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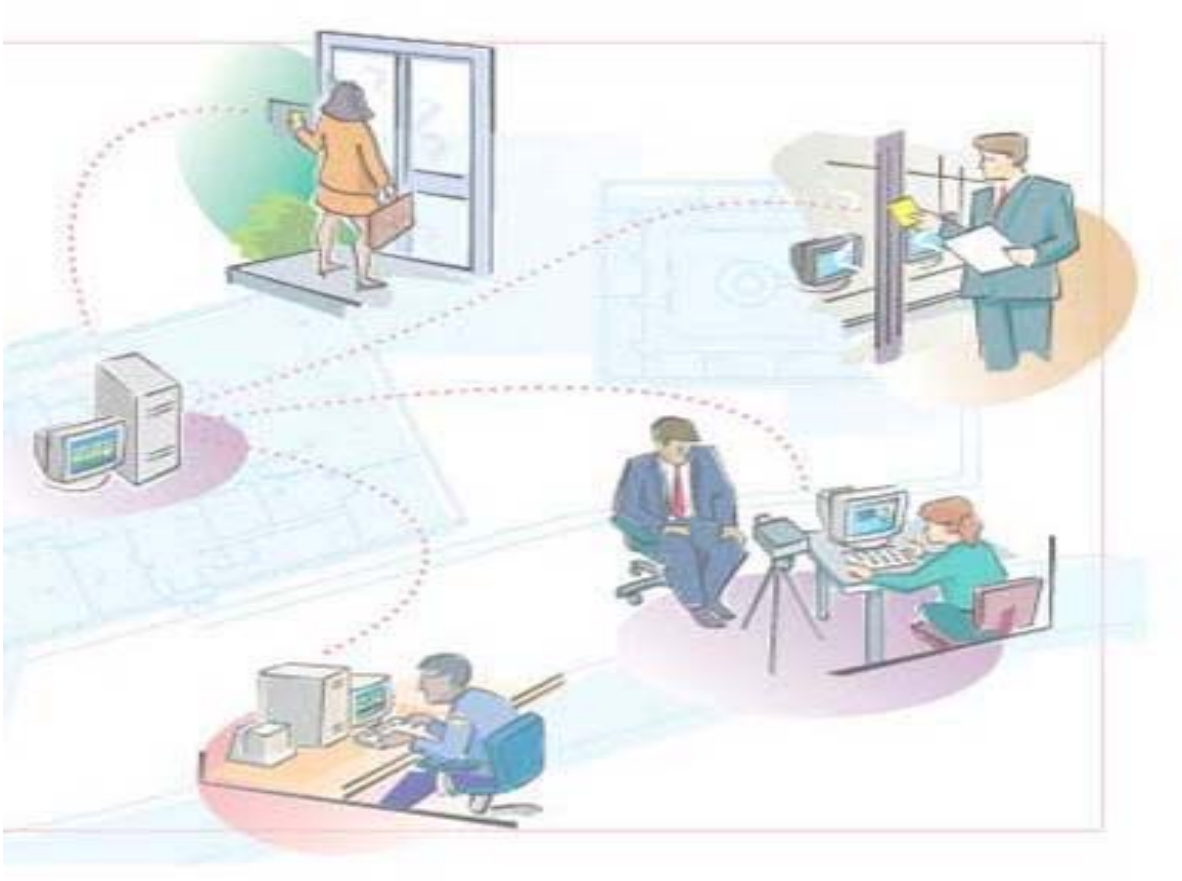
VIDYARATHI

THE COMPLETE CAMPUS MANAGEMENT SYSTEM

CONTENTS

Contactless Smart Card Technology for the following:

- **Identification , Personal Information & Attendance Monitoring**
- **Access Control**
- **Electronic Wallet- Fee/Fine Payment, Canteen Management**
- **Library Management**



Time Attendance Management System with Online Recording, Query, New Registration, Data Management and Up-Keeping

TIME ATTENDANCE SYSTEM BASED ON MIFARE/13.56 RF-ID CARD TECHNOLOGY

- The Contactless Smart Card systems can work in stand-alone mode and come with a local memory. Thus even when the network link is down the system registers the attendance.
- The system can also be used to issue visitors & gate pass.
- The System displays the Photograph of the Student/employee on the Attendance Monitoring Terminal on showing of his card for recording of attendance.
- The software is network compatible, hence gives option of connecting multiple kiosk / readers to the network and share information and store data is a centralized server.

