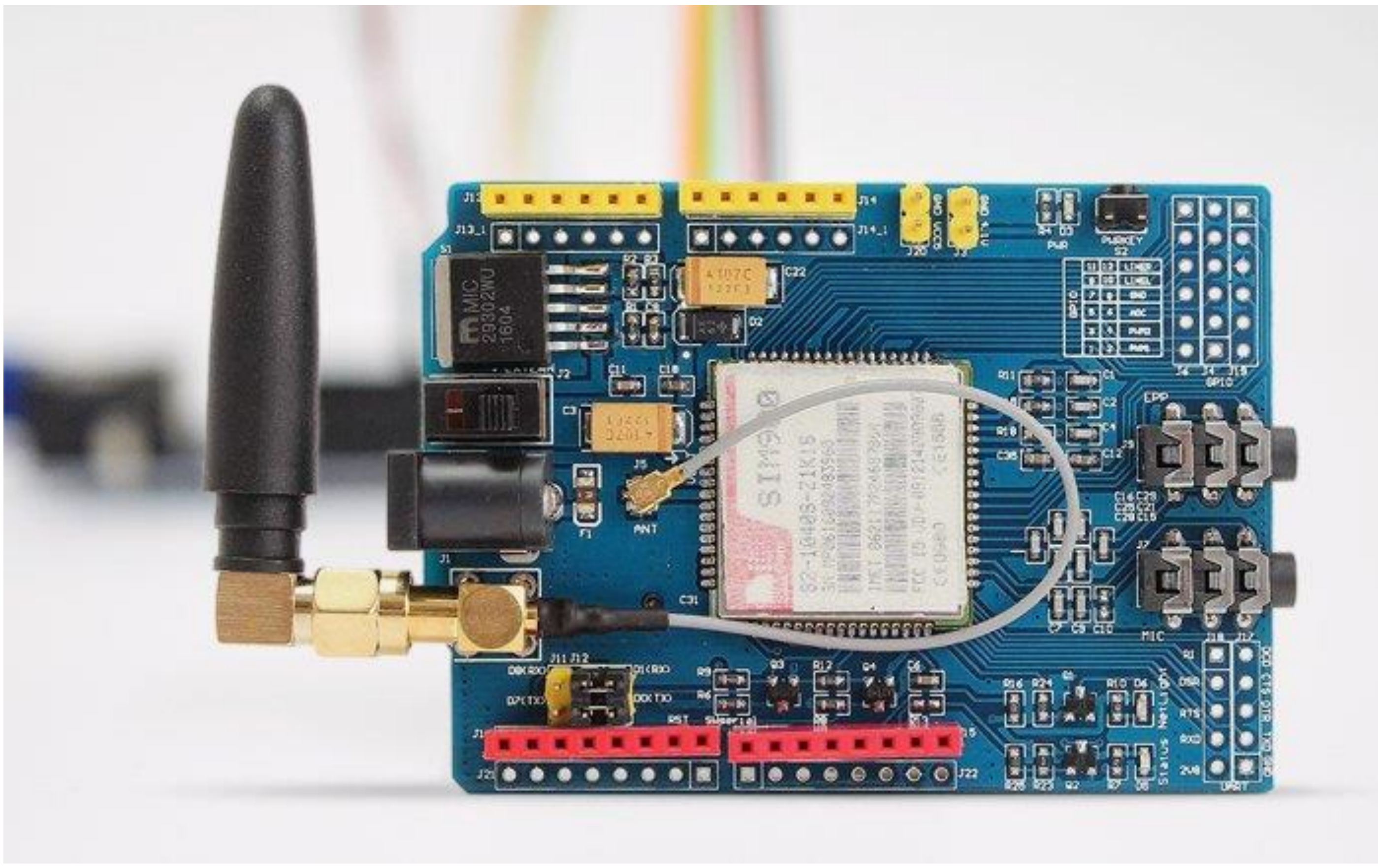
Send Receive SMS & Call with SIM900 GSM Shield & Arduino



