

A Novel Ultra High Speed D.C Motor Protection Using NI Lab View

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Abstract

This paper presents a novel concept of D.C motor protection using NI Lab VIEW. The researcher has designed highly powerful real time D.C motor protection software by using NI Lab VIEW, which is proficient of protecting D.C motor within fraction of seconds against different types of faults, giving the real time protection, hence giving a brilliant solution to virtual instrument based protection system. Now a days due to increase in complication in motor use, there was a vital necessity of motor protection system which can constantly monitor and control a very large motor system. That is why high speed, high accuracy, real time solutions are required for measuring D.C motor protection. This paper presents a high precision and high fidelity approach based on NI ELVIS Instruments and NI Lab VIEW for monitoring and protection of D.C motors.

Keywords: Lab VIEW, Virtual Instruments, D.C motor protection, D.C motor monitoring, fault analysis

1. INTRODUCTION

D.C Motors are the main building block in different industries. Their malfunction will not only lead to repair or substitution of the motor, but also effect major financial losses due to unpredicted process downtime. Reliable protection of d.c motors is essential for reducing the motor malfunction rate and prolonging a motor's lifetime [1]. Conventional d.c protection techniques are not so efficient as compared to the state-of-the-art of computerized highly efficient NI LabVIEW based protection system. In this paper the investigator has developed fully computerized d.c motor protection which not only protects the motors against different faults but also shows the type of fault on the front panel. As soon as fault portion is rectified it again starts the proper functioning of motor and protects it against abnormal conditions all the times.

2. NEED AND IMPORTANCE OF NI LABVIEW BASED PROTECTION SYSTEM

To reduce the damage number and the failure rate of motor, improve the reliability of motor operation, intelligent motors monitoring protection system should be developed [2]. As the cost of motors is extremely high, so high fidelity and high performance, fully automatic protection system is required. This said system fulfils all the conditions of excellent protection system at nominal cost [3].

3. DC MOTOR PROTECTION USING NI LABVIEW

The software is divided into following four sections:

(i) Test panel section

This section is the input section. It is shown in Fig. 1. In the test panel 10 different types of protection system is given. The basic range is divided in the span of 0-10 units. It can be changed as per requirement from the front panel.

(ii) Preset value section

It is shown in Fig.2. It has also 10 different preset controls corresponding to the test panel. The value of preset control can be changed from the front panel.

(iii) Type of fault section

This section is the indicating system for any type of fault. The faulty section gets red and normal working section is represented by green signal. It is shown in Fig.3

(iv) Waveform section

It is shown in Fig.4. This section shows different values of test panel and preset panel. It also contains on/off switch, motor direction reversal switch etc.

4. CASE STUDY

The benefit and utilization of this software is explained in this case study.

Case 1: Test value is greater than preset value

In this case, the control for which test value is greater than preset value, that type of protection will work and the motor will stop to run. The type of fault section will indicate that control by red colour. As soon as the fault will be rectified it will again become green and motor will start to run.

Case 2: Test value is less than or equal to preset value

This case indicates that there is no fault in any section and all indicators will glow green. This is shown in Fig. 5. In figure .5, all the waveforms are shown in test and preset plot. The motor is also running.

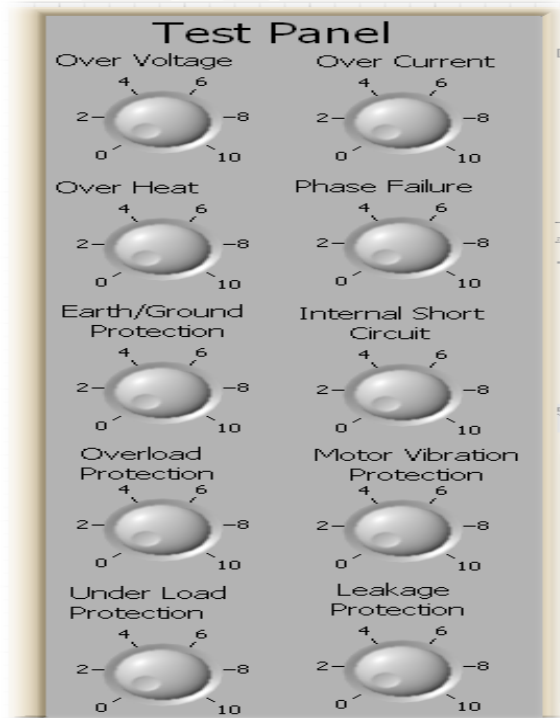


Fig. 1 – Test Panel

The direction of motor can also be changed from the front panel. There is also a provision to control the speed of motor.

