CHAPTER 2

LITERATURE REVIEW

2.1   Flame System: Automating Electrical Failure Mode & Effects Analysis (FMEA)

It is well known that FMEA is both tedious and time consuming so much and, that an FMEA analysis on the design of a system is often only completed after a first prototype has been constructed. This situation can lead to time, effort and money being wasted. Automating the FMEA process will improve the speed and consistency with which an FMEA analysis can be performed. The Flame system aims to provide engineers with knowledge based system which is capable of performing automated FMEA. At present, we are concentrating our efforts on electrical design FMEA, however mechanical and software FMEA will be the subjects of future study. The input to the Flame system consists of a physical description of a particular circuit and a description of that circuit's functionality. The output from Flame will be a complete (or near complete) FMEA form which can be checked, annotated and signed off by an engineer. The Flame system demonstrates that it is indeed possible to provide engineers with a means of performing automated electrical FMEA [1].

2.2   A New Wide-range Reactor Power-measuring Channel

The power range channels of nuclear reactors are linear, which cover only one decade, so they do not show any response during the startup and intermediate range of the reactor operation. So, there is no prior indication of the channels during startup and intermediate operating ranges in case of failure of the detectors or any other electronic fault in the channel. A new reliable nuclear channel has been developed for reactor power measurement, which can be programmed to work in the logarithmic mode during startup and intermediate range of operation, and as the reactor enters into the power range, the channel automatically switches to the linear mode of operation. The log-linear mode operation of the channel provides wide-range monitoring, which improves the self-monitoring capabilities and the availability of the reactor. The channel can be programmed for logarithmic, linear, or log-linear mode of operation. In the log-linear mode, the channel operates partially in log mode and automatically switches to linear mode at any preset point. The channel was tested at Pakistan Research Reactor-1 (PARR-1), and the results were found in very good agreement with the designed specifications. This paper presents design and construction of the channel and field test results [2].

2.3   High Current Arc Accidents In Superconducting Magnets

Experimental data on electric high-current arcs that took place during the tests of superconducting coils for tokomak T-15 are analyzed. Possible locations in magnet system components where circuits shortened with arcs may originate are identified. Models used for numerical simulation of arc discharges in coils and feeding lines are described. Possible arc development scenarios are analyzed. Accident consequences for different scenarios are estimated [3].

2.4   Current Practice for Applications of Atmospheric Monitoring Systems In Underground Coal Mines

The utilization of computer based monitoring systems for fire detection in underground coal mines has grown significantly in the past seven years. In 1984, an annual survey identified a total of 38 systems being used in U.S. underground coal mines, while a 1990 survey indicated the number has risen to 112. The applications for mine monitoring have also changed according to the annual surveys. From April 24 to June 21, 1990, investigations were conducted by personnel of the Ventilation Division, Pittsburgh Health Technology Center, in cooperation with Coal Mine Safety and Health, concerning the installation and operation of Atmospheric Monitoring Systems in underground coal mines. These investigations were conducted to gather information concerning the ability to detect fires and heating, false and nuisance alarm frequencies, information related to system maintenance, and information related to employee training on system operations. This paper addresses current applications of the systems, fire and heating identification rates, application of systems in dieselized coal mines, system maintenance, and employee training requirements. While deficiencies were identified in some applications, results of the studies and survey indicate the use of atmospheric monitoring systems can be effective in identifying mine fires and heating [4].

2.5   Intelligent System for Automatic Fire Detection In Forests

The use of smoke-analysis is described for fire detection by means of standard TV cameras. The smoke detection technique is given and a method to obtain a suitable description of the scene is discussed. The 'intelligent' part of the system is described and the methods and heuristics to speed-up the decision process are covered. The sub-system devoted to the translation of the sensor data into a form suitable for logic manipulation is presented.

2.6   Burning Down The School...The Lessons We Don't Learn Can Hurt Us

Between 1982 and 1986, there was an annual average of 11,100 structure fires in educational properties in the United States. These fires resulted in 3 civilian deaths, 236 civilian injuries, and an estimated average direct property loss of $95.7 million per year. Almost half - 49.7 percent - of these fires were incendiary or suspicious in nature. This article presents a brief look at these structural fires, discussing where they start, automatic detection and suppression systems, types of schools, costs, and other aspects of the subject [6].

2.7   A Microprocessor Based Bus Relay Using A Current Transformer Saturation Detector

A microprocessor based bus protection scheme is presented. It uses a novel technique to overcome the problem of current transformer saturation. The protection algorithm uses a combination of the percentage differential principles and the phase comparison technique. With a sampling rate of 1440 Hz (24 samples/cycle on a 60 Hz system) a realistic bus is considered for algorithm testing. With the incorporation of this saturation detector, the relay can yield a correct trip/block decision for either an internal or an external fault in the presence of current transformer saturation within one cycle. In the best case, this protection scheme can give a trip/block decision in a quarter cycles. Simulation results show that the saturation detection algorithm and the hybrid bus protection algorithm (using percentage differential and phase comparison principles) are simple, efficient, and accurate.