Fault Analysis of Transmission Line by using GSM Technology

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Abstract- Designing and implementing commercial as well as industrial systems based on Wireless. Robust communication has always been a prominent field of interest among many researchers and developers. The proposed GSM based system always calculates the utilization factor and plant efficiency and communicates to the subsy The sub system program architectures can be defined in such a way that, the set points can be altered (only increases) as per the transmission input. This paper presents design and implementation methodology of a real time fault analysis and loss reduction on transmission line using GSM Technology. Using GSM as the medium for fault analysis provides a cost-effective, wireless, always-connected and bi-directional communication as a message or data. The line losses expected at various levels are predefined and beyond that to be notified by smart data acquiring system, which can act fast and alert the electricity authorities about the same.

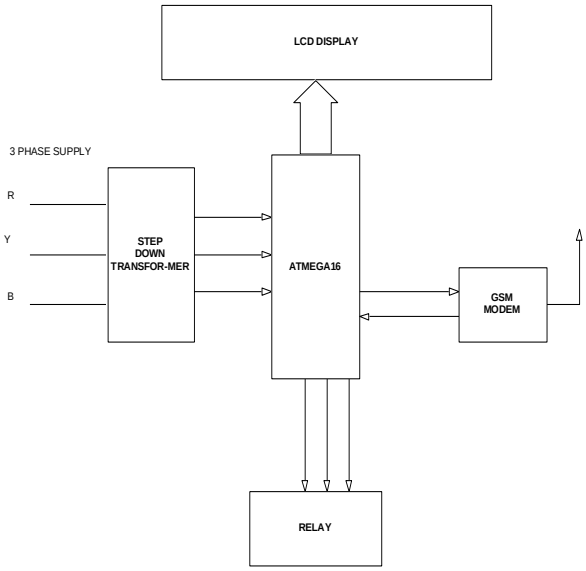
I. INTRODUCTION

As an important part of the transmission and distribution , high-voltage overhead lines often produce grounding, short circuit fault due to various reasons, brought great risks to the user's safety of production. For increased demand and de-regulated power system an advanced technology is required to acquire, control and decision making purposes. By a proper monitoring and effective communication system, we can cost. automate the fault-finding system of the transmission and distribution to improve the utility factor, uninterruptible power, reduce losses and save the time thereby saving, the Types of faults in three phase system is shown in fig-1

(A)Phase-to-earth fault. (B)Phase-to-phase fault. (C)Phase-to-phase-to-earth fault. (D) Three phase fault.

(II)Modeling of the system and analysis –

The system has been modeled as per the block diagram
given in Fig.1. All blocks of the Fig.1 have been designed and fabricated for testing of the faults occurred
in the system



Block dia.ofTransmission line fault analysis with location detection'

1. Power Supply Circuit:

This circuit converts 230 V AC to 5 V DC. It uses bridge circuit and 1C 7805 voltage regulator. 230V AC from the step down transformer is first step down

into 12V DC which is further converted into 5V DC.

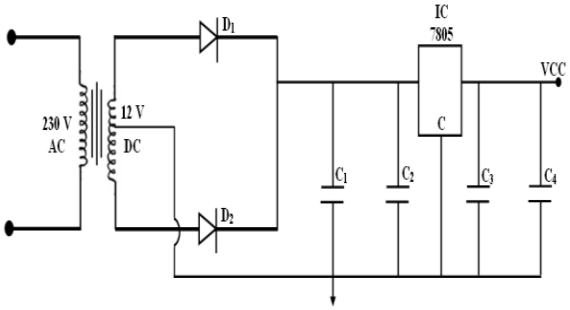


Fig: Power supply circuit

2. Voltage Regulator IC 7805:

General Description

The LM78XX series of three terminal regulators is available with several fixed output voltages making them useful in a wide range of applications. One of these is local on card regulation, eliminating the distribution problems associated with single point regulation.

Features

- Output current in excess of 1A
- Internal thermal overload protection
- No external components required
- Output transistor safe area protection
- Internal short circuit current limit
- Available in the aluminum TO-3 package

Voltage Range

- LM7805C - 5V
- LM7812C - 12V

3. ATMEGA16

Features
• High-performance, Low-power AVR® 8-bit Microcontroller
• Advanced RISC Architecture
– 131 Powerful Instructions – Most Single-clock Cycle Execution
– 32 x 8 General Purpose Working Registers
– Fully Static Operation
– Up to 16 MIPS Throughput at 16 MHz
– On-chip 2-cycle Multiplier
• Nonvolatile Program and Data Memories
– 16K Bytes of In-System Self-Programmable Flash
Endurance: 10,000 Write/Erase Cycles
True Read-While-Write Operation
– 512 Bytes EEPROM
Endurance: 100,000 Write/Erase Cycles
– Programming Lock for Software Security

4. **SIM300 AT**

SIMCOM SIM300 module that connects to the specific application and the air interface. SIM300 can be integrated with a wide range of applications. Application of sim300 are notes, user guide and to design and set-up mobile applications quickly.

