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A PATH FOR HORIZING YOUR INNOVATIVE WORK

REAL TIME DATA ACQUISITION SYSTEM USING ARM 7 AND ZIGBEE

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Abstract

Monitoring environmental condition is very essential in research field like agriculture area. Here climate monitoring system is designed on ARM7 based 16-bit/32-bit microcontroller LPC2148 which measure the temperature, relative humidity. When these parameter values are measured. These values with respect to date and time are stored in the computer serial interface serial communication. By using RS232 interface the store data can be transmitted and saved on the computer system hyper terminal for further analysis.

INTRODUCTION

The potential economic benefits of more accurate weather monitoring are immense. For example, Sample crops that could benefit from more accurate climate monitoring aiding farmer in selecting harvesting times and in protecting their crops from freezing temperature. When weather condition have altered the course of battles.Knowing of temperature, precipitation and humidity essential for preventing and controlling wildfires essential forest. Above are the real time monitoring system is so designed that it can storeparameter values which are observed. ARM7 based 16-bit microcontroller LPC2148 core is a 32-bit embedded. The ARMTDMI core enables system designer to embedded devices requiring low power, editing of time is used for implementing switches temperature, relative humidity & light intensity.

Sensors are used for sensing the climate .humidity and light intensity values with respect to date and time are store in EEPROM using I2C protocol . The data in the EEPROM is displayed on hyper terminal.

FEATURESOF MICROCONTROLLER

ARM7 family LPC2148 has the following features which are required for climate monitoring system design

1. 16-bit/32-bit ARM7.

2. Chip static RAM and on-chip flash memory

3. In-System Programming/In- application Programming (ISP/IAP)

4. Two 10-bit ADCs provide a 14 analog inputs with conversion times as low as 2.44 µs per channel.

5. Low power Real-Time Clock power and 32 KHz Clock input.

6. Multiple serial interfaces including tow UARTs, fast I2C-buses (400kbit/s) .

7. Interrupt Controller (VI)Configurable priorities and addresses

8. Tolerant fast general purpose I/O pins.

9. Individual enable/disable of peripheral functions as well as peripheral clock scaling for additional power optimization

10. CPU operating voltage range of 3.0V to 3.6V (3.3V ± 10%) with 5V tolerant I/O.

be the use of English units as identifiers in trade, such as "3.5-inch disk drive".

Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often
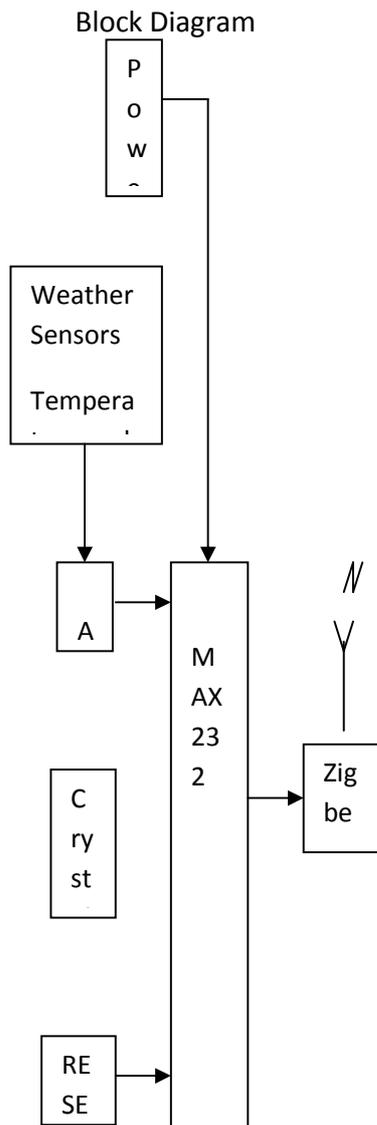
Block Diagram

Fig 1: Block diagram for the optimization

Interfacing sensor to Microcontroller

A sensor is a device that measures quantity and converts it into an equivalent digital signal. Monitoring the climate means sensing the changes in the climate The basic parameters which are measured in the climate monitor are monitor humidity sensors are used.

Temperature Sensor

National semiconductor is used to measure temperature. Its temperature sensor has three terminals. The Vcc pin is given a supply voltage of 5v DC. The ground pin is grounded. The data pin is connected to be channel-1 of the inbuilt ADC using port pin . P0.29. The sensor gives electrical output proportional to the temperature (^{0}C). The general equation used to convert output voltage to temperature is (^{0}C).

