AUTOMATIC FAULT DETECTION AND LOCATION IN TRANSMISSION LINES BY USING GSM TECHNOLOGY

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Abstract :
Electricity has become the most sought after amenity for all of us. Gone are the days when electricity would be only limited to cities. It is now reaching to every distant parts of the world. So we have now a complex network of power system. This power is being carried by the transmission lines. These lines travel very long distances so while carrying power, fault occurring is natural. These faults Damages many vital electrical equipment's like transformer, generator, transmission lines. For the uninterrupted power supply we need to prevent these faults as much as possible. So we need to detect faults within the shortest possible time. Microcontroller based systems used for these fault detection have been advancing rapidly. In this project we are detecting faults and fire accidents occur near transmission lines and sending SMS to the required authorities and uploading to the cloud server.

1 . Introduction :

In power transmission systems, the majority of voltage and current signal distortions are caused by faults. Faults that occur in power transmission lines can cause an interruption of power supply. The time required to locate a fault is drastically reduced, as the system automatically and accurately provides accurate fault location information. This will ensure a shorter response time for technical crew to rectify these faults andthus help save transformers from damage and disasters. A smart GSM based fault detection and location system was used to adequately and accurately indicate and locate where fault had occurred .

.Objectives :

- To protect electrical equipments like transformers , generators , transmission lines from faults.
- To avoid interruption in power supply
- To minimize power problems .
- To get information and reduce time of fault detection with exact location.

2. Types of Transmission line faults :

- ❖ Symmetrical faults:
- Triple line to ground (LLLG)
- Three phase short (LLL)
- ❖ Unsymmetrical faults :
- Short circuit
- Open circuit
- Line to Line (L-L)
- Line to Ground (L-G)
- Double line to ground(LLG)

Existing system:

Currently, the electric power infrastructure is highly vulnerable against many forms of natural and malicious physical events, which can adversely affect the overall performance and stability of the grid. Additionally, there is an impending need to equip the age-old transmission line infrastructure with a high-performance data communication network that supports future operational requirements like real time monitoring and control necessary for smart grid integration. Many electric power transmission companies have primarily relied on circuit indicators to detect faulty sections of their

transmission lines. However, there are still challenges in detecting the exact location of these faults. Although fault indicator technology has provided a reliable means to locate permanent faults, the technical crew and patrol teams still must physically patrol and inspect the devices for longer hours to detect faulty sections of their transmission lines.

Proposed System :

Here we are using Arduino with Some switch type lines to check the fault condition in the lines. Here in this one switch is in ON Condition and another switch is in OFF condition. If On switch is off then it is short circuited and message will be sent. If the Off switch is on then it will be open circuited and message will be sent. These values are uploaded to cloud.

The following mentioned is the block diagram of proposed system.
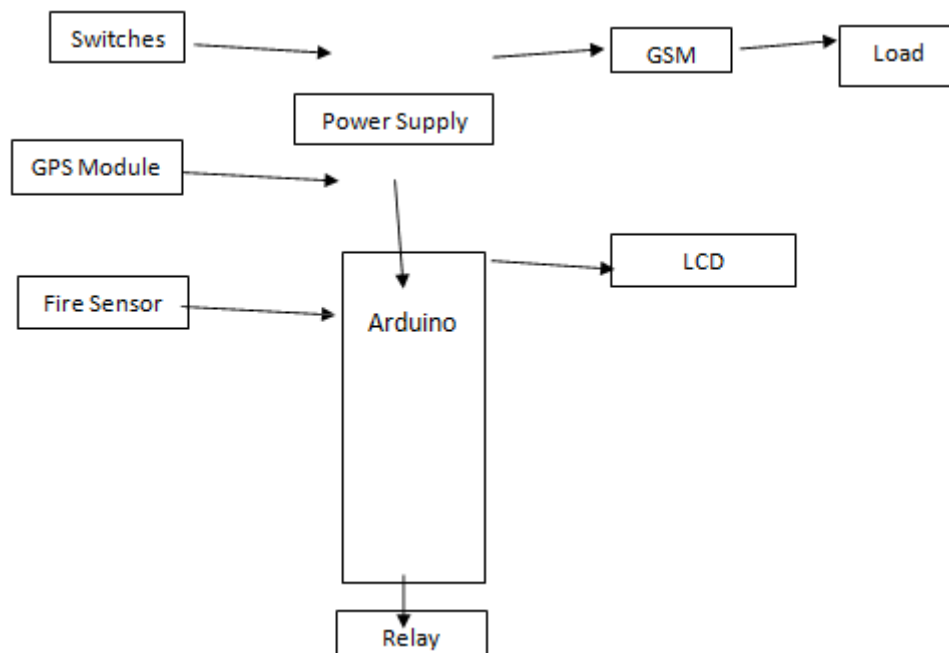
Many of the electricity transmission companies across the world and Ghana in are continuously looking for ways to utilize the modern technologies, in order to improve reliability of the power supply to consumers. These transmission companies mainly relies on circuit indicators (FCIs) in order to assist the locating of specific spots within their transmission lines where power fault have been occurred. In this paper, a smart GSM and IoT based fault detection and location system was used to indicate and locate the exact spot where fault had occurred.

