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A Methods of Supervision, Fault Detection and Fault Diagnosis with Reliability, Safety and Improved Efficiency

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Abstract: Fault detection and isolation consists basic building blocks that support such systems through the development of fault diagnostic methods, intelligent systems based approaches and sensor based machine monitoring system architecture, embedded and distributed. The protection system relays and auxiliary relays also provided signals to alarm and annunciation system. A set of annunciation windows are provided on control panels for each fault clearing relay with accept, test and reset facility through push buttons
Keywords: SPDT-Single pole double throw relay.

I. INTRODUCTION

Today all instrumentation system pertaining to industrial process controls as well as domestic application involve automatic fault finding facility. This facility detects the faulty condition of the system and draws operator's attention towards it enabling him to take suitable remedial action to ensure proper operation of the system. The main purpose of all FDI method is to monitor the system operations and in case of faults accommodate the source of faults so that timely corrective actions are taken.
Fault detection simply involves a decision based on the monitored data as to whether there is a fault or the system is running normally. Fault isolation is then executed to identify the type and location of a fault after the fault detection has triggered an alarm so that corrective actions can be made. Advantages-

A. Versatility

Microcontroller based fault detection and isolation employ various types sensors. This facility provides different choices to users. Different type of sensors can be used to give input to available unit. This facility is available because of signal comparing is done outside the microcontroller. Thus any type of signal can be given as input to the circuit, be its temperature, pressure, humidity, etc. Proper output with respect to input can be provided to LEDS. RELAYS are used to isolate the system according to input signal.

B. Wide applications

Various sensors can be used to give different types of input signals to circuit. This makes.
possible for the circuit to be used for many applications. Using temperature sensor, the temperature changes can be detected and necessary action can be take on detection of temperature outside set limits.

C. Application

Security against thept: - In our country we are facing the acute problem of electricity theft, due to which electricity board faces economic losses. With the help of microcontroller based fault detection and isolation we can limit the current flow in distribution line for a given load. When load increases, relatively large current is drawn by load. The sensor circuit will detect the extensive current flow in the distribution line as a fault if the relay is connected to audio visual alarm. It will activate the warning or if the relay is directly connected to a target line, the relay will operate and isolate the line drawing excess current, thus switching off the excess load.

II. DISCRIPTION

The AT89C52 is a low-power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density non volatile memory technology and is compatible with the industry-standard 80C51 and 80C52 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non volatile memory programmer. By combining a versatile 8-bit CPU with

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Flash on a monolithic chip, the Atmel AT89C52 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control application

The ADC0809 data acquisition component is a monolithic CMOS device with an 8-bit analog-to-digital converter, 8-channel multiplexer and microprocessor compatible control logc. The 8-bit A/D converter uses successive approximation as the conversion technique. The converter features a high impedance chopper stabilized comparator, a 256R voltage divider with analog switch tree and a successive approximation register. The 8-channel multiplexer can directly access any of 8-single-ended analog signals.

The device contains an 8-channel single-ended analog signal multiplexer. A particular input channel is selected by using the address decoder. Table 1 shows the input states for the address lines to select any channel. The address is latched into the decoder on the low-to-high transition of the address latch enable signal.

Liquid Crystal Display's come in various shapes and sizes that can support different numbers of text and different numbers of characters per row. LCD are an unavailable aid to programming, as well as offering a visual interface to the outside world of humans. However, they do not tend to use up precious pins on the microcontroller which makes them prohibitive on smaller devices.

The LM741 series are general purpose operational amplifiers which feature improved performance over industry standards like the LM709. They are direct, plug-in replacements for the 709C, LM201, MC1439 and 748 in most applications.

III. WORKING

Initially user has to set the values of current through switches sw1 and sw2 according to the requirement. These switches are connected as external interrupt INT0 and INT1 of micro controller (pin 12 and 13).

After pressing START switch connected to port 3.5 (pin 15) of micro-controller, system starts working. If no bit found at pin 15, micro controller sends SOC signal to ADC through pin 14 at the same time micro controller sends a low signal to ADC through pin 10 so as to select channel ‘0’ (zero) to this channel of ADC a temperature sensor is connected this after sensing this temperature it is converted into digital form and this digitized value of temperature is fed to the micro-controller through port 1. Micro-controller reads this value and stores it into a register.

After completing this operation micro controller re-sends the high signal through pin 10 to ADC so as to select channel 1, to this channel a current transformer (CT) is connected to ADC through I/V and precision rectifier for providing change in current in DC voltage form.

Thus these digitized values of voltage is stored into another register of micro controller.

Now micro controller compares these values of temperature and current stored in register with the value set initially by the user.

If these values are equal to or less than the set value then micro controller will not take any action.

