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A Novel Virtual Electrical Panel for Ultra Modern Buildings and Industries

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Abstract:

Power quality monitoring and its fault protection is an important part of quality control. But the cost of power quality monitoring and its protection system is very complex system. The investigator has developed virtual instrument based very low cost power quality and its protection system which is extremely useful and effective. This virtual power quality monitoring and protection system will be very useful for large buildings and industries.

Keywords: Power quality monitoring, power quality software, power quality improvement

1. Introduction

Now a days, the measurement of power quality components and electrical protection are becoming more complex and costly also. As the rate of different equipments used in modern building and industries are getting costlier. So very efficient and low cost electrical panel system is required which can give continuous monitoring and measurement of power and also it can protect the whole electrical system. As LabVIEW being worlds number one virtual programming software, this type of electrical panel can be designed which will not only show different parameters but will also protect the electrical system. The main components which are essential to show on electrical panel are as follows:[1],[2], [3]

- i. Voltage
- ii. Current
- iii. Energy consumed
- iv. Active and reactive power
- v. Power factor
- vi. Different types of fault like over voltage, short circuit etc.
- vii. Alarming and indicating system for different types of fault

2. Tools and Softwares Used

2.1. LabVIEW with Electrical Power Toolkit

LabVIEW is a graphical programming environment used by millions of engineers and scientists to develop sophisticated measurement, test, and control systems using intuitive graphical icons and wires that resemble a flowchart. It offers unrivalled integration with thousands of hardware devices and provides hundreds of built-in libraries for advanced analysis and data visualization – all for creating virtual instrumentation. The LabVIEW platform is scalable across multiple targets and OSs, and, since its introduction in 1986, it has become an industry leader.

LabVIEW (short for Laboratory Virtual Instrumentation Engineering Workbench) is a system design platform and development environment for a visual programming language from National Instruments.

The graphical language is named "G" (not to be confused with G-code). Originally released for the Apple Macintosh in 1986, LabVIEW is commonly used for data acquisition, instrument control, and industrial automation on a variety of platforms including Microsoft Windows, various versions of UNIX, Linux, and Mac OS X.

3. Inferences Drawn Out of the Literature Review

The investigator after going through a large number of literatures divulges the following inferences:

- In modern big buildings and industries, advanced electrical panels are used. These read and show different electrical parameters like voltage, power, energy consumed, power factor, power quantity componenets etc.
- The components/equipments used for showing these measurement are very costly.
- Lot of different protection systems are also used to protect the buildings/industrial equipments. These protection systems are very complex and costly also.
- Continuous monitoring and protection of any building is very complex and difficult process.

4. Future Scope of the Work

- LabVIEW, one of the most powerful virtual software, can be very efficiently used to develop this type of power software which will be very much useful for energy auditors and consultants
- By implementing different artificial intelligence tools like ANN etc, it can be made more powerful and efficient.
- This can also be used for automatic protection of any building.
- MATLAB can also be used for online control of different electrical devices.
- This can be used to monitor protect different devices.
- Microcontroller can be used for automatic control of power quality.
- Online power quality monitoring system can also be implimented using Labview web server

5. Proposed Work

The main objectives of this work are as follows:

1. To simulate low cost high performance virtual electrical panel for measruing different electrical quantities like voltage, current, power factor, power quality component etc.
2. To simulate virtual protection system for ultramodern buildings against over voltage, short circuit etc. and give alarm and indication of the type of fault occurred.

6. Software Developed

The investigator has developed a highly powerful and useful software for large building and industries which is shown below.

