

RFID AND GSM BASED MULTIPURPOSE HIGHLY EFFICIENT SECURITY SYSTEM

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ABSTRACT:

The main goal of this paper is to design a multipurpose GSM (Global Service Message) and RFID (Radio Frequency Identification) based security system. This system provides a robust, highly efficient form of security by performing four security checks within very short period of time.

The four stages of verification include:

- RFID verification
- Time limit verification
- SIM card contact number verification
- password matching

The security check failing leads to sending a message to the security agency within a specified time period which enables a quick response and since the message is sent through SIM card, the validity increases as the system cannot be compromised.

We have used an embedded processor Arduino UNO and Arduino 1.01 software IDE for simulation to implement the novel system.

INTRODUCTION:

In the current technological era, where system security and efficiency are of paramount importance, many systems are being compromised every day so there is a need of a robust, secure, efficient and reliable security system.

RFID kits are low-frequency (30- 500 kHz), mid-frequency (900 kHz-1500MHz) and high frequency (2.4-2.5GHz). The RFID is one form of silent commerce where the communication takes place without wireless devices that make everyday objects intelligent and interactive [1-5]]. GSM (Global System for Mobile communications) is a digital cellular technology used for transmitting mobile voice and data services which is developed by Group special mobile which was an initiative of CEPT. GSM provide data transfer speeds around 9.6 Kbit/s, allowing the transmission of basic data services such as SMS (Short Message Service). The system can be used by firms for transaction from ATM machine or to open door of any room, where managers or businessperson / any person who do not have time or who is not present at the spot and he is in emergency of his job [6][7]. Another major advantage is its international roaming capability, allowing the users to access the same services even when travelling abroad. This gives consumers to have the same number connectivity in more than 210 countries. The monitoring station includes a Computer/PC, RFID Reader and RFID Tag, GSM module SIM900A, SIM Card and ARDUINO UNO.

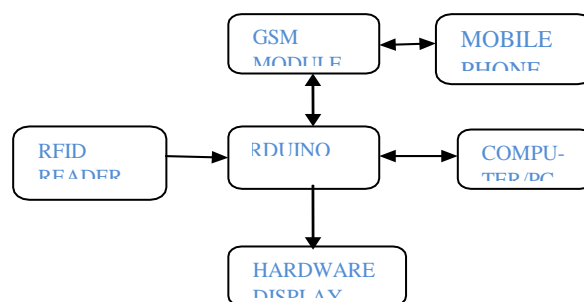


Figure 1 Block Representation:

PROPOSED DESIGN:

A multipurpose RFID and GSM based security system is designed using RFID Reader Module EM-18, GSM Module SIM900A, ARDUINO UNO. The above problem statement is implemented by a secure door lock system as follows:

FIRST-

The system checks the card validity if the card is valid then it proceeds further otherwise status “invalid card” is displayed on Serial Monitor.

The RFID card is swapped over the RFID reader which detects the card and sends the received string to the ARDUINO UNO by UART communication, which is further sent to a PC/Serial buffer by UART, RS 232 communication. Then Arduino compares the string with the database of registered card strings. If it matches to a string, then a led (13th Pin in-built led of Arduino UNO) blinks and a status “welcome, you can proceed further” is displayed on the Serial Monitor and a message is sent to the registered mobile number concerned with the respective card by GSM Module SIM 900A using AT commands in text mode. Message asks the user to send a message containing password within a specified time limit.

