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AN OVERVIEW ON ELECTRONIC PASSPORT SYSTEM USING SMART CARD TECHNOLOGY.

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Abstract - The foremost aim of this work is to have access to all the details of a passport holder by using smart card technology. A smart card is given to the authorized person who will own all the details required for passport verification. This card will contain the name, A Unique Identifier,(UID) number, Date of Birth, Occupation, Nationality and all other required details. An Integrated Circuit (IC) used on this card which will be responsible for storing, processing the information through modulation and demodulation on the Radio Frequency (RF) signal which will be transmitted by the reader. The Radio Frequency Identification (RFID) reader will read the data present in the RFID passport and sends the data wirelessly by using RF transceiver. As soon as the card is kept on the card reader, the details of the person appear on the computer screen and verify it using the data present in the system and if it matches, the details of the passport holder is displayed. It reduces the burden of documentation which thereby reduces the time consumption and also protects the problem of forgery. This makes the system centralized by increasing the security.

***Key Words*: wireless e-passport, RFID reader, authenticity of information, smart card reader.**

1. INTRODUCTION

Smart card technology is being used in this proposed system. For this purpose, a smart card is provided to the authorized person. An IC is used in this system which will be responsible for storing the data and processing it by using modulation and demodulation of RF signal which is being transmitted by the reader. The card will contain all the details required for the passport verification. This proposed system simplifies the process by making use of a smart card which will contain all the details present in the passport such as name, date of birth, nationality, UID number, etc. When the person places the card into the card reader, the data is read and then verified using the data present in the system and then if the detail matches then it displays the details of the passport holder. This system thereby reduces the time consumption and since it uses a smart card reduces the use of documents which increases the security of the system and avoids forgery.

In this system, the RFID tag will contain the details along with a unique identity number and the details of the person are fed into the computer. The RFID reader will read the data of the RFID passport and then transmits the data wirelessly with the help of Global Service for Mobile communication (GSM) module.

1.1 RFID PRINCIPLE

RFID system consists of three components namely transponder (tag), interrogator (reader) and computer containing the database. The interrogator reads the tag data and transmits it to the computer for authentication. The information is processed and upon verification, access is granted. The system offers diverse frequency band ranging from low frequencies to microwave frequencies (K. S. Huang and S. M. Tang,)Low Frequency: 125-134 KHz, High Frequency: 13.56 MHz, Ultra High Frequency: 902-928 MHz, Microwave Frequency: 2.4 GHz Depending upon the source of electrical energy, RFID tags are classified as either active or passive. The active tags use a battery for powering the circuit on the tag and transmit the tag information upon the reader request. However, these tags are very expensive and seldom used. On the other hands, passive tags get energy from the reader to power their circuit. These tags are very cost-effective and hence most of the applications use them. In the present work, passive RFID tags have been used. A passive RFID tag transmits information to the reader when it comes in the vicinity of electromagnetic field generated by the reader. The phenomenon is based on Faraday‟s law of electromagnetic induction. The current flowing through the coil of interrogator produces a magnetic field which links to the transponder coil thereby producing a current in the transponder coil. The transponder coil then varies this current by changing the load on its antenna. This variation is actually the modulated signal (scheme is known as load modulation) which is received by

the interrogator coil through mutual induction between the coils. The interrogator coil decodes this signal and passes to the computer for further processing.

