IOT Based Fault Detection and Automation In Electricity Board

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ABSTRACT: -The intention is to automate the power supply in transmission line which enhances automatic power cutoff during fluctuations and other accidents. Also we intend to cutoff power supply only to affected sub areas rather than shutdown in whole transformer which is in existence. Alert and indication of fault to electricity board and individual consumers is enabled. Eventually power theft which is a major threat to revenue of electricity board is resolved. Additional features like SMS integration , power theft detection , bill generation is implied. The use of arduino , zigbee transceiver , current sensors , voltage sensors , relay devices coupled together to accomplish this product.

KEYWORDS: Fault detection, Transmission line, Relay,Power systems , Electric grids, Fault location

I. INTRODUCTION

The issue of electrocution in electricity board is very high. Especially during natural calamity and disaster, rate of death due to electrocution is a major threat. Internet Of Things, a system that supports the remote control of devices or objects to provide automation that transfers data to online. Internet Of Things is made use in transmission lines to reduce the corresponding risk. It uses sensors and controllers to avoid human interactions in electric grid.

II. RELATED WORK

In literature survey, various papers have proposed to address issues in automatic electric grids. Reference[1] proposes robust fault detection and discrimination technique for transmission lines which computes accurate fault using robust method by values obtained from samples given.An algorithm has been proposed which utilizes various physical parameters such as temperature, pressure , inclination of the line to estimate sagging level of line. This value is uses to generate alert signal to the operator. This algorithm is completely based on probability. The higher the value, higher the probability of damage.[8]
Traditional methodology uses estimation technique with current and voltage parameters to obtain the fault condition. Artificial Neural Network[3] has been applied to locate the fault analyzing parameters such as incipient angle, fault resistance, fault type and fault location. Discrete Wavelet Transform(DWT) is used to classify transients. Another system proposed, TW based fault location schemes [4] which finds difference between incidence and reflection of waves. From this, it estimates the fault in transmission line.

III. PROPOSED ALGORITHM

A. *Design Considerations:*
- Sensing the environmental conditions.
- Poles are monitored constantly for current.

- Keeping track of threshold values.
- Arduino controls and processes signal.
- Embedded C is used to program Arduino.
- Zig-bee collects data from controller and transmits to receiver side.

B. *Description of the Proposed System*

Aim of the proposed is to achieve automatic control and monitoring of the transmission line and reduction of time consumption

Module 1:Sensing the parameters considered for system

Two sensors are made use in the system namely fire sensor and current sensor. Fire sensor is a flame detector used to detect and alert flame or fire.It also can detect ordinary light source in the range of a wavelength 760nm-1100 nm. The detection distance is up to 100 cm. It is highly sensitive to flame and gives the accurate value in LED display it contains. Fire sensor is used in the system to detect fire in the surrounding and alert about fire to shut down power supply. By this action massive damage can be reduced. The sensed values are sent to the Arduino controller.

Current sensors can detect flame upto 200 feet from its location.
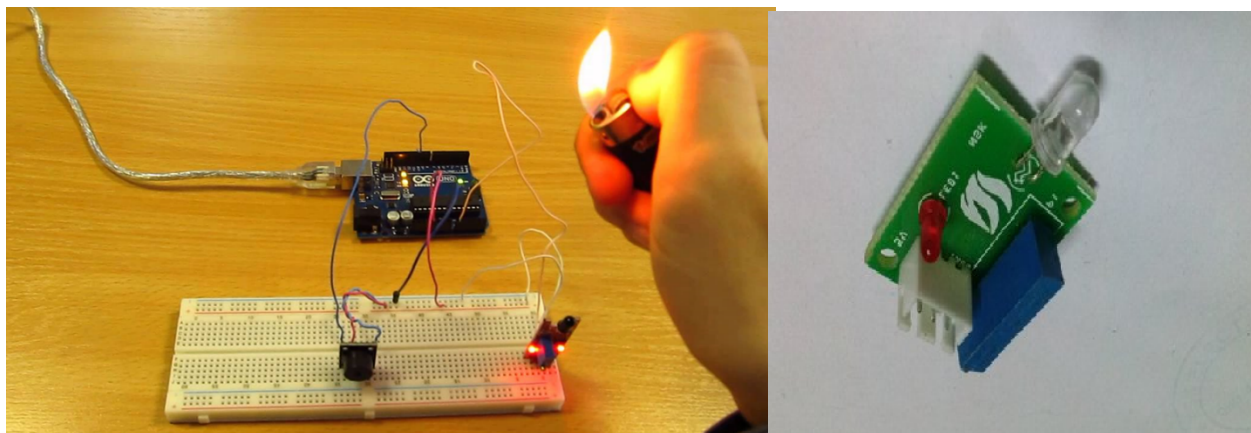
The next sensor used here is current sensor for monitoring current passing through transmission line.
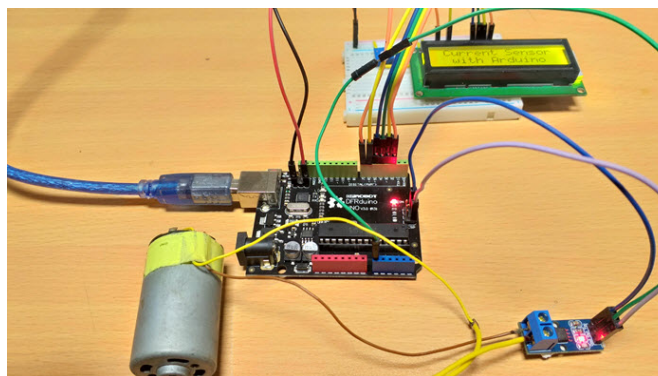
CURRENT SESSOR

