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ANALYSIS OF POWER QUALITY PROBLEM IN THREE PHASE SYSTEM USING MICROCONTROLLER

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ABSTRACT

The main objective of this research is to enhance the dependability of electrical systems through the integration of a microcontroller. This microcontroller is employed to identify and address power quality issues in three-phase systems. Voltage sags, swells, interruptions, and harmonic distortions are among the power quality problems that can lead to inefficiencies and damage electronic equipment.

Keywords - Power Quality Problem, LCD display, Sag, Swell, Interruption, Unbalance.

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I. INTRODUCTION

These days, power quality issues have turned into a critical worry for the power frameworks research local area because of the expanded weakness of electrical gear, going from PCs to robotized producing processes. In an electrical organization, different power unsettling influences like hang, enlarge, unbalance, interference, symphonious twisting, gleam, and transient have been seen to unfavorably affect client gadgets.

The order of force quality issues in a three-stage framework can be founded on the nature and qualities of these unsettling influences. By using a microcontroller-based framework for power quality checking and order, constant examination and opportune reactions can be accomplished. Voltage hangs, grows, music, and different aggravations in three-stage frameworks can disturb tasks and lead to monetary misfortunes.

To successfully handle power quality issues in a three-stage framework, the usage of microcontrollers and high-level checking and control frameworks has become progressively pervasive. Microcontrollers have the ability of getting ongoing information, performing examination, and carrying out control measures, making them fundamental apparatuses in distinguishing and relieving power quality issues. This article means to present the utilization of microcontrollers in the arrangement of force quality issues in three-stage frameworks.

II. LITERATURE SURVEY

S. Asha Kiranmai (2017) Hardware for classification of power quality problems in three phase system using Microcontroller, Cogent Engineering

The legitimate order of force quality issues in a 3-stage framework utilizing microcontrollers is a fundamental figure guaranteeing the reliability and viability of electrical organizations. Power quality worries, for example, voltage lists, enlarges, sounds, and interferences, can adversely affect delicate electronic hardware. Microcontrollers assume an urgent part continuously checking and order of these

issues. Voltage hangs, which include a concise lessening in voltage, can prompt gear glitches, while enlarges, then again, can cause overvoltage and harm. Sounds, which go astray from the key recurrence, can bring about contorted waveforms that influence the presentation of associated gadgets.

A. Jaya Laxmi (2017) Hardware for classification of power quality problems in three phase system using Microcontroller, Cogent Engineering

Interferences, which are impermanent breaks in the power supply, can upset basic activities. Furnished with detecting and handling capacities, microcontrollers empower the quick ID and order of these power quality issues. This order considers focused on and convenient restorative activities, eventually improving the general dependability of the power framework. Executing a microcontroller-based framework for power quality grouping is fundamental in keeping a steady and excellent electrical stockpile in modern and business settings.

III. METHODOLOGY

1) A precise methodology is utilized to characterize power quality issues in a 3-stage framework utilizing a microcontroller.
2) Sensors associated with the microcontroller persistently screen voltage and current waveforms.
3) Signal handling strategies are used by the microcontroller to examine varieties and deviations from ideal sinusoidal waveforms.
4) Common power quality issues like voltage droops, grows, music, and interferences are distinguished in view of predefined limits.
5) The microcontroller triggers proper reactions or alarms, like actuating repaying gadgets or telling administrators, in the wake of arranging the power quality issue.

IV. LIST OF COMPONENTS USED

Hardware used:
Microcontroller (PIC18F452) -

Voltage Sensing Unit -

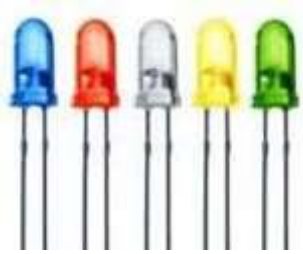
Relay -

Buzzer -

Potentiometer -

LCD Display -

LED's -



V. SOFTWARE DETAILS

The classification of power quality problems in a 3-phase system using a microcontroller involves utilizing software to analyze and identify issues such as voltage sags, swells, harmonics, and interruptions. The microcontroller processes real-time data from sensors, employing algorithms to distinguish and categorize the specific power quality problem. Through this software-driven approach, the system can effectively classify and respond to disturbances, ensuring optimal power quality. This enhances the reliability and efficiency of the 3-phase power system, contributing to stable and consistent electrical performance.

Software used: The program for microcontroller is coded in C language.