But if the value is greater than the set value then micro controller will send high signal at port 2.0 or 2.1 (pin 21,22) as per the fault detected (if temp exceeds then at 2.0 and if over current then at 2.1).

At the same time micro controller will send respective information on LCD display provided and will raise a signal at port 2.2 (pin 23) so as to ring up the hooter.

To acknowledge the fault attendant has press the ACK key connected at port 3.1(pin 11) this action of user will be sensed by micro controller will stop hooter.

After clearing the fault user has to press start button to start system once again. This process will go on in a continuous fashion

Tc9400 can be used as voltage to frequency converter. the converted frequency will fed to microcontroller as clock frequency for the operation of microcontroller.

IV. RESULT

Hardware was tested initially after assembly as mentioned here under

Current Testing : The halogen lamp was connected to 230VAC power supply through a Variac of 12 Amperes. The phase conductor of power supply was passed through the Current Coil. The current was set at an interval of 1 Ampere starting from 1 Ampere. Here also, a Tong Tester was used for measuring the current passing through the conductor. The hardware responded for the currents upto 10 Amperes.

V. CONCLUSSION

Most manufacturing processes involve several process variables which interact with one another to produce a resultant action on the part. A fault is said to occur when any of these process variables deviate beyond their specified limits. An alarm is triggered when this happens. Low cost and less sophisticated detection schemes based on threshold bounds on the original measurements (without

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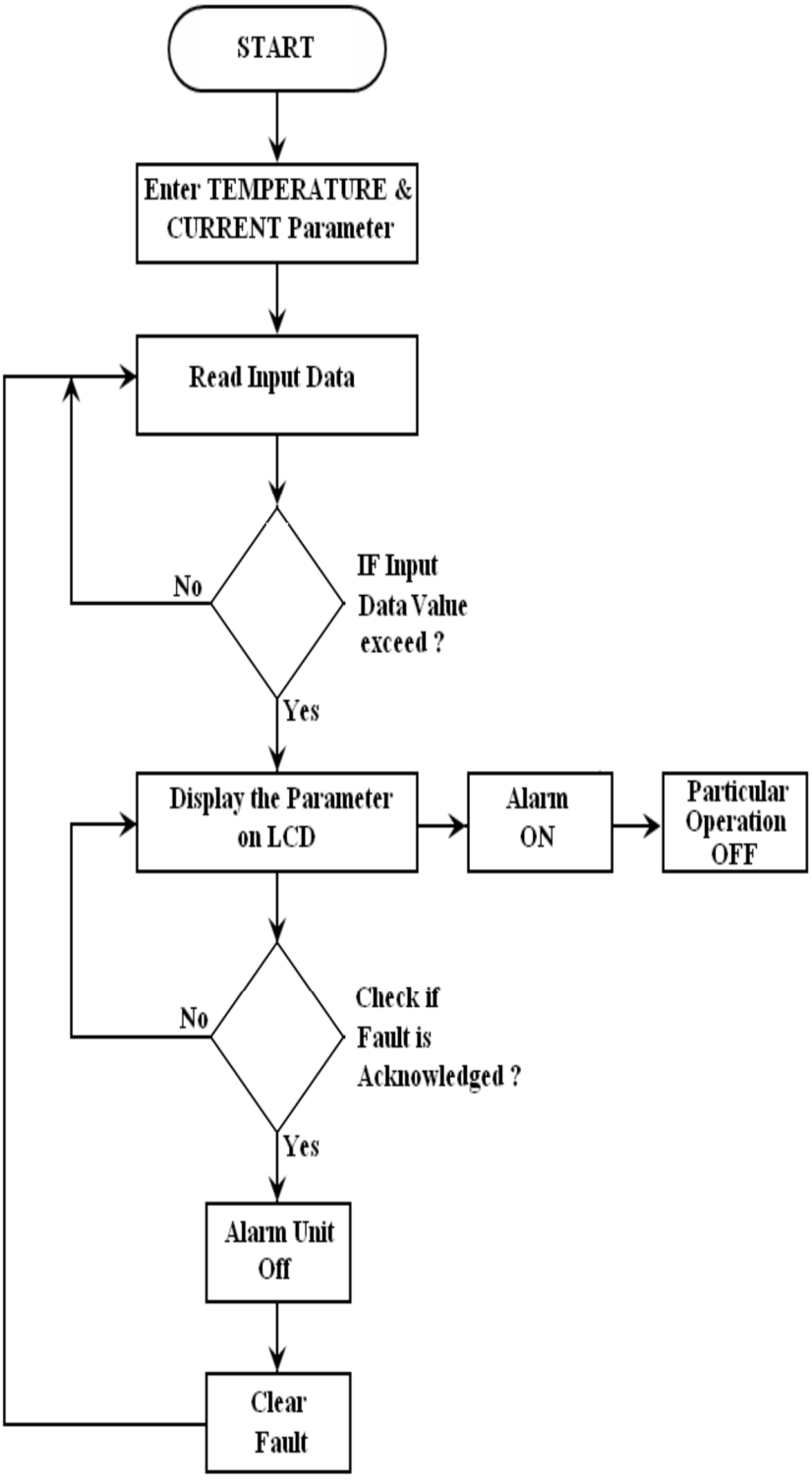
feature extraction) often suffer from high false alarm and missed detection rates when the process measurements are not properly conditioned. They are unable to detect frequency or phase shifted fault signals whose amplitudes remain within specifications. They also provide little or no information about the multiplicity (number of faults in the same process cycle) or location (the portion of the cycle where the fault was detected) of the fault condition.