Many electric power transmission companies such as Ghana Grid Company limited (GRIDco) in Ghana, have primarily relied on circuit indicators to detect faulty sections of their transmission lines. However there are still challenges in detecting the exact location of these faults. Although fault indicator technology has provided a reliable means to locate permanent faults, the technical crew and patrol teams still has to physically patrol and inspect the devices for longer hours to detect faulty sections of their transmission lines. When the fault occurred transmission line Relay will reacted first that turn off the load and then the GSM and GPS will locate the exact location of fault occurred and types of fault occurred will display on the LCD
. By the GSM the fault will send to the registered mobile number.

Short circuit fault :

- When two conductors are contacted with each other then the short circuit will formed and that will be observed by Relay and that isolate the load part .
- Then the type of fault will informed by GSM to the control room.

Open circuit fault :

- When a transmission line is broken then the open circuit will formed . Then that process of detection and location of fault will be indicated by the proposed system .

Phase fault :

- In this system there will be switches arranged as line and ground based on fault we physical applied the switching operation and these process will be applied for all phase faults like L-L,L-G, LLG,LLL etc,.
- After this the type of fault and that fault location will detected and send information to the control room through GSM technology.

3. **Software Implemented :**

- The embedded C programming is used in it and used software is Arduino IDE .
- The Arduino IDE is a open source software . where we cab have the examples codes for the beginners/ In present world there are lot of versions in the Arduino IDE in which present usage version 1.0.5.itis very easy to connect PC with Arduino.
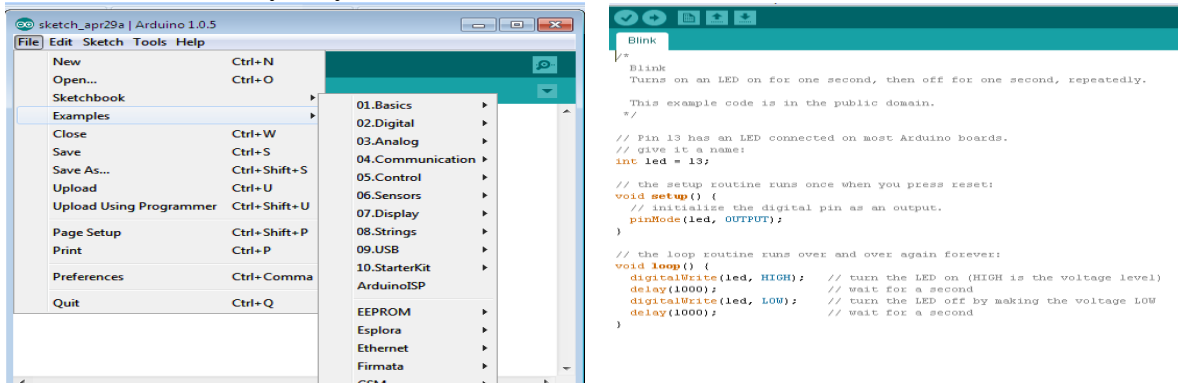
- You can utilize code available in capacity libraries . C code is compact to different microcontrollers with subsequent to 0 alternation . Genuine , installed C program is used nonstandard expansions to the C drive with a view to bolster charming components as an example , settled point range catching is the numerous unmistakable reminiscence banks, and fundamental I/O operations.
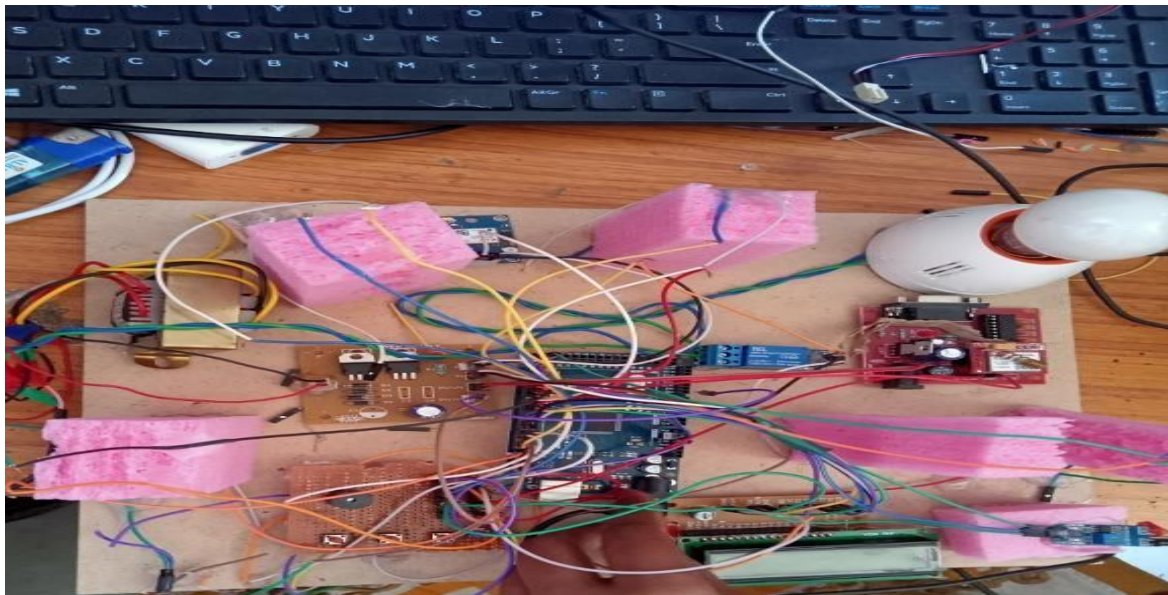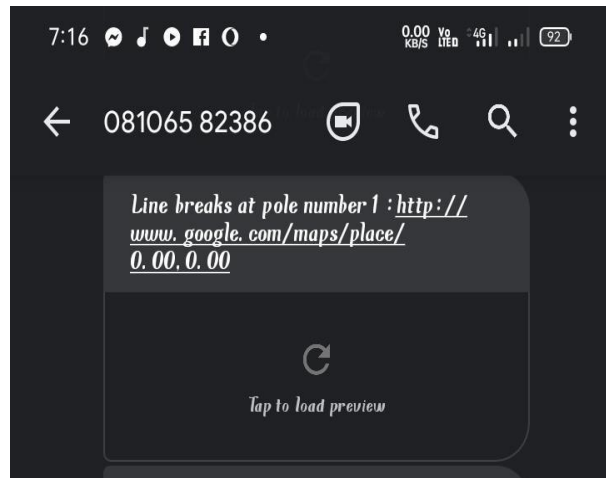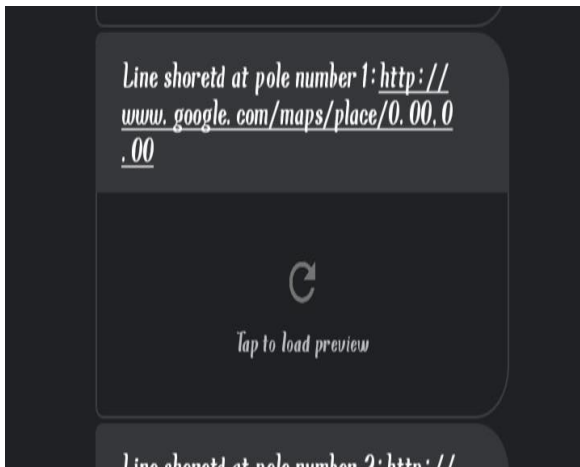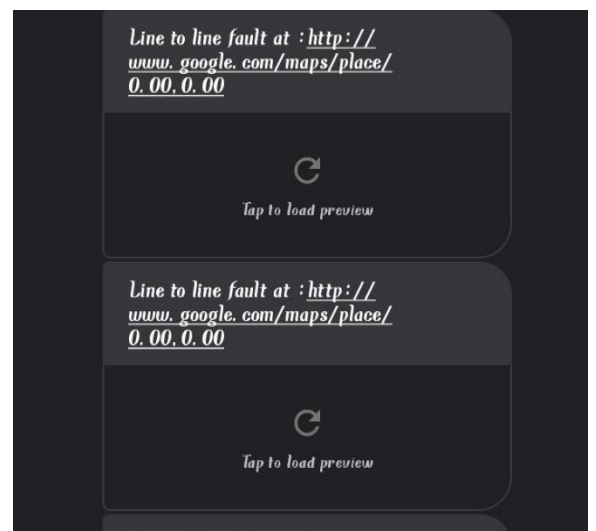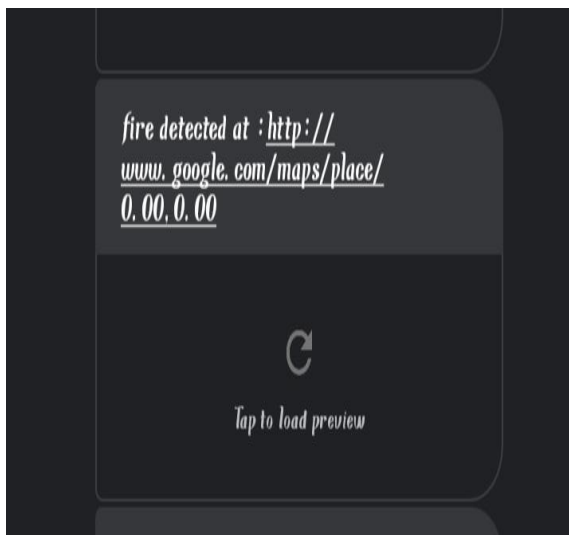
4. **Result :**