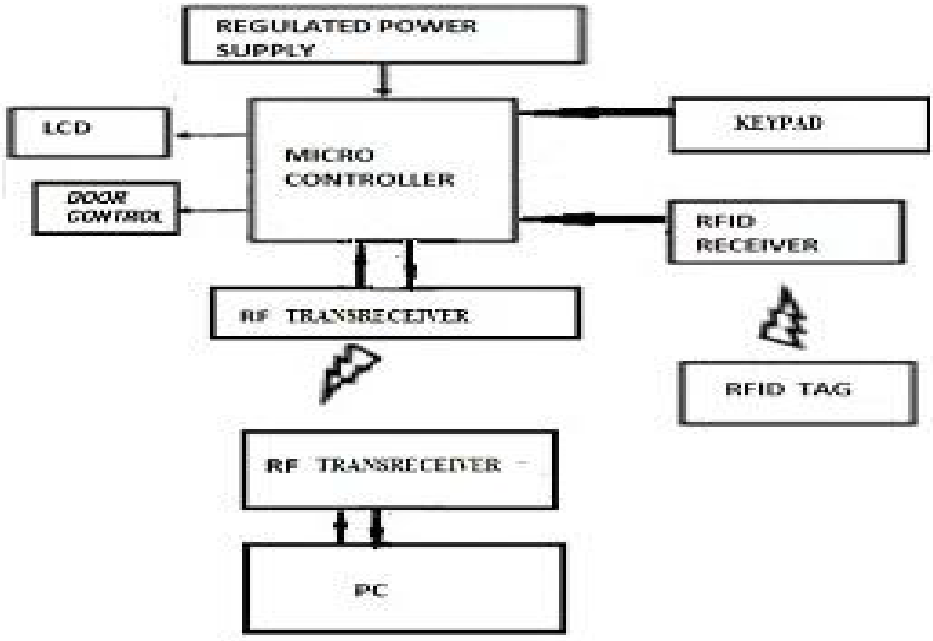

Fig 1.1 Architecture of Electronic Passport System

1.2 SYSTEM COMPONENTS

A. Microcontroller

The controller used for this work is ATMEGA 32 processor. The processor performs following task such as receiving data from RFID reader, conform the password of the each person which is given to him/her which is pressed with the help of keypad, perform all the necessary operations at the hardware circuitry such as giving messages to the Liquid Crystal display (LCD), send the data to the computer using the RF transceiver. Microcontroller acts as the most important component for the hardware circuitry. A program to control the necessary operation is fed into the microcontroller.

B. RFID tag and RFID Reader

RFID stands for Radio Frequency Identification Device. Here the person‘s unique identification number is stored in a passive RFID card and a person is identified with the help of this card and this card can be read with the help of the reader.

C. RF Transceiver

The radio frequency transceiver is used to communicate between the hardware model and the computer. It acts as a wireless link between hardware model and the computer. It is a half duplex model i.e it can communicate in both direction but not simultaneously. It sends the received unique identification number to computer and to send weather to allow user or not.

D. Computer

Computer stores the person‘s information and display it in the form of a visual basic application. It includes information such as name, address and the scanned copies of the digital photograph and other document such as driving license and other card.

E. LCD

The Liquid crystal display is used to display some basic massages such as “ show tag” “enter password” etc. It is used to tell the user how to proceed further

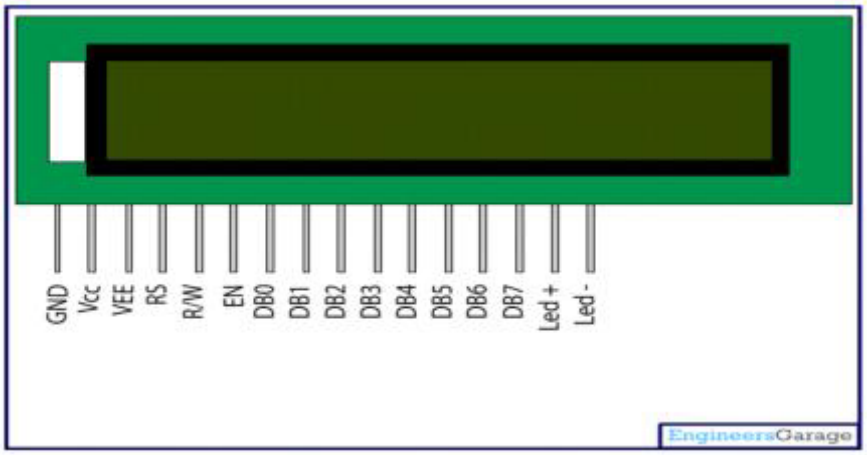

Fig1.2.1 LCD Display

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the American Standard Code for Information Interchange (ASCII) value of the character to be displayed on the LCD. In interfacing of LCD with AT mega 32 using 4-bit mode. In this mode only four pins are used for sending data and command instructions.

This mode has the advantage over the 8-bit mode as it uses less number of pins. The remaining pins of the controller are available for normal use.

F. Keypad

The keypad is nothing but switches which are used to press the assigned password. The password is given to improve the security in the person.

