



# Line fault detection and load sharing using IOT

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## I. ABSTRACT

An important part of distribution is load sharing between two or more areas from the common load. Fault line can be detected through the sensors. In this paper the fault line and load demand are identified through IOT. IOT has the ability to transfer data over network without requiring human-to-human or human-to-computer interaction.

## II. INTRODUCTION

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 has to physically patrol and inspect the devices for longer hours to detect faulty sections of their transmission lines. Wireless sensor based monitoring of transmission lines provides a solution for several of these concerns like real time structural awareness, faster fault localization, accurate fault diagnosis by identification and differentiation of electrical faults from the mechanical faults, cost reduction due to condition based maintenance rather than periodic maintenance, etc.. These applications specify stringent requirements such as fast delivery of enormous amount of highly reliable data. The success of these applications depends on the design of cost-effective and reliable network architecture with a fast response time.

The network must be able to transport sensitive data such as current state of the transmission line and control information to and from the transmission grid. This paper provides a cost optimized framework to design a real time data transmission network. To monitor the status of the power system in real time,

sensors put in various components in the power network.

These sensors are capable of taking fine grained measurements of a variety of physical or electrical parameters and generate a lot of information. Delivering this information to the control centre in a cost-efficient and timely manner is a critical challenge to be addressed in order to build an intelligent smart grid. Network design is a critical aspect of sensor based transmission line monitoring due to the large scale, vast terrain, uncommon topology, and critical timing requirements. Mechanical faults, cost reduction due to condition based maintenance rather than periodic maintenance, etc. The use of sensor networks has been proposed for several applications like mechanical state processing and dynamic transmission line rating applications. The hierarchical model proposed in, offers a very expensive solution with the idea of deploying cellular transceivers on every tower.

### III. BLOCK DIAGRAM

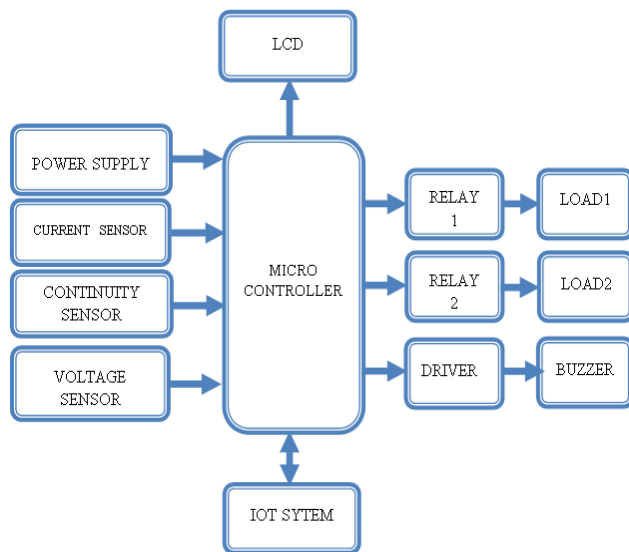


Fig.1: Block diagram

This shows the block diagram of wireless networking system. The transmission line infrastructure, wireless networking presents a feasible and cost effective solution for transmission line monitoring such as voltage

and current. The several works and propose to improve the state of the art in transmission line monitoring by harnessing the power of wireless sensor networks for real-time monitoring and control GSM is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity. The GSM networks operate in four different frequency ranges.

### IV. LINE FAULT DETECTION

#### EXISTING SYSTEM:

In existing system the fault is monitored by the TCP/IP protocol network system. In this system the server will be monitored frequently. The data backup is must. In this protocol paid version server is used. There is no wireless sensor network.

#### PROPOSED SYSTEM:

In this paper a WIRELESS SENSOR PROTOCOL (WSP) is used. In this protocol we can use the cloud server. A cloud server is hosted delivered via a computing platform via the internet, and can be accessed remotely.

### V. ELEMENTS USED

#### (i) Internet of Things

The Internet of things (IOT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these objects to connect and exchange



Fig.2: Internet of Things

Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing internet infrastructure. The figure of online capable devices increased 31% from 2016 to 8.4 billion in 2017. Experts estimate that the IoT will consist of about 30 billion objects by 2020. It is also estimated that the global market value of IoT will reach \$7.1 trillion by 2020. The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, virtual power plants, smart homes, intelligent transportation and smart cities

#### (ii) LCD:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being:

- LCDs are economical
- Easily programmable
- Have no limitation of displaying special characters.

