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Solar Powered Underground Cable Fault Distance Locator Over IOT

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Abstract: ***the objective of this project is to determine the distance of underground cable fault distance from the base station in kilometers and displayed over the internet and to the connected computer .the device is powered by solar cell with storage battery and there is no need of external ac supply . Underground cable system is a common practice followed in major urban areas. While a fault occurs for some reason, at that time the repairing process related to that particular cable is difficult due to exact unknown location of the fault in the cable. Proposed system is used to find out the exact location of the fault and to send data in graphical format to a dedicated website together with on board lcd display over iot & by offline direct to computer.***

The project uses the standard theory of ohms law, i.e., when a low dc voltage is applied at the feeder end through a series resistor (cable lines), then the current would vary depending upon the location of the fault in the cable as the resistance is proportional to the distance. In case there is a short circuit (line to ground), the voltage across series resistors changes according to the resistance that changes with distance .this is then fed to an adc to develop precise digital data which the programmed pic controller family displays in kilometers .the project is assembled with a set of resistors representing the cable length in km and the 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, the respective phase along with the distance is displayed on the lcd. The same information is also sent to a dedicated website over internet or direct to pc, interfaced to the pic controller .furthermore, this project can be enhanced by using capacitor in an ac circuit to measure the impedance which can even locate the open circuited cable, unlike the short circuited fault that uses only resistors in dc circuit as followed in the above proposed project.

I. INTRODUCTION

In the urban areas, the electrical cable runs underground instead of overhead lines. Whenever the fault occurs in underground cable it is difficult to detect the exact location of the fault for process of repairing that particular cable. The proposed system detects the exact location of the fault and by the means of Wi-Fi modem it's serially communicated towards server. Since problem that occurs in underground cable is a big problem till now. As it is very difficult to find the exact location or faulty location manually, which suddenly affects the efficiency of the cable wire due to losses occurred. Till now many techniques had already been implemented in order to detect fault in cable wire .But the problem came up is how to locate the fault distance in the cable when it is under grounded, and how to access or retrieve those data related to faulty location whenever it is required .In order to fill those gaps, we proposed the system which detects the exact location of the fault and through the means of Wi-Fi modem its serially communicated towards server. Through previous researches many techniques came up which were useful to overcome the problem up to some extent.

II. LITERATURE SURVEY

Various methods came in existence in order to detect underground fault or fault in cable wire. Some of them are as follows: Aurthur C .Westrom et .al stated a method in which just after the fault established in a wire a chirped pulse stream are being injected .With respect to delay time between sending and reflected pulses a certain calculations are being made by some correlation process which is designed specially in order to eliminate the effect of noise caused by voltage arcing which thus provide an accurate calculation of the faulty location [5]. Wei-Jen Lee et.al stated that in some circumstances arcing fault on underground cable can generate large amount of heat and gases.

The decomposed gases settled to the end of the duct of the cable lead to fire and explode. By collecting certain information and developing few algorithms he tried to solve the calculation in order to examine and get the data of the faulty location [6]. IoT (Internet of Things) makes the world exciting. Now days everything is converged towards wireless technologies from where IoT has evolved. Y. J. Fan et.al says that the term IoT it is the best way of mitigating any problem as through this all object become interconnected and smart[4].In recent year IoT based application have come up with its wide importance as it summarizes present

