Environmental Parameter Analyzer (EPA) for Renewable-Energy Source Application

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Abstract*: The objective of this research is to retrieve the environmental parameter and process data and LCD. It is useful project for the laboratories, cold storage, green house industries. The purpose of the data acquisition system(DAS) is generally analysis the logged data and the improvement of the objective of the measurements. The DAS is normally electronic based and it is made of hardware and software. The Hardware part is made of Sensor cables and electronics components(among which memory is where information stored). Software part is made of the data acquisition logic and the analysis software, some other utilities that can be used to configure the logic or to move data to Data Acquisition Memory(DAM) to a laptop or to a mainframe computer. An example Data logging, carried out by a DAS can be used to measure parameters such as Temperature and intensity of light.*

Keywords: Environment Parameter Analyzer (EPA) system, DAS(Data Acquisition System), LCD(Liquid Crystal Display), ADC(Analog to Digital Converter), LDR(Light Dependent Resistance), TTL(transistor transistor logic), EEPROM(Electrically Erasable Read Only Memory).

1. Introduction

An data acquisition system is a device designed to measure and logs some parameter. The purpose of data acquisition system is generally the analysis of the logged data and the improvement of the object of measurements. The data acquisition system is normally electronics based device.

Data-acquisition systems are widely used in renewable energy source (RES) applications in order to collect data regarding the installed system performance, for evaluation purposes[3].Data acquisition systems (DAS) are the basis for building monitoring tools that enable supervision of local and remote systems[5]. In our research we use the term data acquisition system(DAS) as an Environment Parameter Analyzer (EPA) system.

2. Literature Review

Amar Adane et & all presented this paper said that A meteorological data acquisition system is built using a PIC16F877A microcontroller and electric output-based sensors. This system is programmed in C language using the PCWH compiler. It is smart, accurate, cheap, small, light and easily movable. It is designed to automatically get instantaneous measurements of air temperature, atmospheric pressure, and relative humidity. Depending on their utilisation, these measurements are collected with repetition rate tuneable from one minute to one hour. They are displayed on LCD screen and transferred to a personal computer where they are stored and processed. As an application, such data are recorded *in situ* and used to estimate the radio refractivity of air near the ground in real time. This parameter is necessary to account for the propagation of radiofrequency waves through the lower atmosphere, during wireless transmissions[1].

Ishaan Dua, et & al. presented that paper said that In this research paper we have designed a system that acts as a temperature sensor and also a warning system the system also has the facilitation of shutting down the machinery whose temperature is to be monitored. The main function of the system is to constantly monitor the temperature of a machine, compare it to a predefined limit and shut down the machine if the temperature exceeds or falls below that limit. The system is highly useful for systems with high dependence on particular temperatures. The paper includes the requirement of such a system along with the idea behind development of the project. We have covered the hardware and software requirements for designing such a system. The paper covers the basic design of the project along with the block diagram. We have divided the entire design into sub circuits that cover the bridge rectifier, relay driver and A to D convertor. We have covered the software simulation of the sub circuits. The results of the simulations have been compared to the expected outcome and so we know that the design is working properly[2].

Eftichios Koutroulis et & all presented this paper said that Data-acquisition systems are widely used in renewable energy source (RES) applications in order to collect data regarding the installed system performance, for evaluation

purposes. In this paper, the development of a computer-based system for RES systems monitoring is described. The proposed system consists of a set of sensors for measuring both meteorological (e.g. temperature, humidity etc.) and electrical parameters (photovoltaics voltage and current etc.). The collected data are first conditioned using precision electronic circuits and then interfaced to a PC using a data-acquisition card. The LABVIEW program is used to further process, display and store the collected data in the PC disk. The proposed architecture permits the rapid system development and has the advantage of flexibility in the case of changes, while it can be easily extended for controlling the RES system operation[3].

Sayantan Dutta et & al. presented that paper said that Data acquisition systems (DAS) are the basis for building monitoring tools that enable supervision of local and remote systems. The present paper describes the design of a cost effective, better resolution DAS which is compatible to most of the PC and laptops. A low cost DAS has been designed using Atmega8 Microcontroller. A suitable Graphical user interface(GUI) is generated by using a Visual Basic program connected to a homemade data converter board using the AVR microcontroller[5].