Current sensor, is a current detector used to detect and alert about the current passing. Current sensor is interfaced with Arduino to give values to it. It senses and passes value to Arduino as analog signal .It displays the value of current in LED display it contains.

Module 2:

The sensors sends the value to Arduino board, the Arduino gets the value as analog signal. The sensors sends the value to Arduino board, the Arduino gets the value as analog signal. Arduino , microcontroller used to get values from sensor and generates output in LED display or publishes it in online for other opertions. It gets input as analog signal and has analog to digital converter to turn it to digital form. In this system it interfaces current and fire sensor and process the data from it. The operations in Arduino is programmed by Arduino Programming Language and Arduino Software. After performing specified operations from data, it sends information to relay. From Arduino, signals are sent to Zig-bee module.
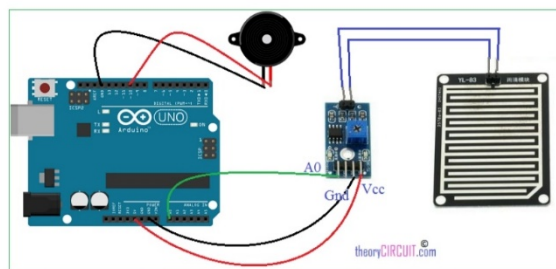
ARDUINO UNO INTERFACE WITH SENSOR & BUZZER

Module 3:

The signals from Arduino is sent to relay, which decides its status. Relay is an electrically operated switch which gets electromagnetic signal as input and generates output by setting its status HIGH or LOW. When it is HIGH, it makes no disturbance in current circuit. When it is LOW, relay switches off the supply. It works same as switch we use to power on/off appliances in home but works with electromagnetic signal.

In the system we used it is used to automate the power supply. Once the controller generates alert signal it shut downs the power supply in specific transmission line, avoiding electrocution or wastage of power. Also only power to specific transmission line is stopped, making the system more efficient.

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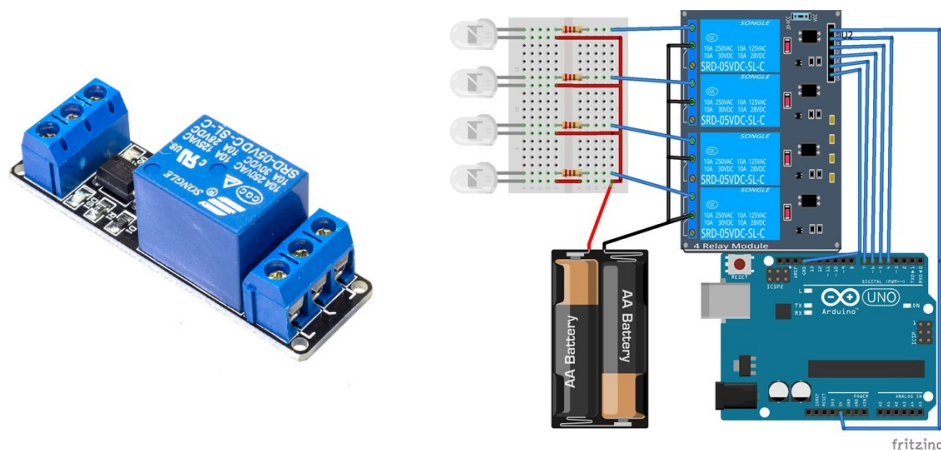*(A High Impact Factor, Monthly, Peer Reviewed Journal)*

