LOAD CURRENT MONITORING & CONTROLLING FOR INDUSTRIAL APPLICATIONS USING IOT

Manasi Patil[1], Sudershan Dolli[2], Ranjeet God[3] , Omkar Navande[4]

Department of E&TC. SKNCOE, SPPU, Pune.

Abstract— **Technology development in Industrial application is rapidly growing with IoT based application for fast and timely response to avoid delays to react on equipment failure. This paper gives the brief idea about the design of IoT technology to monitor and diagnose the load connected to AC voltage by measuring and logging the load current data. Current Transformer is used as sensor to measure the load current and the signal is further processed by Node MCU / ESP8266 device or Arduino. It can be easy to detect the abnormal behaviour of the load by doing data analysis of the data measured and the data captured in healthy condition of the device or electrical load. This will help to reduce the unexpected downtime of the system because of sudden failure of the Industrial devices connected as load and preventive maintenance can be carried out in timely manner to ensure trouble free function and >95% of utilization of the system.**

Keywords: *Load Current, IoT technology, Current transformer, Preventive maintenance, Downtime, Data logging, Dataanalysis.*

I. INTRODUCTION

Failure of industrial devices including running motors creates a big trouble in most of the Manufacturing, Production and Process Industries. In addition, it takes lot of time for fault finding, analysis and parts replacement process makes huge loss to the company. Load current is one of the critical parameters for monitoring the health of the motor or electrical load, however typical process of load current measurement relies too much on the human factor and has limitations. This can be avoided by implementing the continuous load current monitoring system which can detect the abnormal situation at the early stage of the failure and preventive action can be taken to avoid the major breakdown. So, we propose themethod of IoT based Load Current Monitoring System and the purpose of this idea is to designand manufacture the hardware to measure the load current of rotating machines and electrical equipment with the ability to share it on the internet in order to prove the concept of the proposed solution. The current incident to control and monitor the motor from a detached place of residence or activity exists based on Internet of Things. This plan exists smooth to control and is well trustworthy. To prevent the equipment failure by just monitoring the known parameters is the reliable solution. In case of rotating machines this diagnostic means maybe top-secret into two types of engine physical defect: broken rotor bars and winding short circuits. The experimental results show that the logging of current parameter exists a powerful feature to prevent the machine from early failure or to identify the defects in early stage. Adding IoT technology brings more flexibility in monitoring and controlling the devices from remote location without physical intervention and reduced manpower and improved production efficiency.
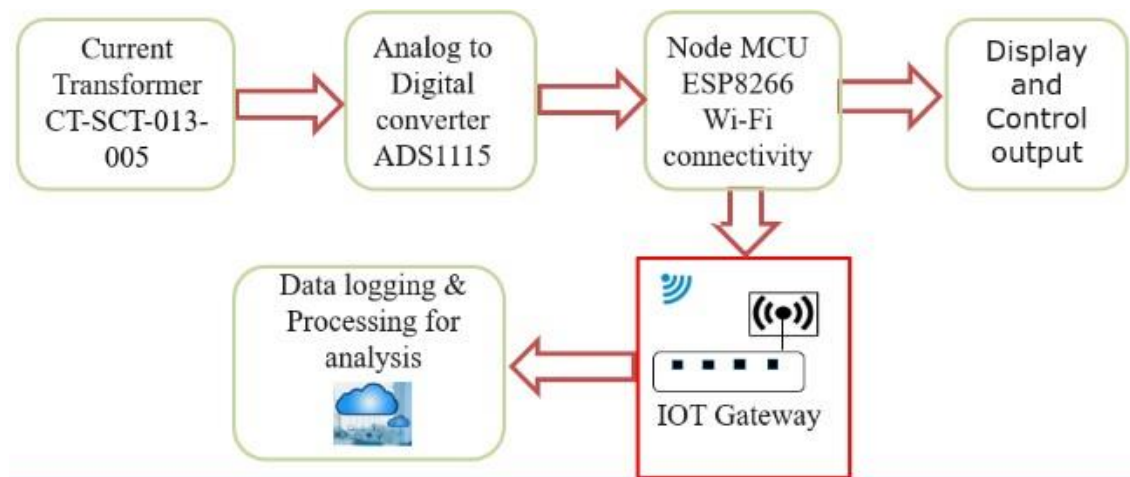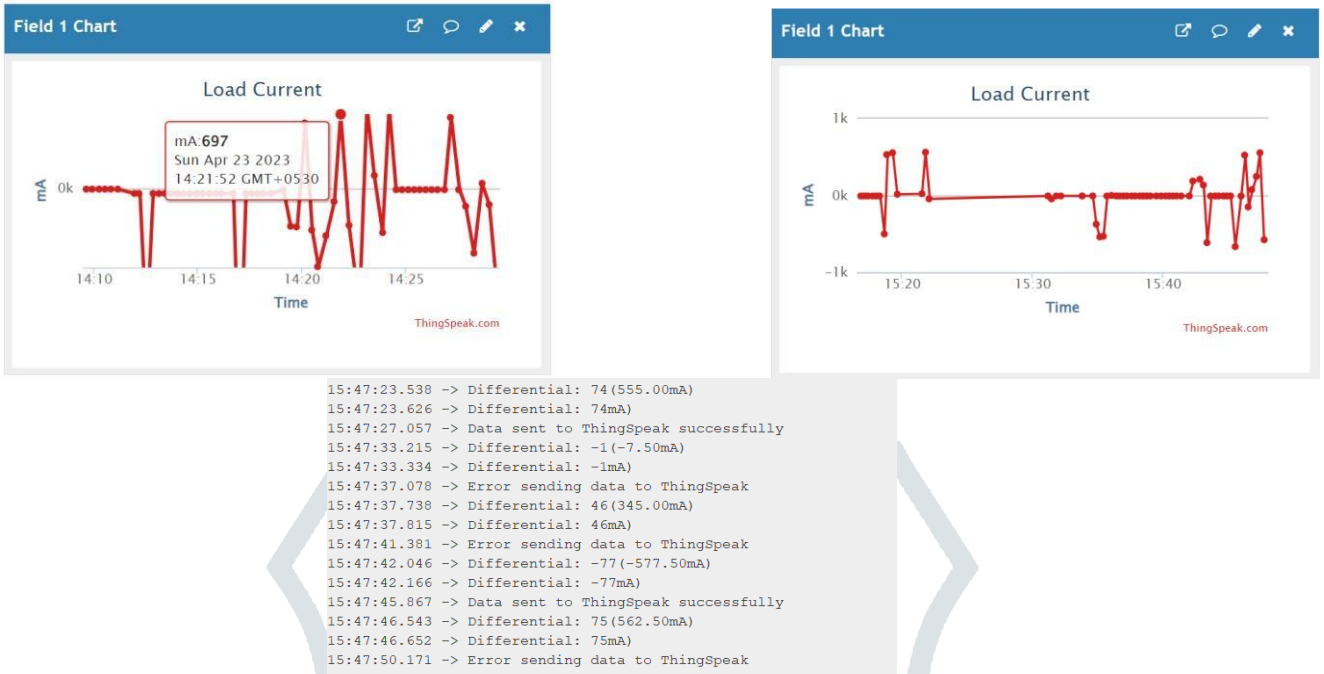
II. METHODOLOGY

