International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 09 | Sep-2016 www.irjet.net p-ISSN: 2395-0072

AutoSensing Electrical DataLogger For Measuring Voltage,Current and Speed

S.NaliniChandra[1], R SaiNagaSirishaDevi[2], G V S Chaitanya[3] ,K V R Sudhir[4]

[1]*Student,Department of EEE,Pragati Engineering College,Surampalem, AP ,INDIA*
[2]*Student,Department of EEE,Pragati Engineering College,Surampalem, AP ,INDIA*
[3]*Student,Department of EEE,Pragati Engineering College,Surampalem, AP ,INDIA*
[4]*Student,Department of EEE,Pragati Engineering College,Surampalem, AP ,INDIA*

Abstract - *In industries, the earliest form of Recording Data involved manually taking measurements, recording them to a written log, and plotting them on graph paper. In the late 19th century, this process was automated with the use of strip Chart Recorders which mechanically record measurements onto paper, but still had drawbacks.Today the most popular method of recording data is with Data Logger, which provides Real-time visualization, User-defined functionality, Reliability, Low cost such advantages over traditional methods. This project provides an automatic way of monitoring and controlling data, the electrical parameters in substations using data loggers are self-contained units, that does not require a host to operate.These loggers used to collect data, or output from sensors, that could measure physical or electrical measurements include temperature, voltage, current and speed etc.*

Key Words: **A/D Converters, Data loggers, Micro-Controllers, Rectifier Circuit, Sensors.**

1.INTRODUCTION

This paper will introduce you to the wide world of electronic data loggers and data logging. A *data logger* shown in the fig. 1.1 is an electronic device that records data over time or in relation to location either with a built in sensor or via external instruments and sensors [1]. These vary between general purpose types for a range of measurement applications to very specific devices for measuring in one environment or application type only. It is common for general purpose types to be programmable [3].

Fig. 1.1 Data logger storing technical and sensor data

2. PROJECT OBJECTIVE

The purpose of this project is to design and construct a non-contact tachometer. A Tachometer (also called revolution-counter or RPM gauge) The Hall Effect sensor measures the current, and then a small shunt register can be used to convert the current into voltage, which the ADC can then measure. So this acts as electrical Data Logger for measuring current, voltage and speed by using Hall Sensor and IR Sensor [2].

3. EXISTING TECHNIQUE

The measurement of Voltage and Current are done by the traditional techniques namely shunt resistors, Potentiometers, Current Transformers, and Clamp meters. All these consume more amount of time to record and analyze the data. Moreover it may not get precise value. These techniques account for the unused data, that requires large space and the data is to be stored to pc before it is going to be terminated.

2. PROPOSED TECHNIQUE

In the proposed technique, the standalone traditional data loggers will capture the recorded data into their memory. This system also allows adding of the basic logging function in accordance with the basic capabilities of software. The voltage, current and the wave length of the light can be easily determined by the proposed technique [5].

3. WORKING OF DATA LAOGGER

A data logger, often referred to as a "HOBO," is an electronic instrument that records measurements at set intervals over a period of time [1]. Depending on the particular data logger, such measurements can include air temperature, relative humidity, AC/DC current and voltage, differential pressure, time-of-use (lights, motors, etc.), light intensity, water temperature, water level, dissolved oxygen, soil moisture,

rainfall, wind speed and direction, leaf wetness, pulse signals, room occupancy, plug load, and many more [8]. Data loggers are typically compact, battery-powered devices equipped with an internal microprocessor, data storage, and one or more sensors.

3. HARDWARE IMPLEMENTATION

3.1 BLOCK DIAGRAM

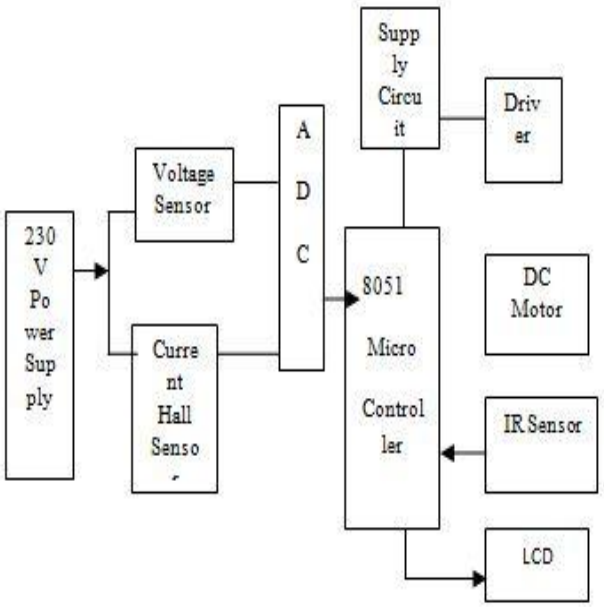


Fig. 3.1.1. Basic Block Diagram for Data Logger

3.2 COMPONENTS REQUIRED

3.2.1 POWER SUPPLY UNIT

The power supply unit is shown in the fig. 3.2.1. The input to the circuit is applied from the regulated power supply. The A.C. input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier.

