

Appendix A :

This is the simulation source code for “Design of An Embedded Automobile Engine Locking and controlling System By Using GSM Technology” version 1.0 .

Sudan university of science and Technology, Collage of Engineering, School of Electronics Engineering, October, 2016.
Written by (Altayeb Abdualah Altayeb Ahmed, Abdalazim Mohammed Sliman Ibrahim, Mohammed Mustafa Ali Eshag and Zeinab Alhadi Khidder Hamed).

All rights reserved.

Source code:

```
/* This sketch for arduino to send message from virtual terminal, depending
on this message, control action will be done */

// Include the LiquidCrystal library

#include<LiquidCrystal.h>

LiquidCrystal lcd(7,6,5,4,3,2); // defition of lcd pins,pin 7 is connected to
RS, pin 6 is connected to Enable, pins (2,3,4,5) for data

int relay1= 12; // relay1 is used for enabling or disabling the system and is
connected to pin 12
```

```

int relay2= 13; // relay2 is used for starting the car ignition system and is
connected to pin 13

int engine = 8; // engine is replicating the car engine and connected to pin 8

void setup() {

lcd.begin(16,2); // define lcd with 2 rows and 16 columns

pinMode(relay2,OUTPUT); // define pins (12,13,8) in arduino as output pins

pinMode(relay1,OUTPUT);

pinMode(engine,OUTPUT);

Serial.begin(9600); // initialize serial communication at 9600 bits per second

lcd.setCursor(0,0); // set lcd cursor in first line and first column

  lcd.print("Starting System "); // print this string in the LCD
}

void loop() {

if (Serial.available()>0) // wait for serial port to connect.
{

String message = Serial.readString(); // read input serial

delay(1500);          // delay for 1.5 second

Serial.println(message); // print the inserted message in virtual terminal

  lcd.clear();      // clear lcd rows and columns

  lcd.setCursor(0,0);

  lcd.print("Message Recived ");
}
}

```

```

delay(100);

if (message == "qw12*e#") // if this message is received enabling ignition
system
{
digitalWrite(engine,LOW);

digitalWrite(relay1,HIGH);

lcd.setCursor(0,1); // set lcd cursor in second row, first column

lcd.print("Eanbling System ");}

else if(message == "qw12*d#") // disabling ignition system if the message
is (qw12*e#)
{
digitalWrite(engine,LOW);

digitalWrite(relay1,LOW);

lcd.setCursor(0,1);

lcd.print("Disabling System");}

else if(message == "qw12*s#") // start ignition when receiving this
message
{

digitalWrite(relay1,HIGH);

delay(100);

digitalWrite(relay2,HIGH);

delay(500);

digitalWrite(engine,HIGH);

delay(2000);

digitalWrite(relay2,LOW);

lcd.setCursor(0,1);

```

```
lcd.print("Starting Engine");  
  }  
  else // any other message disable ignition system and print  
in lcd "No Response"  
  { digitalWrite(relay1,LOW);  
digitalWrite(relay2,LOW);  
digitalWrite(engine,LOW);  
lcd.setCursor(0,1);  
lcd.print("No Response");  
}  
  
}  
  
}
```