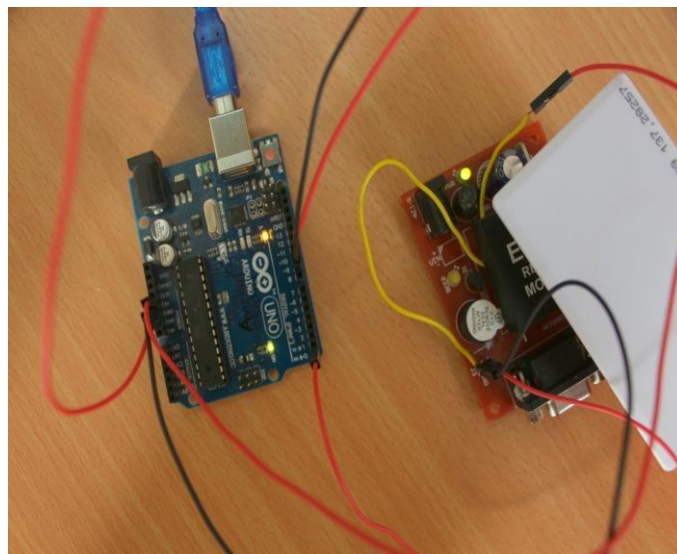


Figure 2 RFID card reader and Arduino UNO

SECOND-

The system checks whether a message is received within the time limit. When message is received within the time limit, the message is received at SIM card attached to GSM Module, which is sent to Arduino UNO by UART for further proceedings and also communicated to Serial buffer/PC where the received message is displayed on the Serial Monitor.

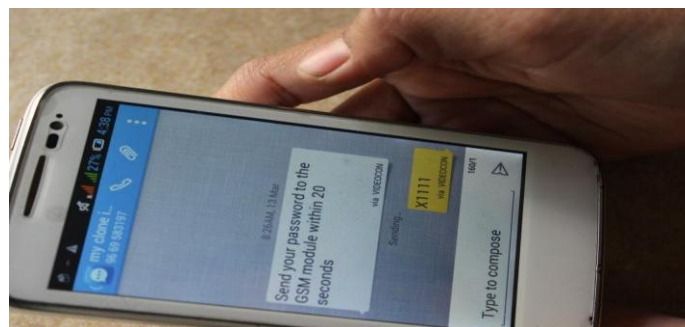


Figure 3 GSM Message Representation

THIRD-

String containing mobile number is extracted from the received message and compared to the registered mobile number. If it matches, the Arduino proceed further for extracting string containing password. Otherwise, a status “your mobile number is not registered” is displayed on Serial Monitor.

FOURTH-

String containing the password is extracted and is compared by Arduino UNO to the saved password related to the respective card. If it matches, then the hardware display of door opening or motor operation is shown by glowing the 13th pin led of Arduino UNO. Otherwise, a status “Incorrect Password” is displayed on Serial Monitor.

