

Simulative Analysis of Various Faults for Protection of Induction Motor using SCADA

Neetika ^[1], Parminder Kaur ^[1], Hardeep Singh ^[3]

M.Tech Student ^[1], Asst. Prof ^[2], M.Tech Student ^[3]

Department of Electronics and Communication Engineerig ^{[1]&[2]}

Department of Electrical Engineering ^[3]

SSIET, Derabassi

GGSCMT, Kharar

India

ABSTRACT

Motors are very important Electrical Device to Convert Electrical energy to Mechanical Energy in almost all the industries. Induction motors are used in many industrial applications in a wide range of operating areas as they have simple and robust structure, and low production costs. Induction motors are now being used more as compared to before due to their certain advantages such as versatility, dependability and economy, good self-starting capability, offers users simple, rugged construction easy maintenance, low cost and reliability. The reliability of an induction motor is of great Importance in industrial as well as commercial, aerospace and military applications. Also the knowledge about fault mode behaviour of an induction motor drive system is extremely important from the standpoint of improved system design, protection and fault tolerant control. In this Work, I have try to simulate many fault like overvoltage, over current , over temperature, over speed, inrush current, vibration monitoring which are being faced by IM's during it's operation. Also, by any reason fault will occur and the algorithm will try to stop the motor to damage it further. The various parameters of data will be connected from Industrial. Ladder Programming PLC Simulator Like Zelio will Used Because Simulator is cost effective solution of analyze and performing various algorithms with Using purchasing Actual Hardware.

Keywords:- Scada, Induction motor, Intouch, Scada Simulation.

I. SCADA

SCADA systems were first used in the 1960s. SCADA stands for supervisory control and data acquisition, a computer system for gathering and analysing real time data. SCADA systems are used to monitor and control a plant or equipment in industries such as telecommunications, water and waste control, energy, oil and gas refining and transportation. A SCADA system gathers information, such as where a leak on a pipeline has occurred, transfers the information back to a central site, alerting the home station that the leak has occurred, carrying out necessary analysis and control, such as determining if the leak is critical, and displaying the information in a logical and organized fashion. SCADA systems can be relatively simple, such as one that monitors environmental conditions of a small office building, or incredibly complex, such as a system that monitors all the activity in a nuclear power plant or the activity of a municipal water system.

Working of SCADA software

The measurement and control system of SCADA has one master terminal unit (MTU) which could be called the brain of the system and one or more remote terminal units (RTU). The RTUs gather the data locally and send them to the MTU which then issues suitable commands to be executed on site. A system of either standard or customized software is used to collate, interpret and manage the data.

SCADA as of now uses predominantly open-loop control systems, though some closed-loop characteristics are often built in. As this is an open-loop system, it means that SCADA system cannot use feedback to check what results its inputs have produced. In other words, there is no machine-learning. Figure 2 shows Configuration of SCADA Systems.

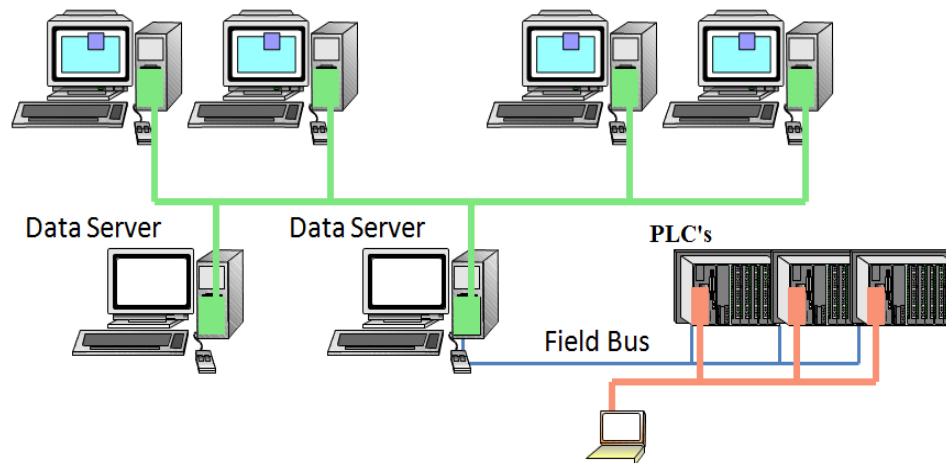


Figure 1:- Configuration of SCADA Systems

II. PROBLEM FORMULATION

Motors play vital role in daily life. We can't imagine Industry or industrial machinery without mechanical movements. Electrical Motors are only solutions to control the speed, torque etc to provide mechanical movements. Mechanical failure in motors can stop its working and effect the production of machines in which these are involved. The faults like Stator faults, broken rotor bars, over temperature, over or Low Voltage, Over Current etc. are seen in real time situations. To protect the motor from these mechanical faults, motor fault finding and motor fault resolution is necessary.

