

Wireless Data Acquisition And Transmission System Design Using Arm 9

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Abstract

Generally in industries there are traditional network communications like RS232,RS485,etc. which are limited for short distances. Data acquisition based on single chip has limited processing capacity and real time reliability. With development in Arm processor, efficient data acquisition and control in various fields can be achieved. Remote I/O data acquisition system developed in this project measures temperature, humidity, gas using WSN(wireless sensor networks) technology. WIFI Technology is a proficient used by mobiles, workplaces, home and computer system all around the world. Wifi technology is a spectrum radio technology and OFDM radio technology therefore it is an alternative of wireless LAN. WIFI technology based on the IEEE 802.11 and wifi technology alliance so we can say that it is a synonym of IEEE802.11.This system is developed using ARM9(S3C2440A) hardware platform combined with WI-FI network. IT consists of two nodes one Transmitter node and one Receiver node. The transmitter node acquires sensors information ,process data and transmit it through WI-FI to Receiver node. The receiver node receives data from sensors node which is implemented on ARM9,process it and retransmits the controlling signal information via WI-FI communication and also display the sensor information on PC based GUI implemented using Mat Lab. The keil IDE software will be used to build the hex file for these C programs.

Key Words: WSN ,RS232,RS485, WIFI, S3C2440A, PIC18F452, ZIGBEE.

1. INTRODUCTION

2. Generally in industries there are traditional network communications like RS232, RS485, etc. which are limited for short distances. Data acquisition based on single chip has limited processing capacity and real time reliability. With the development in ARM processor, efficient data acquisition and control in

various fields can be achieved. Remote I/O data acquisition system developed in this project measures temperature, humidity, pressure etc.

3. Wireless remote monitoring systems are very much essential in industrial environment where manual movement is not possible. Today several wireless technologies are used for building wireless sensor

Sensor can be used to make wireless Gas leak detector in home security system.

2.5 PIC18F452:

It is a 'C' compiler optimized instruction set architecture. It can operate up to 10 MIPS. Power consumed is 40 MHz osc/clock input and 4 MHz - 10 MHz osc/clock input with PLL active. It is of 16-bit instructions, 8-bit wide data path. Three external interrupt pins

2.4 ZIGBEE:

ZigBee is an open technology developed by the ZigBee Alliance to overcome the limitations of BLUETOOTH and Wi-Fi. ZigBee is an IEEE 802.15.4 standard for data communications with business and consumer devices. It is designed around low power consumption allowing batteries to essentially last forever. BLUETOOTH as we know was developed to replace wires and Wi-Fi to achieve higher data transfer rate, as such till now nothing has been developed for sensor networking and control machines which require longer battery life and continuous working without human intervention.

2.5 WIFI:

Wi-Fi Technology is a proficient used by mobiles, workplaces, home and computer systems all around the world. WiFi Technology is a spectrum radio technology and OFDM radio technology therefore it is an alternate of wireless LAN'. **Wi-Fi Technology** based on the IEEE 802.11 and WiFi Technology Alliance so we can say that it is a synonym of IEEE 802.11. Wi-Fi Technology is executing by remote supervising structure like as security and medicine. Wireless remote monitoring systems are very much essential in industrial environment where manual movement is not possible. Today several wireless technologies are used for building wireless sensor networks. The goal of this project is to produce a network processing node for a rapid, deployable, easily reconfigurable monitoring solution for industries.

5. IMPLEMENTATION:

The temperature sensor Vout pin is connected to the RA0/AN0 pin of the PIC. Lpg gas sensor Vout is connected to the RA1/AN1. Vout of humidity sensor connected to the RA2/AN2. Three LED's LED1, LED2, LED3 are connected to RC0, RC1, RC2 of PIC controller respectively. Sensors output is analog signal which is processed through analog channels of the controller and this analog data converted to digital and this can be received by the UART0 within PIC. Every sensor has three terminals Vcc, Vout, GND. Vout of every sensor connected to analog channels of the PIC18F452. PIC has total 8 analog channels so at a time we can use 8 sensors. PIC has internal ADC so this analog input will be given to the AD0, AD1, AD2 channels of ADC. It is also having 8 channels (AD0, AD1, AD2, AD3, AD4, AD5, AD6, AD7).

