FAULT ANALYSIS IN MULTI INVERTER

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ABSTRACT

Electricity has become the most sought after amenity for all of us. Gone are the days when electricity would be only limited to cities. It is now reaching to every distant parts of the world. So we have now a complex network of power system. This power is being carried by the transmission lines. These lines travel very long distances so while carrying power, fault occurring is natural. This fault damages many vital electrical equipments like transformer, generator, and transmission lines. For the uninterrupted power supply we need to prevent these faults. So we need to detect faults within the shortest possible time. Microprocessors and microcontroller based systems used for these fault detection have been advancing rapidly.

In our project we have designed a system which consists of two inverters. These inverters can be provided with power supply either directly through 3 phase supply or through a step down transformer. Usually the inverter provides uninterrupted supply to the system there are also cases where the inverter shuts down due to unidentified faults. During this time the secondary inverter connected will automatically get connected and helps to run the system as it did before.

Keywords- Relay switch, Multi inverter.

I. INTRODUCTION

Microcontrollers are the heart of embedded systems. There are various types of embedded systems for different applications. The applications of embedded systems range from controlling small dc motors to use in industrial automation. When it comes to controlling high voltage devices, microcontrollers often depend on relay to drive them. Relay act as a bridge between the low power microcontrollers and high voltage devices.

II. METHODOLOGY

It will be explaining about, how the path of transmission of power changes during any interruption in its regular path and also helps to understand better using the proteus software. To sum up we have posted the picture of both the hardware and software model of our project.

III. WORK DONE AND STRUCTURAL ANALYSIS

We are doing the model with 5V supply condition means all the devices i.e. Microcontroller, LCD are working on 5V supply. We have given also 5V as the voltage reference. We have fed a continuous analog sinusoidal voltage signal to the ADC. ADC performs sampling, quantization and encoding of the analog signal thus producing digital binary data. This binary output digital data is obtained from the 8 output pins of the ADC. The output from the ADC is fed into the port 1 of the microcontroller through a voltage divider circuit. This further stabilizes the voltage. The output of the microcontroller is fed into the LCD from the port 0 through external pull-up resistor pack of 8 resistors each of 10KΩ and also to a lamp. In the same way an other ADC device is also connected to the lamp.
IV. STEPS

1) Analog signal (current) is obtained from the transmission lines and is reduced by the current transformer.

2) Then the current signal is transformed to voltage signal by using current sensor circuit.

3) The analog voltage signal is then converted to digital binary signal using ADC.

4) The fault occurring is found out and displayed on the LCD.

5) In Microcontroller to which ADC is interfaced, program is written to compare the input.

6) Output is displayed in LCD.

![Fig. circuit diagram](image)

V. INTERNAL CIRCUIT DESIGN

The microcontroller will send a Logic 1 (HIGH) signal to Pin 7, which is connected to the base of the transistor. As a result, the transistor is switched ON. As one of the coil terminals of the relay is connected to the collector of the transistor (which is switched ON), a conduction path between the supply, coil and collector – emitter terminals of the transistor is formed. Because of this, the coil in the relay gets energized and acts as an electromagnet.

As a result, the moving contact of the coil, which was initially in the Normally Closed (NC) position, will be attracted towards the electromagnet and moves to the Normally Open (NO) position. This action will complete the motor circuit and hence, the motor starts rotating.

VI. APPLICATION

In this project, an Arduino control of Relay is explained using a high current DC motor. As mentioned earlier, the circuit can be extended AC systems. Such circuits can be used to implement AC motor control, home automation, remote control of appliances etc. This circuit can also be implemented in high power DC systems like motors, servos etc.

VII. COMPONENTS

- Stepdown transformer
- Arduino UNO
- Power supply module
- Inverter
- Relay unit
- Temperature sensor
- Lamp