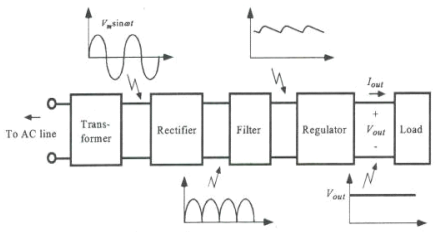


Fig. 3.2.1 supply unit

3.2.2 ADC0804

The ADC0804 families are CMOS 8-Bit, successive approximation A/D converters which use a modified potentiometric ladder and are designed to operate with the 8080A control bus via three-state outputs. These converters appear to the processor as memory locations or I/O ports, and hence no interfacing logic is required. The differential analog voltage input has good common mode- rejection and permits offsetting the analog zero-input voltage value. In addition, the voltage reference input can be adjusted to allow encoding any smaller analog voltage span to the full 8 bits of resolution.

3.2.3 LIQUID CRYSTAL DISPLAY

A liquid-crystal display (LCD) shown in the fig. 3.2.2 is a flat-panel display or other electronic visual display that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

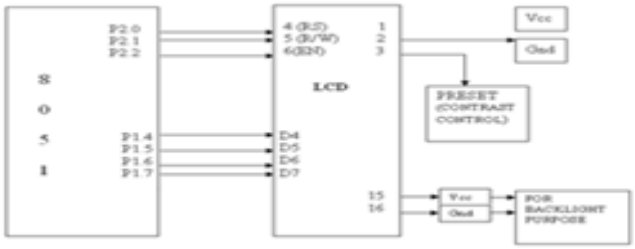


Fig.3.2.2 LCD INTERFACE WITH MICRO CONTROLLER

3.2.3 MICRO CONTROLLER

Micro controller is an integrated circuit or a chip with a processor and other support devices like program memory, data memory, I/O ports, serial communication interface etc integrated together [4]. Unlike a microprocessor (**ex: Intel 8085**), a microcontroller does not require any external interfacing of support devices. In this paper, AT89S52 based microcontroller model is used.

3.2.4 LIGHT EMITTING DIODE

A light-emitting diode (LED) is a semiconductor diode that emits incoherent narrow spectrum light when electrically biased in the forward direction of the pn-junction, as in the common LED circuit. This effect is a form of electroluminescence. The wavelength of the light emitted, and therefore its colour depends on the band gap energy of the

materials forming the p-n junction. In silicon or germanium diodes, the electrons and holes recombine by a non-radiative transition which produces no optical emission, because these are indirect band gap materials. The materials used for the LED have a direct band gap.

3.2.5 SENSORS

i. HALL EFFECT SENSORS

The Hall Effect sensor is shown in the fig. 3.1. It is used for measuring current. It works on the principle of Hall Effect. It works when the current is passed through the conductor and the same conductor is placed in magnetic field perpendicular to the current flow.

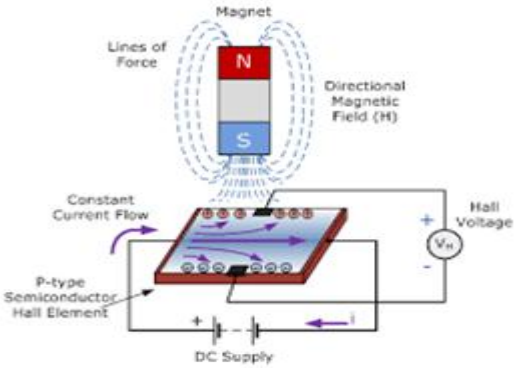


Fig. 3.1 Hall Effect Sensor

ii. VOLTAGE SENSOR:

The voltage sensor is shown in the fig. 3.2. It is used for measuring voltage [9]. Electrical voltage sensors measure AC and/or DC voltage levels. A simple shunt resistor can be used to convert the current into a voltage, which the ADC can then measure.

Fig. 3.2 VOLTAGE SENSOR

iii. IR Sensor:

It is used for measuring the speed. It work by using a specific light sensor to detect a select light wave length in the infra-red (IR) spectrum. This sensor works by looking for reflected light. The electronic circuit used in the IR Sensor is OP-AMP LM358. It is the device consists of two independent, high gain frequency compensated operation amplifier design to operate from a single supply over a wide range of voltages operation from split supplies also is possible if the difference between two supplies is 3V to 32V and V_{CC} is more voltage the low supply current drain is independent of magnitude of the supply voltage.

