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ARTIFICIAL INTELLIGENCE OF DRYER AND ERROR DETECTION

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Abstract— **This paper propose to detect the fault current flowing through the circuit. Any chance of damage or fault in the circuit will cause to automatically allow the device to shut down this helps in reducing the risk in fault current and damage of the device. A well-established tool to characterize the actual condition of electric equipment is the measurement and evaluation of partial discharge data. Immense effort has been put into sophisticated statistic software-tools, to extract meaningful analyses out of data sets, without taking care of relevant correlations between consecutive discharge pulses. In contrast to these classical methods of partial discharge analysis, the application of the Pulse Sequence Analysis allows a far better insight into the local defects. The detailed analysis of sequences of discharges in a voltage and a current transformer shows that the sequence of the partial discharge signals may change with time because either different defect are active at different measuring times or a local defect may change with time as a consequence of the discharge activity. Hence for the evaluation of the state of degradation or the classification of the type of defect the analysis of short 'homogeneous' sequences or sequence correlated data is much more meaningful than just the evaluation of a set of independently accumulated discharge data. This is demonstrated by the evaluation of measurements performed on different commercial apparatus.**

Keywords—Dryer, Drying parameters, instrumentation system, Control and detection errors

INTRODUCTION

The Fault Detection, Isolation, and Recovery (FDIR) is a subfield of control engineering which concerns itself with monitoring a system, identifying when a fault has occurred and pinpointing the type of fault and its location. Two approaches can be distinguished: direct pattern recognition of sensor readings that indicate a fault and an analysis of the discrepancy between the sensor readings and expected values, derived from some model. In later, it is typical that a fault is said to be detected if the discrepancy or residual goes above a certain threshold. Itis then the task of fault isolation to categorize the type of fault and its location in the machinery. Fault detection and isolation (FDI) techniques can be broadly classified into two categories. It includes model-based FDI and signal processing based FDI.

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Fault protection systems a fault clearing system consists of a relay protection system and a circuit breaker. In case of a fault, the task of the circuit-breaker is to clear the fault and the task of the relay protection system is to detect the fault. It is important to understand that the time to clear a fault is Dependent on both the time required to detect the fault and the time needed for the circuit-breaker to clear the fault It is a field of mechanical engineering concerned with finding faults arising in machines. A particularly well-developed part of it applies specifically to rotating machinery, one of the most common types encountered. To identify the most probable faults leading to failure, many methods are used for data collection, including vibration monitoring, thermal imaging, oil particle analysis, etc. Then these data are processed utilizing methods like spectral analysis, wavelet analysis, wavelet transform, short term Fourier transform, Gabor Expansion, Wigner-Ville distribution (WVD), spectrum, bispectrum, correlation method, high-resolution spectral analysis, waveform analysis (in the time domain, because spectral analysis usually concerns only frequency distribution and not phase information) and others. The results of this analysis are used in a root cause failure analysis to determine the original cause of the fault.

I. FAULT EFFECTS AND THEIR CONSEQUENCES

The detection and clearing of electrical faults in power systems is the main topic of this licentiate thesis. To appreciate why a fast and reliable fault clearing is important this chapter contains an overview of the consequences caused by electrical faults and relates the consequences to the duration of the fault

A. Faults

The consequences in most cases damage or potential hazard to humans and property caused by electrical faults in power systems strongly depend on the magnitude of the fault current, which in turn depends on the type of fault, the location of the fault, the system earthing, the source impedance, and the impedance of the fault. The duration of the fault is also of considerable importance when estimating the consequences of a fault. One way to characterize the types of faults is to describe them as shunter series faults. Shunt faults are faults when one or more of the phases are short-circuited. Shunt faults are in general more severe than series faults, which could be described as an interruption in one or more of the phases. The following definition of a short-circuit is taken from an IEEE standard. “An abnormal connection including an arc of the relatively low impedance, whether made accidentally or intentionally, between two points of different potential.

B. Consequences

The consequences of a fault can be divided into one part caused by the initiation of the fault (e.g. insulation breakdown) and one part which is dependent on the duration of the fault. The initial consequences cannot be reduced by faster fault detection whereas the part

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dependent on the duration of the fault can. General Mechanical forces. For parallel conductors in a single- or a three-phase system, the maximal force imposed on one of the conductors can be calculated by using the equation.