III. OBJECTIVES / SCOPE OF THE STUDY

In this Work, the main objective is to save motor from faults that will occur by any reason and the algorithm will try to stop the motor to damage it further. With greater safety measure, an effective system helps them to protect the motor itself, and

human being can achieved. Because SCADA is good solution that but the scope of purchasing all Device like PLC, SCADA, Drive, Motor are out of scope. The thesis work will be proposed and implemented on simulators like Zileo Soft, RsView and RSView32 and algorithm is developed by me.

IV. RESEARCH METHODOLOGY

The first step will be to decide the SCADA Software best suits as per requirement for designing system.

- 1) Evaluate real time data as per motor installed for particular application.
- 2) Make the flowchart as per conditional application for run the motor.
- 3) If condition fails motor stops.
- 4) Implement design in SCADA and run the simulation.

Induction motor simulation will be done in the following manner. The buttons, leds and Display all peripheral devices are connected to the system as shown in the figure below.

V. SIMULATION RESULTS

- 1) First of All, Switch On Motor >> Slow Speed
- 2) After Some Time Run It at High Speed .
- 3) Make Ten Set of Switch [UP] and [DOWN]

UP = UP Button , DN = Down Button , IND = Indicator , Err = Error Message

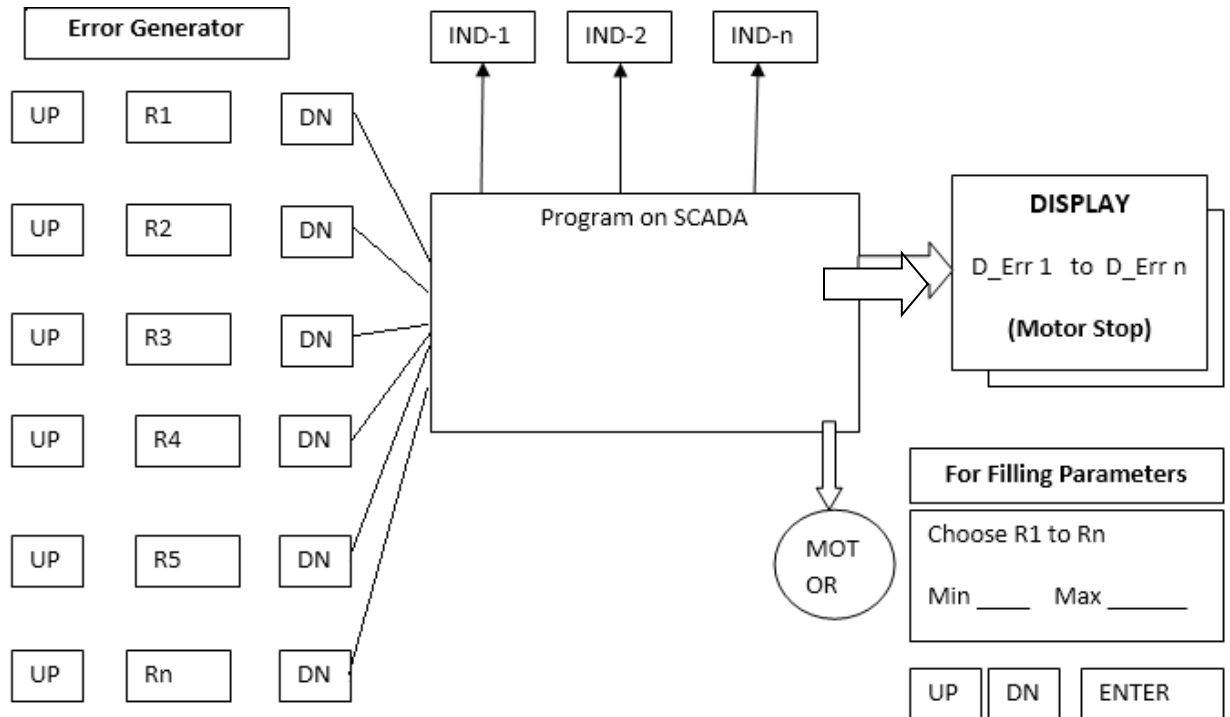


FIGURE 2:- Research Methodology

VI. SIMULATION RESULTS

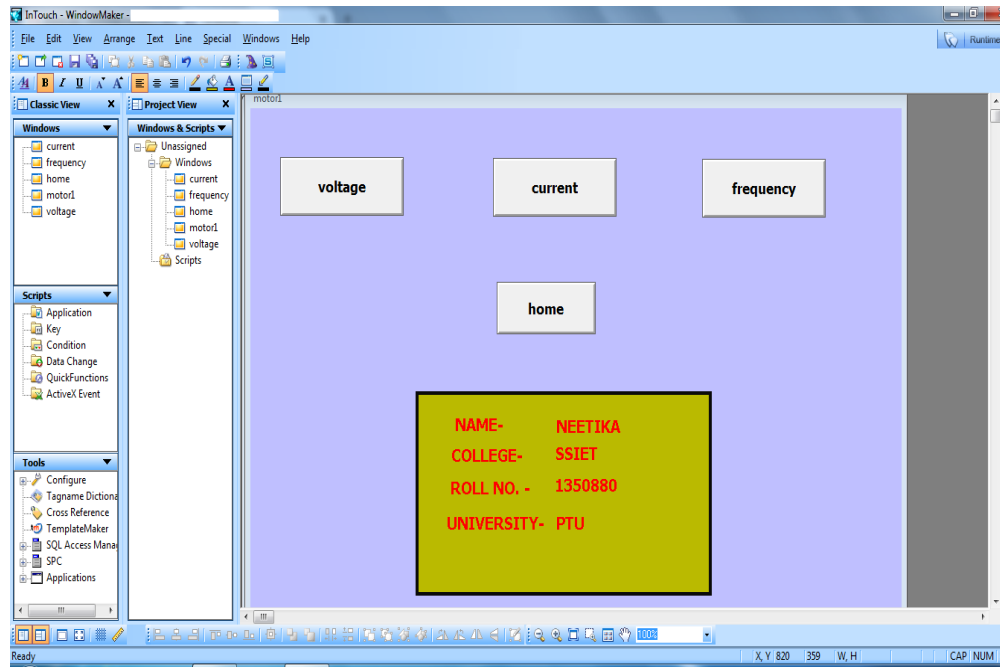


FIGURE 3:- Front Page

The page above displays the parameters which are simulated on SCADA system. Click on any button and the control will be transferred to that particular parameter.