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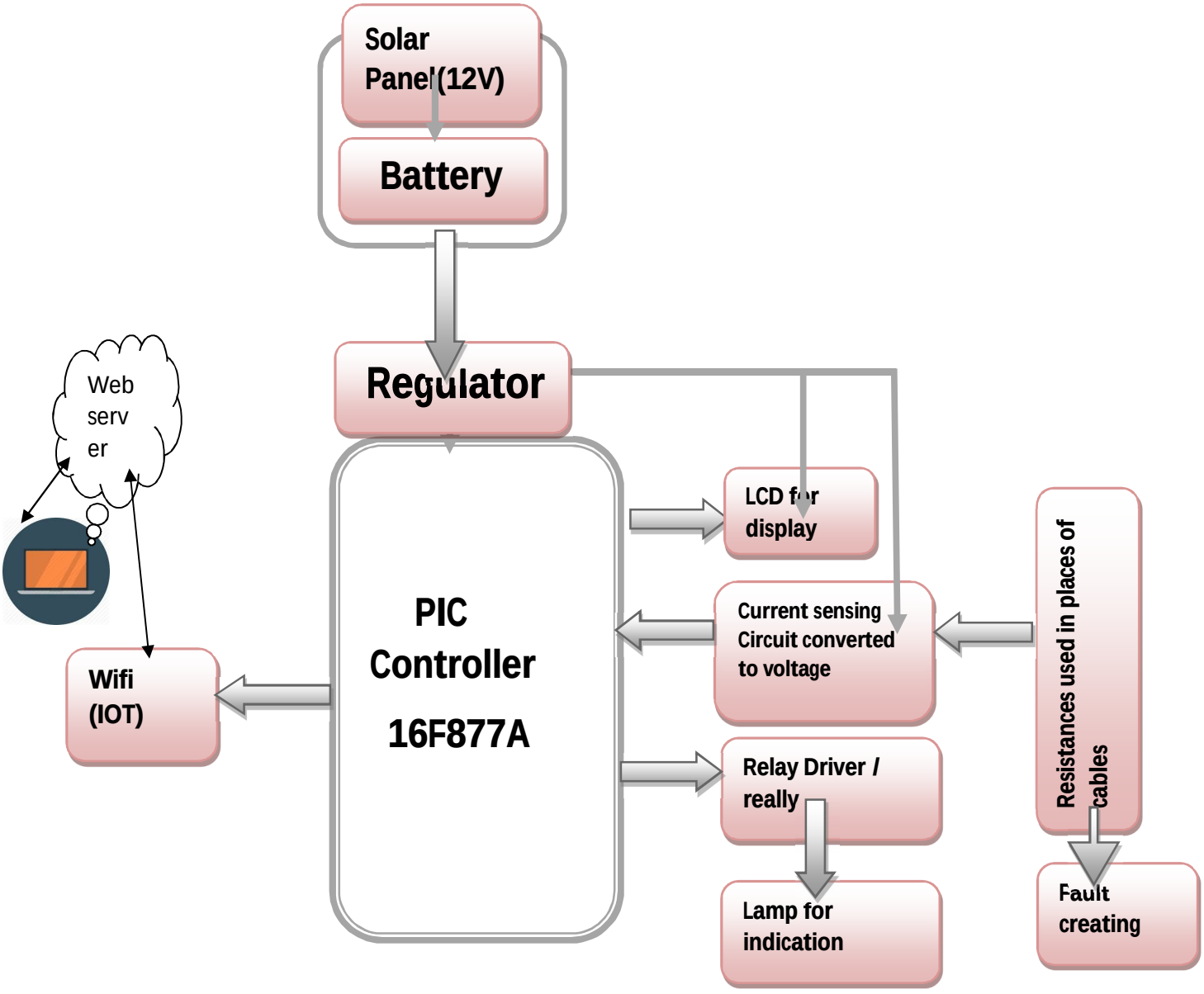
state of art IoT systematically in industry. Collectively the previous researches or the method mentioned above have made its vast application in recent days but those were not enough in order to gather data or to solve the problem regarding underground fault . But in this paper we proposed the system which laid us to get accurate position of the fault in underground cable and also as the fault detected the related data will be communicated to the server through Wi-Fi modem and from the server the information can be retrieved any time using IoT . IoT based techniques are widely used these days in industries.

III. PROBLEMS FACED

While 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 cable fault,

A. *Fault in cable is represented as:* Any defect, Inconsistency, Weakness or non-homogeneity that affect performance of cable, Current is diverted from the intended path and Caused by breaking of conductor& failure of insulation. The device used to locate the distance of the faulted cable requires 230V external AC power supply which is not available in every Areas.

IV. BLOCK DIAGRAM



A. Hardware requirements

1) PIC micro Controller
2) LCD, Crystal
3) ADC
4) Relays, Relay Driver IC
5) Solar Panel, Battery and Voltage Regulator
6) Resistors, Capacitors and LEDs
7) Slide switches max232 and Wifi sensing module.

B. Software required

1) CCS Complier
2) PICKIT-2 for Programming

C. Features

1) Solar Powered
2) Data Conveyed over Internet of things.
3) Less maintenance
4) It has higher accuracy.
5) Underground cable fault location model are applicable to all types of cable ranging from 1kv to 500kv & other types of cable fault such as-Short circuit fault.

D. Advantages

1) Solar powered i.e. no need of any external supply.
2) We can find location of fault of underground cable & which direction it takes place.
3) The fault occurring at a particular distance, the respective phase along with the distance is displayed on the LCD.
4) The same information is also sent to a dedicated website over internet , interfaced to the PIC microcontroller.