G. Door control

The door control consists of a Direct Current (DC) motor and a driver IC L293D which is used to lock the user whenever required.

DC Motors are small, inexpensive and powerful motors used widely in robotics for their small size and high energy output. A typical DC motor operates at speeds that are far too high speed to be useful, and torque that are far too low. Gear reduction is the standard method by which a motor is made useful. Gear‘s reduced the speed of motor and increases the torque.

Fig 1.2.2 DC motor

It has two wires or pins. When connected with power supply the shaft rotates. You can reverse the direction of rotation by reversing the polarity of input. As the Multipoint Control Unit (MCUs) Port are not powerful enough to drive DC motors directly so we need some kind of drivers. A very easy and safe is to use popular L293D chips. It is a 16 PIN chip. The pin configuration is shown in fig1.2.3

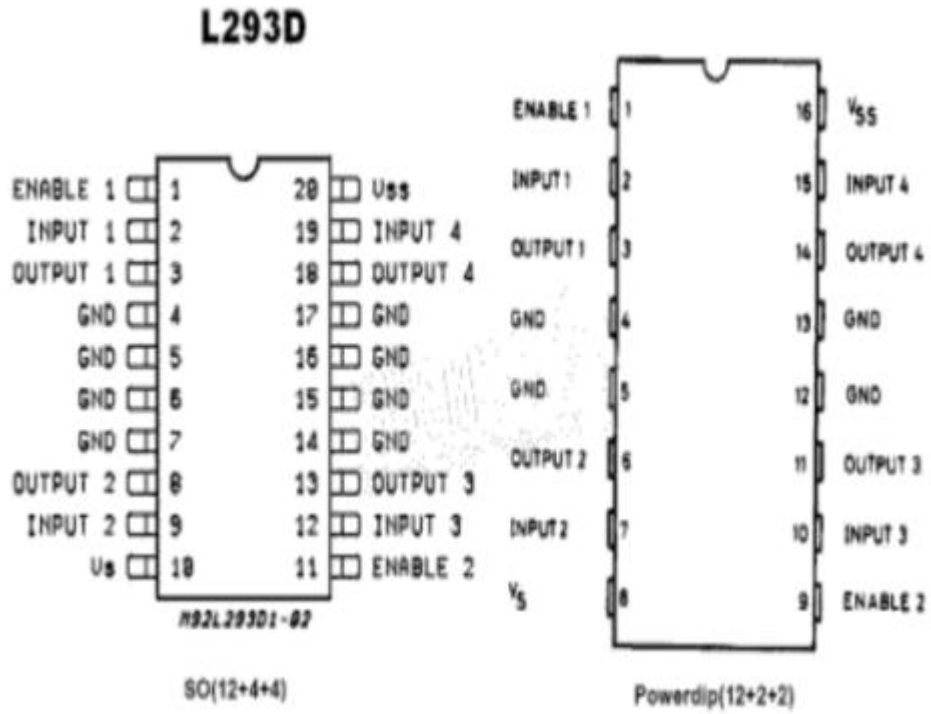

Fig1.2.3 Pin diagram of L239D

Source; DOI: 10.15680/IJIRCCE.2015. 0311112

This chip is designed to control 2 DC motors. Three pins are needed for interfacing a DC motor (A, B, Enable). If you want the o/p to be enabled completely then you can connect Enable to VCC and only 2 pins needed from controller to make the motor work. The connections are shown in fig1.2.5