Mifare Contactless Smart Card

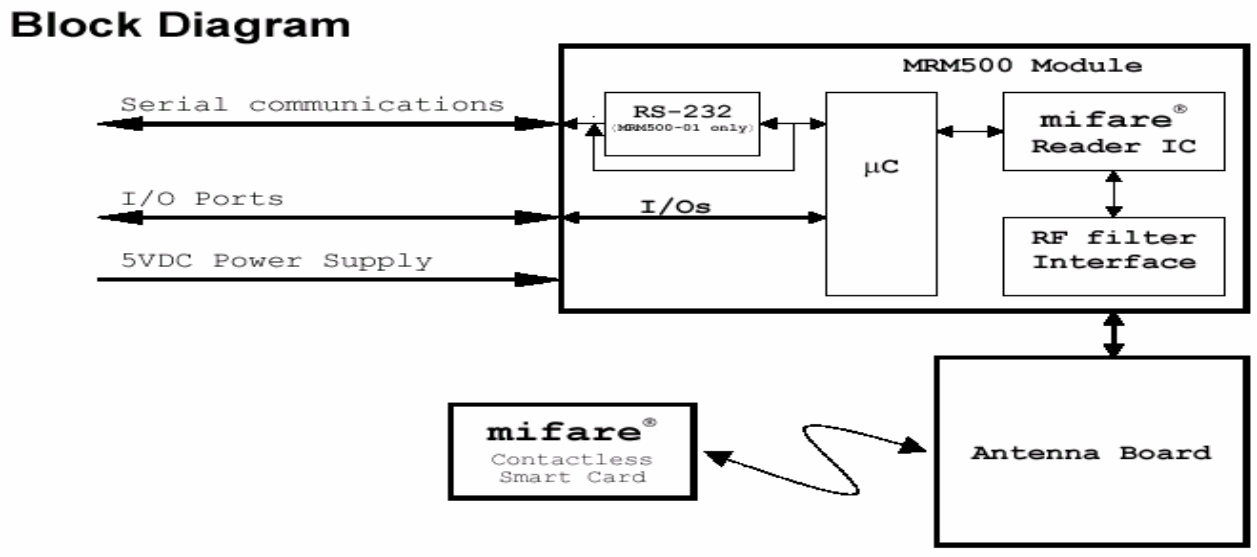
Based on Contactless Philips Mifare Technology
Reads ID Card on show within 5 cm
1 KB Storage Capacity in Card
1,00,000 read/write cycles
REUSABLE
ISO and EMC Compliant

The Mifare Reader Module is a miniature read/write device to access Mifare CSCs. It includes various serial communication interfaces and offers user-defined I/Os. It consists of a Philips Mifare reader IC, and a µC with a serial interface packed in RF shielding box, plastic cover of epoxy coated. It is a highly integrated reader module for contactless communication at 13.56MHz, and utilizes outstanding modulation and demodulation concept completely integrated for all kinds of passive contactless communication methods and protocols at 13.56MHz. It supports all layers of ISO14443A. The internal transmitter part is able to drive a 50 §Ù impedance matching antenna designed for proximity operating distance (up to 100mm) directly without additional active circuitry. The receiver part provides a robust and efficient implementation of a demodulation and decoding circuitry for signals from ISO14443A compatible transponders. It communicates via a serial protocol with a host computer or a µC. It is designed for fast integration into handheld or portable devices. The typical reading range is 50~100mm depending on antenna and card/tag. Because of its miniature size, standard footprint and power consumption control, the module can be embedded easily into existing data collection applications such as access control reader, epos terminal, handheld card scanner, etc.