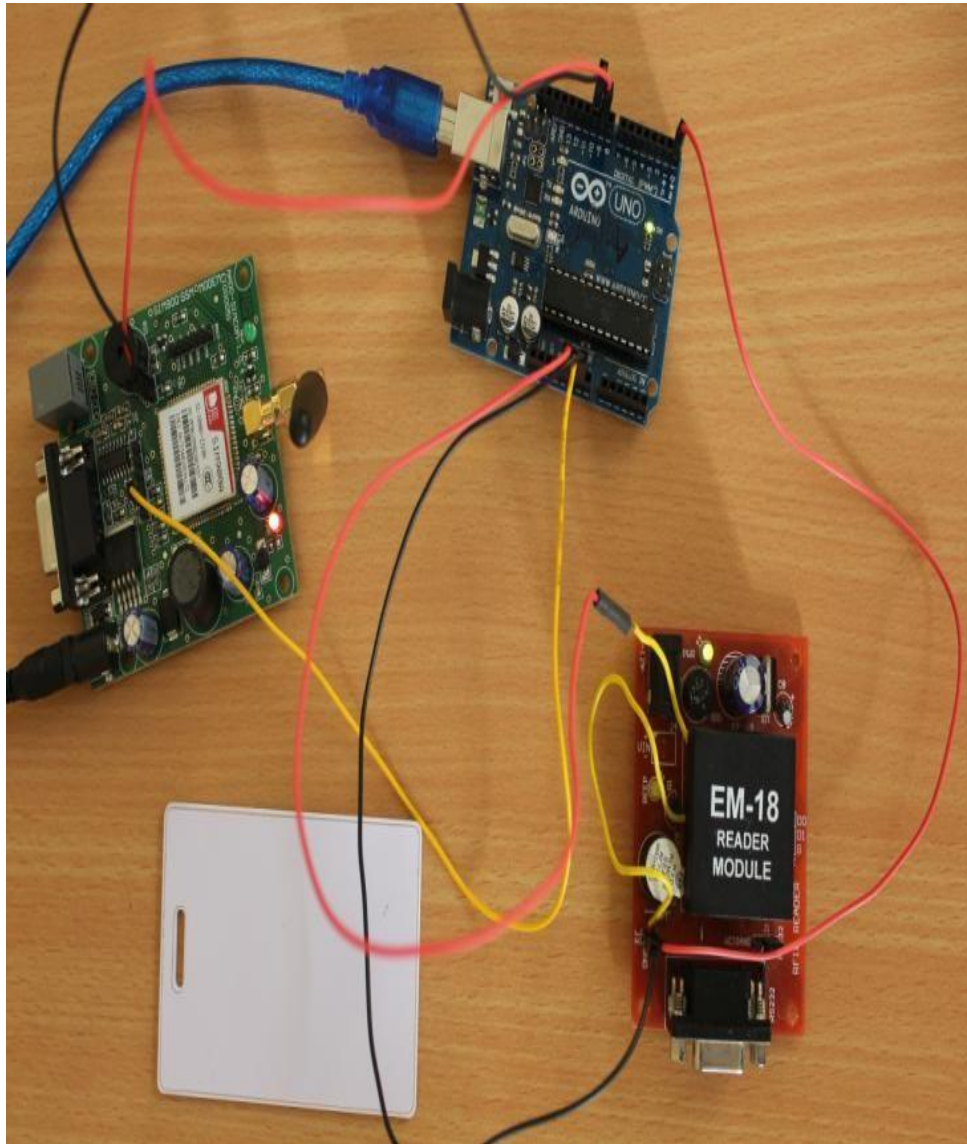
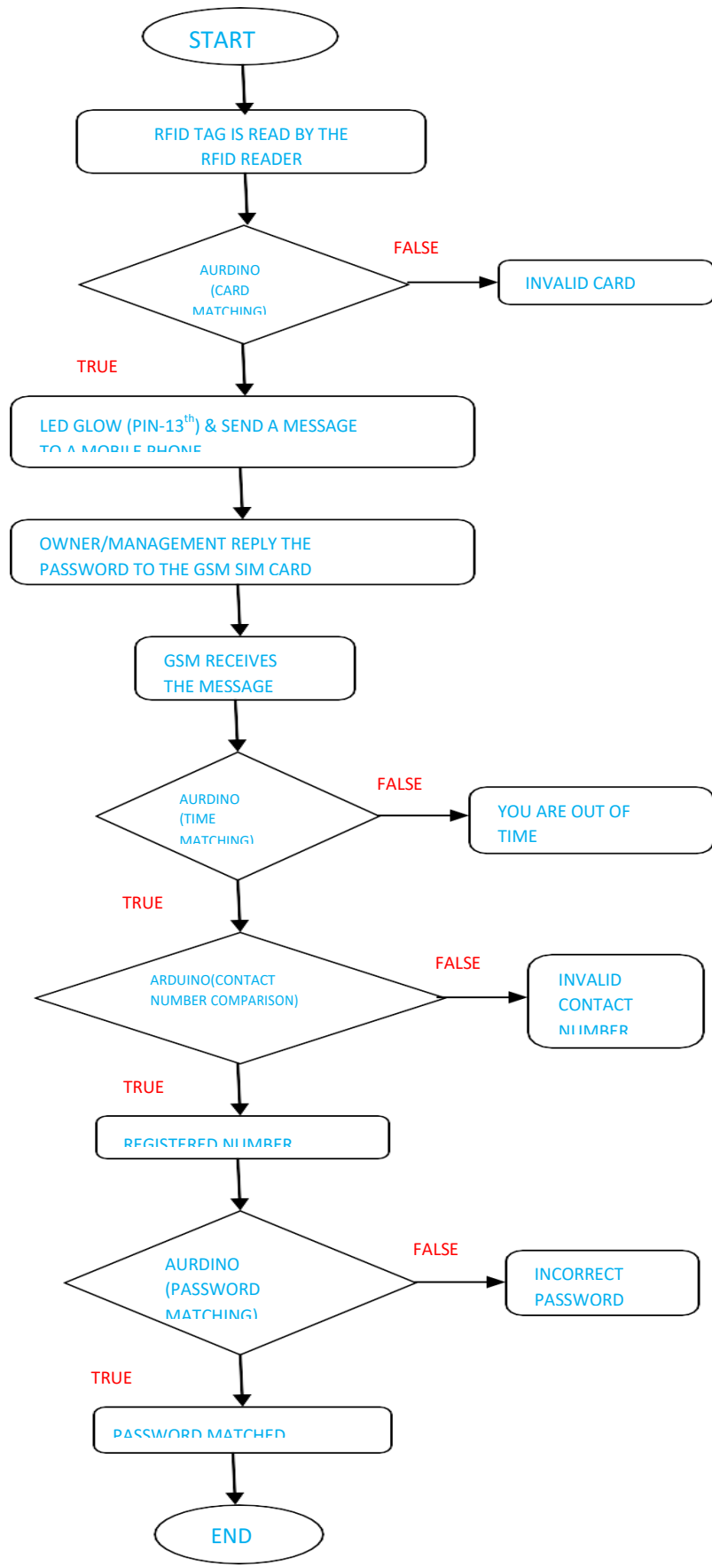