VIII. PIN CONFIGURATION OF LCD
<table>
<thead>
<tr>
<th>PIN NO.</th>
<th>FUNCTION</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ground(0V)</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>Supply Voltage (5V)</td>
<td>Vcc</td>
</tr>
<tr>
<td>3</td>
<td>Contrast Adjustment through a Potentiometer</td>
<td>Vee</td>
</tr>
<tr>
<td>4</td>
<td>Selects Command Register when Low, and Data Register when High</td>
<td>Register Select</td>
</tr>
<tr>
<td>5</td>
<td>Low to Write to a Register, High to Read from the Register</td>
<td>Read/Write</td>
</tr>
<tr>
<td>6</td>
<td>Sends Data to Data Pins when a High to Low Pulse is Given</td>
<td>Enable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the Port/PIN No.</th>
<th>Connected From</th>
<th>Connected To</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P0.0 Microcontroller</td>
<td>LCD pin no. 7</td>
<td>(D0)</td>
</tr>
<tr>
<td>2</td>
<td>P0.1 Microcontroller</td>
<td>LCD pin no. 8</td>
<td>(D1)</td>
</tr>
<tr>
<td>3</td>
<td>P0.2 Microcontroller</td>
<td>LCD pin no. 9</td>
<td>(D2)</td>
</tr>
<tr>
<td>4</td>
<td>P0.3 Microcontroller</td>
<td>LCD pin no. 10</td>
<td>(D3)</td>
</tr>
<tr>
<td>5</td>
<td>P0.4 Microcontroller</td>
<td>LCD pin no. 11</td>
<td>(D4)</td>
</tr>
<tr>
<td>6</td>
<td>P0.5 Microcontroller</td>
<td>LCD pin no. 12</td>
<td>(D5)</td>
</tr>
<tr>
<td>7</td>
<td>P0.6 Microcontroller</td>
<td>LCD pin no. 13</td>
<td>(D6)</td>
</tr>
<tr>
<td>8</td>
<td>P0.7 Microcontroller</td>
<td>LCD pin no. 14</td>
<td>(D7)</td>
</tr>
<tr>
<td>9</td>
<td>P1.0 Microcontroller</td>
<td>ADC pin no. 21</td>
<td>(D1)</td>
</tr>
<tr>
<td>10</td>
<td>P1.1 Microcontroller</td>
<td>ADC pin no. 20</td>
<td>(D2)</td>
</tr>
<tr>
<td>11</td>
<td>P1.2 Microcontroller</td>
<td>ADC pin no. 19</td>
<td>(D3)</td>
</tr>
<tr>
<td>12</td>
<td>P1.3 Microcontroller</td>
<td>ADC pin no. 18</td>
<td>(D4)</td>
</tr>
<tr>
<td>13</td>
<td>P1.4 Microcontroller</td>
<td>ADC pin no. 8</td>
<td>(D5)</td>
</tr>
<tr>
<td>14</td>
<td>P1.5 Microcontroller</td>
<td>ADC pin no. 15</td>
<td>(D6)</td>
</tr>
</tbody>
</table>
X. NEED FOR PROTECTION

1) Fault introduces serious danger on both electrical apparatus and people. Therefore we have to protect ourselves as well as the equipment from these faults. Without it, the power system will fail in no time.

2) Various issues need to be protected are: Safety for People.

3) Equipment safety: Keeping equipment safe from various electrical abnormal and faulty conditions.

4) Power system stability: Maintaining a continuous and reliable power supply.

5) Our safety interlock switches are a means of safeguarding that monitors the position of the gate.

6) You can use them to shut off power.

7) Control personnel access and prevent a machine from starting when the guard is open.

XI. SOFTWARE IMPLEMENTATIONS

PROTEUS: Proteus design suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

1) It is a software suite containing schematics, simulation as well as the PCB designing

2) ISIS is the software used to draw schematics and simulate the circuits in real time.
3) The simulation allows human access during the run time, thus providing real time simulation.

![Diagram of PROTEUS Overview](image)

The necessary parameters values are set in the respective components. After the program being fed into the connected diagram the run button is pressed. The programs runs correctly if there is no error init. We can do the simulation and check if the program coded and the circuit designed and correct them. Simulation is necessary before designing the real time circuit.

**XII. OUTPUT AND CONCLUSION**
The temperature and vibration sensor are connected to monitor the condition of the motor. If they exceed a certain limit then it is advisable to switch off the power supply. This will increase the lifespan of the motor. The proposed system is simple and easy to design and can be initiated in real time system. Since fault detection is an important factor it should be employed in every system that is designed. We have been able to successfully incorporate the detection of fault by using ADC and Microcontroller by taking both the input voltage as DC and AC Sinusoidal. It is observed that when the current value obtained from the secondary current value of the current transformer is greater than the preset value of the relay then the fault is detected by the microcontroller.

The result is displayed on the LCD screen. We can set different trip time delays using definite time characteristics of the relay. By this project it can be ensured faster detection of faults than the electromechanical relay on the power lines and their advanced analysis can be studied from the recorded data by the microcontroller.

REFERENCES