Main Features of the Mifare ® Reader Module

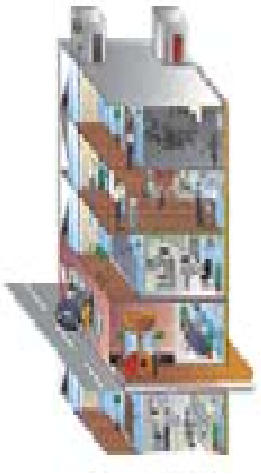
- Operating frequency 13.56 MHz
- Accessible via serial protocols (9600 to 57600 baud, by jumper setting)
- Serial channel such as RS232 with driver, or RS232, RS422, RS485 TTL level, industrial Wiegand and ABATrack II data format
- RTS function for PC / µC connection of polling-free (TBA)
- 5 VDC power supply
- Power Down Mode (TBA)
- Maximum five free usable I/O-pins
- Unique serial number of each MRM500 (readable per software)
- Integrated 50 §Ù balun (abbreviation for Balanced to Unbalanced) transformer for matching antenna impedance
- Directly matched antenna output
- Standard DIP 28 pin footprint with 0.1” pitch and 0.6” row spacing
- 106 kbaud data communication rate between MRM500 and Mifare ÆÊ CSC
- Data encryption and authentication between MRM500 and Mifare ÆÊ CSC
- Authentication key memory for keys (Key A/Key B) for each of the sixteen sectors of Mifare ÆÊ CSC
- Anti-collision
- Error detection for communication between MRM500 and Mifare ÆÊ CSC (CRC, parity check)
- Error detection for communication between host and reader
- Power-on reset
- RF Shielded for whole module (Package type A)
- Complies to EMC standards

Block Diagram



ACCESS CONTROL MANAGEMENT SYSTEM

Overview



Security has become prime concern at all major buildings in India. Especially security and access of individual at buildings with maintenance of automated log is the solution. Every individual without any human intervention is tagged with his access rights to through the various doors of the building and a complete automatic log to his access details with date/time is maintained at the server.

The backend software controls the various hardware like controller, door locks in a synchronized manner for a fast and efficient locking/unlocking mechanism with data capture at multiple points simultaneously. The software further provides option for on-screen viewing of reports, search and deny access option to individual card holders by administration. Network enabled software provides viewing of reports at multiple nodes at the same time within the network even at remote location.

Solution

All individual of the building will be issued a Access Card [Smart Card] with personalization i.e. the card will display the following

1. Photograph of the Card Holder
2. Name
3. Department
4. Designation
5. Blood Group
6. Signature of the Issuing Authority