VI. SYSTEM ARCHITECTURE

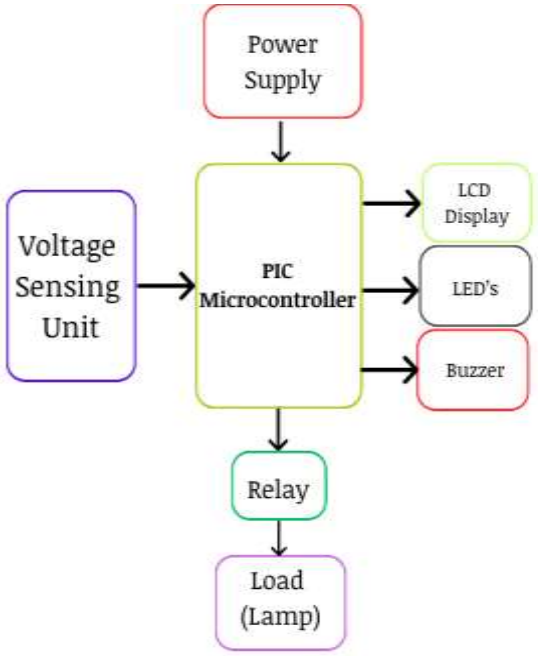


Fig. Block diagram

A framework design that beginnings with the use of sensors to gauge voltage, current, recurrence, and music. The gathered information is then handled by the microcontroller, which utilizes calculations for waveform, consonant, and recurrence investigation. These calculations contrast the information against predefined edges with recognize any issues. Whenever issues are recognized, they are speedily conveyed progressively through show interfaces. Besides, this framework design may likewise incorporate extra elements, for example, information logging for additional investigation and security instruments to guarantee gadget wellbeing during power unsettling influences. By coordinating sensor connecting, information handling, correspondence, and beneficial highlights, this engineering really oversees power quality in three-stage frameworks through microcontroller-based arrangements.

Working:

1)Advanced electronic gadgets are used in this cycle to screen and examine electrical boundaries, ensuring the constancy of force supply. The microcontroller, a minimized coordinated circuit, processes information from sensors that action voltage, current, and recurrence in the 3-stage framework.

2)The microcontroller utilizes calculations to characterize power quality issues, recognizing various unsettling influences like voltage droops, enlarges, sounds, and glimmer. These calculations dissect the gathered information continuously, empowering brief recognizable proof of irregularities.

3)Once a power quality issue is distinguished, the microcontroller starts suitable restorative measures or cautions, limiting the effect on associated gear. By associating with sensors and actuators, the microcontroller considers quick reactions to voltage changes or recurrence varieties, accordingly upgrading the general solidness of the power framework.

4)This shrewd control framework assumes an essential part in keeping a solid and effective electrical stockpile, shielding delicate electronic gadgets from potential harm brought about by power quality issues.

5)Moreover, the high level electronic contraptions utilized in this cycle can likewise consolidate correspondence modules, considering remote observing and control of the power framework. This element empowers ongoing information transmission to focal control habitats or upkeep faculty, working with proactive support and convenient intercessions to resolve any arising issues.

6) Additionally, the microcontroller can be modified to carry out prescient support calculations, which break down authentic information to expect likely disappointments or debasement in power quality, empowering precautionary activities to forestall disturbances or harms to the electrical framework.

7) Moreover, coordination with savvy network advancements can improve the proficiency and flexibility of the power framework by empowering request side administration systems, for example, load shedding or pinnacle shaving, to upgrade asset usage and relieve matrix blockage during times of appeal or supply vacillations.

VII. HARDWARE DESIGN

Fig. Smart glove Project

In electronic frameworks, a directed DC power supply circuit is crucial for convert the air conditioner input voltage into a steady and proper DC voltage. This change is important to drive up different gadgets, with the normal DC voltages commonly going from 3 to 30 V DC. Among the proper kinds of DC voltages generally utilized are 5, 9, 12, 15, and 18V. To accomplish a managed power supply, an air conditioner contribution of 230 V, 1-stage is given to a stage down transformer.

This transformer lessens the voltage to 12 V AC, which is then taken care of into a diode span rectifier. The rectifier successfully changes over the air conditioner supply into a DC supply. The subsequent DC supply is then gone through a channel, which effectively dispenses with any waves or changes in the unidirectional stockpile from the rectifier.

The sifted DC supply is then coordinated to 7805 controllers, which guarantee that the voltage is directed at a consistent 5 V. This controlled voltage is then used to supply power the PIC Microcontroller, giving it a steady power.

VIII. RESULT ANALYSIS

Condition	Buzzer	Red	Yellow	Blue
Normal	Off	2.53	2.53	2.54
Sag	On	1.63	2.13	1.20
Swell	On	3.88	4.35	3.17
Interruption	On	0.02	0.05	0.08
Unbalance	On	3.33	2.95	3.07

Table: Reading Table

Fig. Normal Condition

Fig. Sag Condition

Fig. Swell Condition

Fig. Interruption Condition

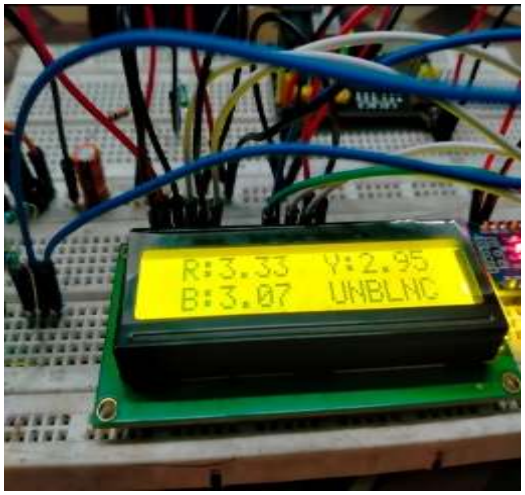


Fig. Unbalance Condition

IX. CONCLUSION

The created equipment framework successfully distinguishes and groups different power quality issues in a 3-stage framework, including typical circumstances, droops, enlarges, interferences, and unbalances. It gives obvious signs through LCD shows, drove lights, and a bell, guaranteeing simple getting it and brief activity. The framework is financially savvy, easy to use, and independent, offering a straightforward yet proficient answer for moderating power quality issues without the requirement for complex programming information or costly information procurement frameworks.

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