V. FUTURE SCOPE

By using high Concentrated Solar cells we can save the space .We can also include a charging circuit to charge the battery which can be used in cloud days. In this project we detect only the location of short circuit fault in underground cable line, but we can also detect the location of open circuit fault, to detect the open circuit fault capacitor is used in ac circuit which measure the change in impedance & calculate the distance of fault..

VI. CONCLUSION

In this paper we detect the exact location of short circuit fault in the underground cable from feeder end in km by using PICcontroller . For this we use simple concept of OHM's law so fault can be easily detected and repaired.

VII. ACKNOWLEDGEMENT

I obtain this prospect to gratefully acknowledge the inspiration, encouragement, guidance, help and valuable suggestions received from all our well-wishers. I would like to thank our project guide Mrs. Zoya Parvez who have helped us and made available much useful information to regard this project . I solemnly express my heartiest gratitude to our head of the department, Dr. Pradeep B Jyothi for his guidance and encouragement.

VIII. ALGORITHM & FLOWCHART

A. Algorithm

Step1: Initialize the ports, declare timer, ADC, LCD functions.
Step2: Begin an infinite loop; turn on relay 1 by making pin 0.0 high.
Step3: Display "R:" at the starting of first line in LCD.
Step4: Call ADC Function, depending upon ADC output, displays the fault position.
Step5: Call delay.
Step6: Repeat steps 3 to 5 for other two phases

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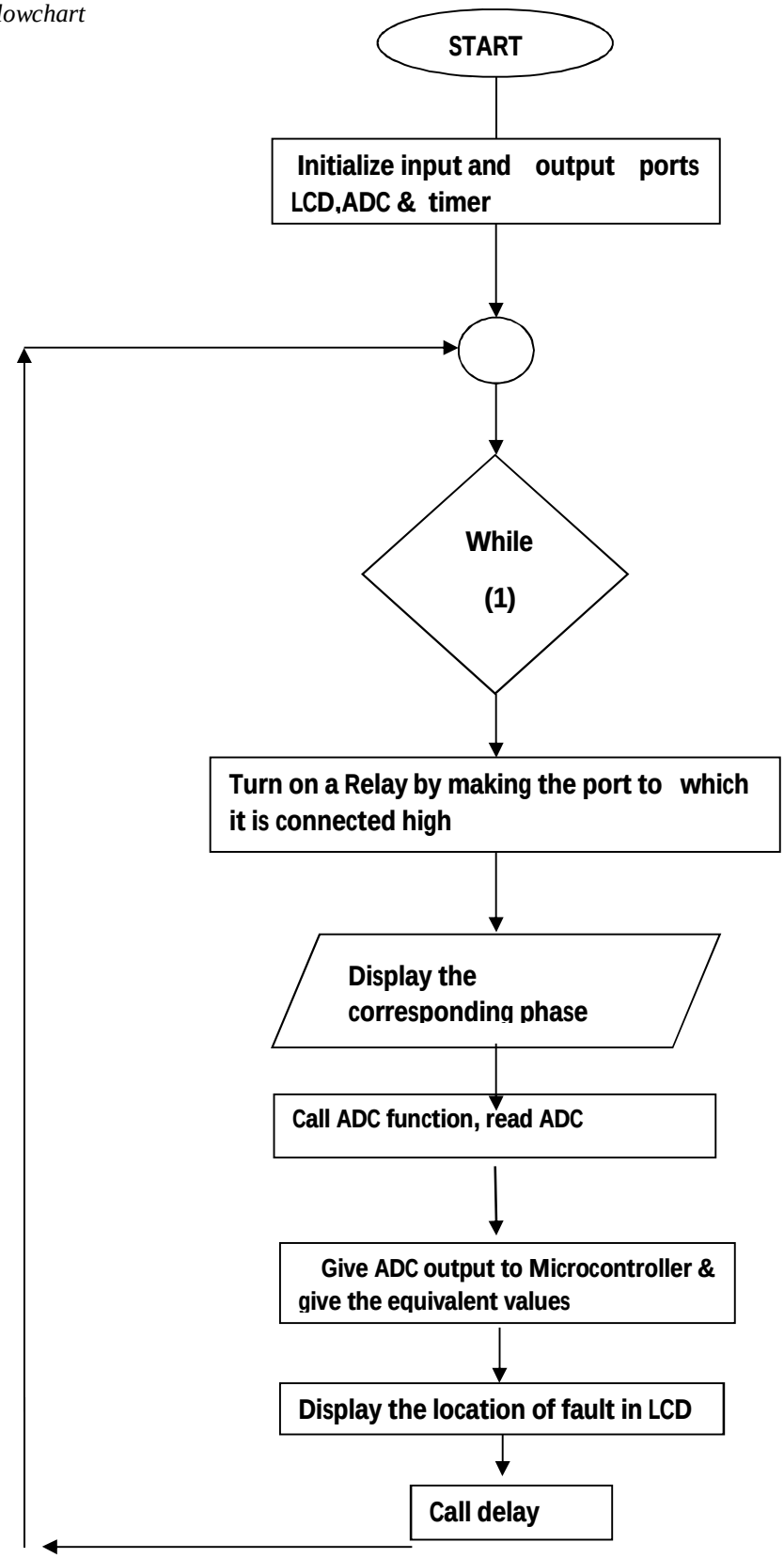
B. Flowchart



