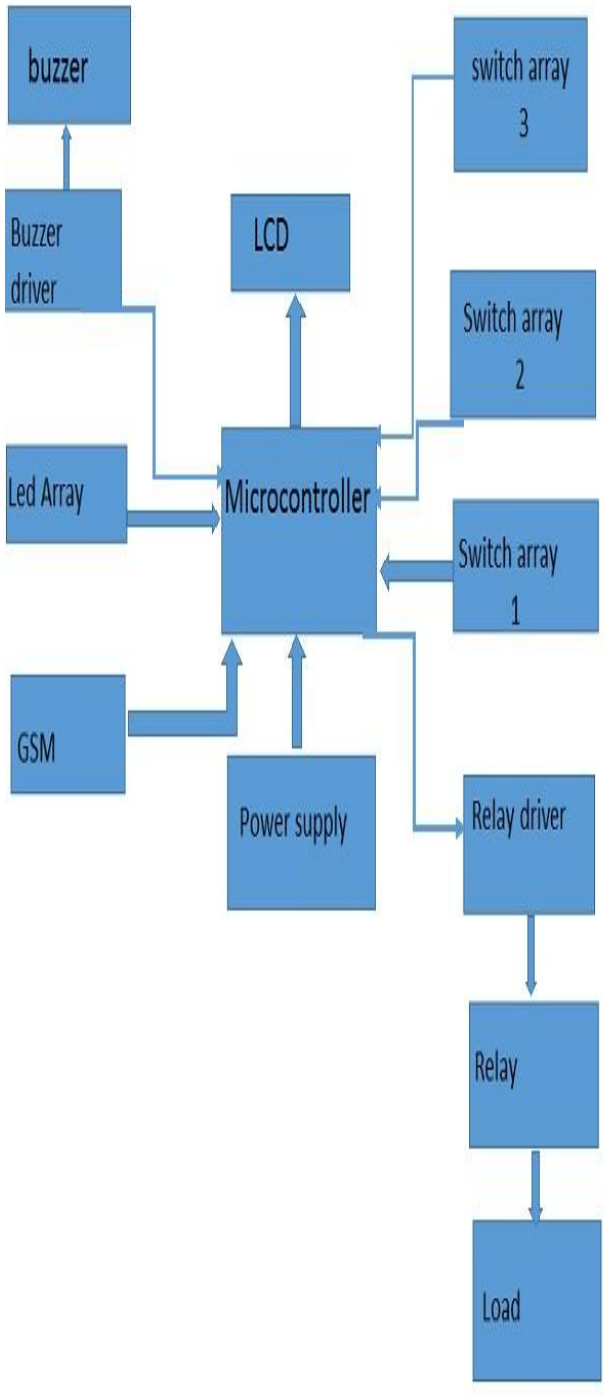
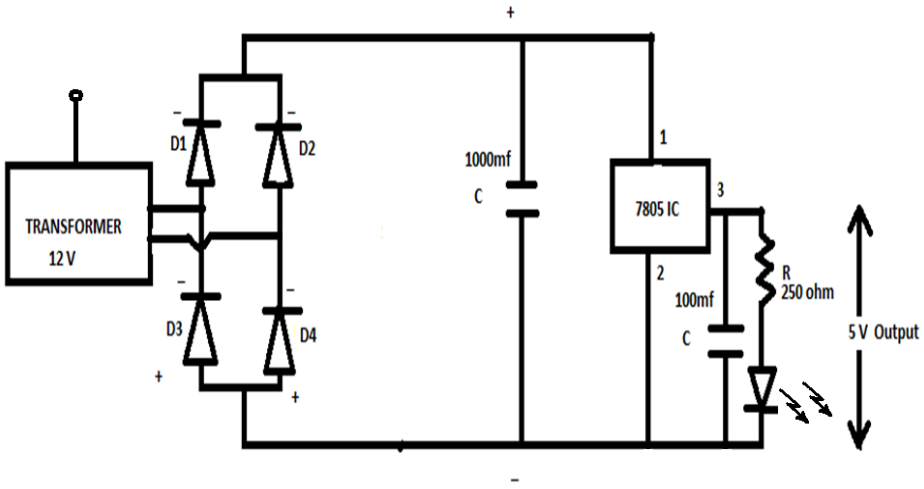


Fig : 1 block diagram

II. DESCRIPTION:



TRANSFORMER

Transformer works on the basis of ELECTROMAGNETIC INDUCTION and they are mainly classified into two:

- STEPUP TRANSFORMER
- STEPDOWN TRANSFORMER

Step-up transformer up-convert the input voltage while step-down transformer down-converts. For a DC Power Source we have to use step-down transformers, to covert the high voltage AC supply to low voltage DC.