5. Eagle vide

There are a few visions of Eagle for different tasks. The one that will be used in this tutorial is a free version of Eagle. The free version of Eagle is restricted to a maximum size of 3.9 inches by 3.2 inches. It is capable of designing two-layer PCB, while this tutorial will only demonstrate the single-layer PCB layout. Even with the restrictions, the free version of Eagle is still an ideal tool of design small single-layer printed circuit board.

6. PCB

PCB, which is also known as printed circuit board, is very commonly used in commercially produced electronic devices. A printed circuit board usually use conductive pathways, tracks and traces etched or striped from a copper sheet covered on a non-conductive substrate. PCB is also a very reliable and a very effective way of implementing a designed circuit with a good manufacturability.

7. **Potential transformer**

Potential transformer (PT) used here suits to all the standards of electrical transmission and distribution. The PT provides greater isolation along with ratio metric reduction of voltage. This could be class-I accuracy comes under Instrument transformer. The general specification will be 330kv/110v AC.

8. **Current transformer**

Current transformer (CT) used here is xxx/5Amps. Extreme care for shunting is taken to avoid accidents. The perfect specification of CT will be 1000 Amps/5Amps with shunt resistance of 0.1Ω whose burden will be 5VA according to the industry standard.

9. **Flex Sensors:**

Mechanical Specifications
-Life Cycle: >1 million
-Height: 0.43mm (0.017")
-Temperature Range: -35°C to +80°C
Electrical Specifications
-Flat Resistance: 10K Ohms
-Resistance Tolerance: ±30%
-Bend Resistance Range: 60K to 110K Ohms
-Power Rating : 0.50 Watts continuous. 1 WattPeak

Proposed Work

Many data acquiring systems are available in the commercial markets, but, often fails to meet electrical environment, which need to work in the open area (Hostile environment). The data acquiring system works at hostile environment to be specially designed to meet all types of electrical disturbances. The device should acquire the data at the below mentioned conditions.

f Electromagnetic interference

f Radio frequency interference

f Voltage sag/swell

f Harmonics of various levels

With extreme fluctuations of frequency and current. The data acquiring system design accepts the AC voltage & AC current and produces power output with four quadrant analog multiplier. The data acquiring system is entirely free from all electrical, electronic, software attacks.

Result

1.If line R shorted with ground then result will be shown as 'R*G'

2.If line Y shorted with ground then result will be shown as 'Y*G'

3.If line B shorted with ground then result will be shown as 'B*G'

4.If line R shorted with line Y then result will be shown as 'R*Y'

5.If line Y shorted with line B then result will be shown as 'Y*B'

6.If line R shorted with line B then result will be shown as 'R*B'

7.If the distance between two lines as changed then the result will be shown as 'WIRE'

Conclusion

The real-time hardware, software, GSM network is a designed for robust environment and implemented in the electrical environment for observation. The true data obtained from the device is plotted using VB6.0 and subsequent data base. The fault percentage at each place of transmission line is displayed, and used to generate data to GSM transmitter to the distribution network for effective distribution management to keep utility factor at higher side.

Future scope

Exact cost analysis between various communication systems and their loss profile towards cost to be designed based on tariff system and with help of electricity regulation authority.

References

[1] In-Gyu Im, Hyo-Sang Choi, and Hye-Won Choi," *Limitation of Fault Current and Burden of Superconducting Element Applied to Neutral Line of the Transformer",* IEEE TRANSACTIONS ON

APPLIED SUPERCONDUCTIVITY, VOL. 24, NO. 3, JUNE 2014

[2]Benjamin Mimoun, Vincent Henneken, Arjen van der Horst, and Ronald Dekker,*" Flex-to-Rigid (F2R): A Generic Platform for the Fabrication and Assembly of Flexible Sensors for Minimally Invasive Instruments,"* IEEE SENSORS JOURNAL, VOL. 13, NO. 10, OCTOBER 2013

[3] Pavel Ripka , Karel Draxler , and Renata Styblikova*," Measurement of DC Currents in the Power Grid by Current Transformer",* IEEE TRANSACTIONS ON MAGNETICS, VOL. 49, NO. 1, JANUARY 2013

[4] Qi Huang, Wei Zhen, and Philip W. T. Pong " *A Novel Approach for Fault Location of Overhead Transmission Line With Noncontact Magnetic-Field Measurement* ", IEEE TRANSACTIONS ON POWER DELIVERY, VOL. 27, NO. 3, JULY 2012

[5] S. aKwabata, K. Nonaka, K. Tokushige, and T. Hirayama," *Measurement of Transport Characteristics in HTS Conductors With Large Current Capacity by Using an HTS Current Transformer",* IEEE TRANSACTIONS ON APPLIED SUPERCONDUCTIVITY, VOL. 22, NO. 3, JUNE 2012

[6] Prof. M. S. SUJATHA, Dr. M VIJAY KUMAR," *On-Line Monitoring and Analysis of Faults in Transmission and Distribution Lines using GSM Technique",* Journal of Theoretical and Applied Information Technology 30th November 2011.