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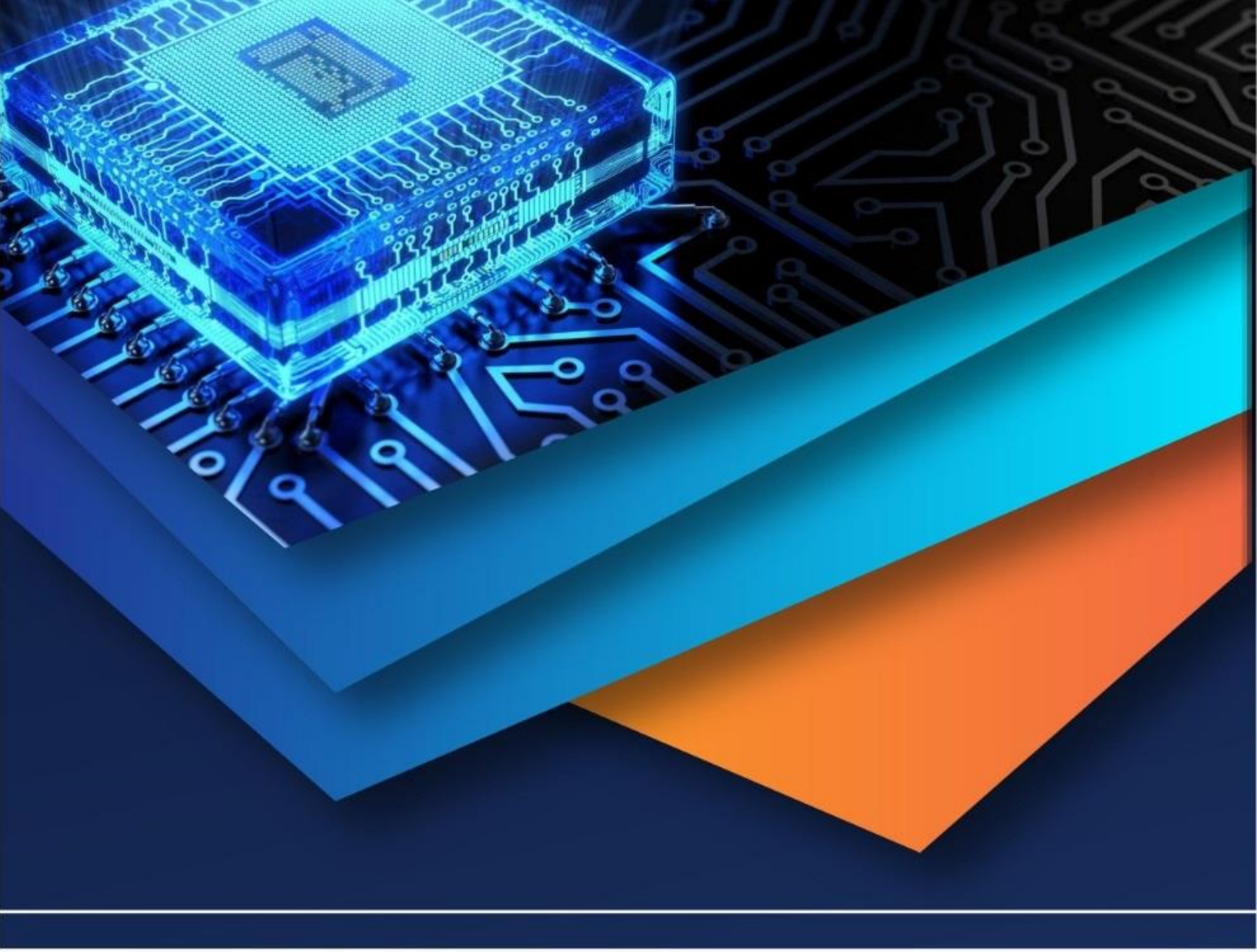

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