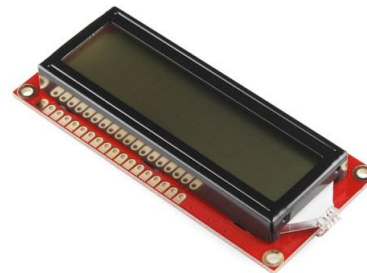


Fig.3: LCD

A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like

- Initializing
- Clearing its screen
- Setting the cursor position,
- Controlling display

#### (iv) POWER SUPPLY:

The power supply circuits built using filters, rectifiers, and then voltage regulators. Starting with an ac voltage, a steady dc voltage is obtained by rectifying the ac voltage, then filtering to a dc level, and finally, regulating to obtain a desired fixed dc voltage. The regulation is usually obtained from an IC voltage regulator unit, which takes a dc voltage and provides a somewhat lower dc voltage, which remains the same even if the input dc voltage varies, or the output load connected to the dc voltage changes.

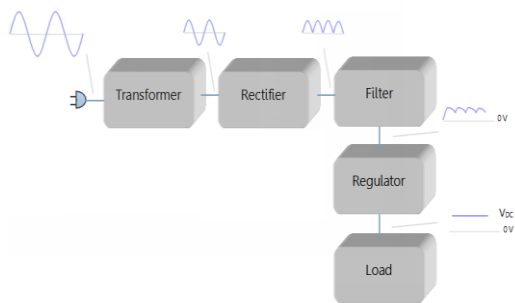


Fig.4: Power Supply

**(v) BUZZER:**

Fig.5: Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical use of buzzers and beepers is giving sound indication to the users

**(vi) MICRO CONTROLLER:**

The PIC microcontroller PIC16f877a is one of the most renowned microcontrollers in the industry. This controller is very convenient to use, the coding or programming of this controller is also easier. One of the main advantages is that it can be write-erase as many times as possible because it use FLASH memory technology. It has a total number of 40 pins and there are 33 pins for input and output. PIC16F877A is used in many pic microcontroller projects. PIC16F877A also have many application in digital electronics circuits.

**(vii) RELAYS:**

Relays are simple switches which are operated both electrically and mechanically. Relays consist of an electromagnet and also a set of contacts. The switching mechanism is carried out with the help of the electromagnet. There are also other operating principles for its working. But they differ according to their applications. Most of the devices have the application of relays.



Fig.6: Relay

**(viii) HYPER TERMINAL:**

HyperTerminal is the defacto terminal program for any Windows OS up to XP – Windows Vista 7, and windows 8 don't include it. If you're on Windows Vista 7, or 8, and really just have to have Hyper Terminal, a little scouring of the Internet should turn up some workarounds. But better alternatives are more easily available; we'll get to those shortly.

**(ix) MPLAB IDE:**

MPLAB IDE is a software program that runs on a PC to develop applications for Microchip Microcontrollers. It is called an Integrated Development Environment, or IDE, because it provides a single integrated "environment" to develop code for embedded microcontrollers

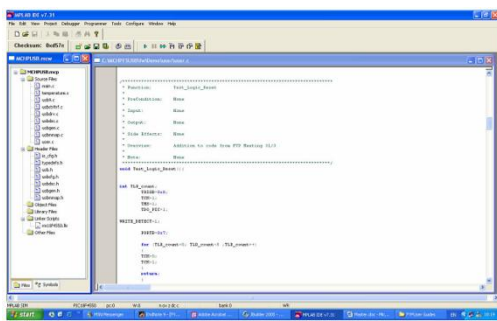


Fig.7: MPLAB IDE

## V.CONCLUSION

This paper present an optimal formulation for a cost optimized wireless network capable of transmission of time sensitive sensor data through the transmission line network in the presence of delay and bandwidth constraints. Our analysis shows that a transmission line monitoring framework using WSN is indeed feasible using available technologies. The proposed method with formulation is generic and en-compasses variation in several factors such as asymmetric data generation at towers, wireless link reliabilities, link utilization dependent costs, non-uniform cellular coverage characteristics and requirements for cost optimized incremental deployment.

The evaluation studies show that the main bottleneck in cost minimization is wireless link bandwidth. Further, in cases of increasing flow bandwidth, the limited wireless link bandwidth leads to a feasible but expensive design due to increased dependence on cellular network to satisfy constraints.

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