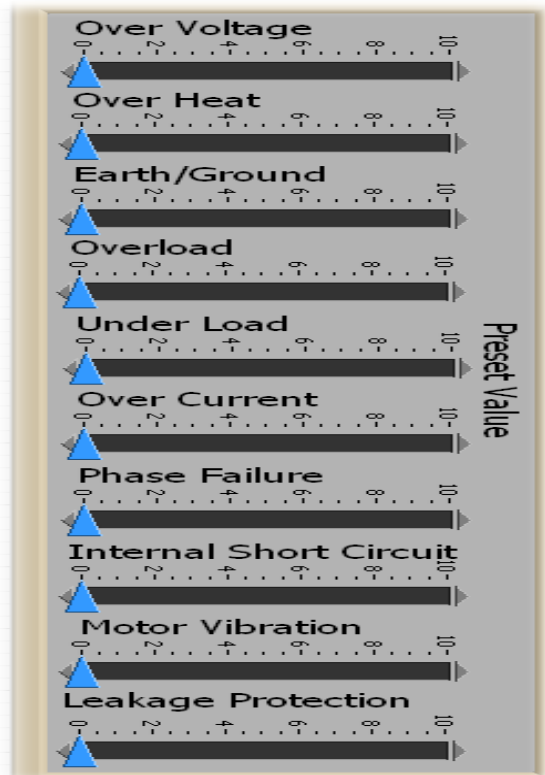


Fig. 2 – Preset value panel

5. HARDWARE AND SOFTWARE INTERFACING

The investigator has successfully tested prototype model of the above software. NI ELVIS and DAQ card and different sensors has been used to acquire different value of test panel. Preset value is set as per the requirement. As soon as the test value acquired from online data is greater than the preset value, the software stops the motor and protects against different type of faults [4], [5], [6].