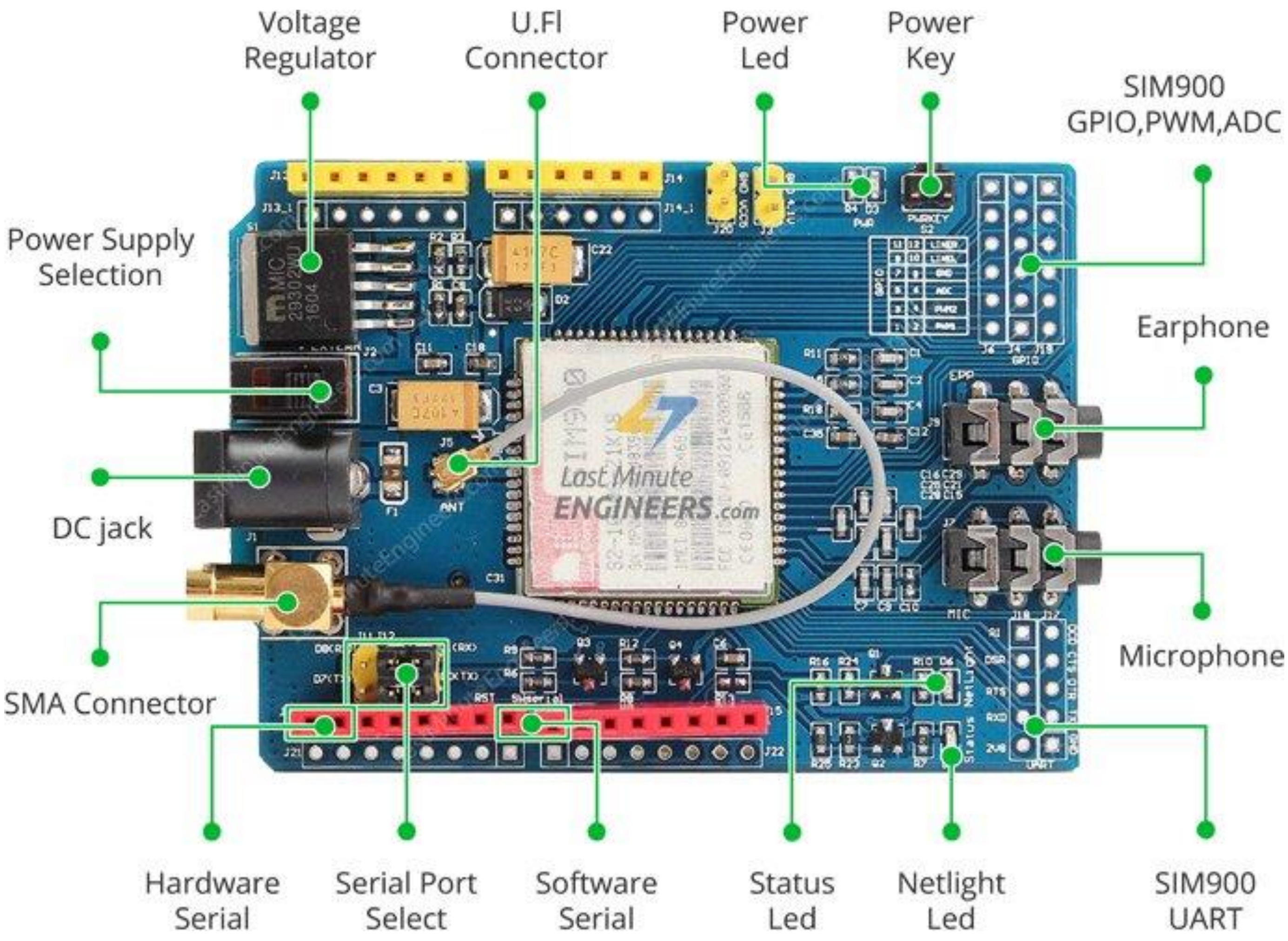
Whether you want to listen to what happens in your house that's miles away from you or activate sprinkler system in your garden just with a silent call; Then SIM900 GSM/GPRS shield serves as a solid launching point for you to get you started with IoT!

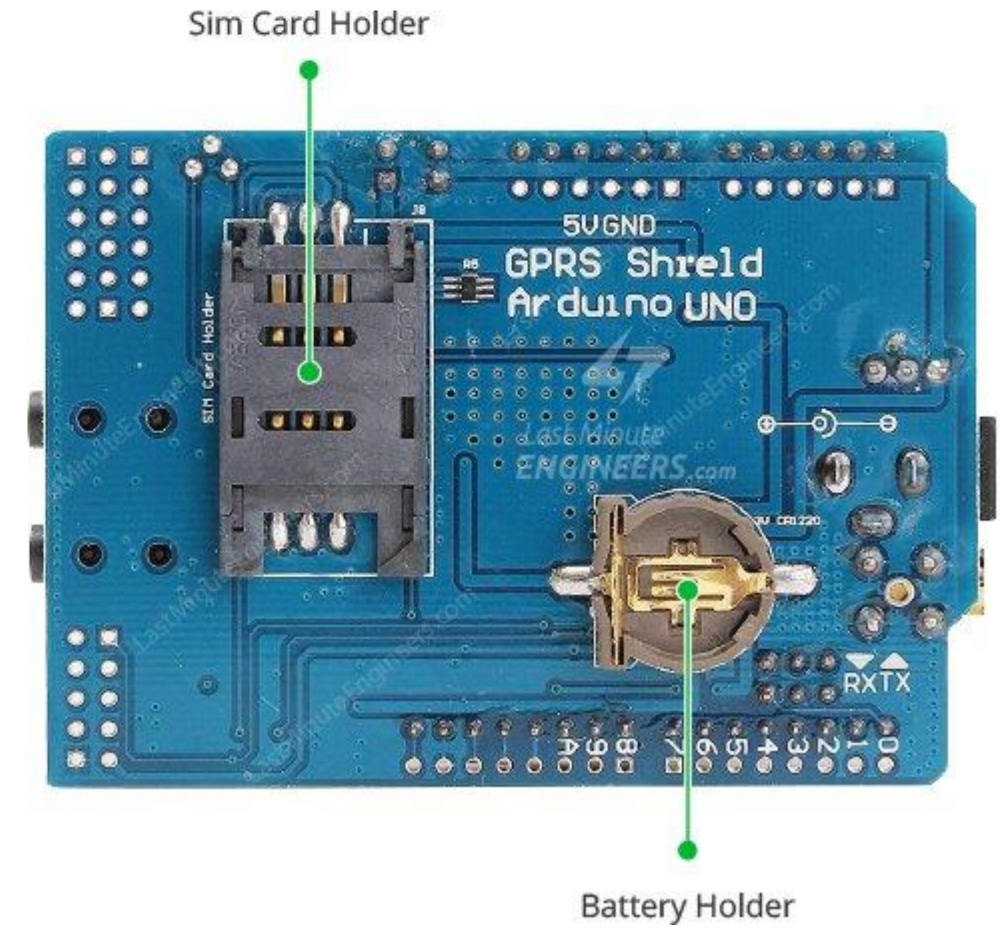
SIM900 GSM/GPRS shield is a GSM modem, which can be integrated into a great number of IoT projects. You can use this shield to accomplish almost anything a normal cell phone can; SMS text messages, Make or receive phone calls, connecting to internet through GPRS, TCP/IP, and more! To top it off, the shield supports quad-band GSM/GPRS network, meaning it works pretty much anywhere in the world.

