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Motivation

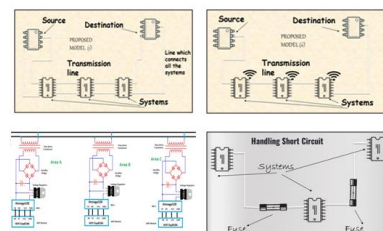


- FAULT IN A CABLE CAN BE ANY DEFECT THAT DIVERTS THE PATH OF CURRENT OR AFFECTS THE PERFORMANCE OF THE CABLE. HENCE, THE FAULT HAS TO BE CORRECTED.
- IT IS EASY TO DETECT AND CORRECT THE FAULTS IN OVERHEAD LINE BY MERE OBSERVATION; IT IS NOT POSSIBLE TO DO SO IN AN UNDERGROUND CABLE.
- THIS LEADS TO DIGGING OF THE ENTIRE AREA TO DETECT THE FAULT WHICH IN TURN CAUSES WASTAGE OF MONEY AND MANPOWER.
- HENCE IT IS NECESSARY TO DETECT THE EXACT RANGE OF FAULTS IN THE UNDERGROUND CABLE.
- OUR AIM IS TO GET THE "EXACT" RANGE OF THE FAULT, WITHOUT DIGGING UP THE ENTIRE AREA!

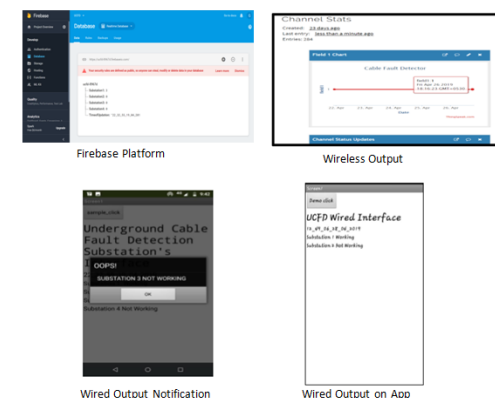
Methods



- We develop "systems" which are placed at equal intervals between the source and the destination of a Transmission line. Thus, these systems help us to locate the exact range of the faults.
- Here, we locate the Open Circuit faults using switches. The Short Circuit fault has been detected for the first sub system using a circuit component.



Analysis



Theory

TYPES OF FAULTS :

- **OPEN CIRCUIT FAULTS :**
 - THESE FAULTS OCCUR DUE TO THE FAILURE OF ONE OR MORE CONDUCTORS.
 - OPEN CIRCUIT FAULTS ARE ALSO CALLED AS SERIES FAULTS.
- **SHORT CIRCUIT FAULTS :**
 - THEY RESULT IN THE FLOW OF ABNORMAL HIGH CURRENTS THROUGH THE EQUIPMENT OR TRANSMISSION LINES. .
 - SHORT CIRCUIT FAULTS ARE ALSO CALLED AS SHUNT FAULTS.

DETECTION METHODS:

- **ONLINE METHOD :**
 - HERE, WE USE SAMPLED VOLTAGES AND CURRENT TO DETERMINE THE FAULT RANGES.
 - D LINES.
- **OFFLINE METHOD :**
 - HERE, SPECIAL INSTRUMENTS ARE USED.
 - TWO TYPES :
 - TRACER METHOD
 - TERMINAL METHOD
- **TRACER METHOD :**
 - HERE, FAULT POINTS ARE DETECTED BY WALKING ON THE CABLE LINES.
 - IT IS USED TO PINPOINT FAULT LOCATION ACCURATELY.
- **TERMINAL METHOD :**
 - USED TO DETECT BOTH ENDS OF A FAULT. (RANGE)
 - WITHOUT REALLY DETECTING THE EXACT LOCATION OF THE FAULT.

Results



- WE HAVE IMPLEMENTED THE FOLLOWING :
 - "OPEN CIRCUIT FAULTS" USING SWITCHES.
 - A SMALL DEMO OF "SHORT CIRCUIT FAULTS" USING A 3V DC SUPPLY AND A 100MA FUSE.
- WHENEVER, THERE IS A FAULT BETWEEN THE SUB-STATIONS, WE ARE IMMEDIATELY NOTIFIED.
- THE OUTPUT OF THE WIRED SUB - STATION IS CAPTURED ON THE ARDUINO SERIAL MONITOR. FURTHER, WE HAVE THE WIRED OUTPUT AVAILABLE ON THE CLOUD .
- THE OUTPUT OF THE WIRELESS SUB - STATION IS CAPTURED ON THE CLOUD.
- HENCE, WE NEED TO FURTHER LOOK AT ONLY THE REQUIRED AREA OR REGION OF FAULT.

Conclusions and Future Scope



- **THUS WE CAN CONCLUDE THE FOLLOWING :**
 - OPEN CIRCUIT AND SHORT CIRCUIT FAULTS WERE DETECTED.
 - USER WAS INFORMED ABOUT THE EXACT RANGE OF FAULT.
- WE CAN IMPLEMENT THIS PROJECT IN RURAL, URBAN AND INDUSTRIAL AREAS WHERE A LOT OF UNDERGROUND CABLES HAVE BEEN LAID FOR TRANSMISSION.
- THESE SYSTEMS SHOULD BE MADE EASILY AVAILABLE BY THE GOVERNMENT AS THEY HAVE THE FOLLOWING ADVANTAGES :
 - LESSER COST.
 - HIGHER EFFICIENCY.
 - PROVIDES IMPROVED PUBLIC SAFETY.
 - APPLICABLE FOR ALL TYPES OF CABLES AND ALL TYPES OF FAULTS.

REFERENCES: INTERNATIONAL RESEARCH JOURNAL OF ENGINEERING AND TECHNOLOGY (IRJET), VOLUME: 05 ISSUE: 02 | FEB-2018 ~"AUTOMATIC UNDERGROUND CABLE FAULT DETECTION WITH SMS ALERT"