The micro-chip will contain the following

1. ID No.
2. Access Rights through Doors [i.e. Door Nos.]

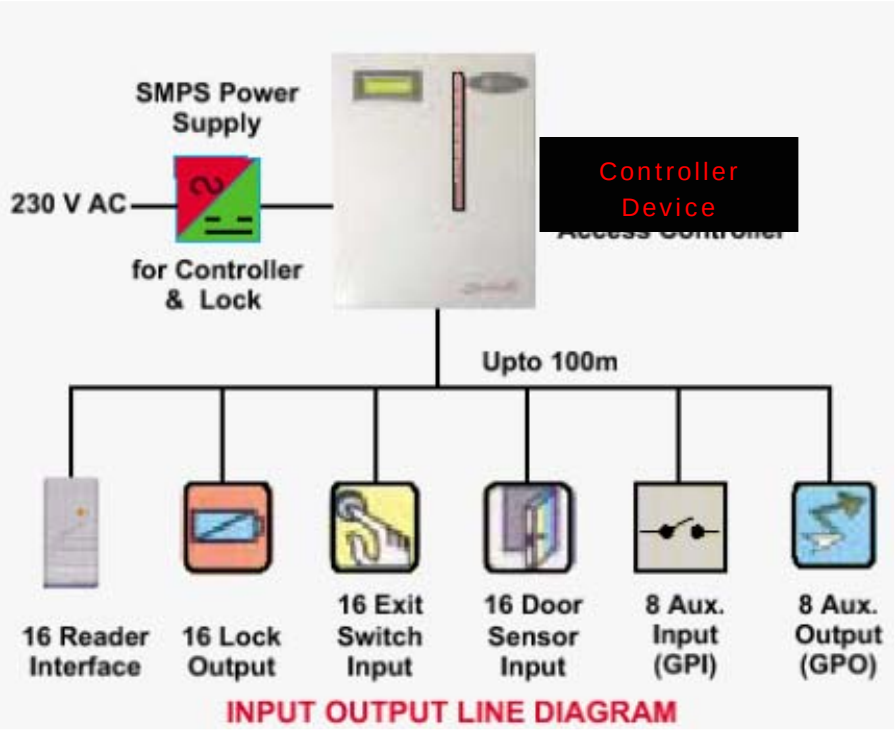
The Doors will be fitted with automatic door locks and smart card readers, on display of his Access Card to the door, the reader will automatically verify the authenticity of the Smart Card and check whether he has the access through this door or not. On correct verification of his access rights the door lock will automatically unlatch and the individual will be granted access. Incase of unauthorized access the door lock will not unlatch, hence denying access.

For visitors to the building, Visitor Cards can be issued with predefined access rights to the Door No. /Corridor No. and a similar process as mentioned above is followed, hence denying any visitor to venture in other areas of the building apart from where his access is granted for. On completion of his work the visitor will hand back his Access Card to the reception and the card can be reviewed to check where all he has tried to access and also time spent in the building.

The total above process is logged by the computer automatically and reports can be generated online and also verified for a particular period incase of any breach in the security.

The above mentioned system is a vital tool to help in maintaining security at buildings and is widely used internationally.

Multidoor Access Controller is a Cost Effective solution suitable for all environments. It manages upto 1/4/8/16 Mifare Card Reader (Wiegand Compatible) installed at various doors in an organization. The low cost, small, attractively packaged front end Readers are connected to the Controller in a Star Connection and the Lock release output is driven from the Controller itself. Hence no intelligent hardware is required at the door end.



INPUT OUTPUT LINE DIAGRAM

It provides a field configurable intelligent Engine for taking care of any organization's access control requirement .The controller can be configured using front-end

Software, all the Access decisions are taken by the controller making it truly a standalone system independent of PC. It can be used in on-line mode for larger PC Controlled Building Management System. Multiple Controllers can be networked on a RS485 bus or on an Ethernet Network with suitable hardware for larger application.

Contactless Smart Card Reader

Contact less Smart card Reader also works on Proximity technology. The Smart card is Read/Write type & can be personalized with the Card holder information. Smart card can also store Finger image for stringent Access. Smart Card Reader may be used (Read range: 25mm).

Hardware Features

16 Reader Interface

Panel supports 16 Wiegand Reader interface. The Reader type supported is Proximity or Smart Card Reader. Readers draws power from the panel and individually be upto 100 m cable distance from Panel.

16 Relay Output for Lock Operation

The relay outputs are available for Lock Release, &is tagged to one or more Reader for door operation as per requirement.12V wet contact can be provided from the Bulk Power Supply for Lock operation.

16 Exit Push Switch Input

There is a provision for 16 Exit Push Switches & is paired with the lock, it is going to release. The switch is normal Push Button offering momentary contact. The lock is operated upon usage for Lock On-Time.

16 Lock Feedback Input

For monitoring the status of the Door (i.e. Open or Close), Lock feedback input is used. The Lock feedback is paired with a lock. It is also useful for Turnstile, for locking the same upon rotation.

8 General Purpose Input (GPI)

There is a provision for Potential free contact inputs, which can be input from Fire/Intruder Alarm panel and can be programmed to make the Controller Fail Safe/Fail Secure, in emergency situation.

8 General Purpose Output (GPO)

The General purpose outputs are available for Alarm annunciation in case of emergencies. The GPO's are paired with GPI 's. Potential free contact may be optionally provided.

