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Multi Account Embedded ATM card with Fingerprint Recognition

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Abstract - *ATM is an abbreviation of Automated Teller Machine. A new embedded system is to be developed which is used for ATM security applications. In these systems, bankers will collect the customer finger prints, cards and mobile number while opening the accounts then customer only access ATM machine.*

Security measures at banks can play a critical, contributory role in preventing attacks on customers. These measures are of paramount importance when considering vulnerabilities and causation in civil litigation. Banks must meet certain standards in order to ensure a safe and secure banking environment for their customers. Existing ATM systems use magnetic card reader.

The customer is identifying by inserting an ATM card with magnetic card that contain unique information such as card number and some security parameters. By entering a personal identification number, the customer is authenticated first then can access bank account in order to make cash withdraw or other services provided by the bank.

***Key Words*: ARM LPC2148 Microcontroller, Node MCU module, Keil µVision4, smart card, RFID Reader**

1. INTRODUCTION

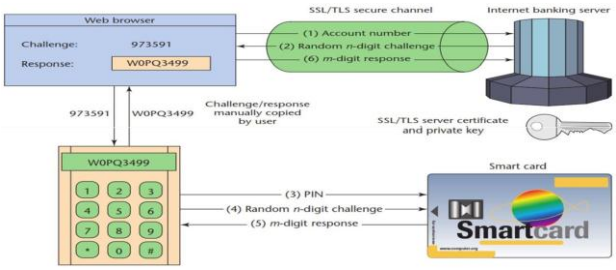
ATM is an abbreviation of Automated Teller Machine. It is introduced in the year 1959 for encouraging self-service in retail banking. It is a mechanical device that has its roots embedded in the accounts and records of a banking institution. This makes people to deposit, withdraw and transfer amount without the help of banking personnel and it can be done at anytime and anywhere. At first, the ATM was made to transact for the particular bank customers but later on the ATMs are connected to interbank network, so that it enables people to deposit, withdraw and transfer amount from the ATM machines not belonging to that particular bank (i.e.) any one can access any banks ATM machine to carry out their transactions.

At present every customer has an individual ATM card for each and every bank in which he/she maintains account. Many ATMs also allow people to deposit cash or cheques, transfer money between their bank accounts, top up their mobile phones prepaid or even buy postage stamps. In most modern ATMs, the customer identifies him or herself by inserting a plastic card with magnetic strip or plastic smart card with a chip that contains his or her account number. The customer then verifies his or her identity by entering a passcode (i.e.) personal identification number (PIN) of four digits.

2. LITERATURE SURVEY

This Paper gives an overview of basics of smart card and its application and how it is used in various sectors. It also deals with security algorithm during encryption and decryption of data's. This Paper tells us that why smartcard is preferred for banking system than other type cards.

A Smart card is type of chip card embedded with computer chip that stores and transacts data between users. It was introduced in Europe nearly three decades ago to pay phone bills. Smart cards greatly convenience and security of any transaction. They provide tamper proof storage of user and account identity. Smart cards systems have proven to be more reliable than other machine-readable cards.



3. CIRCUIT DESCRIPTION

A DC power supply which maintains the output voltage constant irrespective of AC. mains fluctuations or load variations is known as regulated DC power supply. It is also referred as full-wave regulated power. Supply as it

uses two diodes with the transformer. This laboratory power supply offers excellent line and load regulation and output voltages of +5V & +12 V at output currents up to one ampere.

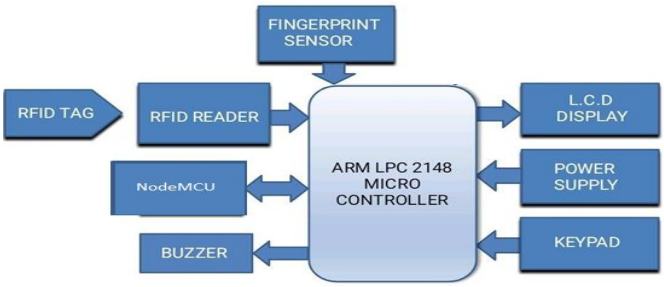
1. Step-down Transformer: The transformer rating is 230V AC at Primary and 12-0-12V, 1Ampers across secondary winding. This transformer has a capability to deliver a current of 1Ampere, which is more than enough to drive any electronic circuit or varying load. The 12VAC appearing across the secondary is the RMS value of the waveform and the peak value would be 12 x 1.414 = 16.8 volts. This value limits our choice of rectifier diode as 1N4007, which is having PIV rating more than 16Volts.