$F_{max} = k * Kr$ (1)

$d = I$ (2)

$S = K_p/m$ (3)

where F_{max} is the largest force (in kp3/m) imposed on the conductors, is the peak current expressed in kA, d is the distance between neighboring In Sweden, the transmission system (voltages more than 130 kV) is solidly earthed, but the distribution system (at least for 10 – 40 kV)is either non-earthed or high impedance earthed. The impedance can be resistance, an inductance, or a combination thereof. 31 kp (kilopond)is equal to 9.82 K_n Conductors expressed in cm, and k and Kr are constants. Since k, Kr, and are design parameters, it can be concluded that for a given power system, the maximal force imposed upon it is proportional to the square of the peak current. Thus, when a short-circuit current is carried by the phase conductors, there will be a mechanical force upon them and that force will grow rapidly with increasing short-circuit currents since it depends on the square of the current. In the case of a short-circuit, the fault current will contain a decaying dc component that depends on the instant of fault initiation. Thus, the fault current is largest immediately after the fault initiation and the largest mechanical force imposed on the power system components is caused by the largest peak current. Power system equipment is designed to manage a current peak of a certain magnitude. The organization IEC4 has published a proposed standard value of the maximally allowed peak current expressed in terms of a peak factor that relates the RMS5-value of the short-circuit current to the peak current.

$Speak = 2.5*I_{rms}$ (4)

Thermal stress use to resistance in the conductors of a power system, heat losses according to equ (5) is produced when a current flows through them.

$P = R * I^2$ (5)

From equ (5), P denotes the heat losses for a conductor caused by the current I, when passing through the resistance R. I is the RMS value of the current

II. EXISTING WORK

The existing method in Error Detection of the networks made it possible to use in monitoring using 7 Segment display and to detect the fault error. If an error is found,

the discovering node will transmit an error flag and take appropriate action In three-phase

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systems, a fault may involve one or more phases and ground, or may occur only between phases. In a "ground fault" or "earth fault", current flows into the earth. The prospective short-circuit current of a predictable fault can be calculated for most situations. In power systems, protective devices can detect fault conditions and operate circuit breakers and other devices to limit the loss of service due to a failure.

Short circuit study is one of the basic power system analysis problems. It is also known as fault analysis. When a fault occurs in a power system, bus voltages reduce and large current flows in the lines. It may cause damage to the equipments. Hence faulty section should be isolated from the rest of the network immediately on the occurrence of a fault. This can be achieved by providing relays and circuit breakers

This can be done by either increasing the inductance of the circuit, or by removing parts of the circuit from the fault path. The first is done by adding reactors, the second by current limiters. Reactors can be installed anywhere in the distribution circuit in order to limit the fault current.

III. PROPOSED WORK

In this section, to control the fault arising in the circuit of the dryer by applying different means of fault correction techniques that is by providing pressure fault, over load, phase sequence. We provide 7segment display for displaying the fault at a particular area.

Any chance of damage or fault in the circuit will cause to automatically allow the device to shut down this helps in reducing the risk in fault current and damage of the device. The monitoring of the actual condition of the high voltage apparatus more important.

A. Working of Sensors

The temperature sensor is a device, to measure the temperature through an electrical signal it requires a thermocouple or RTD (Resistance Temperature Detectors) if the difference in voltage is amplified, the analog signal is generated by the device and it is directly proportional to the temperature.

B. Block Diagram

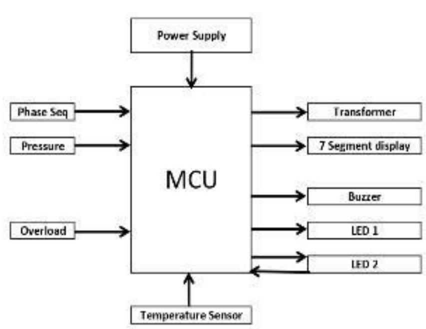

Fig.4.1 Error Detection Unit

IV. HARDWARE USED

A. ATmega32A Microcontroller

The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers. The ATmega32A provides the following features: 32Kbytes of In-System Programmable Flash Program memory with reading-While-Write capabilities, 1024bytes EEPROM, 2048bytes SRAM, 32 general-purpose I/O lines, 32 general purpose working registers, a JTAG interface for Boundary-scan, On-chip Debugging support, and programming, three flexible Timer/Counters with compare modes, Internal and External Interrupts, a serial programmable USART, a byte- oriented Two-wire Serial Interface, an 8- channel, 10-bit ADC with optional differential input stage with programmable gain (TQFP package only), a programmable Watchdog Timer with Internal Oscillator, an SPI serial port, and six software selectable power saving modes.

B. Motor

A motor is a machine, especially one powered by electricity or internal combustion, that supplies motive power for a vehicle or for another device with moving parts Electric motors are so much a part of everyday life that we seldom give them a second thought a single clock cycle. They convert electrical energy into mechanical energy.