Bulk Lock power Supply

A Bulk 12V Power Supply is centrally connected to the controller to power the locks thereby removing the necessity for power supplies near lock. 6 core multistrand (each core 14/36) shielded cable for Reader is used. One Pair of electrical multistrand cable (each core 1.5 sq mm) is used for Lock operation, Lock Feedback (DOTL) and Exit Switch. The cable runs from each Door to Controller. Cable length should be within 100 m.

Connectivity

Computer can be connected to a single Controller within 15 m using RS232, or multiple controllers thru' RS485 upto 1.2 Km in bus topology or thru' add on Ethernet interface for plugging into the TCP//IP network.

CAMPUS e-PURSE

Many successful E-purse schemes have been implemented in "close communities" including college campuses, clubs, food malls, shopping complex and massive transportation services. It could be applied to fast food outlets, laundromats, photocopy machines, fax services and vending machines. Generally speaking, debit and prepaid cards for small value payments will soon be common when more merchants accept this payment scheme.

The future of smart card in electronic commerce is not just in payment cards, but also loyalty cards, airline tickets and other value-added cards. Customers' preferences, bonus and other information could be kept in the card. Companies could then obtain their customers' preferences and shopping histories for planning more customer-oriented marketing strategies. The card could also be personalized to hold the cardholder's profile. In this way, companies could become more competitive in attracting customers.

Smart card as electronic wallet

In the future, the smart card would be used for payment in different aspects. They could be used for both bankcard and prepaid debit card functions. Furthermore, because the smart card is easily portable, it could be used for both online and offline payment.

In the area of electronic commerce, smart cards can be used for storing and protecting a number of keys. With the use of smart card for payment, security risk could be reduced as each transaction is considered an individual event. Furthermore, even if a particular smart card is hacked, the user account will still be safe.

Together with the use of the pin number, biometrics and visual verification smart cards can prevent unauthorized access and user's privacy and security could be achieved.

When electronic payment is widely accepted in daily uses, transactions would become more efficient. A single card could be used for different applications.

Smart e-Purse at Campus

The Smart Card system application software enables simple administration of the smart card's electronic purse. The Student details are easily maintained on the system with the ability to add a Student onto the system, edit an existing Student's information and delete a Student from the system. Students are maintained in categories where, among other things, the category determines the credit limit and access privileges for the Student. Clicking one button will initialize a Smart card for a Student. If lost, a Smart card can be hot listed. A new card can be issued by clicking a button and the Student's current balance will be automatically transferred. Funds can be added or removed from the card by simply showing the card to the reader Clicking on a transaction type (Credit, Debit) Entering an amount Clicking "Write to Card". A statement can be printed detailing the Student's purchase history.

Transactions can be listed in detail or summary format by date and location. This software can be in integrated with the existing system

Balance Readers

Based on type of facility the Smart card system will perform the following function:

a. When the semester starts the student is expected to load some cash on the Card. This is done by placing the student card on the reader.
b. The student then uses the card for all cash transactions within the campus.
c. Every time the cash goes below the designated level the student is advised to re-load the card with cash.
d. All fee payments are made with this card
e. The student Card is also used to make payments for all canteen charges
f. All fines are also paid using this card. The card is blocked in case the student has some pending charges.

All facilities in operational infrastructure will consist of one PC/POS, one Smart Card Terminal fitted and one POS terminal. Figure below shows the infrastructure setup at the club. The PC/POS will be loaded with Application module and a Smart Card Terminal will be connected to it. The PC/POS will in turn be networked to the central server.

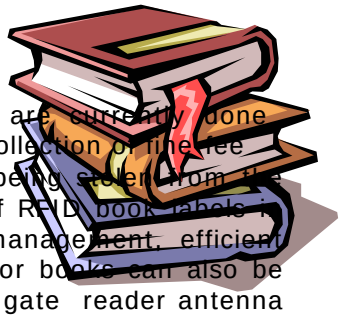
A complete canteen management software in the form of a POS is available to manage the orders and payments from the student in the canteen.