Hardware Overview of SIM900 GSM/GPRS Shield

The SIM900 GSM/GPRS shield is designed to surround the SIM900 chip with everything necessary to interface with Arduino, plus a few extra goodies to take advantage of the chip's unique features.

Let's familiarize ourselves with these features and abilities of the shield. Here's a quick overview:


Voltage Regulator
U.Fl Connector
Power Led
Power Key
SIM900 GPIO,PWM,ADC
Power Supply Selection
Earphone
DC jack
SMA Connector
Microphone
Hardware Serial
Serial Port Select
Software Serial
Status Led
Netlight Led
SIM900 UART
Last Minute ENGINEERS.com

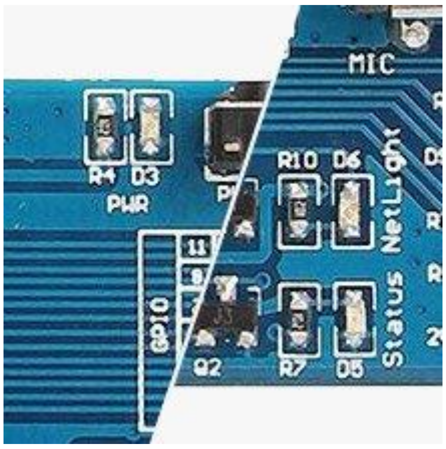


The SIM900 shield packs a surprising amount of features into its little frame. Some of them are listed below:

- Supports Quad-band: GSM850, EGSM900, DCS1800 and PCS1900
- Connect onto any global GSM network with any 2G SIM
- Make and receive voice calls using an external earphone & electret microphone
- Send and receive SMS messages
- Send and receive GPRS data (TCP/IP, HTTP, etc.)
- Scan and receive FM radio broadcasts
- Transmit Power:
  - Class 4 (2W) for GSM850
  - Class 1 (1W) for DCS1800
- Serial-based AT Command Set
- U.FL and SMA connectors for cell antenna
- Accepts Full-size SIM Card

LED Status Indicators

There are three LEDs on the SIM900 GSM/GPRS shield which indicates connectivity or power status. By observing these LEDs you can get a visual feedback on whats going on with the shield.



PWR: This LED is connected to the shield's power supply line. If this LED is on, the shield is receiving power.

Status: This LED indicates SIM900's working status. If this LED is on, the chip is in working mode.

Netlight: This LED indicates the status of your cellular network. It'll blink at various rates to show what state it's in.

- off: The SIM900 chip is not running
- 64ms on, 800ms off: The SIM900 chip is running but not registered to the cellular network yet.
- 64ms on, 3 seconds off: The SIM900 chip is registered to the cellular network & can send/receive voice and SMS.
- 64ms on, 300ms off: The GPRS data connection you requested is active.

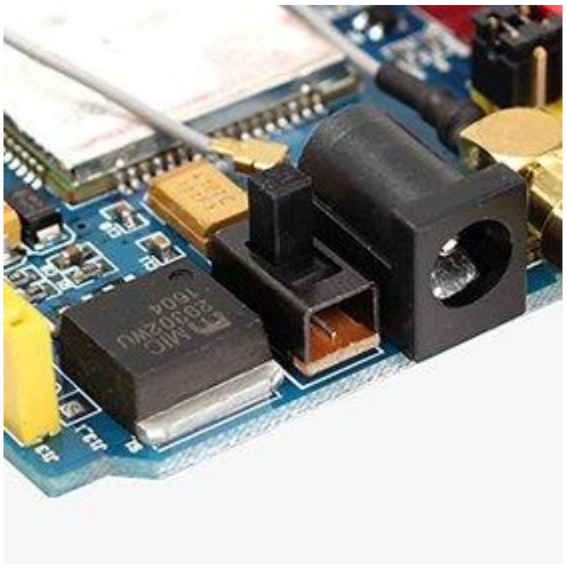
Supplying Power for SIM900 Shield

One of the most important parts of getting the SIM900 shield working is supplying it with enough power.