2. Rectifier Stage: The two diodes D1 & D2 are connected across the secondary winding of the transformer as a full-wave rectifier. During the positive half-cycle of secondary voltage, the end A of the secondary winding becomes positive and end B negative. This makes the diode D1 forward biased and diode D2 reverse biased. Therefore, diode D1 conducts while diode D2 does not. During the negative half-cycle, end A of the secondary winding becomes negative and end B positive. Therefore, diode D2 conducts while diode D1 does not. Note that current across the center tap terminal is in the same direction for both half-cycles of input AC. voltage. Therefore, pulsating DC is obtained at point 'C' with respect to Ground.

3. Filter Stage: Here Capacitor C1 is used for filtering purpose and connected across the rectifier output. It filters the AC. components present in the rectified DC and gives steady DC voltage. As the rectifier voltage increases, it charges the capacitor and also supplies current to the load. When capacitor is charged to the peak value of the rectifier voltage, rectifier voltage starts to decrease. As the next voltage peak immediately recharges the capacitor, the discharge period is of very small duration. Due to this continuous charge-discharge-recharge cycle very little ripple is observed in the filtered output. Moreover, output voltage is higher as it remains substantially near the peak value of rectifier output voltage. This phenomenon is also explained in other form as: the shunt capacitor offers a low reactance path to the AC. components of current and open circuit to DC component. During positive half cycle the capacitor stores energy in the form of electrostatic field. During negative half cycle, the filter capacitor releases stored energy to the load.

4. Voltage Regulation Stage: Across the point 'D' and Ground there is rectified and filtered DC. In the present circuit KIA 7812 three terminal voltage regulator IC is used to get +12V and KIA 7805 voltage regulator IC is used to get +5V regulated DC output. In the three terminals, pin 1 is input i.e., rectified & filtered DC is connected to this pin. Pin 2 is common pin and is grounded. The pin 3 gives the stabilized DC output to the load. The circuit shows two more decoupling capacitors C2 & C3, which provides ground path to the high frequency noise signals. Across the point 'E' and 'F' with respect to ground +5V & +12V stabilized or regulated DC output is measured, which can be connected to the required circuit.

4. PROPOSED SYSTEMS



The µVision3 IDE is a Windows-based software development platform that combines a robust editor, project manager, and make facility. µVision3 integrates all tools including the C compiler, macro assembler, linker/locator, and HEX file generator. The µVision3 IDE offers numerous features and advantages that help you quickly and successfully develop embedded applications. They are easy to use and are guaranteed to help you achieve your design goals. The circuit needs two different voltages, +5V & +12V, to work. These dual voltages are supplied by this specially designed power supply. Radio frequency identification (RFID) technology is a wireless communication technology that enables users to uniquely identify tagged objects or people. RFID is rapidly becoming a cost-effective technology. This is in large part due to the efforts of Wal-Mart and the Department of Defense (DoD) to incorporate RFID technology into their supply chains.

The RFID technology is a means of gathering data about a certain item without the need of touching or seeing the data carrier, through the use of inductive coupling or electromagnetic waves. The data carrier is a microchip attached to an antenna.

An RFID system has four basic components:

•A tag which is composed of a semiconductor chip and an antenna.

