Design and implementation of college automation using wireless technology

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Abstract: **The aim of this paper is to present the college automation and control system using the embedded controller. The microcontrollers are used as the controlling device which can control the operations of the processing units. In this paper the user can give the information to the students in a remote access method. The controlling of the electrical devices is done automatically by detecting the presence of human in the class room. This is accomplished by using the PIR (Passive Infra-Red) sensor. The PIR sensor can detect the presence of motion in field of operation and can convert the measured movement into the heat energy which in turn converted into the electric current pulse. Next the zigbee protocol is provided for the indoor communication for this purpose the LCD is placed in the class room. Finally the presence of alcohol consumed students within the class room in identified by using the MQ-3 gas sensor. Thus the full college automation is provided and managed by this paper.**

Keyword*: zigbee, LCD, alcohol detection, PIR sensor.*

Introduction

This paper illustrates the usage of wireless communication methodologies in the colleges. In the present scenario there is no any wireless communication integrated in the colleges. For this purpose this paper utilizes the zigbee communication within the campus. This paper introduces the conceptual understanding and strategy of ZigBee IEEE 802.15.4 standard to be deployed in smart college environment. ZigBee technology offers a multi-hop communication capability for data transfer. Prototype systems of college security and automation are built utilizing ZigBee based sensor network to present an insight. This paper replaces the wired technology integrated in the present system into a wireless technology. The complete proposed system integrate the wireless mode of communication in the college campus and provide the automation of the entire class room and also provides the monitoring of the class rooms by the college management. Zigbee and the GSM are used for the purpose of the wireless communication.

I. Hardware system design

LPC2148 EDU kit hardware

A microcontroller (or MCU) is a computer-on-a-chip used to control electronic devices. It is a type of microprocessor emphasizing self-sufficiency and cost-effectiveness, in contrast to a general-purpose microprocessor (the kind used in a PC). A typical microcontroller contains all the memory and interfaces needed for a simple application, whereas a general purpose microprocessor requires additional chips to provide these functions. A highly integrated chip that contains all the components comprising a controller. Typically this includes a CPU, RAM, some form of ROM, I/O ports, and timers. Unlike a general-purpose computer, which also includes all of these components, a microcontroller is designed for a very specific task – to control a particular system.

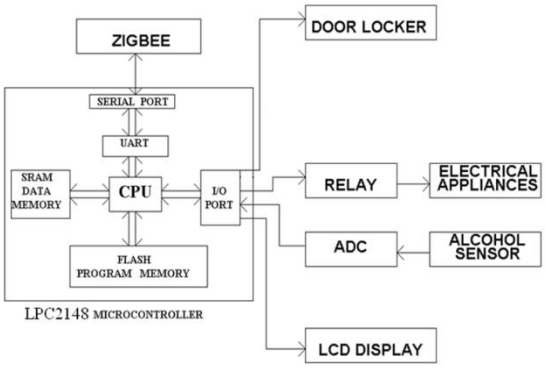


Fig: proposed system diagram

This section introduces the LPC2148-EDU kit design and various features on this kit. The LPC2148-EDU is based on ARM7TDMI core processor and a set of

popular peripherals. It is designed to provide a high performance processor evaluation solution with high flexibility for various kinds of applications. Embedded Artists *LPC2148 Education Board* with NXP's ARM7TDMI LPC2148 microcontroller lets you get up-and-running quickly. The small form factor board offers many unique features that ease your learning curve and program development.NXP ARM7TDMI LPC2148 microcontroller with 512 KByte program Flash and 32+8 KByte SRAM

What is a Boot loader?

A Boot loader is a small piece of code that runs before the operating system starts running. In our case the bootloader is the code that runs before the device firmware starts up. The CoiNel LPC2148 ARM7 USB Boot loader performs three steps:

1) First, the Boot loader checks to see if a USB cable has been plugged in. If the LPC2148 is connected as a USB device then it initiates a USB Mass Storage system. This will cause the target board to appear on any computer platform as a removable flash drive. The user can then seamlessly transfer files to the flash drive.

2) The next thing the Boot loader does is look for a firmware file. This file contains the desired operating firmware (in a binary file format) for the LPC2148. If the Boot loader finds this file system then it programs the contents of this file to the flash memory of the LPC2148. In this way, the Boot loader acts as a "programmer" and we can upgrade the firmware on the LPC2148 simply by loading a new file.

3) After performing for first two checks, the boot loader calls the main firmware.