Depending on which state it's in, the SIM900 can be a relatively power-hungry device. The maximum current draw of the chip is around 2A during transmission burst. It usually won't pull that much, but may require around 216mA during phone calls or 80mA during network transmissions. This chart from the datasheet summarizes what you may expect:

Modes	Frequency	Current Consumption
Power down		60 uA
Sleep mode		1 mA
Stand by		18 mA
Call	GSM850	199 mA
	EGSM900	216 mA
	DCS1800	146 mA
	PCS1900	131 mA
GPRS		453 mA
Transmission burst		2 A

The operating voltage of SIM900 chip is from 3.4V to 4.4V. To keep supply voltage safe at 4.1V, the shield comes with a high current, high accuracy, low-dropout voltage regulator MIC29302WU from Micrel – capable of handling load currents up to 3A.



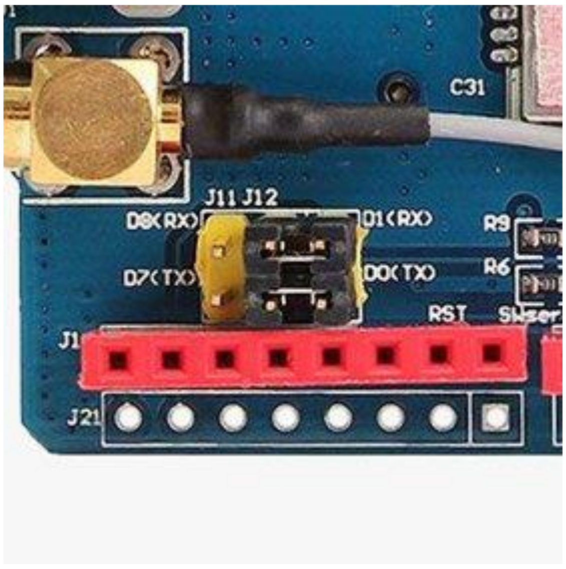
You can add an external power supply to the shield with the 5.5mm DC jack, to which you can connect any 5V-9V DC wall adapter you have. Next to the DC jack, is a Slide Switch to select the power source labeled **EXTERN**. To use external power source, move the slider as shown above.

Warning:

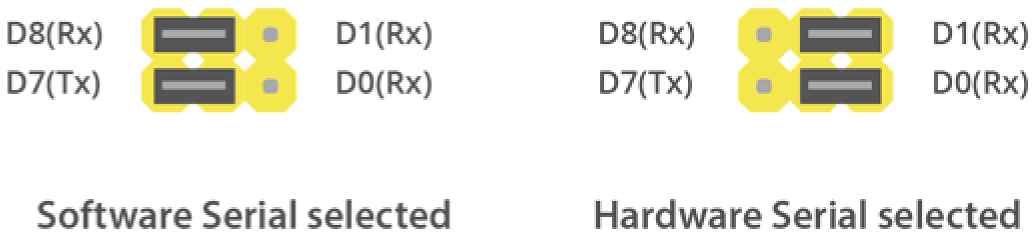
The power supply should be able to source minimum 2A of surge current, otherwise the chip will keep shutting down.

UART Communication

The SIM900 GSM/GPRS shield uses UART protocol to communicate with an Arduino. The chip supports baud rate from 1200bps to 115200bps with Auto-Baud detection.

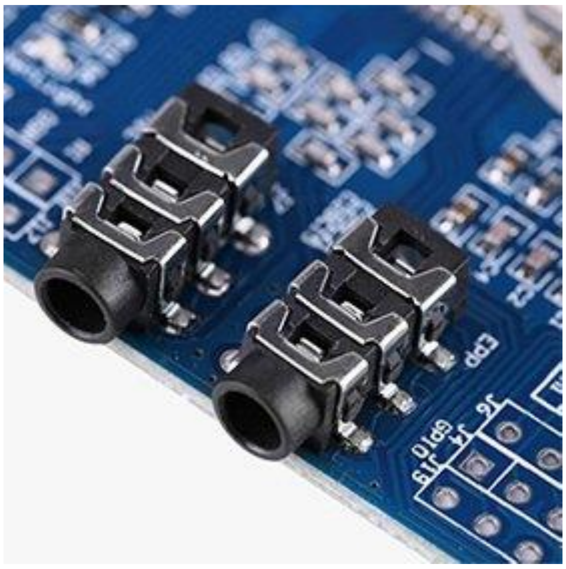


With the help of jumpers you can connect (RX,TX) of the shield to either Software Serial(D8,D7) or Hardware Serial(D1,D0) of the Arduino.