Fig.5.2 Electric Motor

C. LM35 Temperature Sensor

A temperature sensor is a device, to measure the temperature through an electrical signal it requires a thermocouple or RTD (Resistance Temperature Detectors)...if the difference in voltage is amplified, the analog signal is generated by the device and it is directly proportional to the temperature. In this project, we use the LM35 precision temperature sensor. The LM 35 sensor is highly used because its output voltage is linear with the Celsius scaling of temperature. It does not provide any external trimming. The maximum output is 5V. The outputs will increase10mV for every one-degree rise in temperature. The range is from -55 degrees to +150 degrees. It consumes a minimum amount of electricity. Thus, it is energy efficient. It is very efficient in horticulture. It is user friendly.

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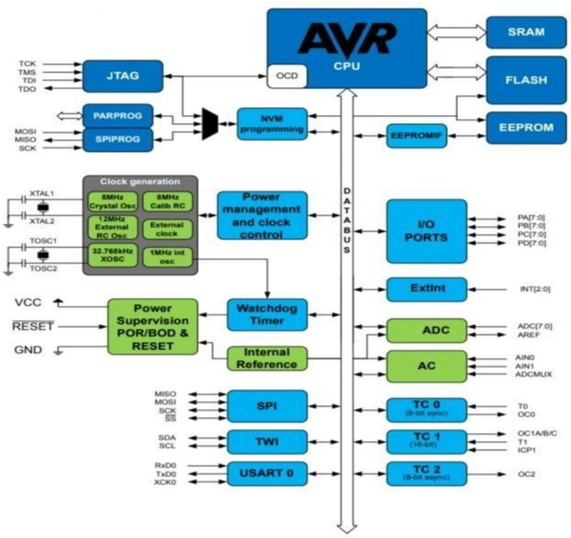

Fig.5.1 ATmega32A Microcontroller

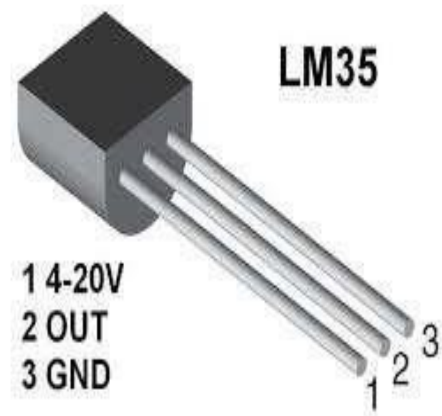

Fig.5.3 Temperature Sensor

D. Relay Board

It works on the principle of an electromagnetic attraction. When the circuit of the relay senses the fault current, it energies the electromagnetic field which produces the temporary magnetic field. This magnetic field moves the relay armature for opening or closing the connections. Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. Relays were first

used in long-distance telegraph circuits as signal repeaters: they refresh the signal coming in from one circuit by transmitting it on another circuit. Realys were used extensively in telephone exchange and early computers to perform logic operations.

Fig. 5.4 Relay Board

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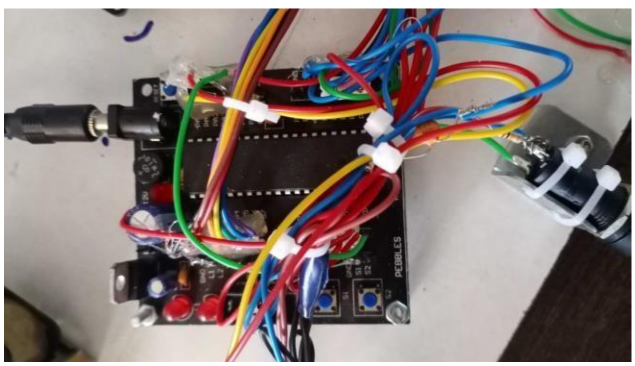
HARDWARE SETUP

The prototype of the smart drying system is successfully developed involving a few typical process which helps in the future growth of the industry. The quality of the power used in the industry will be stable and controlled. The significant impact that common cause failures can have on the reliability and safety of a system comprising redundant components is widely acknowledged.

These common cause failures can significantly endanger the benefits of the redundancy which is seen as the main principle upon which safety systems design is based. Thus, consideration of common cause failures is one of the most challenging and critical issues in the probabilistic safety assessment (PSA). This is especially emphasized within PSA fault tree modeling of safety systems within nuclear power plants.



FUTURE WORK & CONCLUSION

The proposed system was implemented and then installed for a fault to monitor the environmental conditions like temperature and pressure. By using this system it is easy for the users to control the field through this method. This system can monitor and control the field continuously and accurately which will reduce human error. For future developments, it can be enhanced by developing this system for large acres of land. Functionalities like scheduled manual override can be added, camera monitoring.

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