

Unique ID Card Design for Personal Data Transaction

Aakula Lavanya^{*1}, S. Naveen², Animoni Nagaraju³

^{*1,2}Brilliant Institute of Engineering & Technology, Hyderabad, Hyderabad, Telangana, India

³Professor, Sree Dattha Group of Institutions, Sheriguda, Telangana, Hyderabad, India

ABSTRACT

Smart card technology is successfully penetrating the youth market, this market provides an opportunity to develop brand awareness and establish customer loyalty. Smart card solutions are now being deployed that recognize this vulnerability and are making a significant impact in promoting social inclusion. Access control is the ability to permit or deny the use of a particular resource by a particular entity. Access control system can be used in managing physical resources, logical resources, or digital resources, for these kinds of things the smart card system is a better solution.

In this paper most important role discusses are smart Card, smart card Reader/Writer and microcontroller unit. Smart card is a chip card embedded with a computer chip that stores and transacts data. This data is associated with either value or information or both and is stored and processed within the card's chip. The card data is transacted through a reader that is part of a computing system. Designing of unique ID card for personal transactions i.e. one ID card is used for the different applications like attendance, access control, money transactions etc. this development is very helpful for the public in daily life.

Keywords: Smart Card, Access Control, Card Chip, Unique ID Card, Transacts Data

I. INTRODUCTION

Embedded Systems

Embedded systems are electronic devices that incorporate microprocessors within their implementations. The main purposes of the microprocessors are to simplify the system design and provide flexibility. Having a microprocessor in the device helps in removing the bugs, making modifications, or adding new features are only matter of rewriting the software that controls the device. Or in other words embedded computer systems are electronic systems that include a microcomputer to perform a specific dedicated application. The computer is hidden inside these products. Embedded systems are ubiquitous. Every week millions of tiny computer chips come pouring out of factories finding their way into our everyday products.

Embedded systems are self-contained programs that are embedded within a piece of hardware. Whereas a regular computer has many different applications and software that can be applied to various tasks, embedded systems are usually set to a specific task that cannot be altered without physically manipulating the circuitry. Another way to think of an embedded system is as a computer system that is created with optimal efficiency, thereby allowing it to complete specific functions as quickly as possible.

Embedded systems designers usually have a significant grasp of hardware technologies. They use specific programming languages and software to develop embedded systems and manipulate the equipment. When searching online, companies offer embedded systems development kits and other embedded systems tools for use by engineers and businesses.

Background

Embedded system is an intelligent system that has the capability of processing, monitoring and controlling. It may comprise of Sensors, Microcontrollers, FPGA, ASIC, etc. It typically has a specialized function with programs stored on ROM. Examples of embedded systems are automatic environmental systems, security systems, and entertainment systems.

An added feature in any embedded system is its ability to communicate. The communication can be via Bluetooth, WI-FI, GSM and Smart Card. The Smart Card is a widely used standard for modern digital communication.

The project we have undertaken is “Design of an Embedded Control and Acquisition Security System for Personal Data Transaction Based on ARM”. It includes the two concepts embedded systems, Smart Card communication, and finger print communication. It provides High security for the personal data

II. METHODS AND MATERIAL

ARM 7 Controllers

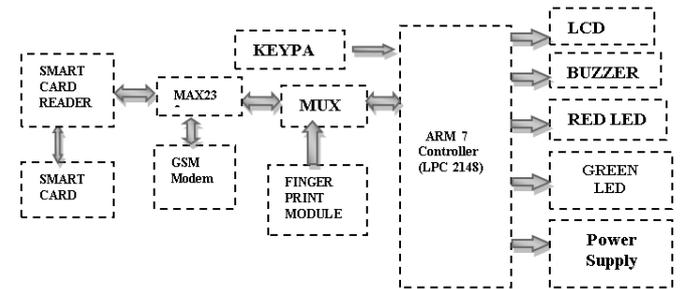
ARM (LPC 2148) is a family of instruction set architectures for computer processors based on a reduced instruction set computing (RISC) architecture developed by British company ARM Holdings. A RISC-based computer design approach means ARM processors require significantly fewer transistors than typical processors in average computers. This approach reduces costs, heat and power use. These are desirable traits for light, portable, battery-powered devices including smart phones, laptops, tablet and notepad computers, and other embedded systems. A simpler design facilitates more efficient multi-core CPUs and higher core counts at lower cost, providing higher processing power and improved energy efficiency for servers and supercomputers

Power Supply

In this power supply, a step down transformer is used to step down the current from 230V to 5V AC, next step is to convert this AC to DC which is done by using a

Bridge Rectifier and additional Filter Circuits are used where the ripples or noised in the DC voltage are removed and at last a 7805 Regulator is used to makeup regulated a 5V DC, from the output of the 7805 IC we connect a 2 pin connector to make a connection with the corresponding Vcc and Gnd pins of the LPC 2148 controller. Now the controller is powered up to do the specified controlling action given by the user.

