**A SMART FRAMEWORK FOR POWER DISTRIBUTION AND LOAD BALANCING USING ARDUINO**

**ABSTRACT**

This paper presents the design of monitoring and controlling system for different industrial loads using Arduino. The proposed model highlights the automation of loads. The proposed model is based on two important factors i.e., reliability and accuracy in its monitoring and controlling parameters. The proposed model is built on Arduino which provides a cost efficient alternative to existing solutions widely based on Programmable Logic Controller (PLC) and Supervisory Control and Data Acquisition (SCADA). When evaluated through experimental setup, the model gives results in good agreement with the simulation results in terms of efficiency and performance.

Keywords— Arduino, automation, load balancing, smart distribution.

**INTRODUCTION**

The main objective of the automated power system is that it reduces time consumption and increases efficiency of the power system through proper monitoring and control of the system. An Arduino controller collects the data from the power house and controls it according to the demand of the user. The data can be transferred through wired or wireless communications [1]. Each substation then gets the current changes in power systems that make the system complex. The electric power system is definitely the most revolutionary invention of the 20th century. Efficient and reliable power system has always been in great demand to meet the day-to-day requirements [2]. However, it is a challenging task and is a tradeoff between different factors. Power distribution systems are imposing new constraints on the substations. The projecting changes increases the demand for the increased uninterruptible power supply and power quality with direct or indirect impact on all types of manufacturers and customers in the (electrical) energy market.

**EXISTING SYSTEM**

Time to time monitoring is involved in this step. The purpose of this step is to analyze and control the outputs with respect to time. Timely vigilance increases the efficiency which generates better and stable results for the system. The current literature, to the best of our knowledge, presents load balancing and power distribution widely based on PLC and SCADA platforms which are costly. It presented a load balancing system through simulation using SCADA; however, the reported work lacks experimental validation of the simulated results. It have validated the results experimentally by designing an automatic system using PLC and SCADA but the overall system is very expensive, as PLC and SCADA systems are costly.

**EXISTING SYSTEM DISADVANTAGE**

* It is very complex process.
* Cost is higher.
* Complex to install and maintain.

**PROPOSED SYSTEM**

Arduino provides a complete package with software and hardware facility which has been incorporated to implement the proposed system. Pins of the Arduino are set for digital and analog input/output accordingly and may be interfaced with various boards and circuits. The proposed model is built on simple board and has two parts: one is the control system and the other is field zone. Both may be at different places and the systems can be monitored from both the places. Block diagram of the proposed model is shown in Fig. 1. The Arduino controls and manages the overall system functionality. The power given to Arduino is of 5V and the supply to the feeders can be taken from one of the available sources namely generator, wind, solar or local distribution. The preferred supply in this case is 220 V from the local distribution. Main components of the overall model are explained below. Potential Transformer: A potential transformer (PT) of 220/24V is used and a digital supply is made with two output pins: a 5V DC and a 24V DC. The two different output pins are required because the input to Arduino must be of 5V DC and the magnetic contactors have input of 24V DC. We use step down PT of 220/24 ratio, as the transformers basic operation is to change the voltage level from one to other level. Contractor: Magnetic contactors are used for the switching purpose to connect and break the circuit. The contactors used are DC contactors which operate on 24V DC and the supply is given to contactors from a DC supply. A total of eight contactors are used such that each load has its own contactor. For each feeder, there are two contactors, one for balancing load and one for control system protection.

**PROPOSED SYSTEM ADVANTAGE**

* System is able to provide the status of different feeders with respect to changes in different loads namely domestic, municipal, commercial, and industrial load.
* The model is able to provide automatic operation of the distribution as well as load balancing of the power system.

**HARDWARE REQUIREMENT**

* Arduino
* CT sensor
* Transformer
* Relay
* Loads
* LCD

**SOFTWARE REQUIREMENT**

* Arduino IDE

**BLOCK DIAGRAM**

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