Monitoring And Recording Data For Solar Radiation, Temperature And Charging Current

Aung Bhone Myint, Kyaw Soe Lwin, Hla Myo Tun

Abstract: A data logger based on 8051 microcontroller has been implemented in this project to measure the solar radiation, temperature and charging current. Development of a low-cost data logger can easily be made and easily be used to convert the analog signal of physical parameters of various test or other purposes of engineering. By using a suitable program code it can be used to read the value digitally with a PC. Our aim is to provide with a module and a software package when installed in a computer, one can remotely acquire and monitor several numbers of the same or different types of signals sequentially at a time. Signals obtained from various sensors have been effectively conditioned. Now interfacing these signals using ADC with the Bluetooth module port of a computer satisfies the very goal of data acquisition. Proposed system provides better performance and has low cost, versatile, portable.

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1. Introduction

A data logger is an electronic instrument (or specialized computing device in some cases) that records digital, analogue, frequency or smart protocol based measurements over time. It is an all-purpose piece of measuring equipment that finds use in an extremely wide range of applications. The design is associated with flexible structure for the software and the hardware support. The proposed system consists of temperature sensor (ds18b20), radiation sensor (LDR) and current sensor (asc712), 8051 microcontroller, hc-05 Bluetooth module and LCD module. The temperature sensor detects the temperature. Like temperature sensor, radiation sensor and current sensor detect radiation and current; the two sensors are connected to the ADC. The AT89C52 microcontroller is connected to the ADC. The LCD module displays the current values of the system where data logger maintains all the data of the measurements. The aim of this work is to use data logging for temperature, solar radiation and charging current. The temperature sensor acquires the temperature of the system. In the proposed system we use the temperature sensor DS18B20. The analog output of temperature sensor, which is analog form that convert into digital form with ADC. And light dependent resistor (LDR) acquires solar radiation from the sun of the system. This analog output is analog form and converted into digital form with ADC. As temperature and LDR, current sensor (ACS712) acquires current values from charging current and this sensor output is analog form and converted into digital from with ADC.

2. System Architecture And Working Principal

The proposed architecture of development of data logger for solar radiation, temperature and charging current using 8051 are divided into two parts

A. Hardware Part&
B. Software Part.

The concept of this project is to develop 8051 microcontroller and to develop data logger. The proposed system maintains the solar radiation, temperature and charging current of the system within specified range. In the circuit, it consists of LDR, temperature sensor, current sensor, AT89C52, LCD module and NE555 timing IC. LDR is used to detect solar radiation from the sun and connected to the channel0 of ADC0808.
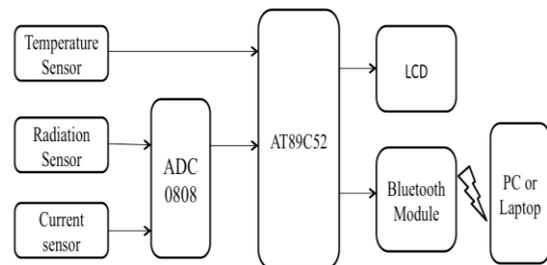
Fig1: Block Diagram of proposed system

Temperature sensor (DS18B20) is a one-wire device protocol so it doesn't need ADC. Current sensor detects charging current. The current sensor is connected to the channel6 of ADC0808. The output pins of ADC0808 are connected to the port0 of the microcontroller. The temperature sensor is connected to the port2_1 pin of microcontroller. NE555 timing IC support some clock frequency for ADC0808 converter. The LCD module displays the current values of the system. The device is designed to receive data from sensors and to store the results on PC by using GUI. The design is associated with flexible structure for the hardware support.

3. SYSTEM SOFTWARE REALIZATION
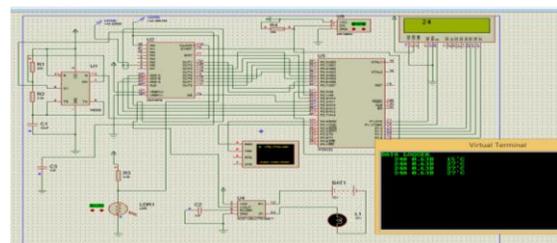
Fig2. Hardware representation of system with proteus software

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Here we are use DS18B20 temperature sensor which senses the temperature and light depedent resistor which senses the solar radiation. The ACS712 current sensor is used to sense the charging current of the system. In this project, we can use the 8051 microcontroller for controlling purpose, the output of ldr and current sensor is connccted to the analog channel 0,6 of ADC0808 converter. At the power on first controller initialize the all ports, uart and lcd, then controller perform its operation. Data from three sensors will be displayed on LCD and transferred to PC for monitoring and loggind by using bluetooth module. In fig2 we use virtual terminal such as PC.By using mikroc pro for 8051 & java language, we will display the value of solar radiation, temperature and charging current on the LCD and computer screen.

4. FLOWCHART OF SYSTEM
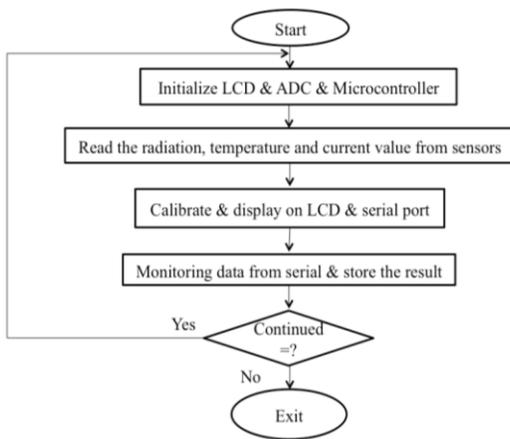
Fig3: flowchart of the proposed system

JAVA
The graphical user interface describes anything your application displays to the user. It is the primary way you interact with the user and allow him or her to interact with you. We can create professional interfaces with minimal effort. Graphical User Interfaces have been around for many years. Java provides a powerful and flexible development environment for creating Microsoft Windows-based and Microsoft.Net-based applications. Here we use Java in an integrated development system.

Fig4: development of data logger with real time storage system

4. RESULTS AND DISCUSSION
After initializing the system, LCD & ADC & AT89C51 microcontroller are turned on. Sensors read their respectively values and send these values to PC for monitoring and record on PC as a txt file. These data will be stored in every 30 seconds. Temperature sensor (DS18B20) is one-wire device so it doesn't need ADC conversion. After we get readings of solar radiation, temperature and charging current using mikroc pro for 8051 and java, then finally we get the print outs of these data.

Fig: stored data are generated as a excel file

5. CONCLUSION
In this system, 8051 microcontroller based real time data logger is designed and developed. With the help of data logger we can maintain all records. Data is logging & the data is transmitted to computer by using bluetooth module. Output is display on LCD. 8051 microcontroller & ADC0808 converter & LCD have been successful interfaced.

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