3.2.7 LOADS

Electrical bulb is used as a electrical load for measuring current and voltage.
DC motor is used as a electrical load for measuring speed.
AC load is connected at 230/5V converter.
DC load is connected at 12V power supply circuit.

4. ANALYSIS

TORQUE MEASUREMENT:

Torque T= 9.81x S x r in N-m
r=radius of the rotor in c-m=4cm
S= Weight of the load used=35gm

POWER MEASUREMENT:

Input Power= V*I Watts

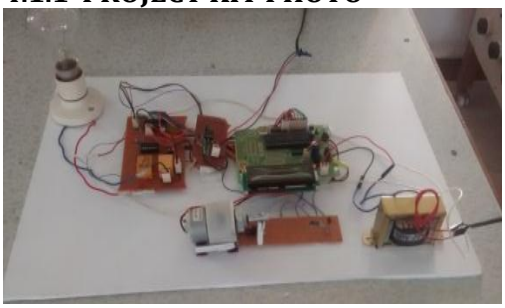
V=Input Voltage in Volts
I=Input Current in amps

Output Power=2ΠNT/60

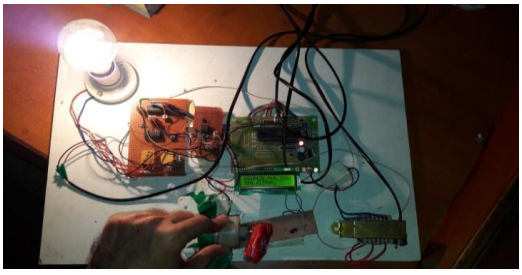
N=Speed in rpm

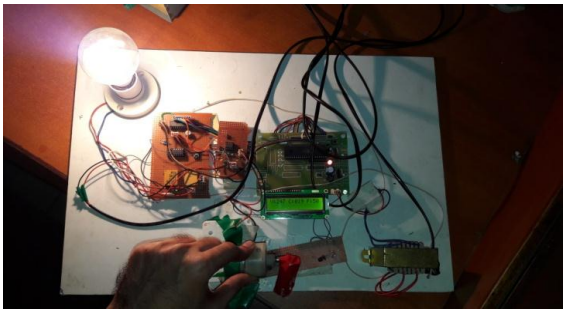
T=Torque measured in N-m

4.1.1 PROJECT KIT PHOTO



5. RESULTS





From the above figures, it is noted that.

Voltage = 247volts

Current = 19milli amps

Frequency = 50Hz

Torque = 0.0137N-m.

Power = 0.158Watt

Max. Speed (MS) = 420rpm

6. CONCLUSIONS

By this project all the disadvantages faced by the manual substation system can be overcome In this project, we are using Hall-effect sensor that measures Current, from which Voltage is calculated further and IR (infrared) for Speed measurement of a DC motor, which is operated as variable speed motor. Then by using the specifications of the DC motor the corresponding torque and power can be determined. The signals obtained by the sensors are measured and displayed in the LCD display connected to the microcontroller.

7. FUTURE SCOPE

This project will be 90% efficient for the design engineers to calculate the parameters in an efficient method with in less duration of time. In future this will be applicable to Instrument transformers and Non-Tachometers.

REFERENCES

[1] A.K. Sawhney "Electrical and Electronic Measurements and Instrumentation"

[2] Cooper D. and A.D. Heifrick "Modern Electronic Instrumentation and Measuring Techniques"

[3] Muhammad Ali Mazidi and Jenice Gillispe Mazidi "The 8051.

[4] Microcontroller and embedded systems", Pearson education Ltd. India, 2007.

[5] An autonomous, small scale temperature mapping data-logger for automated manufacturing applications.

[6] Development of a Novel Microcontroller-based data logger.

[7] Validation and testing of design hardening for single event effects using the8051 microcontroller.

[8] Temperature and Humidity Analysis using Data Logger of Data Acquisition System: An Approach.

[9] Design and Development of Multi-Channel Data Logger for Built Environment.

BIOGRAPHIES (Optional not mandatory)

S. Nalini Chandra, pursuing her graduation in the department of Electrical & Electronics Engineering in Pragati engineering college, surampalem, near peddapuram . Her area of intrest is in Data Analyzation in Robotics.

R. sai Naga Sireesha Devi, pursuing her graduation in the department of Electrical & Electronics Engineering in Pragati engineering college, surampalem, near peddapuram . Her area of intrest is in Data Analyzation in Robotics.

G.V.S.Chaitanya pursuing his graduation in the department of Electrical & Electronics Engineering in Pragati engineering college, surampalem, near peddapuram . His area of intrest is in Data Analyzation in Robotics.

K.V.R.Sudhir pursuing his graduation in the department of Electrical & Electronics Engineering in Pragati engineering college, surampalem, near peddapuram . His area of intrest is in Data Analyzation in Robotics.