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Module 4:
 Transceiving data by zig-bee module
ZigBee IEEE 802.15.4-based specification is a device used for wireless communication between devices . It is used here to transmit data from Arduino to monitoring unit. Another zig-bee in monitoring unit receives data from transmitter. When wireless sensors are used in long transmission lines, zig-bee is used to transmit data from those sensors. Zig-bee is interfaced with Arduino to generate alert signals to the operating personality.

ARDUINO - XBEE ⤳ (DATA) ⤳ XBEE - ARDUINO
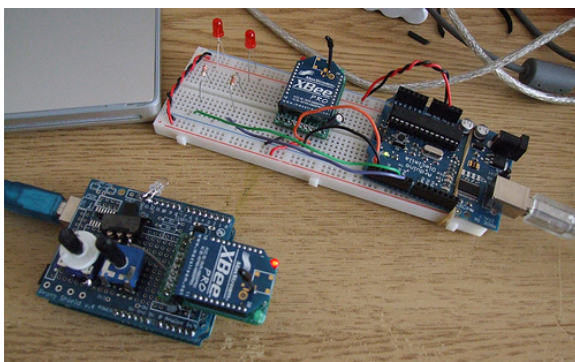
ZIGBEE MODULE

IV. PSEUDO CODE

Step 1: Initialise variables for current and fire sensors.
Step 2: Declares threshold value for current
Step 3: Check the below condition for each value of current
Get "current" value
$\qquad${
If (current> threshold)
 Set relay(low)
If (current < =threshold)
 Set relay(high)
$\qquad$}
Return current
Step 4: If the condition is satisfied, current supply is left undisturbed
Step 5: : Declares threshold value for fire
Step 6: Check the below condition for each value of fire
Get "fire" value
{
If (fire> threshold)
 Set relay(low)
If (fire < =threshold)
 Set relay(high)
}

Step 7: After sensing,alert signals are transmitted by zig-bee to monitoring unit
Step 8: End.

V. SIMULATION RESULTS

The proposed system has the main intention to avoid human interface and loss of life by electrocution. It provides automation to the major working system. Only affected sub-junction suffers from power cut-off rather than whole region connected to a transformer.

The indication of fault in any transmission line is enabled. Electricity board gets the alert of fault in any location. When faults like damage ofwire, fluctuations and fire accident is detected , powersupply in particular transmission line is automatically induced to cut-off.

The power supply to each consumer is initiated from transformer and passes to distributed transformer which affords power to four poles. Each pole transmits power to maximum four houses. Sensors are induced in sub-junction which monitors the current and voltage passing through, sends data to Arduino controller. The controller on receiving the data signals from sensors, processes it. If the data exceeds or suppresses from threshold, it generates a signal to set low the relay.

