OPEN ACCESS
ISSN: 2249-6645

International
Journal
Of Modern Engineering Research (IJMER)

Security System For Bank Sectors Using Wireless Sensor Network

R.Sridhar[1]

Asst. Prof, ECE,Dept,, CMR ENGINEERING COLLEGE, INDIA Sridharsri518@gmail.com

Abstract: *The Project design is to develop a system based on Embedded controller(ARM) which is used to provide security to the bank. This project design makes use of ARM controller for interfacing to various hardware peripherals. Technology today is seeing its heights in all the areas, especially in the area of Embedded Systems. It is true that every electronic gadget that is used in daily life right from a PC keyboard to a refrigerator is an Embedded System. This it self shows how vastly the technology is expanding .In this project we provide security to bank using IR (Infra red) sensor. We first attached the IR sensor which is comprises of transmitter and receiver to window, door and all the location from where there is any threat to bank security. When a person try to access such places without the prior permission of bank authority the IR sensor will detect that intruder and send the message through RFID (Radio- frequency identification) and the wireless sensor networks (WSN) to the bank control room and hence the bank security authority will take immediate step to avoid any types of incident.*

I. INTRODUCTION

In this project we provide security to bank using IR (Infra red) sensor. We first attached the IR sensor which is comprises of transmitter and receiver to window, door and all the location from where there is any threat to bank security. When a person try to access such places without the prior permission of bank authority the IR sensor will detect that intruder and send the message through RFID (Radio- frequency identification and the wireless sensor networks (WSN) to the bank control room and hence the bank security authority will take immediate step to avoid any types of incident.

When ever the IR sensor detects any unauthorized activity then it sends signal to the PIC microcontroller which again send the signal Through RFID to the Reader Node. The Reader node is having one RFID reader which will read the TAG information placed in sensor node to detect the exact place from which node we want to read the parameters. If the tag id is matched with the sensor node then the parameters can be read and transmitted to the monitoring node using WSN.

In this project work the micro-controller plays major role. Micro-controllers were originally used as components in complicated process-control systems. However, because of their small size and low price, Micro-controllers are now also being used in regulators for individual control loops.

Wireless sensor network (WSN):

Wireless sensor network of spatially distributed autonomous sensors to monitor physical or environmental conditions, such as temperature, sound, pressure, etc. and to cooperatively pass their data through the network to a main location. The more modern networks are bi-directional, also enabling control of sensor activity. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance; today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on.

The WSN is built of "nodes" from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. Each such sensor network node has typically several parts: a radio transceiver with an internal antenna or connection to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source, usually a battery or an embedded form of energy harvesting. A sensor node might vary in size from that of a shoebox down to the size of a grain of dust, although functioning "motes" of genuine microscopic dimensions have yet to be created. The cost of sensor nodes is similarly variable, ranging from a few to hundreds of dollars, depending on the complexity of the individual sensor nodes. Size and cost constraints on sensor nodes result in corresponding constraints on resources such as energy, memory, computational speed and communications bandwidth.

ZigBee is a low-cost, low-power, wireless mesh networking standard. The low cost allows the technology to be widely deployed in wireless control and monitoring applications, the low power-usage allows longer life with smaller batteries, and the mesh networking provides high reliability and larger range. ZigBee is intended for use in embedded applications requiring low data rates and low power consumption. It operates in the industrial, scientific and medical radio bands; 868 MHz in Europe, 915 MHz in countries such as USA and Australia, and 2.4 GHz in most jurisdictions worldwide. ZigBee is simpler and less expensive than other WPANs such as Bluetooth. It will emerge as the dominant wireless mesh networking technology. ZigBee targets on three major markets: the home, commercial buildings, and industrial facilities. Four of the five top vendors of building automation systems, Johnson Controls, Siemens, TAC, and Trane, have introduced wireless products based on ZigBee in the past years, and Honeywell as the fifth is moving toward doing so. Over the next five years, up to 20% of commercial building automation system field equipment may "go wireless," seeking the lower costs, better control, and greater flexibility that such systems deliver.

II. PROPOSED SYSTEM

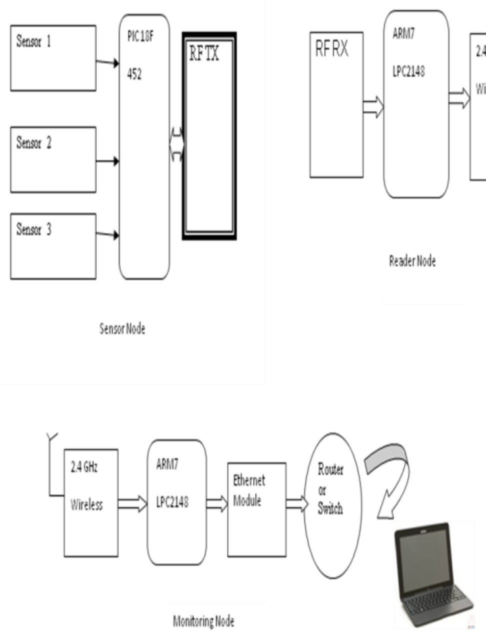

Fig1: Block diagram for proposed system

III. SOFTWARE SPECIFICATIONS AND FRAMEWORK

KEIL C

Keil software is the leading vendor for 8/16-bit development tools (ranked at first position in the 2004 embedded market study of the embedded system and EE times magazine).

Keil software is represented worldwide in more than 40 countries, since the market introduction in 1988; the keil C51 compiler is the de facto industry standard and supports more than 500 current ARM 7 device variants. Now, keil software offers development tools for ARM.