Block Diagram



Smart Card Reader

ASIC (application specific IC) and smart card reader development experience since 1990. It Contact T=0, T=1 protocol support, Memory card support through SCM MCARD API, Communication speed up to 344,105 bps, Frequency up to 8 MHz, Support ISO 7816 Class A and AB smart card, 100,000 insertions, Sliding contact.

MAX 232

It is an a serial communication between portable handled devices to the microcontroller and it is operated by 5v power supply.

ARM Controller (LPC 2148)

The LPC2141/42/44/46/48 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. Due to their tiny size and low power consumption, LPC2141/42/44/46/48 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice

recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical systems.

Finger Print Module

The ARA-EM01 is high performance fingerprint module developed by Aratek Biometrics Technology Co, Ltd .it has many features : easy restructure, powerful functions, compatible with PC , and multiple-functions in one module: Fingerprint enrollment, image process, characters acquisition, fingerprint template creation, fingerprint template storage, fingerprint compare (1: 1, 1: N), fingerprint delete. This module can work with different devices based on UAWRT such as PC, SCM and so on. Only easy circuits and fingerprint module can enhance your product into fingerprint authentication power. It is widely used by electronics business, information security, access control, identity authentication and other security industry.

Keypad

Here Keypad size is 4X4 Matrix. It is used for enter the password and select options w r p display.

LCD

It is a thin, flat panel used for electronically displaying information such as text, images, and moving pictures. Its uses include monitors for computers, televisions, instrument panels, and other devices ranging from aircraft cockpit displays, to every-day consumer devices such as video players, gaming devices, clocks, watches, calculators, and telephones. Among its major features are its lightweight construction, its portability, and its ability to be produced in much larger screen sizes than are practical for the construction of cathode ray tube (CRT) display technology.

LED

It requires a definite amount of energy to generate an electron-hole pair. The same energy is released when an electron recombines with a hole. This released energy

may result in the emission of photon and such a recombination. Hear the amount of energy released when the electro reverts from the conduction band to the valence band appears in the form of radiation. It works only 2.5-2.8V dc and 1.m amp current.

Buzzer

It is used for indicate the sound signal.

GSM Modem

The GSM commercial modem is an approved modem for embedded applications. It provides a 5v TTL compatible serial interface to host data terminal equipment. Call control is provided by using the Hayer AT command set. By sending a code from a transmitter GSM equipped mobile to other mobile which is a receiving GSM equipped mobile.

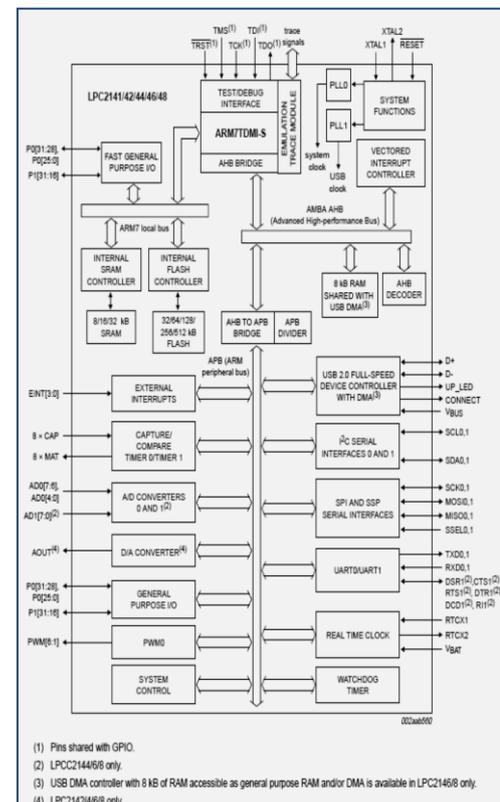
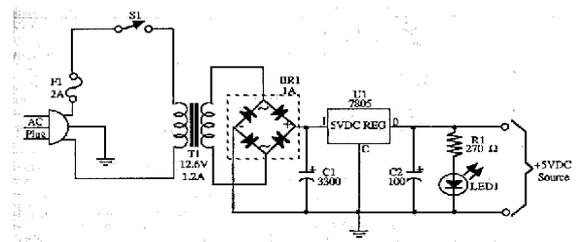


Figure 1: 5V dc Circuit Diagram & LPC2148 block diagram

Pin Configuration:

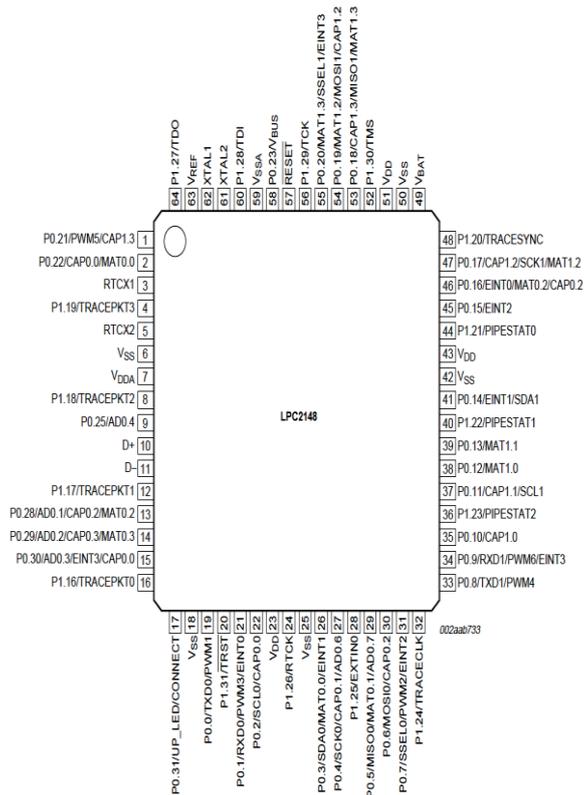


Figure 2: LPC2148 64-Pin Package

III. RESULTS AND DISCUSSION

The hardware contains LPC2148 controller, LCD Display, Smart Card Reader, Smart Card, Finger Print Module, LED, and Buzzer & Power Supply the implementation of the project is divided into different phases.

Phases of Implementation

Depending on type of hardware, interfacing mechanism and control flow of software, the implementation of the project is divided into five phases. The five phases of implementation will be introduced as below and explained in detail in the later sessions.

1. Interfacing Smart Card Reader module with LPC2148.
2. Interfacing FingerPrint module with LPC2148 using RS232 protocol.
3. Communication through Smart Card.
4. Monitoring using Keypad.
5. Display on LCD.

Interfacing Smart Card Reader module with LPC2148

In the communication using MAX232 IC used to monitoring the data speed levels. Here MAX 232 is mediator of Controller and Smart Card Reader and monitoring the voltage levels. In this interfacing main terminals are Receiver (RDx), Transmitter (TDx) and Ground.

Interfacing FingerPrint module with LPC2148 using RS232 protocol

In the communication using MAX232 IC used to monitoring the data speed levels. Here MAX 232 is mediator of Controller and FingerPrint Module and monitoring the voltage levels. In this interfacing main terminals are Receiver (RDx), Transmitter (TDx) and Ground. This Device is works after swipe the smartcard. Here accessed data send to controller. Specific Controller checks the smartcard code and fingerprint code.

Hardware Design Implementation

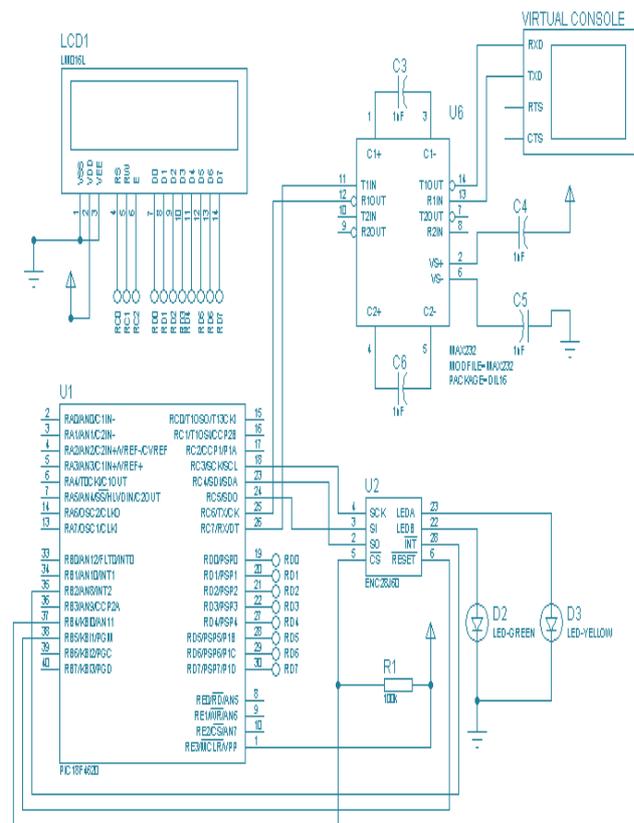


Figure 3: Schematic Diagram of LPC2148 Interfacing

Communication through Smart Card

Here mainly access the personal data through smart card. In this way Smart card code is add to the server, if code is not added card is not valid.

Monitoring using Keypad

After Completing smart card and fingerprint verification to ask the password of the card (This is only for high security purpose). Here password is entering through keypad and options also select through keypad only.

Display on LCD

All information to display on LCD display.



Figure 4: Final Design

IV. CONCLUSION

The paper consists of 3 major portions: the Smart Card Reader, the controller, and the Finger Print Module which is used to high security. It provides Personal data of banking, passport, home expenses like gas bill, telephone bill, etc. and online voting system for electing the right person.

This concept is implemented in banking sectors (only banking services), but not only banking services, to add all information in single card. In this paper to avoid the hacking because of high security with fingerprint.

In future scope we can enhance the scope with addition of GSM and GPS services to get the message to card holder and track the card if it is lose.

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