Speaker & Microphone

The shield comes with two standard 3.5mm jacks. One for stereo earphone and other for mono microphone. It allows you to use SIM900's audio interface to make and receive voice calls and listen FM radio.



Mic: You can connect an external electret microphone to this jack.

Earphone: You can connect earphones to this jack. Any ‘iPhone’ or ‘Android’ compatible earphones should work.

Antenna

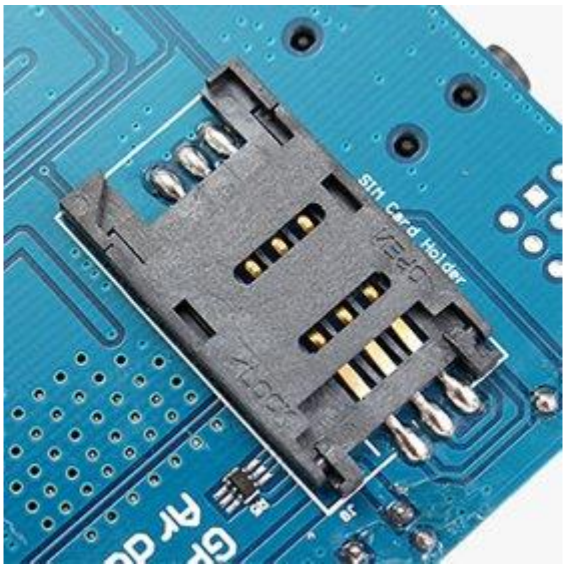
An antenna is required to use the SIM900 for any kind of voice or data communications as well as some SIM commands.

The shield has two interfaces for connecting antenna viz. a U.FL connector and a SMA connector. They are connected through a patch cord.

The shield usually comes with a 3dBi GSM antenna and allows you to put the shield inside a metal case(as long the antenna is outside).

SIM Socket

There's a SIM socket on the back. Any activated, 2G full-size SIM card would work perfectly.



The workings of the SIM card socket can take some getting used to. To unlock the latch, push the top part of the assembly, and then lift it up. Place the SIM card into the bottom part of the socket. Then fold the arm back into the body of the socket, and gently push it forward towards the LOCK position.

RTC(Real Time Clock)

The SIM900 shield can be configured to keep time. So there is no need for any separate RTC. This will keep the time even when the power is OFF.

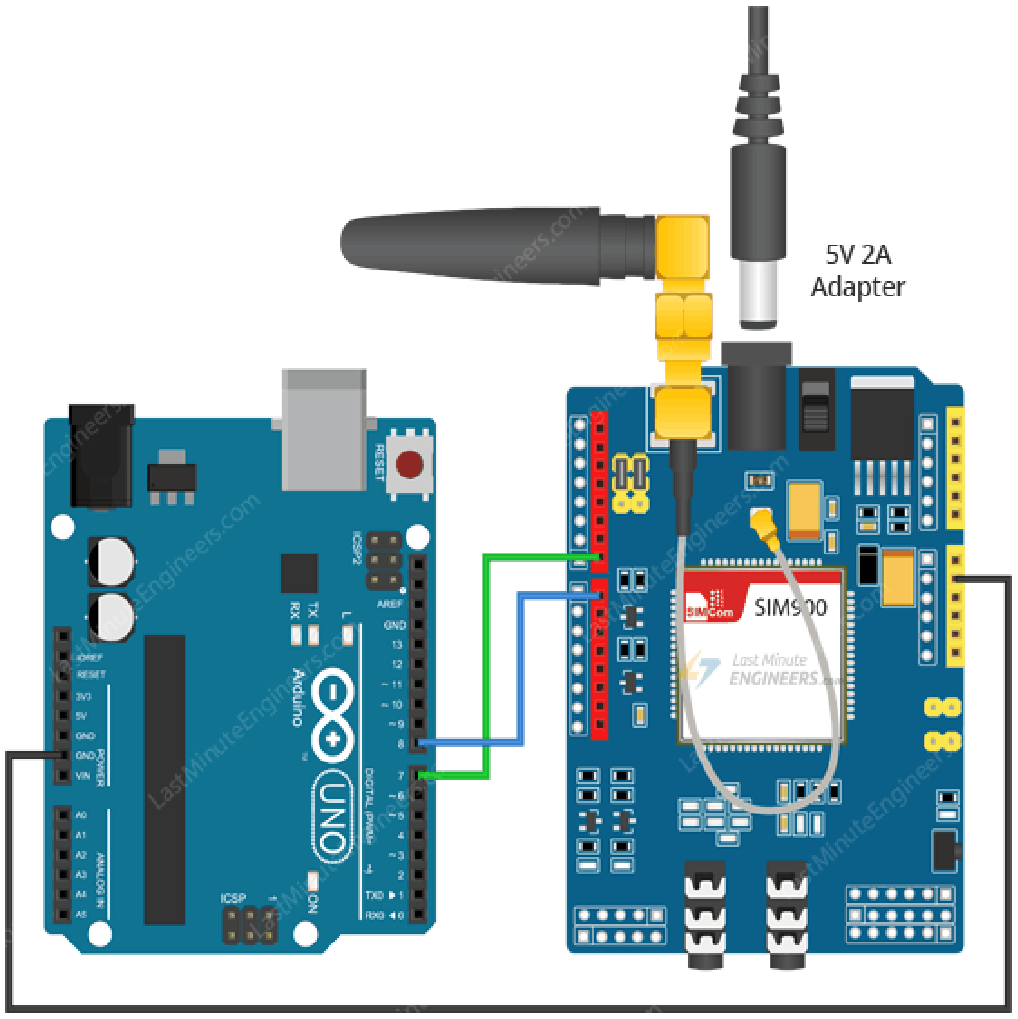
If you want to use internal RTC, you need to install CR1220 battery at the back side of the shield.