Fig. Arrangement of the proposed system

- The output when the fault detected is,
- Short circuit fault detected :Open circuit fault detection :
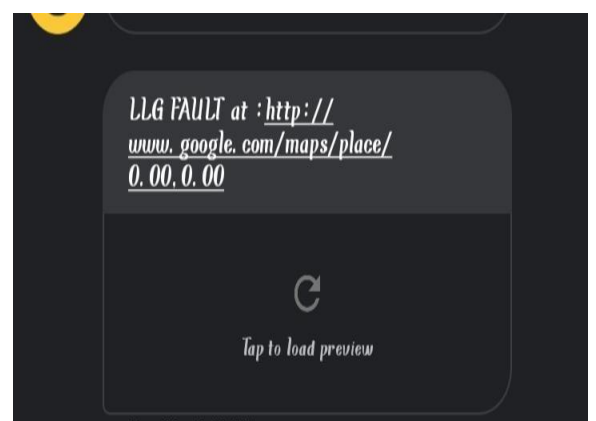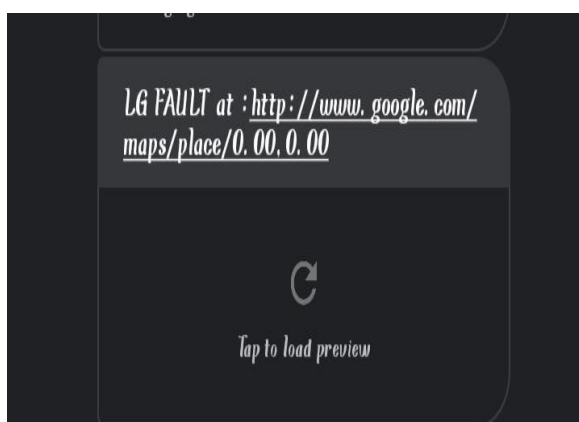

- Fire detection :
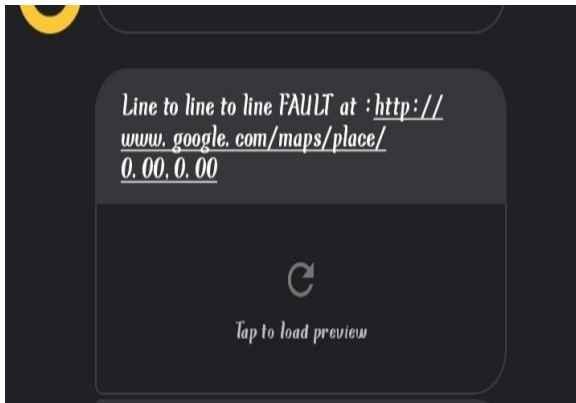
Line to Line fault detection :

- Line to ground fault detection :

Double line to Ground :

➤ Triple line fault detection :

Advantages :
- Devices are enabled by wireless communication.
- Coverage area is large compared to the existing system.
- Less number of components and manual observation. So, it is economically reliable and low cost.

Applications :
- Used in transmission line.
- Used in textile mills.
- Used in food industry.

Conclusion :

In this project present an optimal formulation of a cost optimized wireless network .Here , in this project we have designed a GSM based transmission line monitoring and indication system that sends information of the same to control room via SMS . The implemented system design mainly concentrates on the distribution system .The project has continuous monitoring system integrating the GSM communication technology and the microcontroller technology **.**It is also represents the hardware architecture and softwareflow.

References :

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