3. Problem Identification

Today the whole world comes under the trend of rush and competition. Nobody can think about the nature keep doing work against the nature like cutting of forest and pollution from factories and auto mobile improper sewage and drainage system use artificial cosmetics etc. which can harm the environment and disturb the nature the ecological balance of the nature due to adverse effect of system which can properly examine and analysis the environment parameter in single roof.
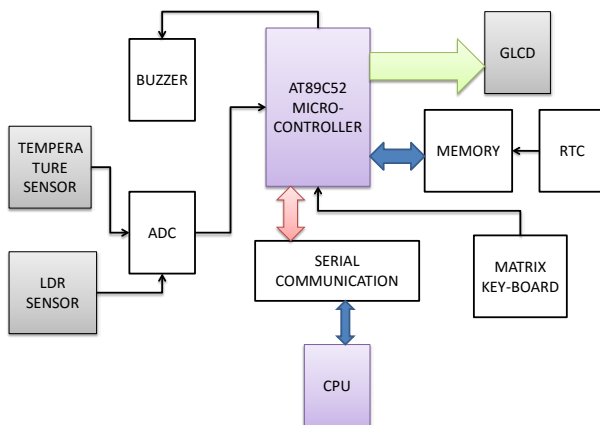
4. Methodology

Figure1:Blockdiagram of EPA system

Process of the EPA system

  ➢ when power supply is **ON** ,the sensors sense their respective parameter and converts them from the analog form into digital form by **IC 0808 A/D** converter then it send to the microcontroller **AT89C52.**
  ➢The **graphical LCD** which is connected to microcontroller plot a graph between Temperature and light intensity with respect to Time domain.

➢At the same time the external memory which is connected to the microcontroller keep recording the previous date and time.
➢The **matrix keyboard** used to determine the range of the parameter.
➢If the Parameter value out of the range then Buzzer start buzzing.
➢We can also monitoring regularly the status of parameter by the computer(CPU) through serial communication.

Layout design is very important part of circuit design so carefully arrange the component at specific place on the PCB
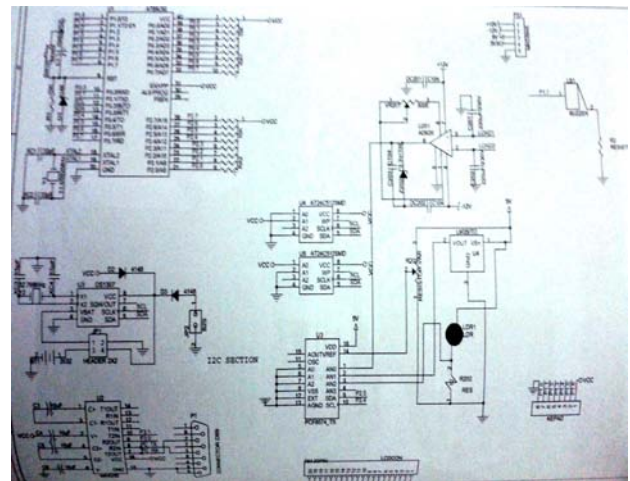

Figure2: circuit layout for EPA implementation

Design and implementation of DAS system the following components are required

  a) Power supply unit
  b) AT89C52 Microcontroller
  c) RS-232 Serial Communication
  d) MAX 232
  e) DS13207 64x8 SERIAL REAL-TIME CLOCK
  f) LDR(Light dependent resistance)
  g) LM35 Precision centigrade temperature sensor
  h) ADC (analog to digital converter)
  i) Two wire serial EEPROM(AT24C512)
  j) JHD12864J Graphic Module To AT89C52

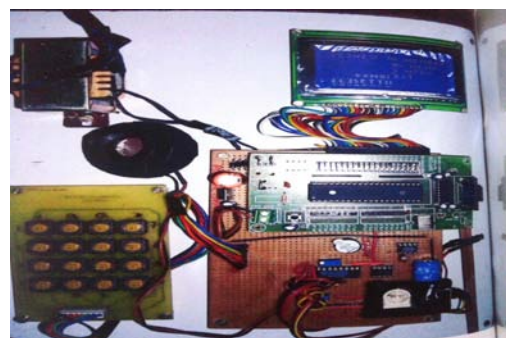All the component are mounted on PCB with the help of PCB design software

Figure3: EPA system attached with LDR, temperature sensor and humidity sensor

5. Result

With the help of DAS we clearly examine and analyze environmental parameters like humidity, temperature, light intensity, with the help of the serial communication on the PC. We can successfully drawn the environmental parameter i.e. temperature, humidity, light intensity with respect to time on GLCD as well as the computer screen with help of the serial communication.

we statically analyze the parameter value on data and time and keep previous records as well as DAS has also a facility to indicates with help of buzzer.

DAS can examine and analyze only the environmental parameter but it can auto control the environmental parameters.

6. Conclusion

This project gives an embedded environment for keeping recodes of variation in environmental parameter and provide alarm for critical condition. By the future we can add clearly examine the other environmental parameter through DAS in future with more accurate and precise form This project used in future research in wide area of application , the following areas are Laboratories, Cold storage, Cooling Room, Aerospace Industries etc.

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