Your network provider may not support setting the time automatically. In that case you can do it manually using `AT+CCLK` AT command.

Connecting SIM900 GSM/GPRS Shield to Arduino UNO

Now that we know everything about the shield, we can begin hooking it up to our Arduino!

To start with, connect D7(Tx) and D8(Rx) pin on shield to digital pin#7 and #8 on Arduino. As we'll be using software serial to talk to the shield, make sure the jumper cap is placed on the software serial port select.



Power the shield using external power supply rated 5V 2A. Do not be tempted to connect this pin to 5V supply on Arduino, as the shield may not work due to the lack of supply current. Also make sure you select the external power source with the slide switch next to the DC jack.

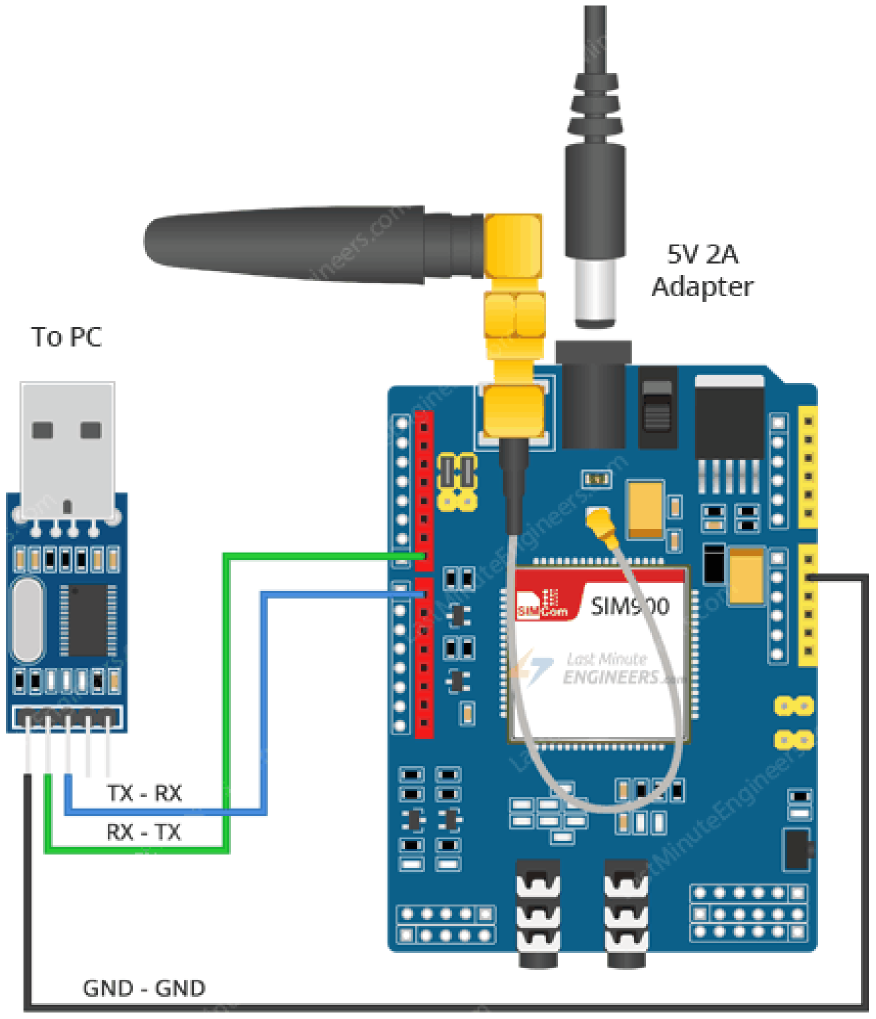
Now connect all the ground in the circuit.

Finally, connect the antenna, insert fully activated SIM card in the socket.

Connecting SIM900 GSM Shield to PC

In order to operate SIM900 GSM Shield directly over PC, you need to connect it to PC using any USB to TTL converter.

Below image shows SIM900 GSM Shield connected to PC through PL2303 USB to TTL converter.

