# MEASUREMENT AND ANALYSIS OF ENERGY PARAMETER FOR ELECTRICAL SYSTEM

# <sup>1</sup>Digvijay Gohil, <sup>2</sup>Vivek Vasavada, <sup>3</sup>Ashifiqbal Thakor

<sup>1</sup>Electronics & Communication Engineering, <sup>2</sup>Team Leader, <sup>3</sup>Assistant Professor <sup>1</sup>Vlsi & Embedded System Design, <sup>2</sup> Electronics & Communication Engineering, <sup>3</sup>Electronics & Communication Engineering <sup>1</sup>GTU PG SCHOOL, Gandhinagar, Gujarat, India, <sup>2</sup>System Level Solution, Gujarat, India, <sup>3</sup>A. D. I. T. Gujarat, India

Abstract - In order to monitoring power quality and reduce harmonics pollution of any electrical power system we need to measure certain energy parameter like RMS voltage, current, power, power factor, frequency and harmonics.

Index terms – Harmonic, power factor, monitoring, Energy parameter.

### I. INTRODUCTION -

In recent years, power electronic components add some harmonic pollution on electric power systems. The harmonic pollution flowing in the distribution network Decrease the quality of the electrical power supply. There can have several downgrade effects on the operation of the power system. So rapidly monitor incoming line current, phase voltage to provide greatest protection to other instrument or machines in industries from premature damage or system failure because of unbalance phase voltages, low power factor, frequency, harmonics, etc. After measuring certain parameters we have some useful information about system in order to increase efficiency and reduce power requirement.

## **II. OVERVIEW OF DIFFERENT ENERGY PARAMETER MEASUREMENT ALGORITHMS:-**

**1. Electrical Power Measurement Using Arduino Uno** – One implementation for power measurement done using arduino uno microcontroller (ATMega8) - multiplexer IC 4051, voltage and current sensor on lab-view software. Their wattmeter displays voltage, electric current, power Consumption, energy use, frequency of the power source, and the usage fees calculation. That can measure power between 2 to 1200 W. The proposed watt meter circuit diagram as shown in Fig 1. The only disadvantage of this implementation was that it cannot measure total harmonic distortion and three phase supply. [1]



Figure 1: Watt meter circuit [1]

**2.** Power factor metering system using Arduino - One implementation for harmonic distortion detection and power factor measurement done using arduino uno microcontroller (AT Mega 2560), ACS712 current sensor, USB, Proto board, AC to AC adapter and output display on oscilloscope - Their PF metering system display Power factor, Total harmonic distortion, voltage, current. The proposed PF metering system as shown in Fig 2. The only disadvantage of this implementation was that it cannot measure Frequency and three phase supply. [2]



- 1 Arduino Mega 2560
- 2 USB
- 3 ProtoBoard
- 4 ACS712 (Current Sensor)
- 5 AC AC Adapter Figure 2: PF Meter [2]

### **III. REVIEW TABLE:-**

Name Of Paper		Published	Development	Advantages	Disadvantages
		Year	Board		
Electrical	Power	IEEE	Arduino Uno	Measuring Parameters –	1. It cannot measure Power
Measurement	Using	2013	(ATMega8)	1. Voltage,	Factor, Frequency and
Arduino	Uno			2. Current,	Harmonics Distortion.
Microcontroller	and			3. Power.	
Lab-VIEW					
Power factor m	etering	IEEE	Arduino Uno	Measuring Parameters –	1. It cannot measure
system using Ardu	iino	2017	(ATMega256 <mark>0)</mark>	1. Voltage,	Frequency and Harmonics
				2. Current,	Distortion.
				3. Power.	
				4. Power Factor	

Table 1: Review Table

#### **IV. CONCLUSION -**

We need a single chip solution in order to measure energy parameter like R.M.S voltage, current, power factor, frequency and harmonics to analyze the real-time data of three phase power system with high accuracy.

#### REFERENCES

- [1] Fransiska, R. W., et al. "Electrical power measurement using arduino uno microcontroller and labview." *Instrumentation, Communications, Information Technology, and Biomedical Engineering (ICICI-BME), 2013 3rd International Conference on.* IEEE, 2013.
- [2] Machado, P. P., et al. "Power factor metering system using Arduino." *Power Electronics and Power Quality Applications (PEPQA)*, 2017 IEEE Workshop on. IEEE, 2017.