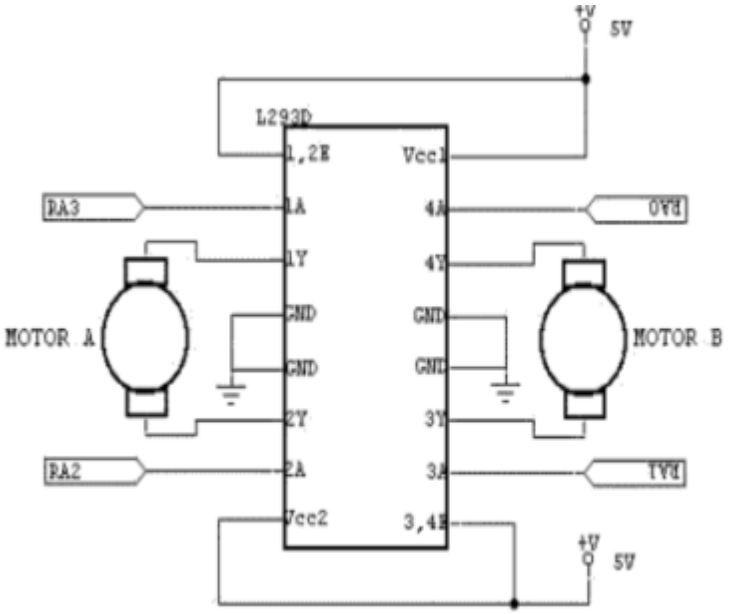

Fig 1.2.4 DC motor connection

The table-1 shows the direction of motor control with respect to the input given

Direction of rotation of motor according to input

Function	**A**	**B**
Stop	Low	Low
Clockwise	Low	High
Anticlockwise	High	Low
Stop	High	High

H-Bridge Circuit using transistors for bidirectional driving of DC motor. H-Bridges in IC‘s to reduce the drive circuit complexity.L293D is a dual H-Bridge motor driver, So with one IC we can interface two DC motors which can be controlled in both clockwise and counter clockwise direction and if you have motor with fix direction of motion you can make use of all the four I/Os to connect up to four DC motors. L293D has output current of 600mA and peak output current of 1.2A per channel. Moreover for protection of circuit from back Electromotive force (EMF) output diodes are included within the IC. The output supply (VCC2) has a wide range from 4.5V to 36V, which has made L293D a best choice for DC motor driver.