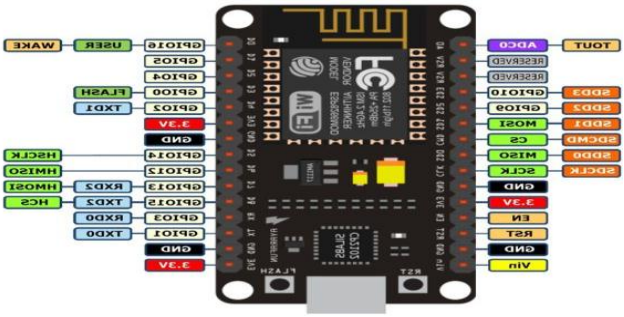
•An interrogator (sometimes called a read/write device), which is composed of an Antenna, a RF electronics module, and a control electronics module.

•A controller (sometimes called a host), which most often takes the form of a PC or a workstation running database and control (often called middleware) software.

•An antenna, which converts electrical power to RF power.

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. The LPC2141/42/44/46/48 flash memory provides a minimum of 100,000 erase/write cycles and 20 years of data-retention. The LPC2141, LPC2142/44 and LPC2146/48 provide 8 kB, 16 kB and 32 kB of static RAM respectively. This is equipped with a USB device controller that enables 12 Mbit/s data exchange with a USB host controller. It consists of a register interface, serial interface engine, endpoint buffer memory and DMA controller. Each contain two UARTs. In addition to standard transmit and receive data lines, the LPC2144/46/48 UART1 also provides a full modem control handshake interface. Compared to previous LPC2000 microcontrollers, UARTs in PC2141/42/44/46/48introduce a fractional baud rate generator for both UARTs, enabling these microcontrollers to achieve standard baud rates such as 15200 with any crystal frequency above 2 MHz The purpose of the watchdog is to reset the microcontroller within a reasonable amount of time if it enters an erroneous state. When enabled, the watchdog will generate a system reset if the user program fails to 'feed' (or reload) the watchdog within a predetermined amount of time.

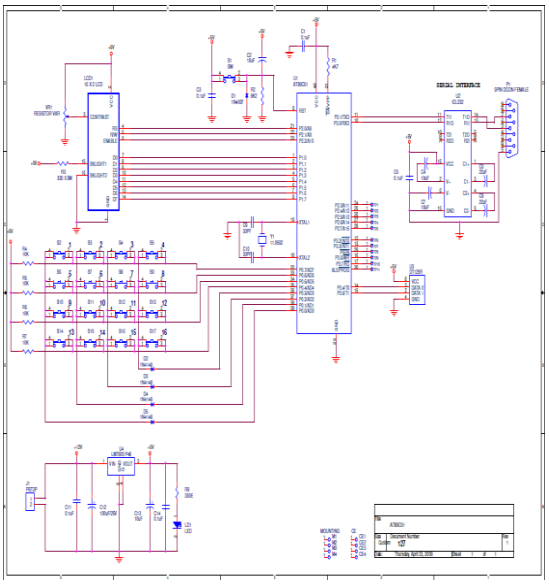
The ESP8266 Node Mcu has 16 GPIO pins and one analog input pin shown in the image bellow. However only 10 of these GPIO pins can be used for digital input and output operations.



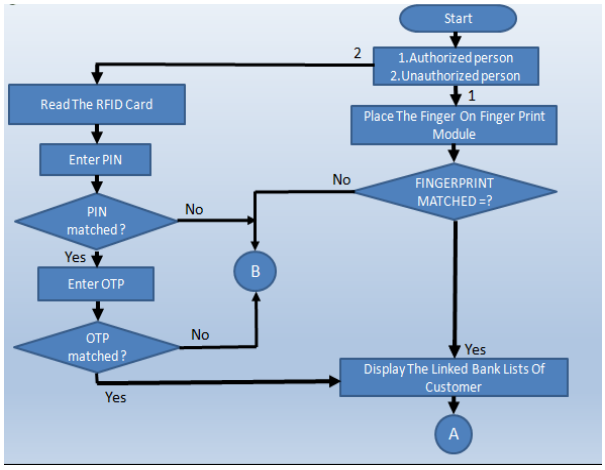
The LCD module is used in the vehicle anti-collision system to display the range information which is calculated by LV Max Sonar-EZ1 and also to display one of the three zones in which the vehicle is present. If the distance displayed is above 20 inches it displays "safe" zone.