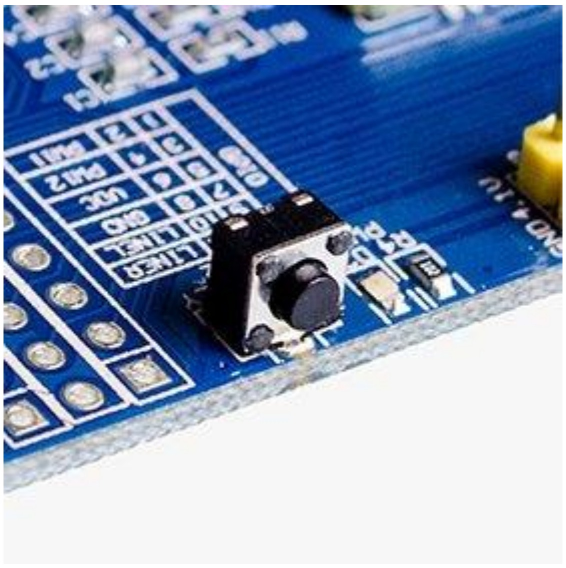


Powering Up/Down SIM900 Chip

Even if you power the shield up, you need to turn on the SIM900 chip to get it working.

As per datasheet, pulling the **PWRKEY** pin on the chip LOW for at least 1 second will power up/down the chip. There are two ways to do this with our shield.

Hardware Trigger

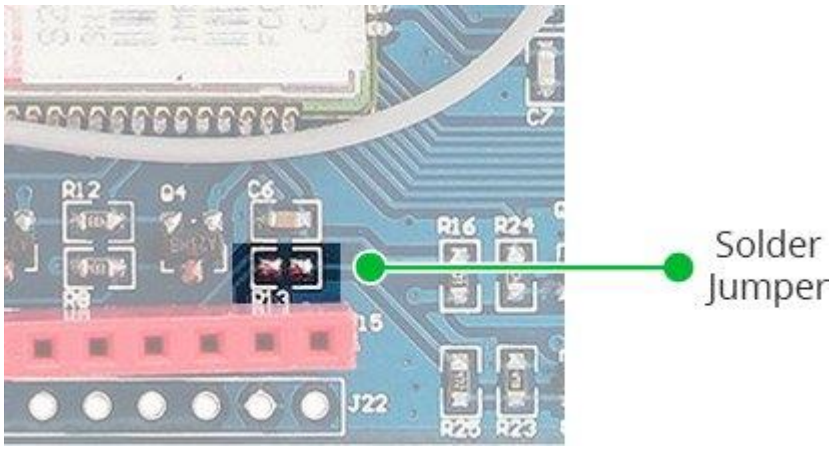


The shield comes with a right angle tactile switch situated near the PWR LED indicator. You need to press that switch for about 2 seconds to power the shield up/down.