Initially relay is set high for the stable power supply. The zig-bee transmitter is used to receive data from microcontroller and transmits data to receiver present in electricity board. Through monitoring unit it is indicated and controlled.
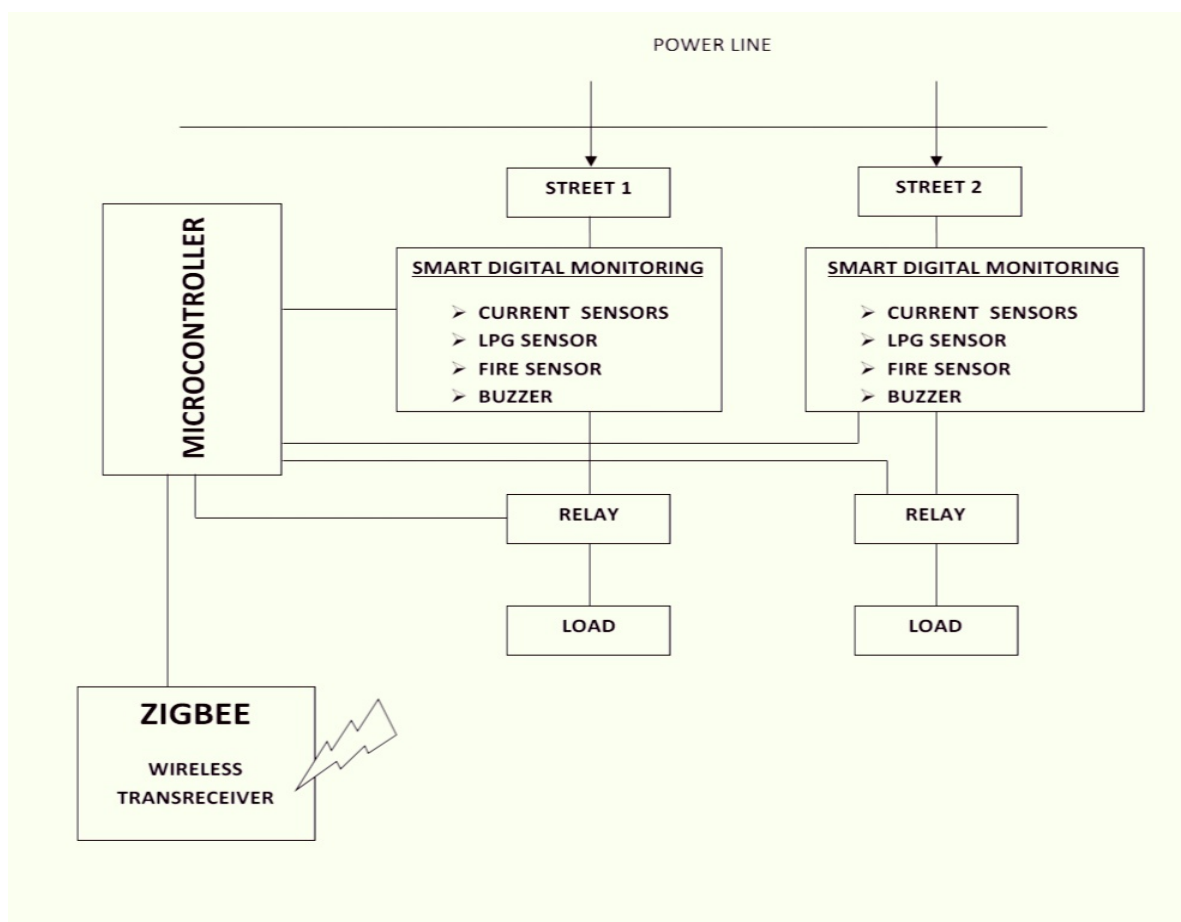
The main objective of this project is to maintain the safe and secure power distribution to the users where the IOT system has been integrated and programmed to maintain the system stable. Our automated server responds to various problems automatically without any human support. From the block diagram consider there is a problem with

pole line 2, the problem was automatically identified by the server and respond to the perspective problem. For example if there is any breakout in the transmission line of pole 2 it will turn off the relay of pole 2 alone the breakout won't affect the other transmission lines also our server automatically inform to the particular workman to trouble shoot the problem.