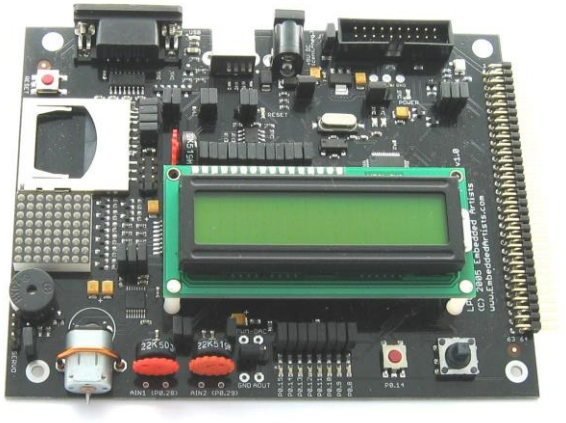


Fig: LPC2148 hardware kit

FUNCTION BLOCKS

Processor

The LPC2148-EDU is equipped with a LPC2148 microcontroller in LQFP64 package. The LPC2148 embeds:

1. 512kB of on-chip flash memory
2. 32KB of on-chip SRAM + 8KB RAM for USB

Analog to digital converter (ADC)

Signal in the real world are analog: light, sound, temperature etc. To convert these analog signals into digital signal, a circuit called ADC (Analog-to-Digital Converter) is needed. There are many commonly used devices that have a built-in ADC circuit, for examples, a scanner which converts the picture (light) into digital information, a telephone which converts the voice into digital signal before using in communication.

The main reason for using digital signals instead of the analog one is because of the noise. Since analog signal can assume any value, noise is interpreted as being a part of the original signal. However, in the digital systems, there are only two numbers to be concerned, zero and one. Anything different from this will be discarded. Another advantage to use digital signal is the data compression capability. This can save storage space or time to manage the data.

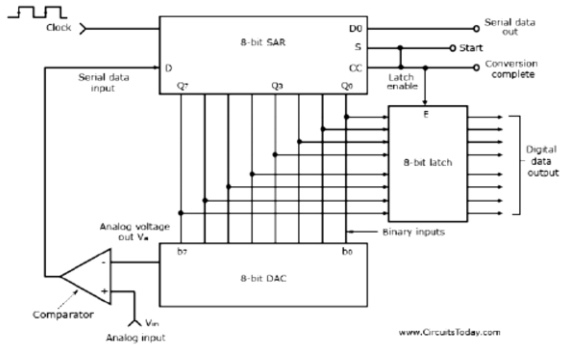


Fig: ADC converter circuit

ADCs essentially act as a bridge between the analog signal (real world scenario) and the digital signal used within the microcontroller. They convert input voltage to a numeric value that the microcontroller can understand. For example, with an internal voltage of 3.3V (LPC2148's reference voltage) and the ADC set to return the maximum 10- bit data (the possible value is in the range of 0 to 1023), 0.0V would return 0, and 3.3V(or higher) would return 1023, and 1.65V would return approximately 512. An ADC in LPC2148 needs to be properly configured and enabled before it can be used. An LPC2148 board contains a simple device called a potentiometer. It is the device that changes its resistance as the knob is adjusting. For example, the resistance may be 10k Ohms at one end and 0 Ohm at the other. Since this resistance will affect the amount of current available on the ADC line, it can be determined where the dial is currently positioned between two extremes. As the potentiometer is turned, the current position of the dial is being converted from analog to digital and receives a value between 0 (at one end) and 1023 (at the other end). This is a 10-bit ADC

PIR Motion Sensor Module

Compact and complete, easy to use Pyroelectric Infrared (PIR) Sensor Module for human body detection. Incorporating a Fresnel lens and motion detection circuit, suitable for a wide range of supply

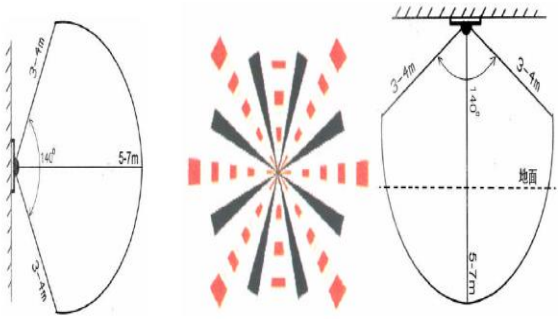


Fig: range of PIR sensor

Alcohol detection system

This system detects the content of alcohol in the breath and thus it attempts to clamp down alcoholics. This system uses PIC16F877A, LCD display, MQ-3 gas sensor, relay and buzzer. The output of the sensor is directly proportional to the content of alcohol consumed. Nowadays alcohol sensor play a significant role in our society and it has vast applications. This type of sensors in cars is a great safety factor which can be embedded in the steering of the cars. When the driver starts the ignition, sensor measures the content of the alcohol in his breath and automatically switches off the car which will stop the drink driving offenders. Thus we can reduce alcohol related road accidents and hence these kinds of detectors have a great relevance.