Cash transactions are also done through the same software in the PoS.

BOOKMARK – LIBRARY MANAGEMENT

System components

- Check-in & Check-out kiosks / counters
- Gate reader antennas
- RFID book labels
- RFID smart cards (paper cards for student ID)
- Software



The Solution

This solution will take care of most of the operations that are currently done manually, like lending/borrowing of books, returning of books, collection of fine fee (incase of late deposit of books), inventory checks, books being stolen from the library, book circulation and management of inventory. Use of RFID book labels in library enables self check-in / checkout, better inventory management, efficient tracking and tracing of books. The checkout system solution for books can also be simultaneously linked to anti-theft control systems via use of gate reader antenna solutions for better management of movement of library books.

Initialization

All books will be pasted with RFID labels. A technical description of the book labels is mentioned herein (separately). The technology works on 13.56 MHz frequency. Every student also has his / her own ID card which also has the same technology chip. All RFID labels pasted on books are customized with the book name, author's name, accession number of the book & other details if necessary (memory on chip of book label is 384 bits). Similarly all student ID cards contain the personalized information of the student.

Technical Specification of library book label

Product used – TTP-Label 55x55-PH (Thermal Transfer Paper Label, 55x55 mm, using Philips iCode chip, plain white and 100% tested to function)

Feature TTP Label 55x55-PH

Recommended Operating Frequency	13.56 MHz
Factory programmed Read Only Number	64 bits ID
Memory (user programmable)	384 bits
Typical programming cycles	100,000
Antenna size (l x w)	45x45 mm
Dimensions (l x w)	55x55 mm
Technology	iCode
Anti-collision	* Up to 30 tags/second
Operating distance	* Up to 1 feet
Inlay base material Substrate	PET
Antenna	Copper
Operating temperature	-20°C to +70°C
Storage temperature (recommended)	20°C ±5°C

Adhesion	Permanent adhesive for wide range of applications on books, CD, video cassettes, etc
Printability	Thermal Transfer Printable surface
Delivery form	Reel with 250 units per reel, other forms available on request

* Depending on antenna size, label size, power supply and RFID rules governing each country and region.

This new technology of implementing RFID labels for library books enables a high degree in process automation compared to the conventional manual systems. It increases speed, efficiency and accuracy.

The delivery form for this product is in reel format however the size of the label and number of labels on each reel can be designed according to specific application or customer request.

The paper labels can be individually printed using standard Thermal Transfer RFID Printers just like any other labels in standard printers.

Check-In/Check-Out Kiosks or Counters

It consists of a screen monitor, mid-range reader with pad antenna. A technical specification of this equipment is mentioned below: -

Recommended Operating Frequency	13.56 MHz
Technology	iCode, ISO 15693
Product dimensions	(l x w x h) Reader Module – 85 x 145 x 31 mm
Pad Antenna	240 x 340 x 9 mm
Weight Reader	200 g
Pad Antenna	530 g
Power supply	12 VDC max
Protection Reader	IP 30
Antenna	IP 20
Anti-collision functionality	Supported
Operating distance Read only and Read / Write	Up to 30 cm in maximum read range with transponder antenna size 45 x 76 mm over Reader Antenna
Communication / Connection	RS 232 interface for reader and SMA connector, Cable 2 m for Antenna
Operating temperature Reader	-20°C to +60°C
Antenna	0°C to + 55°C

Storage temperature (recommended) Reader	+20°C to +70°C
Antenna	+20°C to +85°C
Casing unit	Special design plastic case
Delivery contents	Mid-range Reader Module, Pad Antenna, Smart Labels, tags, tickets, VDC power supply, Cable for interface, User documentation and demonstration software
Minimum software requirements	Windows 9x, NT 3.5 or later, Internet Explorer 4.0 or later
Minimum Hardware requirements	Pentium PC with 133 MHz, 16 MB RAM, and 20 MB free-disk space
Restrictions on usage	Some approvals and features may vary by country and may change without notice. Please check with your nearest sales office for further information.