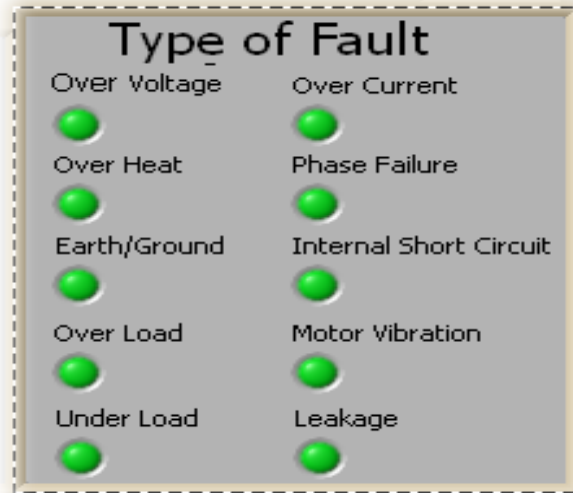


Fig. 3 – Fault monitoring

and alarming

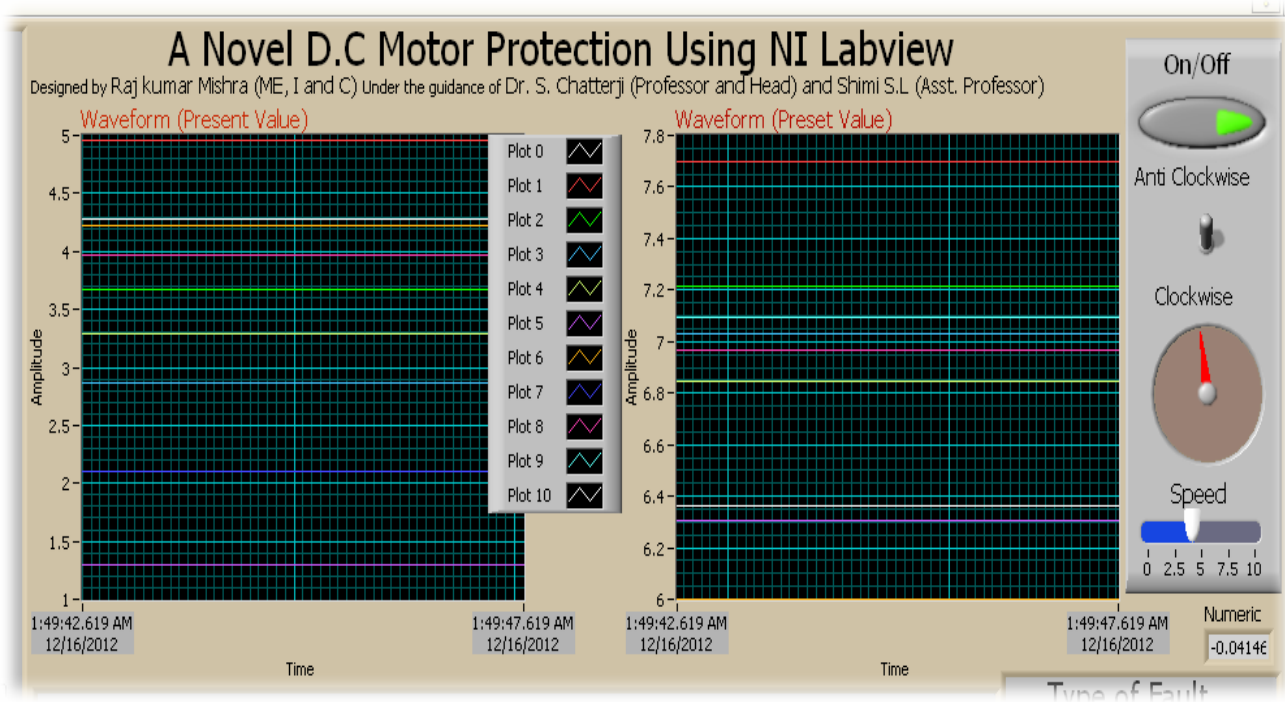


Fig. 4 – Waveforms of test and preset panel

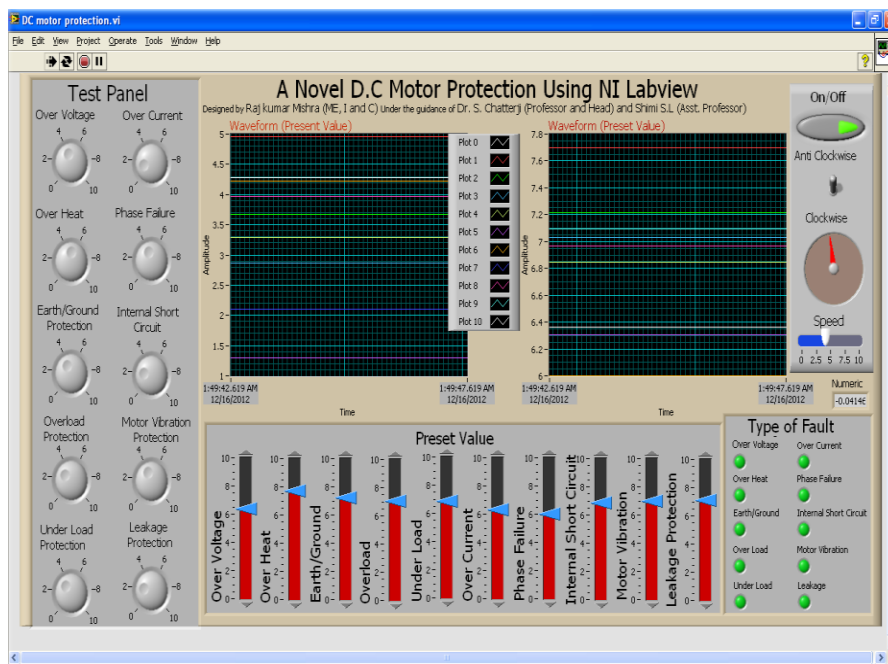


Fig. 5 – Complete functioning software

6. CONCLUSION

The introduction of this software is a revolutionary step in the field of d.c motor protection. Some major points which are very useful regarding this software are:

1. It gives highly accurate result with ultra high speed. So it can be an excellent choice for advance and accurate d.c motor protection.
2. It saves very costly motors. Therefore it can be used in industries very efficiently.
3. Its state of art of protection system makes it exceptionally powerful and very much prominent in the industrial application
4. It can be also used as online monitoring and protection tool.

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