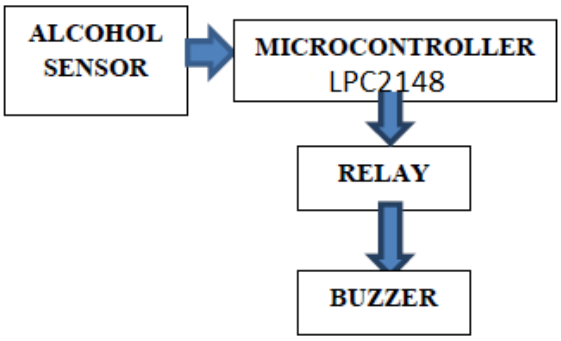
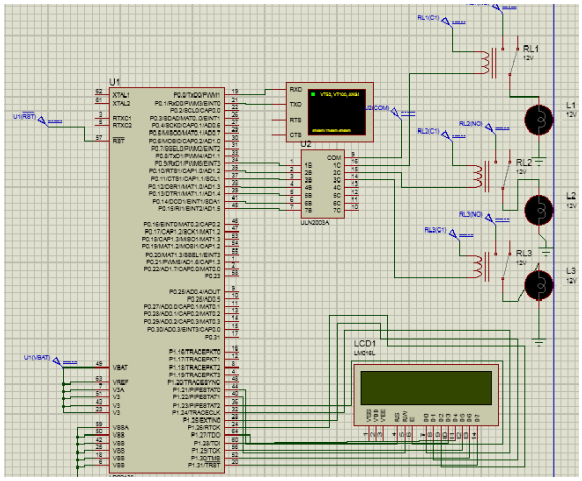


Fig: alcohol detection system

It can also be used in schools, colleges, offices and some public places such as hospitals, libraries etc. The above figure shows the block diagram of the proposed alcohol detection system. It consists of an alcohol sensor, a microcontroller, and a relay.

Simulation result

Simulation result is done by using the keil v.4 and a protius v.8 software tools. Initially the c file is generated in keil software and the program is compiled for error checking. Then the hex file is generated for the compiled file



The proteius design suite is used to desing the system tools like the microcontroller unit, LCD, sensor modules and the electrical appliances control module.

Initially the program is created in the keil software and then the compiled program is dumped into the system designed in the proteius design suite.

CONCLUSION

This paper presents the college automation by using the embedded microcontroller integrated with the wireless technology such as the Zigbee and the GSM communication. This paper overcomes the current limitations in the college campus thereby providing the wireless communication among the entire class rooms.

REFERENCES

[1] C for Embedded Systems Programming,. AMF ENT T0001 November 11, 2010 Derrick Klotz Regional Field Applications Engineer

[2] Introduction to Programming Embedded Systems Sebastian Fischmeister sfischme@seas.upenn.edu Department of Computer and Information Science University of Pennsylvania

[3] C programming for embedded microcontroller systems. V. P. Nelson

[4] USB BOOT LOADER Tutorial on LPC2148 BASED BOARD CoiNel Technology Solutions LLP

[5] Simulation framework for performance assessment of tft-lcd fab

[6] Prof. P. H. Kulkarni1, Ms. Ravina Wafgaonkar2, Ms.Shruti S.Gujarathi3, Mr. Gaurav Ahirrao4 Padmashree Dr. D. Y. Patil Institute of Engineering and Technology, Pimpri, Pune-18 Alcohol Detection and Automatic Drunken Drive Avoiding System

[7] THIAGO TEIXEIRA Yale University, GERSHON DUBLON Massachusetts Institute of Technology1 And ANDREAS SAVVIDES Yale University “A Survey of Human-Sensing: Methods for Detecting Presence, Count, Location, Track, and Identity”.

[8] A Human Detection Method f or Residential Smart Energy Systems Based on Zigbee RSSI Changes Bojan Mrazovac, Milan Z. Bjelica, D ragan Kukolj, *Senior Member, IEEE*, Branislav M. Todorovic, *Member, IEEE* and Nikola Teslic, *Member, IEEE RT-RK Computer Based Systems, Novi Sad, Serbi*

[9] B. Mrazovac, M. Z. Bjelica, I. Papp, N. Teslic, “Towards Ubiquitous Smart Outlets for Safety and Energetic Efficiency of Home Electric Appliances”, ICCE 2011, Berlin, Germany 2011, pp. 324-328.

[10] Remote Device Control and Data Acquisition Using Embedded Systems J. D. S. Andrade, M. V. S. Sodré, D. S. Dominguez, F. M. Milian and M. Torren