The incorporation of this equipment into kiosks gives it the functionality of acting as self check-in or checkout counters. The operational procedure works as below –

The student who wants to borrow the books picks his choice of books from the shelf, comes to the kiosk, shows his / her ID card and then places all books (to be borrowed) on the space provided in the kiosk. He / she will automatically see the display of his card, and book information on the screen which once ticked will allow or authorize the student to carry the book outside the premises of the library. Similarly, during returning of books, the student simply comes to the kiosk and drops off his book in the socket provided for the same one at a time. During this process he/she also sees on the display screen the information of the book being returned.

Student ID Cards

All personnel using the library usually have his / her own student ID card, this enables the student to borrow or return books from the library. In the RFID library management system, the students are given smart cards with contact less RFID chip embedded in them. This helps the library to note when a student has arrived in the library (real-time systems), helps for access control, time and attendance for all library staff (when they pass through the entrance gates) and manage the fine or late payment for returning of books.

Smart ticket, which is made either of paper or film, based material. It is tear-resistant and has a life period of more than a year, if properly maintained by the student either in his wallet or handbag / purse. Since the cover material is paper or film based, it is much cheaper than plastic PVC cards which are now available quite commonly and are more expensive than the above-mentioned products. It is not only flexible, which makes the product easily to be carried in a wallet, but also durable to last long. The product used is TDP-Ticket 54x86-PH03 (Thermal Direct Paper Ticket, 54x86 mm, using Philips iCode chip, plain white and 100% tested to function).

These ID cards are especially suitable for hands-free access and allow the change of information inside the transponder chip. Optimized for a variety of applications, this product comes in basic version of Thermal Direct or Thermal Transfer printable surface material. PVC or PET surface material products are available on request, which will be variation for demand of long-life time of the product.

This highly reliable and user-friendly product is convenient to use for efficient management at controlling gate stations for continuous and increased data transparency.

Gate Reader Antenna Solution

It is one of the most important components in the library management system. This gate solution acts as a multi-purpose hardware that can easily log entry of a visitor or personnel in to the library recording the time when he / she had entered or left the library premises, it will also verify the items taken from the library against every individual (member who holds the smart ID card) or issue a warning signal incase of any theft, counter-check the books issued to students and update the system accordingly. Gates are easily mounted and are connected with warning light signals and also sound alarms to inform the security personnel that some mischief has taken place.

A technical specification of the gate reader / antenna solution is mentioned as below. Also please find the picture of the gate solution.

Feature Reader Module

Dimension (h x w x d)	180 x 152 x 98 mm
Weight	3.1 kg
Input power	AC85V~250V/47Hz~63 Hz
Output power	4 W
Connection	BNC
Communication with PC	RS 232