When enrolling, user needs to enter the finger two times. The system will process the two-time finger images, generate a template of the finger based on processing results and store the template. When matching, user enters the finger through optical sensor and system will generate a template of the finger and compare it with templates of the finger library. For 1:1 matching, system will compare the live finger with specific template designated in the Module; for 1:N matching, or searching, system will search the whole finger library for the matching finger. In both circumstances, system will return the matching result, success or failure.

5. CIRCUIT DIAGRAM



Circuit Diagram of RFID tag



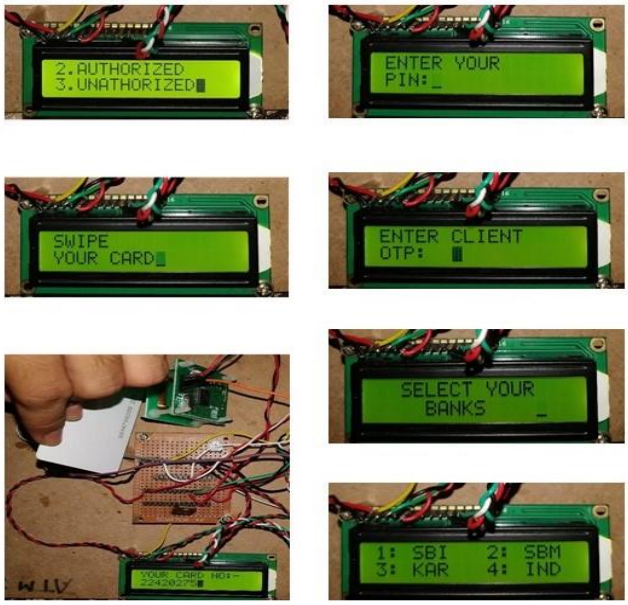
Flowchart of Multi-account ATM system

The trouble with projects done with assembly code can is that they can be difficult to read and maintain, especially if they are not well commented. Additionally, the amount of code reusable from a typical assembly language project is usually very low. Use of a higher-level language like C can directly address these issues. A program written in C is easier to read than an assembly program.

6. RESULTS

The result can be seen as a two-segment model where an Authorized person and unauthorized person.

AUTHORIZED PERSON TRANSACTION



UNAUTHORIZED PERSON TRANSACTION

7. CONCLUSION & FUTURE SCOPE

ADVANTAGES OF PROJECT:

•Provides very food security to ATM users.

•Use of RFID allows only authorized users to use ATM facility.

•Alerts card holders during theft through Telegram modem.

•Low cost and secure transaction is possible.

•There is not possible to duplicate the RFID card.

•Advantages of smart card over magnetic cards

DISADVANTAGES OF PROJECT:

•If network fails, then it is not possible to transact.

•It requires more time during transaction.

The system we are using for handling multiple accounts here is more efficient than existing system. This Reduces transaction cost of handling multiple accounts of a single user. This make banking system more efficient than the existing system. Using this the users can perform transactions for all his bank Accounts using single smart ATM card with Enhanced security system such as OTP (one-time password) and face recognition. Thus, the user can manage his multiple accounts in various banks with the help of this

single smart card which provides access and reduces the complex of managing more than one ATM card and passwords. This also leads to reduce cost of transaction charges that were on the customers for making transaction and decrease in their production of smart cards for every account the user has. By implementing this ATM fraud i.e. skimming etc., can be avoided.

FUTURE SCOPE:

•This project can be implemented for office security also.

•Also, to colleges, hospitals and also in parking system.

•Future research will help to do away with PINs completely and dwarf ATM card authorization by introducing palm and finger vein authentication which is fast, accurate and difficult to fake.

•Since more than one bank accounts being added, the existing PIN security are not sufficient enough, so we can use a biometric scan in the smart card i.e. multi component card So that the user holds the card such that the face recognition on the biometric scan reader while he swipes the registered card and the image is authenticated at the real time. No one other than the user and their family can use the card. Only if the face matches the user can enter his PIN number otherwise the transaction will not be allowed until the user is authenticated.

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