Along with this, various features like power theft, fire accident are automatically identified and information will be updated to the particular workman to manage about the particular street. Also this system won't affect other street while there is problem in a single street.
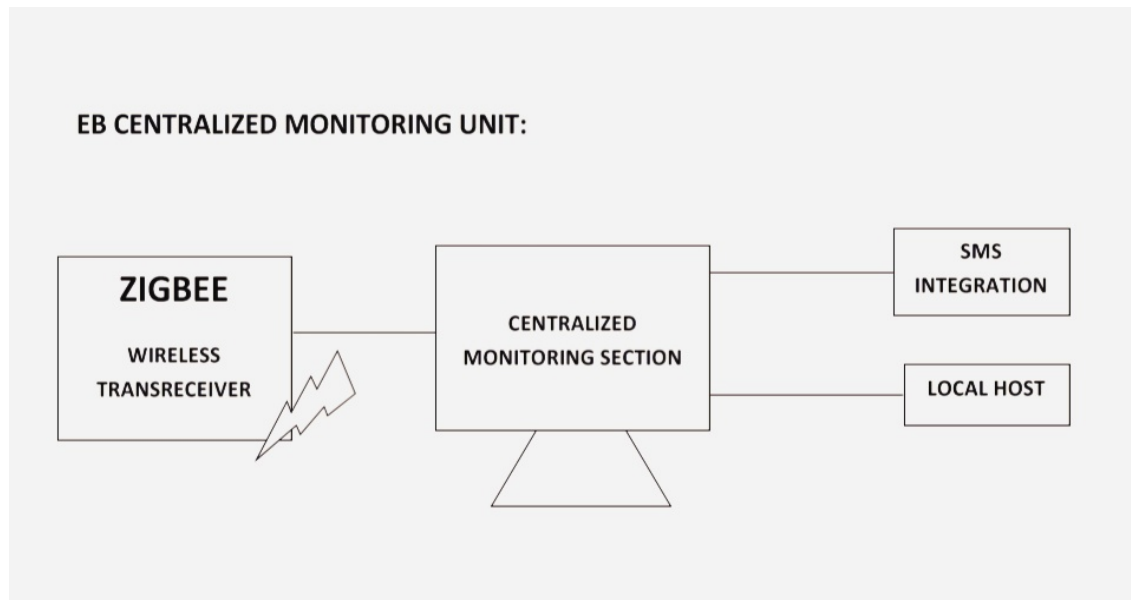
ARCHITECTURE DIAGRAM:
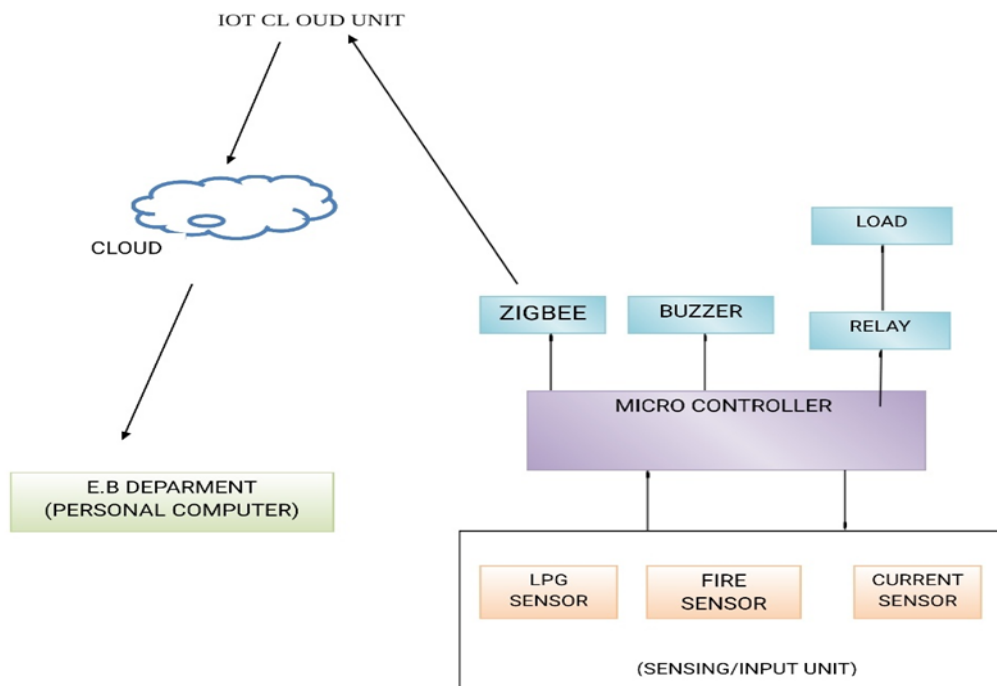
Monitoring unit consists of Zig-bee wireless transceiver connected to system as it receives data from controller unit. Monitoring unit will be present in electricity board for convenience. It displays all the transmission lines and power flow. If any error or fault occurs then a pop-up appears in display to indicate it without any delay. The consumer contains log-in information for their usage. SMS integration is done to alert consumers about fault or power shut-down. SMS is sent to the consumers related to the specific transmission line. A web page is hosted from electricity board for usage of consumers.

VI. CONCLUSION AND FUTURE WORK

We have proposed automated control in transmission line for electricity board which needs no human interface. It reduces time consumption which is a major problem. It achieves safety to human life without electrocutions at any situation. It avoids damages to physical properties while fire accidents by stopping power supply. Establishes a safer and smart supply of power to every individual consumers.

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