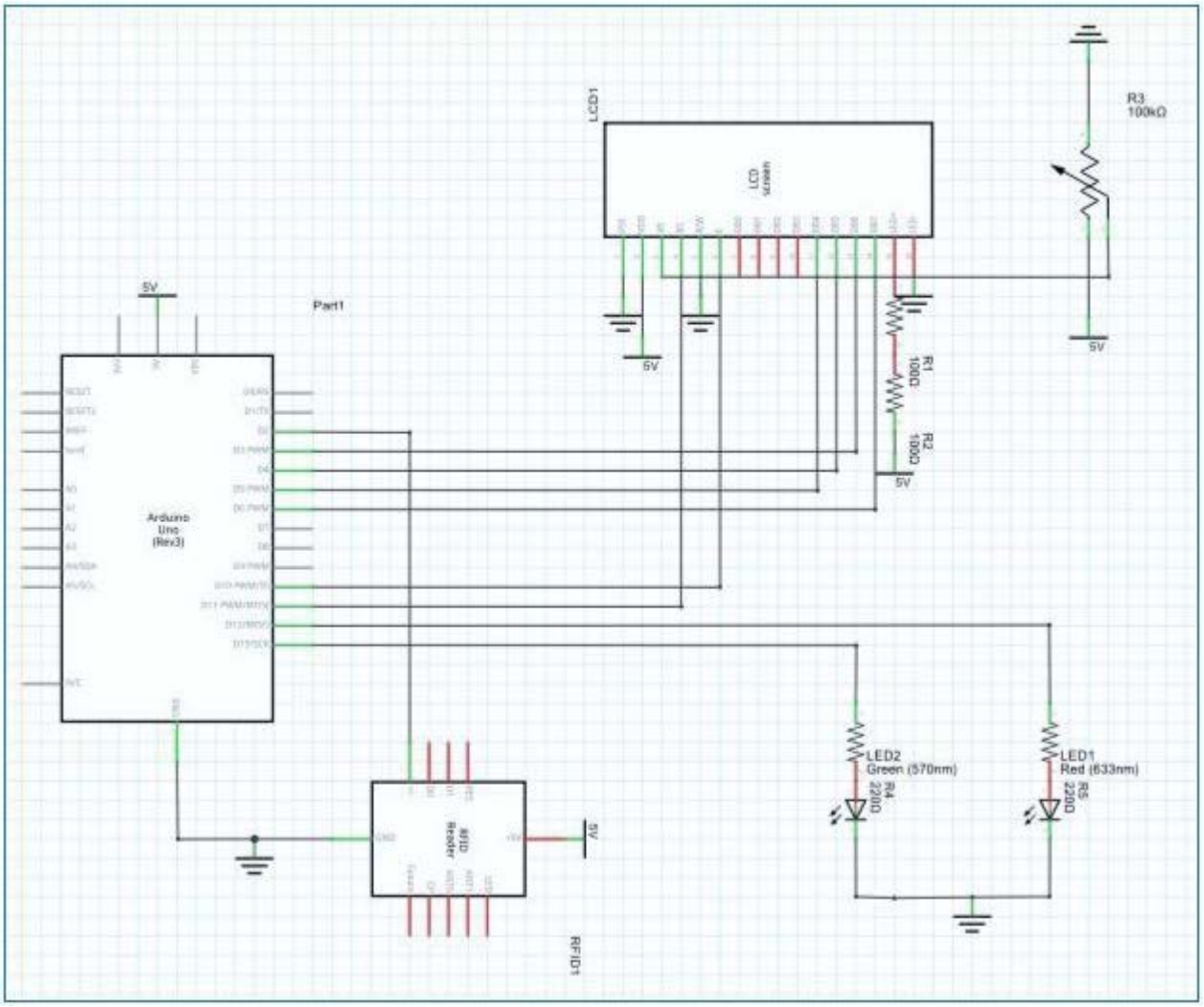

Fig 1.2.5 **RFID based e-passport schematic**

2.0 SYSTEM OPERATION

The main functionality of this project is to access the passport details of a passport holder through RFID technology. For this purpose the authorized person is given an RFID card. This card contains an integrated circuit that is used for storing, processing information through modulating and demodulating of the radio frequency signal that is being transmitted. Thus, the data stored in this card is referred as the passport details of the person. The system architecture of the research work is shown in fig. 1. In this the details of the person would be fed into the computer and a unique number is allocated to the person that number is printed of RFID tag. The RFID reader reads the details of the RFID passport and sends the data wirelessly with the help of RF transceiver. On the other side the other RF receiver receives the details and sends to the microcontroller. Here, the controllers compares with the data already there. If it matches then the person is allowed, less he would be termed as a criminal by giving an alarm/buzzing signal.

3.0 Execution details

Having placed the card on the card reader, if it is a valid card, the details shown on Fig.3.1 are displayed on the computer.