System Design

Fig 1. Block Diagram

Automatic IoT based load current monitoring system is designed for Industrial application. This technology can be used for commercial use as well. Load current is the primary/main parameter to measure and monitor for decision making purpose. CT (Current Transformer) is used as a sensor for current sensing purpose and to connect the CT output to Microcontroller ESP8266 or Arduino module for signal processing purpose. ESP / Arduino will further log the current data to transmit to centralized server or individual laptop for data trend monitoring and analysis purpose. The data can also be accessed through IoT tool using wireless communication network.

By monitoring the power consumption of the devices, the data is collected by the coordinator for the base station, and save all these data in the database at computer system for processing and analyzed, as well as in cloud database for remote access. The current data in the form of mV will be displayed through and smartphone app window. Suitable actions, as turning devices ON or OFF, are done from the smartphone app screen according to consumer requirements. In addition, the system depends on the average of drawn current that is identified in the program, which means the applications can be turned ON or OFF automatically, the relays work and the power is cut when the dawn current exceeds.

III. RESULT

The load current in the form of mA signal can be seen as an outcome of the processor.


```
15:47:23.538 -> Differential: 74(555.00mA)
15:47:23.626 -> Differential: 74mA)
15:47:27.057 -> Data sent to ThingSpeak successfully
15:47:33.215 -> Differential: -1(-7.50mA)
15:47:33.334 -> Differential: -1mA)
15:47:37.078 -> Error sending data to ThingSpeak
15:47:37.738 -> Differential: 46(345.00mA)
15:47:37.815 -> Differential: 46mA)
15:47:41.381 -> Error sending data to ThingSpeak
15:47:42.046 -> Differential: -77(-577.50mA)
15:47:42.166 -> Differential: -77mA)
15:47:45.867 -> Data sent to ThingSpeak successfully
15:47:46.543 -> Differential: 75(562.50mA)
15:47:46.652 -> Differential: 75mA)
15:47:50.171 -> Error sending data to ThingSpeak
```

This data logging further can be used for analysis and limit monitoring purpose as per the data reflected on cloud platform.

IV. CONCLUSION

Load current is measured, monitored & logged in the form of raw data at cloud by using IoT technology and the load can be controlled by implementing suitable control logic in the software. Motor load current data can be monitor and logged for decision making purpose by using suitable measurement hardware & ESP8266 as a processor based on IoT technology.

V. REFERENCES

1. S.U.Prabha, S.Pavithra, A.Prathiba and S.Sharmila, "IoT based Motor Monitoring System," International Research Journal ofEngineering and Technology (IRJET),vol: 07 Issue: 03,Mar 2020.

2. Dr.P. V.Rama Raju, G. Naga Raju, G.V. P. S. Manikantah, Abdul Vahed, A. L. Bhavyaw, Ganesh Reddy, "IOT Based PowerMonitoring System and Control," JETIR (ISSN-2349-5162),Volume 4, Issue 11, November 2017.

3. M.Ashmitha, D. J. Dhanusha, M. S. Vijitlin, and G. Biju George, "Real Time Monitoring IoT Based Methodology for FaultDetection in Induction Motor," Irish Interdisciplinary Journal Of Science & Research (IIJSR), vol.5,Iss2, April-June 2021.

4. "ADS1115 Datasheet," Texas Instruments Incorporated, SBAS444D –MAY 2009–REVISED JANUARY 2018.

5. "Arduino® UNO R3 Datasheet," Product Reference Manual SKU: A000066, Modified: 24/04/2023

6. (2021) The IEEE website.[Online]. Available: http://www.ieee.org/