Figure 4 RFID and GSM based Security System

Figure 5 Flow Diagram of the Proposed Design



RESULT-

Condition	Result
When the card is not the registered one.	Invalid card.
When card is valid.	Welcome, Your card matched...you can proceed further and a message is sent to the owner of that card by GSM attached SIM
When the message is not received within time	You are out of time... Please try
When the message is not received from the desired	Invalid mobile number.
When a wrong password is entered by the user/owner.	Incorrect Password.
When all the conditions are met.	Welcome, your card matched... You can proceed further.

VERIFICATION:

The above system has been verified using Serial monitor of Arduino, SIM card attached to GSM module, 13th digital output pin having an inbuilt led as a visual tool. When RFID card is swapped through RFID reader, the status of validity of card is shown on Serial Monitor and displayed by glowing a led (13th Pin in-built led), status of message sent and received is also shown on serial monitor. Final status of door opening is shown by glowing led pin no. 13 of Arduino UNO.

CONCLUSION:

The paper has presented a low-cost compact, ubiquitous highly efficient and highly secured multipurpose security system. The Novel system can be used in many applications such as ATM machine, entry systems etc. The system can be further extended to generate OTP (one time password) to enhance security concerns and GPRS service of GSM module can also be used to provide internet connectivity. GPS module can also be used to enhance security by providing location of the user. Thus, we presented a multipurpose security system that is proved to be beneficial in almost every field.

SIMULATION RESULTS ON SERIAL MONITOR:

```
* - Vy1800896E619E
Invalid card
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```
1800896E619E
Welcome,Your card matched...you can proceed further.
AT+CMGF=1
AT+CMGS="+919074746917"
Send your password to the GSM module within 20 seconds

OK

You are out of time, Please try again ..!!!
1800896E619E
Welcome,Your card matched...you can proceed further.
AT+CMGF=1
AT+CNMI=2,2,0,0,0

OK
AT+CMGF=1
AT+CMGS="+919074746917"
Send your password to the GSM module within 20 seconds

OK

+CMT: "+918357065501", "Ankita Ei", "16/03/04,20:02:23+22"
X11AT+CMGF=1
AT+CNMI=2,2,0,0,0

OK

+918357065501
Invalid mobile number
1800896E619E
Welcome,Your card matched...you can proceed further.
AT+CMGF=1
AT+CMGS="+919074746917"
```

```
Send your password to the GSM module within 20 seconds

OK

+CMT: "+919074746917", "", "16/03/04,20:03:08+22"
Z1111
AT+CMGF=1
AT+CNMI=2,2,0,0,0

OK

+919074746917
Your Mobile number is registered.
MT: "+919074746917", "", "16/03/04,20:03:08+22"
Z1111
AT+CMGF=1
AT+CNMI=2,2,0,0,0

OK

Incorrect Password
1800896E619E
Welcome,Your card matched...you can proceed further.
AT+CMGF=1
AT+CMGS="+919074746917"
Send your password to the GSM module within 20 seconds

OK

+CMT: "+919074746917", "", "16/03/04,20:04:01+22"
X1111
AT+CMGF=1

AT+CNMI=2,2,0,0,0

OK

+919074746917
Your Mobile number is registered.
X1111
your password matched wait for a while. THANKS
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