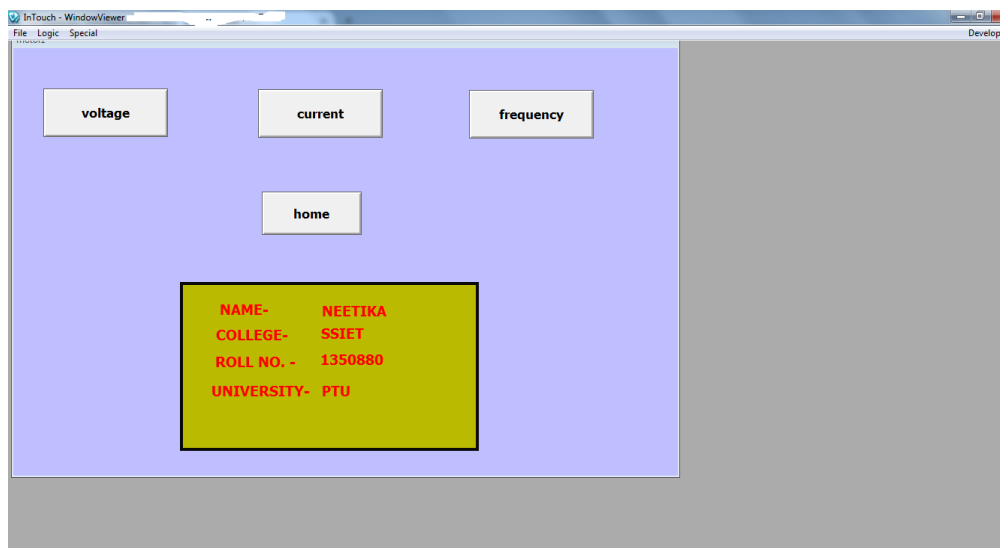


Figure 4:- Simulation mode

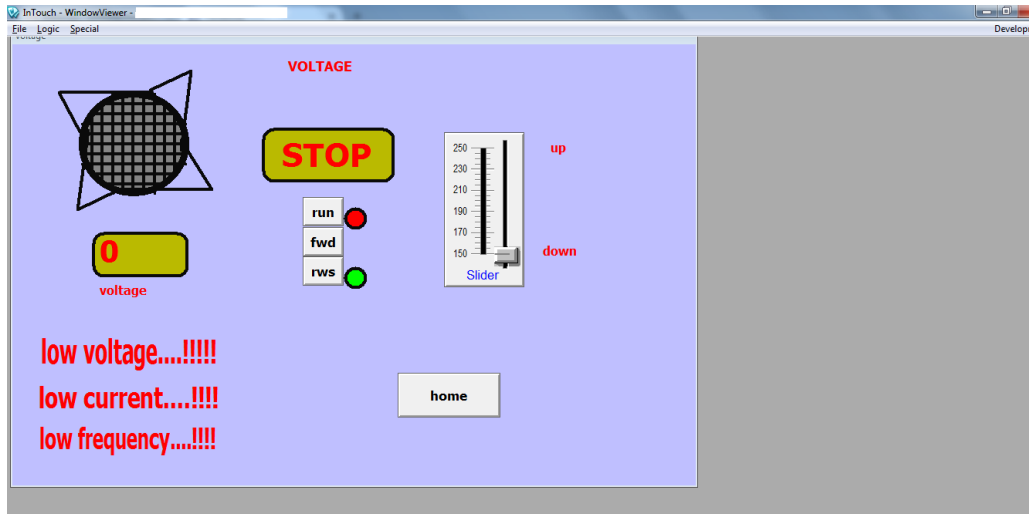


Figure 5:- Error display

The figure above shows the errors occurred in the motors. It will display the warning according to the corresponding parameter which is low or high.

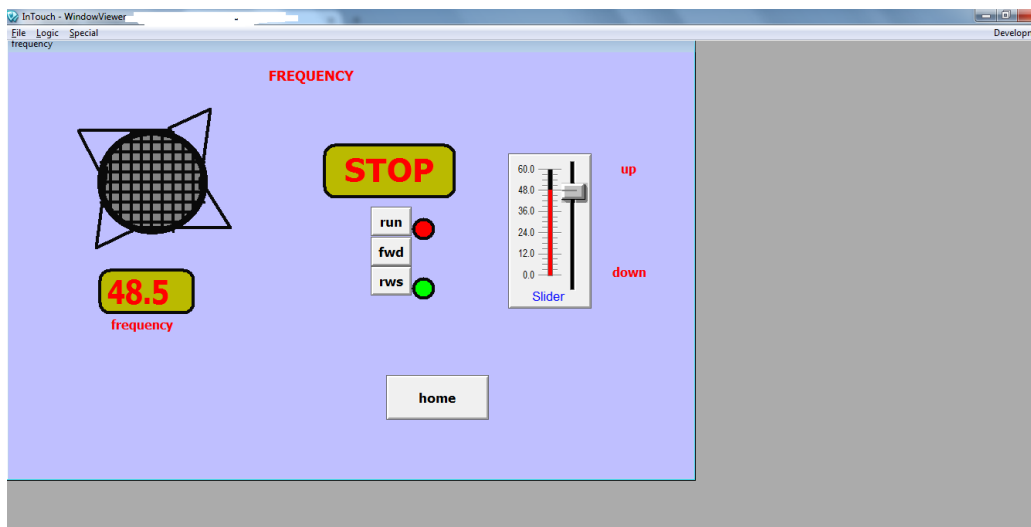


Figure 6:- Simulator display

When the parameters are in proper range the display will never show any warning or error. This will display motor in stop mode.



Figure 7:- Simulator display on running mode

The motor in the figure is in running mode, the 'fwd' and 'rws' buttons will be used to run the motor in forward and reverse directions. Click on the run button to force the motor in working mode.

The figure above shows the warning for high frequency; if the frequency to the motor will be decreased or increased the motor will stop working and displays the message for the warning.

PARAMETER	LOWER RANGE	UPPER RANGE	UNITS
VOLTAGE	180	240	Volts
CURRENT	3.0	6.0	Amp
FREQUENCY	46.0	52.0	Hz

Table 1:- Parameters used in motor

VII. CONCLUSION

In this paper, a SCADA based protection system for human beings from 3 phase induction motors has been presented and simulated. A SCADA model is implemented for stopping the induction motor in over voltage, over current, temperature and voltage unbalance etc. The motor stops working or running when voltage will be increased or decreased, variation in current applied and change in frequency.

VIII. FUTURE WORK

In this system a SCADA based design is implemented, SCADA system Wonderware Intouch is used for designing purpose. In the next studies, the same system can be implemented using some other tool and also the system can be improved by increasing input numbers to control various fault parameters

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