RECTIFIER

Rectifiers are used to convert the sinusoidal AC voltage to non-sinusoidal pulsating DC. The main components used in Rectifiers are diodes due to its switching action. They will conduct Current only in one direction, hence the voltage. So we can use them on rectifiers to make the alternating Current unidirectional.

Rectifiers are classified into Three:-

- HALF WAVE RECTIFIERS
- FULL WAVE RECTIFIERS
- BRIDGE RECTIFIERS

FILTERS

Filters are used to eliminate or filter-out the unwanted ripples from the rectified output. Filters play an important role in dc Power supplies, they make the pulsating dc steady.

VOLTAGE REGULATOR

Voltage Regulators are used to regulate the output Voltage over load. They make the Voltage unvaried with load connected to it. This will eliminates the remaining ripples from the filter output. The output from Voltage Regulator may be the required DC. Voltage Regulators includes some safety measures such as Current Limiting, short circuit etc.

- Brief description of operation: Gives out will-regulated +5V output, output current capability of 500mA.
- Circuit protection: Built-in overheating protection shuts down output when regulator IC gets too hot.

- Circuit complexity: Very simple and easy to build.
- Circuit performance: Very stable +5V output voltage, reliable operation.
- Availability of components: Easy to get, uses only very common basic components.
- Design testing: Based on datasheet example circuit, we have used this circuit successfully as part of many electronics projects
- Works on 12v dc input

III. 1 COMPONENTS LIST

RESISTORS	CAPACITOR	SEMICONDUCTORS	Miscellaneous
22 Ω	1000 µf,16v electrolytic	ATmega16 microcontroller	6 pin connector
220 Ω	10 µf,16v electrolytic	LM317,voltage regulator	SIM 300 GSM module
330 Ω	223 mica capacitor	7805,5v regulator	SIM card
4.7 k Ω		BC547 npn transistor	Sensor for water tank level (MAGNETIC SENSOR)
470 Ω		1N4463 zener diode	Humidity sensor(SY-HS 230)
100 Ω		Photodiode	MOC7811-Smoke sensor
150 Ω		IR LED	Bridge Rectifier
22 Ω		Small LED for network light	12 V, 1 Amp Transformer
2.7 k Ω		red LEDs	6 pin connector

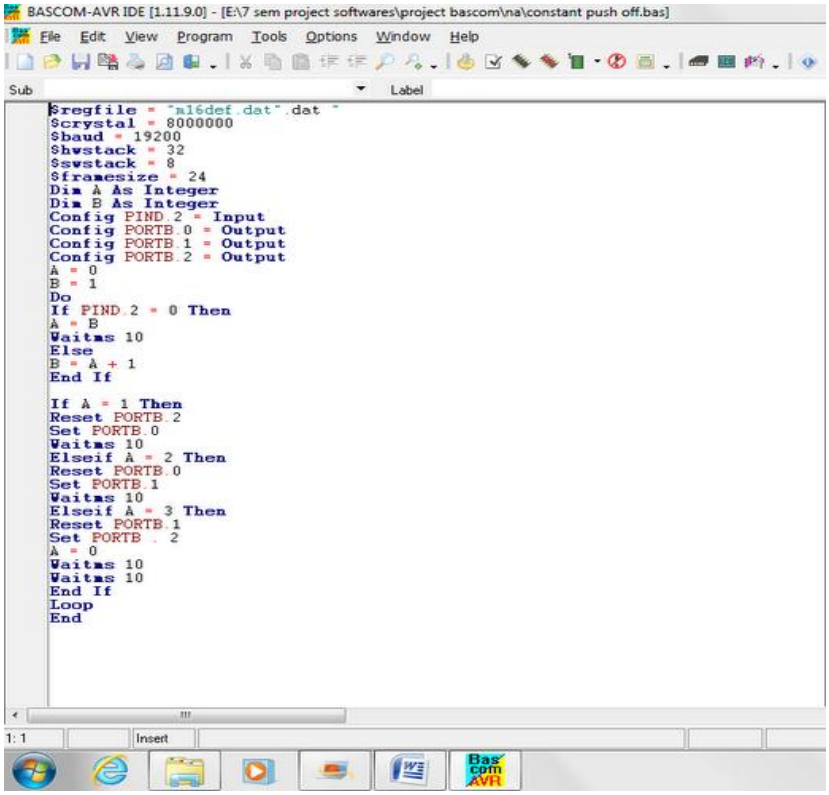
IV. SOFTWARE DESCRIPTION

Software design includes series of flowchart which helps to track the whole program and enable easy programming and error checking. Software tools are as important as hardware tools required to mould a perfect design.
The following are the different tools used for software development.