Keil software makes C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, and evaluation boards for 8051, 251, ARM and XC16x/C16x/ST10 microcontroller families.

The Keil C51 C Compiler for the ARM 7 is the most popular ARM 7 C compiler in the world. It provides more features than any other ARM 7 C compiler available today.

The C51 Compiler allows you to write ARM 7 applications in C that, once compiled, have the efficiency and speed of assembly language. Language extensions in the C51 Compiler give you full access to all resources of the ARM 7.

The C51 Compiler translates C source files into re-locatable object modules which contain full symbolic information for debugging with the µVision Debugger or an in-circuit emulator. In addition to the object file, the compiler generates a listing file which may optionally include symbol table and cross reference

- Nine basic data types, including 32-bit IEEE floating-point,
- Flexible variable allocation with bit, data, bdata, idata, xdata, and pdata memory types,

- Interrupt functions may be written in C,
- Full use of the ARM 7register banks,
- Complete symbol and type information for source-level debugging,
- Use of AJMP and ACALL instructions,
- Bit-addressable data objects,
- Built-in interface for the RTX51 real time kernels,
- Support for the Philips 8*x*C750, 8*x*C751, and 8*x*C752 limited instruction sets,
- Support for the Infineon 80C517 arithmetic unit.

IV. HARDWARE IMPLEMENTATION

A. AT89C2051 Micro controller

The AT89C2051 is a low-voltage, high-performance CMOS 8-bit microcomputer with 2K bytes of Flash programmable and erasable read-only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51 instruction set. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C2051 is a power-ful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

The AT89C2051 provides the following standard features: 2K bytes of Flash, 128 bytes of RAM, 15 I/O lines, two 16-bit timer/counters, a five vector two-level interrupt architecture, a full duplex serial port, a precision analog comparator, on-chip oscillator and clock circuitry. In addition, the AT89C2051 is designed with static logic for opera-tion down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port and interrupt system to continue functionning. The power-down mode saves the RAM contents but freezes the oscillator disabling all other chip functions until the next hardware reset.

B. ATMEGA16 Micro Controller

The ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega16 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

ATMEGA16 Microcontroller Features:

• A CPU (Central Processing Unit) 8 Bit.
• 16k bytes of ROM
• 512 bytes of EEPROM
• 1K byte internal SRAM
• 32 Programmable I/O Lines
• 40-pin PDIP, 44-lead TQFP, and 44-pad QFN/MLF
• The internal oscillator and timing circuits.
• Two 8-bit timer / counters with separate presales
• One 16 bit timer/counter
• A programmable serial USART
• Maximum speed execution of instructions per cycle is 0.5 s at 16 MHz clock frequency

PIN CONFIGURATION

ATMEGA16 microcontroller has 40 pins with a single 5 Volt power supply. The pin 40 is illustrated as follows:

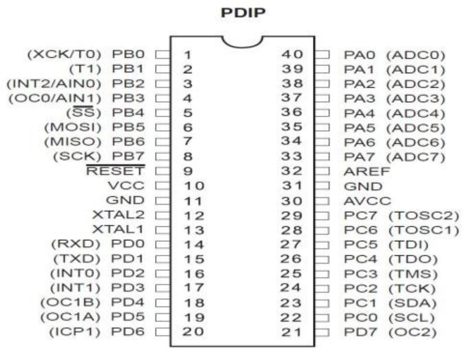

Fig.3.1.1 ATMEGA16 microcontroller Pin Configuration

V. RF MODULE

An RF module (radio frequency module) is a (usually) small electronic circuit used to transmit and/or receive radio signals on one of a number of carrier frequencies. One of the main form of communication that has been in use since 19th century is Radio Wave communication. Radio Waves have found its place in each and every field whether it be medical, electronics or space. In general it exists in every system in one or the other form.RF modules are widely used in electronic design owing to the difficulty of designing radio circuitry. Good electronic radio design is notoriously complex because of the sensitivity of radio circuits and the accuracy of components and layouts required achieving operation on a specific frequency. Design engineers will design a circuit for an application which requires radio communication and then "drop in" a radio module rather than attempt a discrete design, saving time and money on development.

B. Humidity Senser:

This module converts relative humidity to the output voltage.

Fig3: Humidity sensor

Specifications:

Item : SY-HS-220
Rated voltage : 5.0v
Rated power : <=3.0mv
Operating temperature : 0-60C
Storage humidity : within 95%RH
Storage temperature: -30 t0 85C
Standara Output : 25C at 60%RH
Accuracy : +or -5C

C. LDR (light dependent register):

A photo resistor or Light Dependent Resistor or CdS (Cadmium Sulphide) Cell is a resistor whose resistance decreases with increasing incident light intensity. It can also be referred to as a photoconductor.A photo resistor is made of a high resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance.

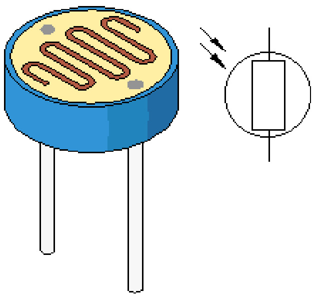

Fig4:LDR Sensor

D. Temperature Sensor (LM35):

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1/4°C at room temperature and ±3/4°C over a full -55 to +150°C temperature range.

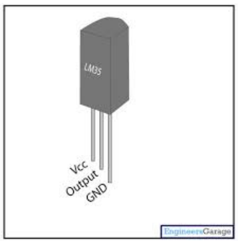

Fig5: Temperature senso

VI. CONCLUSION

The project **"Security system for bank sectors using wireless snsor network"** has been successfully designed and tested. It has been developed by integrating features of all the hardware components and software used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit.

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