

WI-FI BASED DIGITAL I/O CONTROL IN EMBEDDED SYSTEMS

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Abstract: This paper presents very simple and economical way to provide Wi-Fi connectivity to microcontroller based embedded systems. This system uses LPC2148 microcontroller to store the main application source code, web pages and TCP/IP stack which is a vital element of the system software. A Wi-Fi controller chip, ENC wifi04 is used to handle the Wi-Fi communications and is interfaced with the host microcontroller using UART pins. There are several I/O pins available at the microcontroller which are used to interface with sensors and relays for monitoring and controlling operations. Nowadays, Internet has spread worldwide and most of the internet connections use wi-fi as media for data transfer. In industries or in home appliances, most of the time we need to monitor and control different parameters using microcontrollers. Once we enable interface to such systems, we can communicate with them remotely over the internet.

Keywords: Wi-Fi controller; TCPI/P stack; UART LPC 2148.

I. Introduction

Now days we are using many Networked embedded systems for monitoring and control the home or industrial devices. With the scalable networking solution the server enables Web access to distributed measurement/control systems and provides optimization for educational laboratories, instrumentation, Industrial and home automation. In this paper , we present the principles and to design a system for Internet-based data-acquisition system and control by using Advanced RISC Machine i.e ARM processor and in-build web server application with.

The main core of the system is an embedded hardware running on a NUT OS, a industrial grade RTOS for hard time applications. The proposed system eliminates the need for server software and maintenance. The proposed system minimizes the operational costs while operating with a large amount of data. Web access functionality is embedded in a device to enable low cost widely accessible and enhanced user interface functions for the device. A web server in the device provides access to the user interface functions for the device through a device web page. A web server can be embedded into any appliance and connected to the Internet so the appliance can be monitored and controlled from remote places through the browser in a desktop.

II. The Hardware System

Micro controller: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

ARM7TDMI: ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

Liquid-crystal display (LCD) is a flat panel display, electronic visual display that uses the light

modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

III. Design of Proposed Hardware

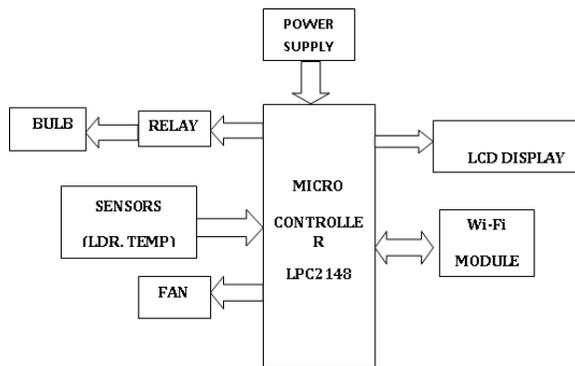
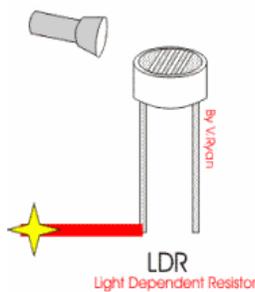


Fig. 1. I/O Device controlling section

Board Hardware Resources Features

LDR:



LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as

1000 000 ohms, but when they are illuminated with light resistance drops dramatically. The image shows that when the torch is turned on, the resistance of the LDR falls, allowing current to pass through it. In a light sensor circuit, When the light level is low the resistance of the LDR is high. This prevents current from flowing to the base of the transistors. Consequently the LED does not light. However, when

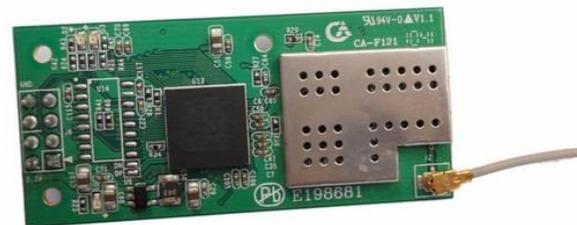
light shines onto the LDR its resistance falls and current flows into the base of the first transistor and then the second transistor. The LED lights on.

The preset resistor can be turned up or down to increase or decrease resistance, in this way it can make the circuit more or less sensitive.

Thermistor

A **thermistor** is a type of resistor whose resistance varies significantly with temperature, more so than in standard resistors. The word is a portmanteau of thermal and resistor. Thermistors are widely used as inrush current limiters, temperature sensors, self-resetting over current protectors, and self-regulating heating elements. Thermistors differ from resistance temperature detectors (RTD) in that the material used in a thermistor is generally a ceramic or polymer, while RTDs use pure metals. The temperature response is also different; RTDs are useful over larger temperature ranges, while thermistors typically achieve a higher precision within a limited temperature range, typically $-90\text{ }^{\circ}\text{C}$ to $130\text{ }^{\circ}\text{C}$.

Wifi



VSD03 is the new third-generation embedded Uart Wifi modules studied by VSDTECH. Uart-Wifi is an embedded module based on the Uart serial, according with the WiFi wireless WLAN standards, It accords with IEEE802.11 protocol stack and TCP / IP protocol stack, and it enables the data conversion between the user serial and the wireless network module. through the Uart-Wifi module, the traditional serial devices can easily access to the wireless network. The module supports quick networking by specifying channel number. In the



usual course of wireless networking, devices would first scan automatically on the current channel, in order to search for the network(or Ad hoc) built by the target AP. This module provides working channel configuration, when the channel of the target network is known, users can specify the working channel directly, the networking time will be reduced from 2 seconds to about 300 milliseconds, then quick networking is achieved.

IV. CONCLUSION

Wi-Fi enabled digital I/O control system is designed for multiple input and output arrangements for industrial as well as non industrial applications. The module is small, simple and flexible which can perform different I/O operations remotely over Wi-Fi. Our system can be extended for sensing malfunctioning in industrial machines and making corrective measures in it. Wi-Fi enabled interface can also be developed. There is no limit for future scope in the monitoring and control operation. Industrial automation is no longer limited by the walls of the production facility. More and more automation is being handled via remote communication. This Wi-Fi Embedded system paves the way to numerous applications to be developed in the area of monitoring and automation.

V. REFERENCES

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