- Bascom-AVR
- Robokits AVR USB Programmer (STK 500)

4.2 BASCOM SOFTWARE:-

Bascom Software is used to provide you with Bascom development tools for AVR based microcontrollers. With the Bascom tools, you can generate embedded applications for virtually every AVR derivative. The supported microcontrollers are listed in the Bascom-AVR.
Screenshot of Bascom software is shown in figure.



4.1screenshot of Bascom software

Since Atmel's AVR microcontrollers are new to the market, they are not so well known as the 8051 controllers. Therefore this microcontroller family should be described in more detail.Atmel's AVR microcontrollers use a RISC architecture which has been developed to take advantage of the semiconductor integration and software capabilities of the 1990's. The resulting microcontrollers offer the highest MIPS/mW capability available in the 8-bit microcontrollers market today.

Fig. 4.2 Software Startup

The architecture of the AVR microcontrollers was designed together with C-language experts to ensure that the hardware and software work hand-in-hand to develop a highly efficient, high-performance code.The family of AVR microcontrollers includes differently equipped controllers - from a simple 8-pin microcontroller up to a high-end microcontroller with a large internal memory. The Harvard architecture addresses memories up to 8 MB directly. The register file is "dual mapped" and can be addressed as part of the on-chip SRAM, whereby fast context switches are possible.All AVR microcontrollers are based on Atmel's low-power nonvolatile CMOS technology. The on-chip in-system programmable (ISP), downloadable flash memory permits devices on the user's circuitboard to be reprogrammed via SPI or with the help of a conventional programming device.By combining the efficient architecture with the downloadable flash memory on the same chip, the AVR microcontrollers represent an efficient approach to applications in the "Embedded Controller" market.

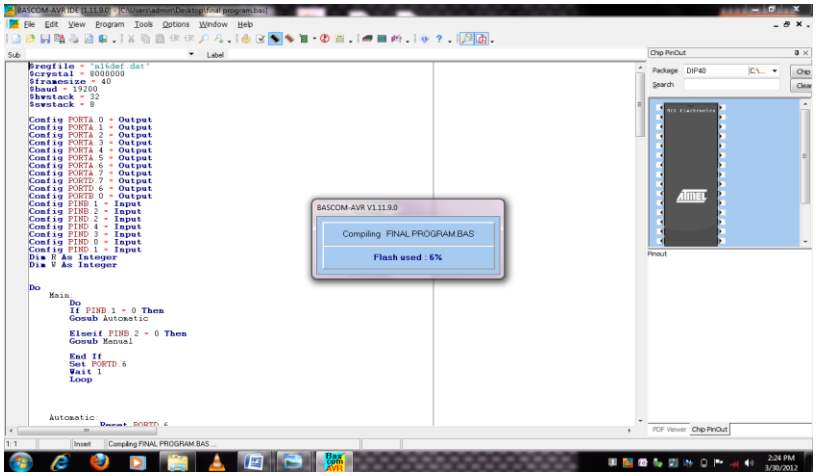
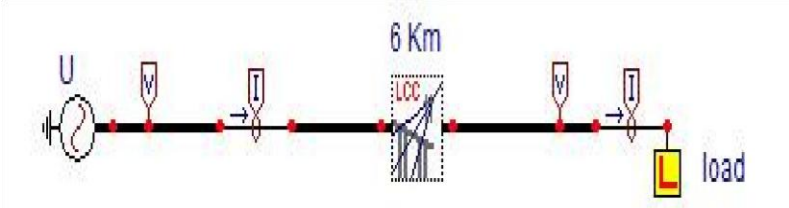


Fig. 4.3 Program compilation snapshot

V. IMPLEMENTATION

FIGURE 5.5 shows the single line diagram,and FIGURE 5.6shows the waveform of current at the sending end at no fault (normal conditions)During no fault (normal conditions), the waveform of the current is constant and stable.



F IGURE 3.1 single line diagram of at no fault (normalconditions**)**

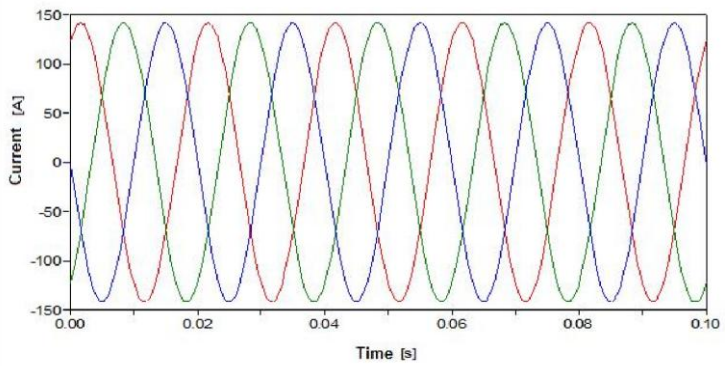


FIGURE 3.2 Current waveforms at no fault (normal conditions)

FIGURE 5.7 shows the single line diagram and FIGURE 5.8 shows the waveform of current at the sending end at three phase to ground fault. Based on FIGURE 5.8, when three phase to ground fault occur, all the three phases current for the faulted phases are higher than during normal condition.