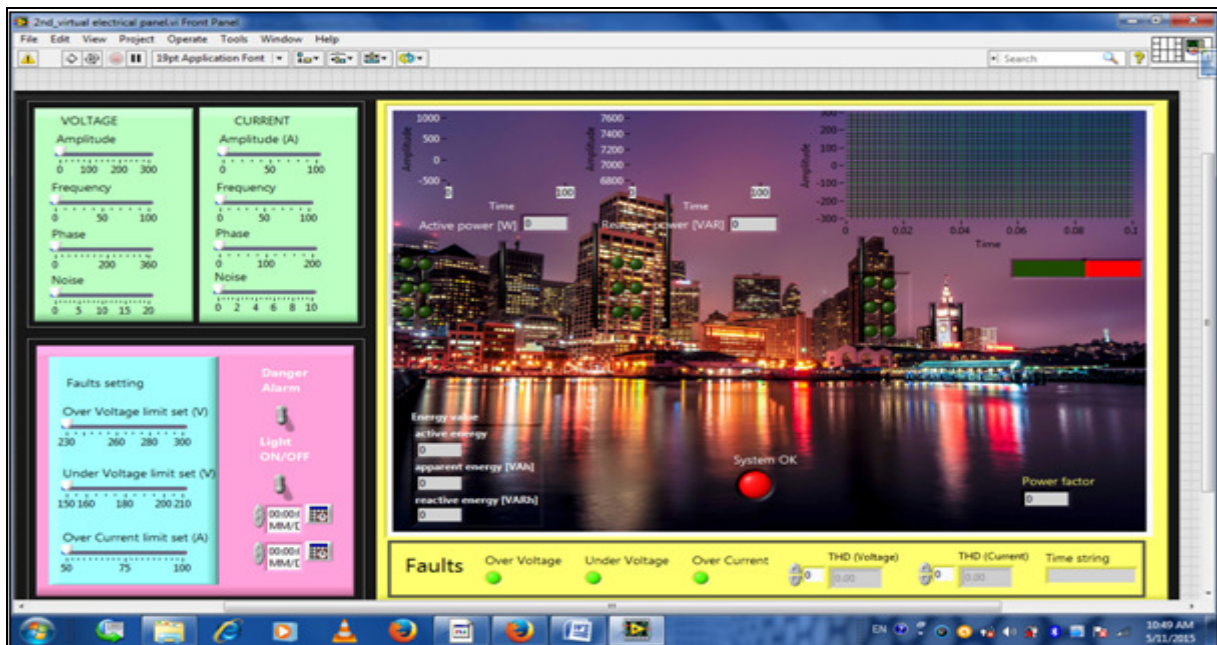


Figure 1

Power quality monitoring and fault protection, alarming system etc. has ben successfully developed. The functional figure is also shown below for the reference

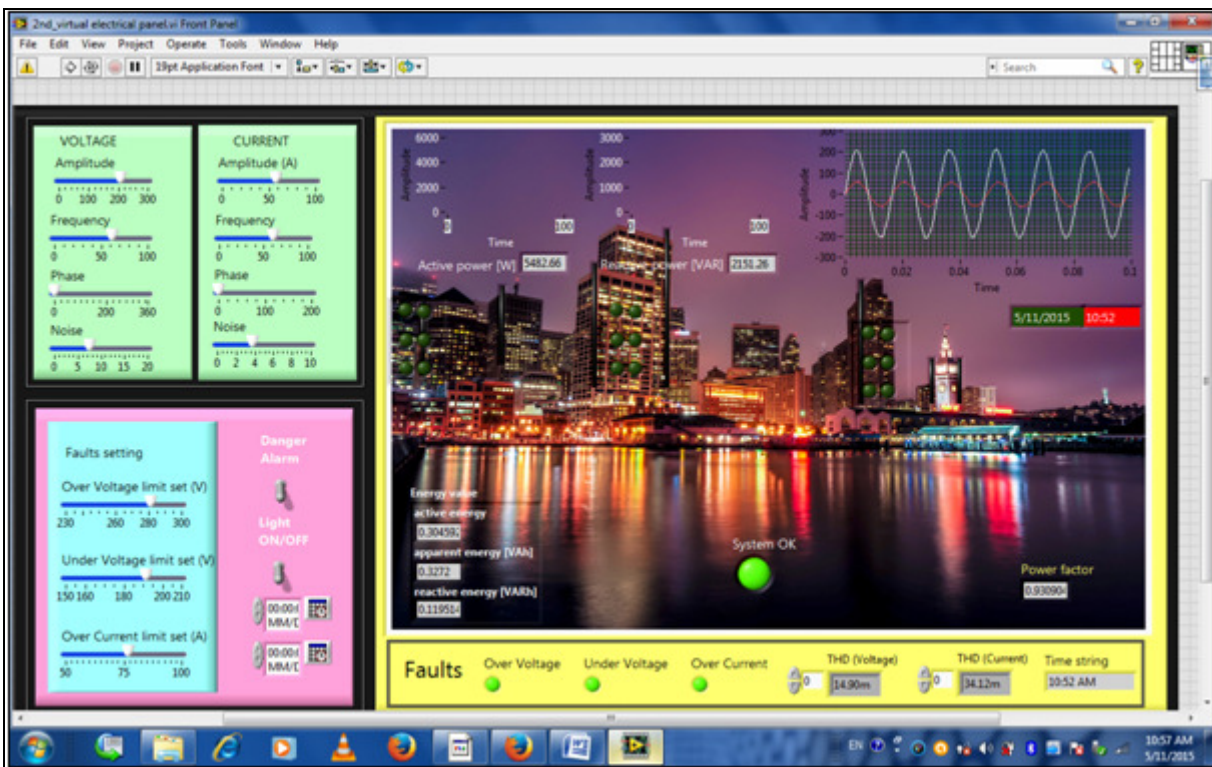


Figure 2

7. Conclusion

The power quality monitoring equipments are very costly. But investigator has developed the software which is not only very cost effective but also has protection feature included. This makes this software extremely beneficial for large buildings and industries.

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