Flow chart of operation



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Volume 5 Issue VI, June 2017
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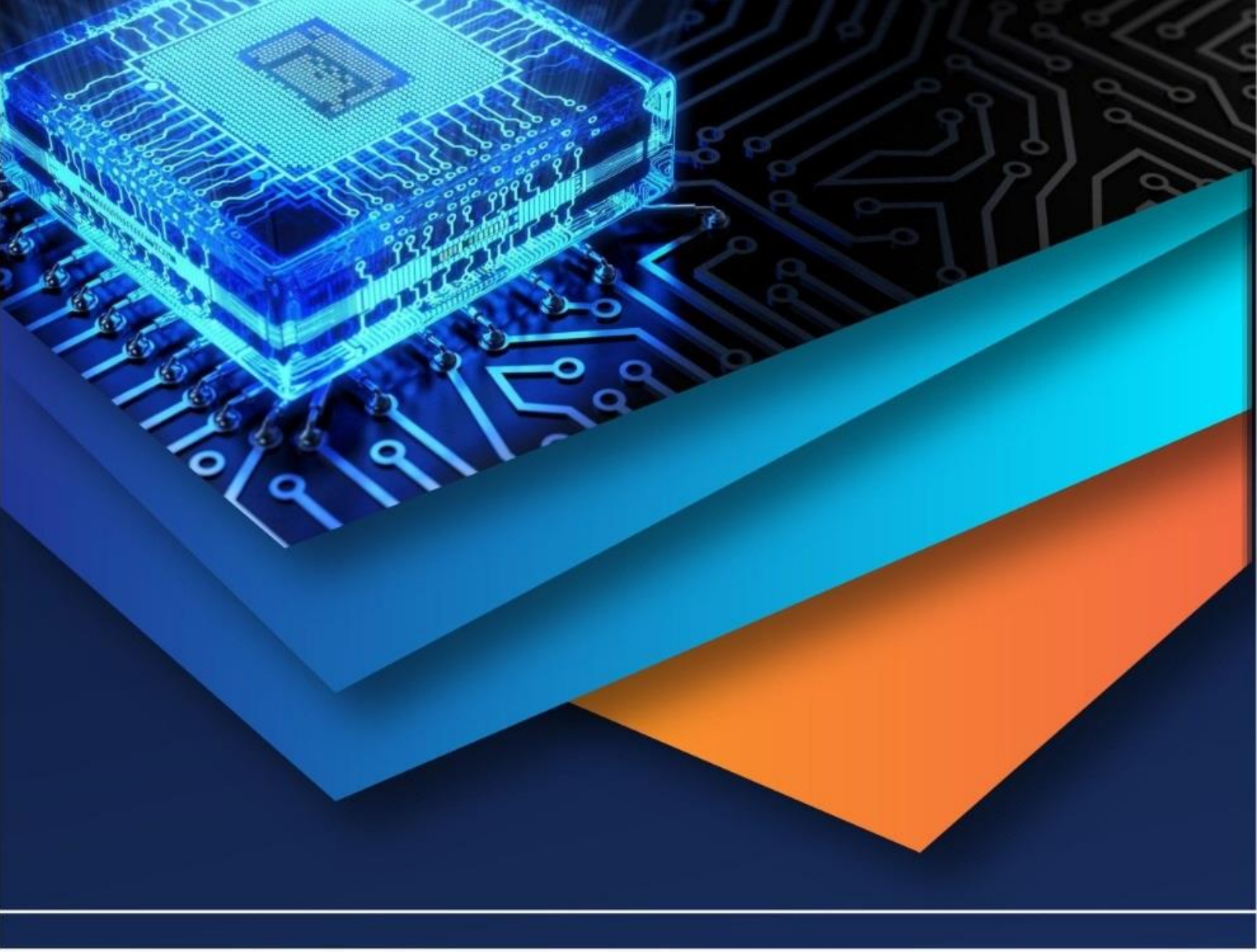

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