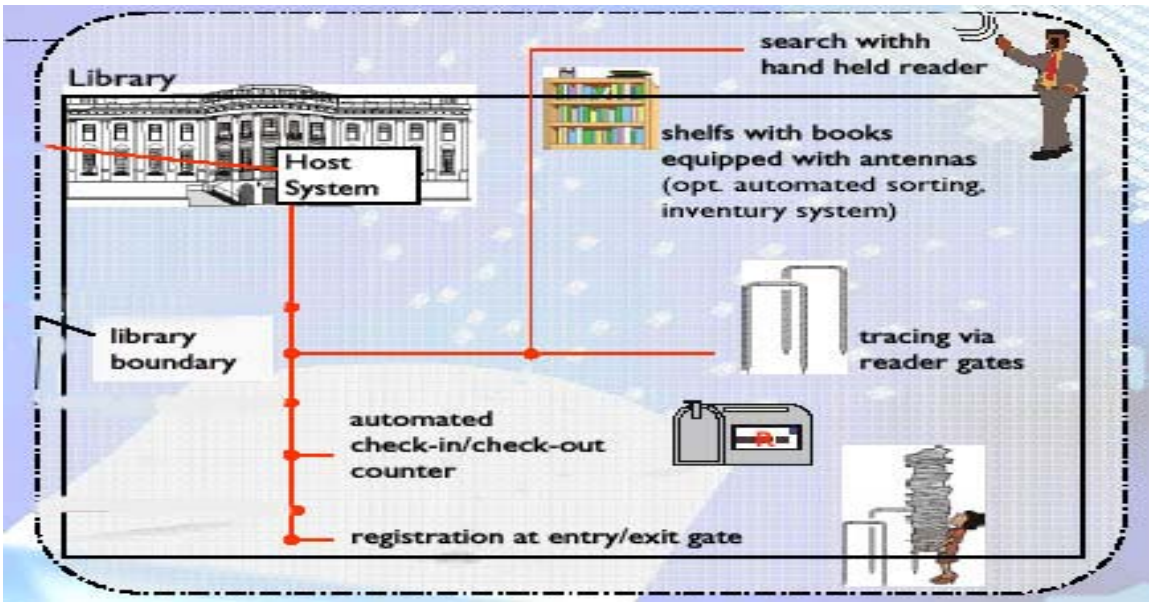
Features Gate Antenna Module

Dimension (h x w x d)	190 x 75 x 5 cm
Weight	8.2 kg
Frequency	13.56 MHz
Reading distance	90 cm ~ 120 cm
Color	Light gray
Material	ABS Length
of Cable	2.5 m
Kind of Cable	Coaxial Cable

Software

Backbone software which links the check-in and check-out solution with gate reader / antenna solution and other devices is available. Customization software for RFID book labels is also available along with customization of Student ID smart cards. This software can be modified according to specific customer requirements.

Gate Reader / Antenna Solution with long-range reader module and gate antenna for better reading distance and efficiency.



Card Comparison

Magnetic Swipe Card	Proximity Card	Mifare Contactless Card	RF-ID
Contact Type Card	Contactless Technology	Contactless 13.56 RF-ID Technology	Contactless Technology 13.56 or 125 KHz
The card has to be inserted in the reader and swiped	No swipe only touch	No swipe to be shown to the reader	Requires No Line of Sight Contact
Read Distance – Not Applicable	Read Distance – upto 3 mm	Read Distance –upto 5 cm	Read Distance between 1 feet to 4 feet [depends on antenna size of rf-id card and reader]
Storage Capacity – 8/16 bit	Storage Capacity – 16 bit	Storage Capacity – 256 bytes or 4 KB	Storage Capacity 256/384 bytes
One-Time Write Only	One-Time Write Only	Read/Write upto 1,00,000 cycles. Multiple Updation possible	Read/Write upto 1,00,000 cycles. Multiple Updation possible
Specific to Application	Specific to Application	Can load other application for MULTI-APPLICATIONS in same Card	Can load other application for MULTI-APPLICATIONS in same Card
Prone to Wear & Tear	Better Durability as no insert or swipe required	Better Durability as no insert or swipe required	Flexible Card/Tag/Label form and can be embedded in any shape or size Rf-ID can be in form of stickers/label/plastic mouldings/metallic/cards
Expensive Hardware Cost	Cheaper Hardware Cost in comparison to Swipe Technology	Cheaper Hardware Cost in comparison to Swipe & Proximity Technology	Reasonably priced hardware, depends on applications with variety of readers like desktop, wall mounted, gate readers
Cheap Card Cost	Reasonably priced to features available	Reasonably priced to features available with scope for multiple featured applications	Reasonably priced to features available
Obsolete Technology	Latest Technology	Latest Technology	Latest updated technology in contactless
Limited options to add further security	Options to add security features	Options to add security features like biometrics, pin number etc	Options to add security features like biometrics, pin number etc
Limited integration with other hardware	Possible integration with door locks, automatic door openers etc	Integration with door locks, automatic door openers etc	Integration with door locks, automatic door openers etc
No trail recording on card	No trail recording on card	Trail can be recorded on card	Depends on data requirements