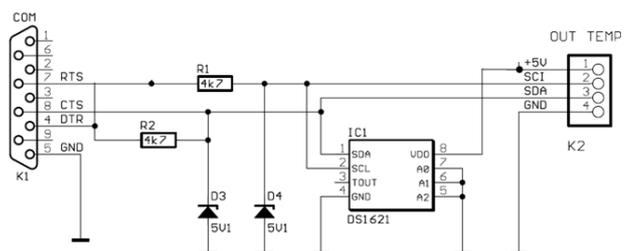$$T\ (^oC) = V_{out} * (100^o\ C/V_{cc})$$

Fig.3: Temp Sensor

Humidity Sensor

LM324 humidity sensor is used to measure humidity. Humidity is t factor in personal comfort and in quality control for materials, etc. The sensor has pins as shown in the figure 2. The sensor circuits a linear voltage verses. RH The sensor circuit produces linear voltage vs. RH output that is proportional to the supply voltage operating voltage is 3.3V as the humidity varies from 20~95% RH. The accuracy of humidity sensor is ±5% RH (at 25ºC, 60%RH). The change in the RH of the surrounding produces a digital output which is given to the inbuilt ADC of the microcontroller.
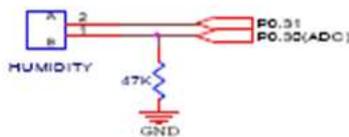

Figure 2. Pin connection of humidity sensor

EEPROM INTERFACING

The EEPROM stores data coming from analog where converter digital for the microcontroller. The serial clock and serial data used for data from EEPROM. The required for storing data which consist of temperature, relative humidity with respect to date and time are stored in EEPROM.The EEPROM of ATMEL is used. This is programmed to store data. The features of EEPROM are low voltage and standard voltage operation MHz, 400 KHz and 100 KHz.

Serial Clock (SCL): The SCL input to positive edge clock data to EEPROM device edge clock data out device.

Serial Data (SDA): The SDA pin bidirectional for serial data transfer. This pin is open-drain driven and may be wire-OReddrain collector devices. Device Addresses (A0, A1, A2): The A0, A1, A2 pins are device address inputs that are hardwired or left not connected for hard.

Inter-Integrated Circuit generically referred to as "two-wire interface" is a multi-master serial single-ended computer bus to attach low-speed peripheral like EEPROM to the microcontroller. Each Device connected to the bus has a unique address and only one device is connected. Data is divided into 8-bit bytes to be transmitted. A few control bits for controlling the communication start, end, direction

and for an acknowledgment mechanism are used. The active wire i.e. serial clock (SCL) and serial data SDA Data are both bi-directional. The I2C protocol specification states that the IC that initiates a data transfer on the bus is considered the bus master. Consequently, at that time, all the other ICs are regarded to be bus slaves. Here LPC2148 microcontroller which is having inbuilt 12C. Protocol which is completely interrupts driven acts as a master and EEPROM as slave. The I2C protocol specification states that data may only change on the SDA line if the SCL clock signal is at low level conversely, the data on the SDA.

PC INTERFACING USING RS- 232 SERIAL COMMUNICATION

PC is interfaced with ARM7 LPC2148using MAX-232. It is the IC used to convert the TTL   logic level to the RS-232 logic level. RS-232 is one of the communication protocols that does not

Require clock along with data lines. There are two data lines Tx and Rx for the serial communication. To convert TTL Logic level

to RS-232 standard, MAX-232 IC is used. The

MAX-232 operates from a single 5-V power supply with 1.0μF charge-pump capacitor. Data stored in the EEPROM is transmitted to PC using this serial communication.
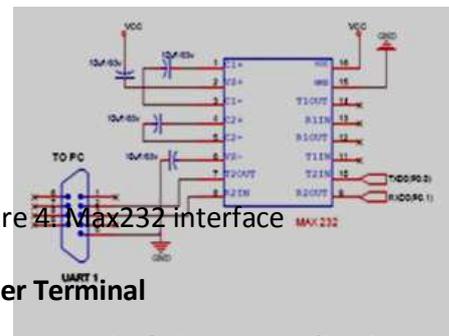

Figure 4. Max232 interface

Hyper Terminal

Hyper terminal is an application in PC, which isUsed to display data read from EEPROM using RS-232 serial communication. The baud rate is set to 9600. When the interrupt switch is pressed, the data stored in the EEPROM is uploaded on to the hyper terminal. The displayed data can be saved for further analysis.

Results and Conclusions

Sensors are interfaced to the microcontroller andthe

EEPROM is interfaced to the microcontroller using serial communication protocol.

Switches are interfaced to74LS21 IC and the IC is interfaced to the microcontroller. Date and Time are displayed on LCD display. The data from the sensors are stored in the EEPROM. Hence, the project climate monitoring system using ARM was developed. The developed system is successful in measuring temperature, relative humidity and light intensity. The stored values with respect to date and time are uploaded on to the hyper terminal for further analysis.

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