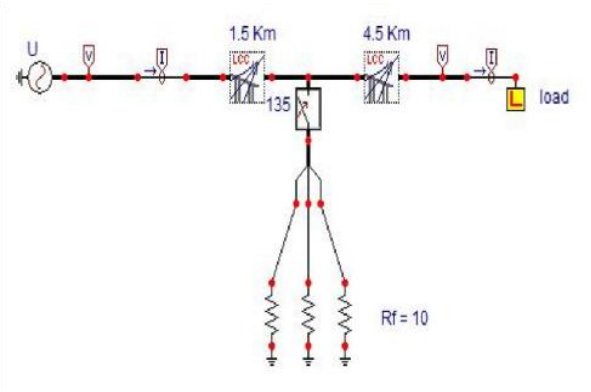


FIGURE 3.3 Single line diagram of three phase to ground fault.

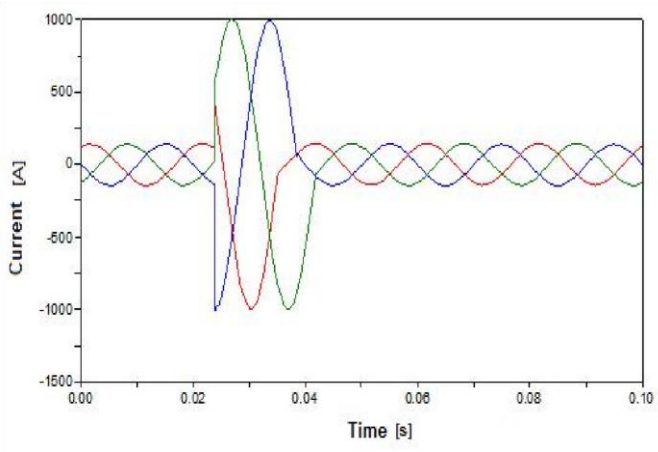


FIGURE 3.4 Current waveforms at three phase to ground fault

When line to line fault occur the current for the faulted phases is higher compared with the healthy phases. This can be seen in FIGURE 5.14, where the phase A and phase B current is much higher than phase C current.

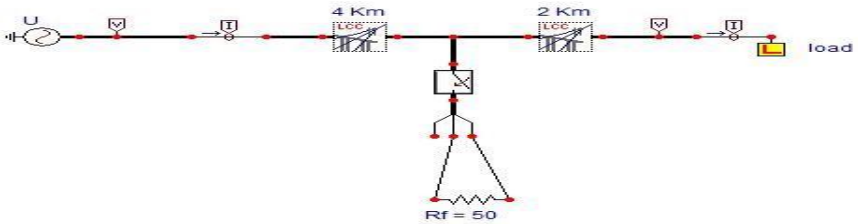


FIGURE 3.5 Single line diagram of line to line fault.

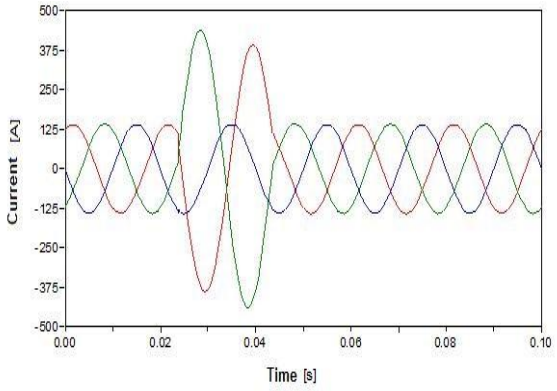


FIGURE 3.6 Current waveforms at line to line fault.

VI. ADVANTAGES

Advantages:-
•Safe and secure to use.
•It is fast, effective and flawless service.
•Highly-reliable and efficient to use.

VII. CONCLUSION:-

•Thus, as described in above all chapter shows that the implementation of our module is very easy to understand, more user friendly, cheaper in cost, easy algorithm of working. We here want to mention that WE are working with global acceptance. We have used the standard method & standard GSM network to communicate between the system & user. the project can be enhanced by interfacing it with a GSM modem where by sending an SMS to the control system we can solve underground fault at distance occurs.

VIII. REFERENCES

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