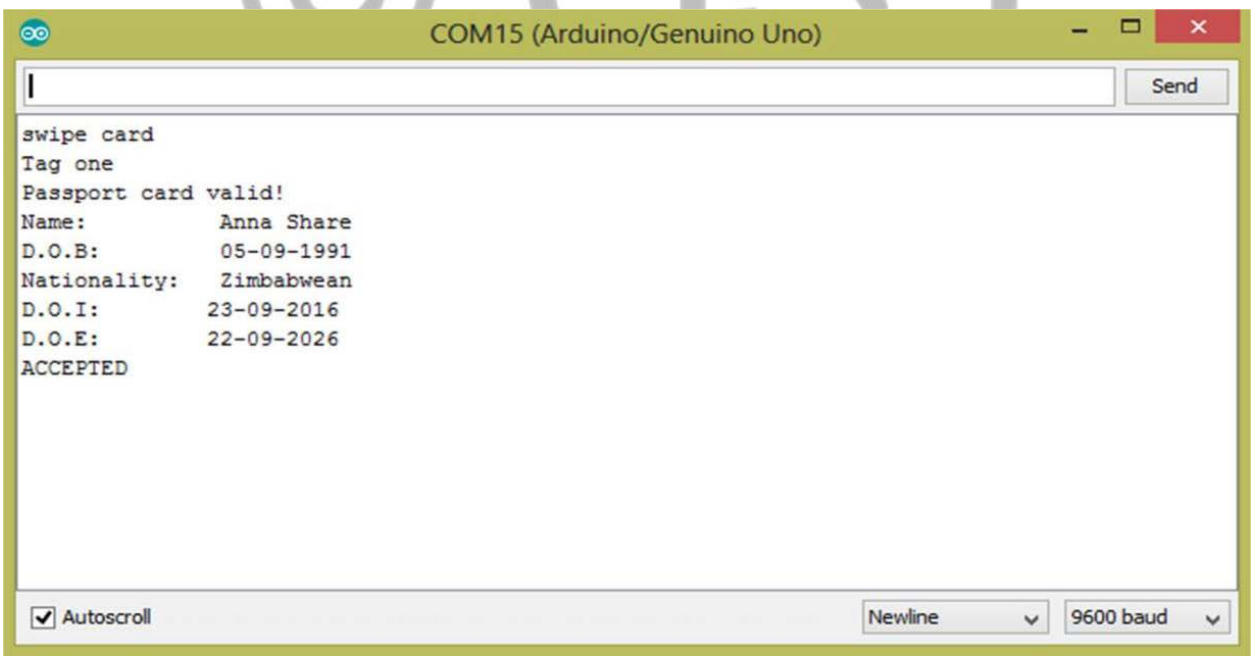

Fig 3.1 Result for tag 1

Fig. 3.2 is showing the results for tag two. The results are for an invalid card which is not recognized by the system.

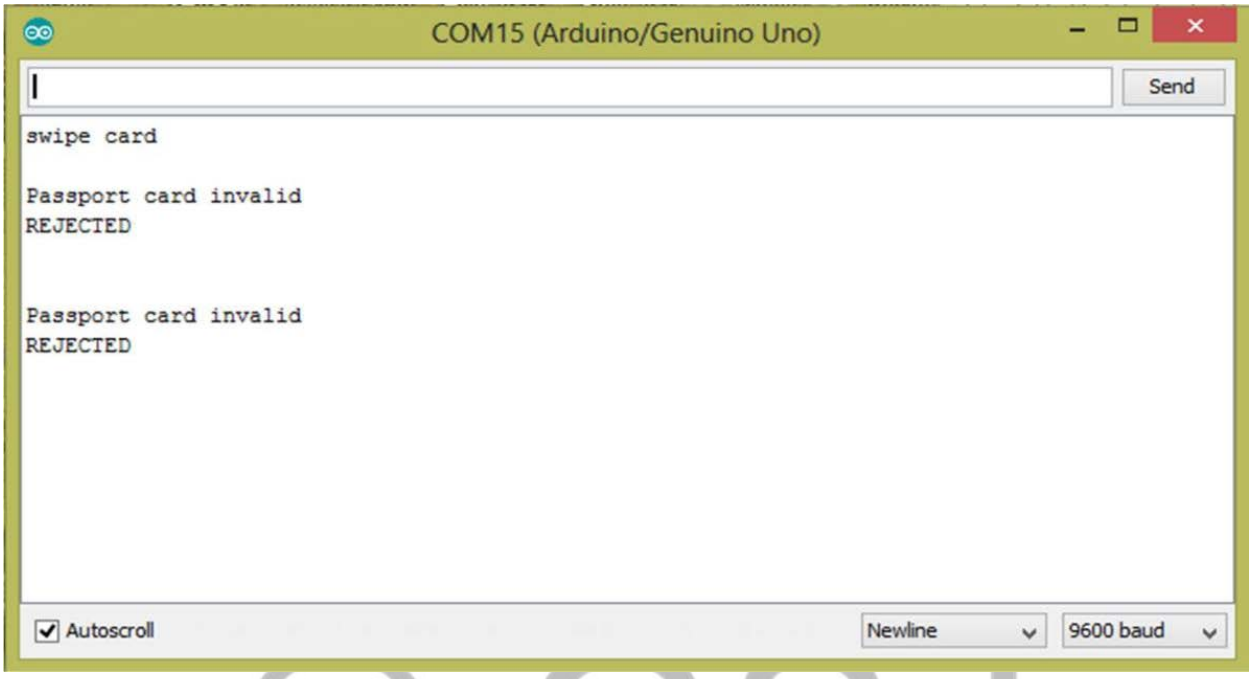

Fig 3.2 Result for tag 2

4.0 CONCLUSION

Wireless e-passport system uses smart card technology which gives a clear vision about the benefits of using smart card technology as this system avoids forgery and thus increases the security. This decreases the burden of documentation and thereby reduces the time consumption. The use of smart card technology makes the system centralized and thus improves the security. The security of the system can be further be enhanced by adding biometric information such as palm scan, fingerprints, iris scan, digital signature and other active validation in the passport system.

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