To convert analog to digital signal "Successive Approximation" method can be used. The way successive approximation works is thru constantly comparing the input voltage to a known reference voltage until the best approximation is achieved. At each step in this process, a binary value of the

approximation is stored in a successive approximation register (SAR). In this mainly used sampling and quantization. PIC controller gives 10 bit output, this output will be compared to binary value in the coding. After converting this data from digital to analog by multiplying digital data with step size. One wireless module Zigbee is connected to PIC. This information will be transmitted from UART0 of the controller. Zigbee received the information and transmit to another zigbee which is connected to ARM9.

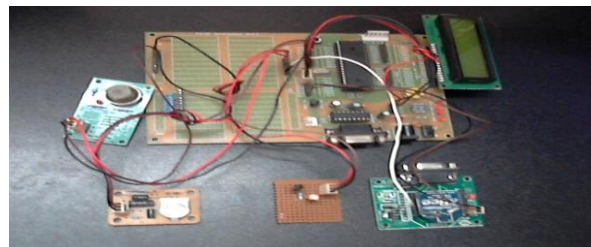


Fig 4 Result of Sensors unit

The information transmitted from Zigbee in the form of T32H40G20Z. The Zigbee which is ARM9 received the Data package and checks the last letter Z then it will conform that all the information will be received and transmit to the UART1 of the ARM. ARM9 receive the information and process it to the another UART2 which is connected to the WI-FI. UART2 transmit this information to WI-FI. .

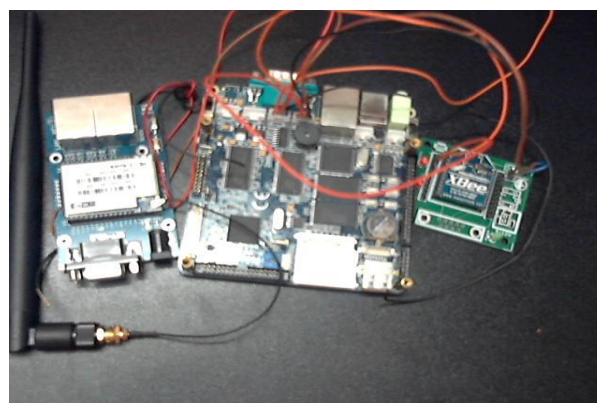


Fig 5 Result of Receiver Node

The information from wifi RX can be received by WIFI in central node. By using serial port this data can be transmitted to PC. The values can be displayed in PC through GUI.

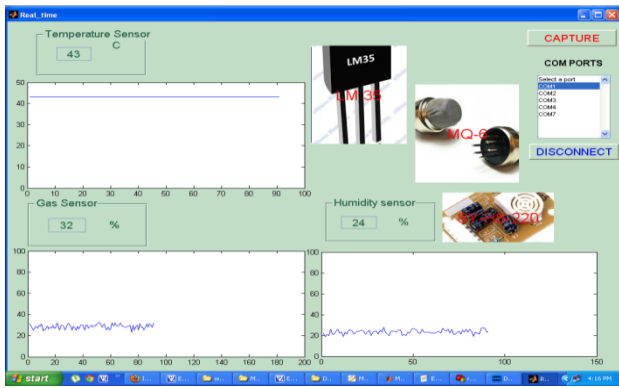


Fig 6 Central Node Output

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6. CONCLUSION:

Wireless communication is implemented, so that the information can be transmitted to a centralized monitoring station through a F.M. transmitter & FM receiver. Design a perfect system which helps to monitor the sensors data and automatic control of the devices in order to reduce the human effort.

7. FUTURE SCOPE:

Combination of this Sensors network and other wireless devices would dominate in the near future. Many “works are in progress” that will surely develop into more usable devices in the future.

8. REFERENCES:

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