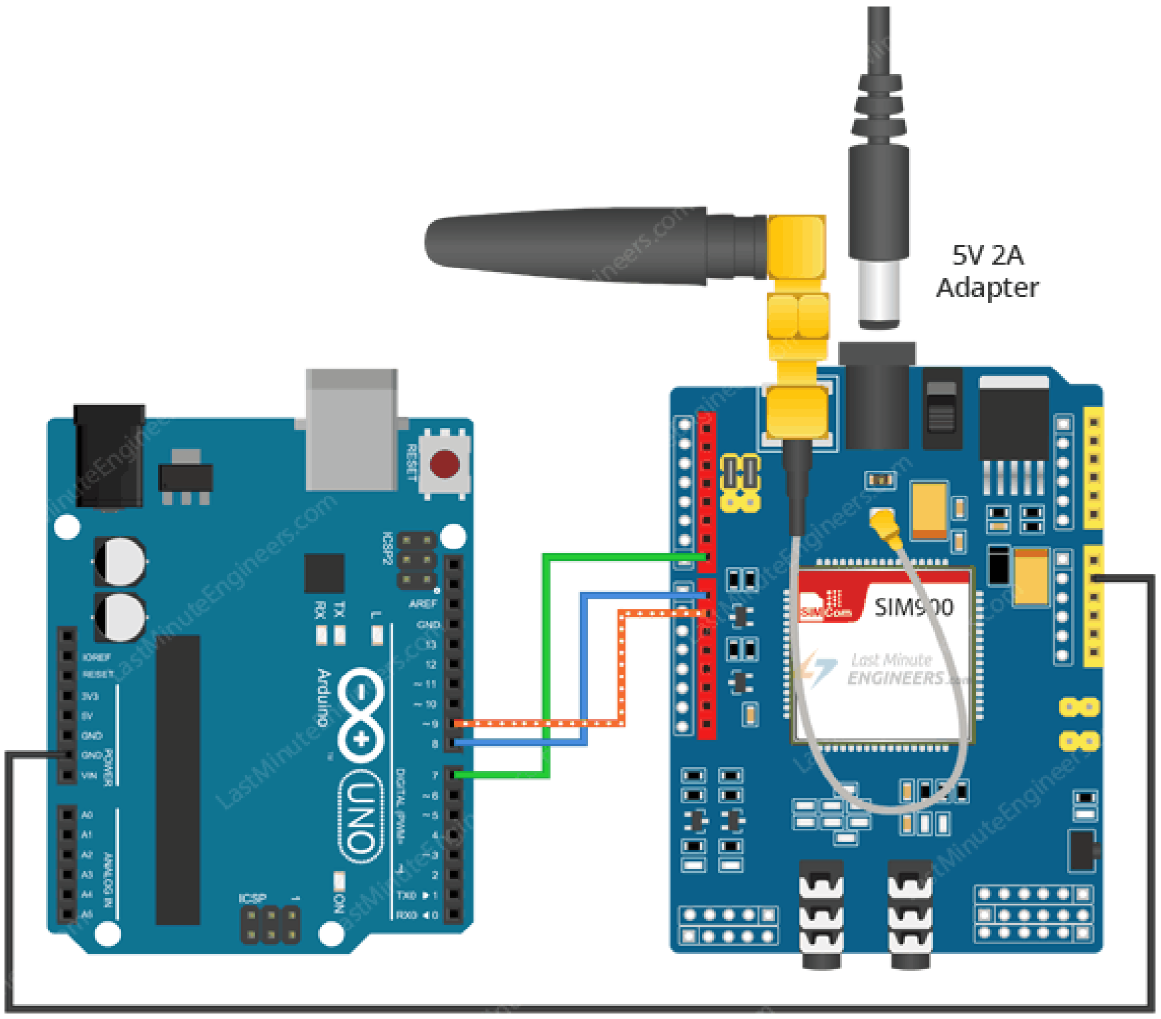
Software trigger

Instead of manually pressing the PWRKEY every time, you can turn the SIM900 up/down programmatically.

First, you need to solder the SMD jumper named **R13** on the shield as highlighted in the image.



Next, you need to connect D9 pin on the shield to the D9 pin on Arduino.



Finally, you need to add following custom function in your program.

```
void SIM900power()
{
  pinMode(9, OUTPUT);
  digitalWrite(9,LOW);
  delay(1000);
  digitalWrite(9,HIGH);
  delay(2000);
  digitalWrite(9,LOW);
  delay(3000);
}
```

Arduino Code – Testing AT Commands

For sending AT commands and communicating with the SIM900 shield, we will use the serial monitor. Below sketch will enable the Arduino to communicate with the SIM900 shield on serial monitor. Before we proceed with detailed breakdown of code, connect your Arduino to PC, compile below code and upload it to the Arduino.

Once you open a serial monitor, **make sure that 'Both NL & CR' option is selected!**

```
#include <SoftwareSerial.h>

//Create software serial object to communicate with SIM900
SoftwareSerial mySerial(7, 8); //SIM900 Tx & Rx is connected to Arduino #7
& #8

void setup()
{
  //Begin serial communication with Arduino and Arduino IDE (Serial
Monitor)
  Serial.begin(9600);

  //Begin serial communication with Arduino and SIM900
  mySerial.begin(9600);

  Serial.println("Initializing...");
  delay(1000);

  mySerial.println("AT"); //Handshaking with SIM900
  updateSerial();
  mySerial.println("AT+CSQ"); //Signal quality test, value range is 0-31 ,
31 is the best
  updateSerial();
  mySerial.println("AT+CCID"); //Read SIM information to confirm whether
the SIM is plugged
  updateSerial();
  mySerial.println("AT+CREG?"); //Check whether it has registered in the
network
  updateSerial();
}

void loop()
{
  updateSerial();
}

void updateSerial()
{
  delay(500);
  while (Serial.available())
  {
    mySerial.write(Serial.read());//Forward what Serial received to
Software Serial Port
  }
  while(mySerial.available())
  {
    Serial.write(mySerial.read());//Forward what Software Serial received
to Serial Port
  }
}
```

Code Explanation:

The sketch starts by including a SoftwareSerial.h library and initializing it with the Arduino pins to which Tx and Rx of SIM900 shield is connected.

```
#include <SoftwareSerial.h>

//Create software serial object to communicate with SIM900
SoftwareSerial mySerial(7, 8); //SIM900 Tx & Rx is connected to Arduino #7
& #8
```

In setup function: we initialize a serial communication link between Arduino, Arduino IDE and SIM900 shield at a baud rate of 9600.

```
//Begin serial communication with Arduino and Arduino IDE (Serial Monitor)
  Serial.begin(9600);

  //Begin serial communication with Arduino and SIM900
  mySerial.begin(9600);
```

Now that we have established a basic connection, we will try to communicate with the SIM900 shield by sending AT commands.

AT – It is the most basic AT command. It also initializes Auto-baud'er. If it works you should see the AT characters echo and then OK, telling you it's OK and it's understanding you correctly! You can then send some commands to query the shield and get information about it such as

AT+CSQ – Check the 'signal strength' – the first # is dB strength, it should be higher than around 5. Higher is better. Of course it depends on your antenna and location!

AT+CCID – get the SIM card number – this tests that the SIM card is found OK and you can verify the number is written on the card.

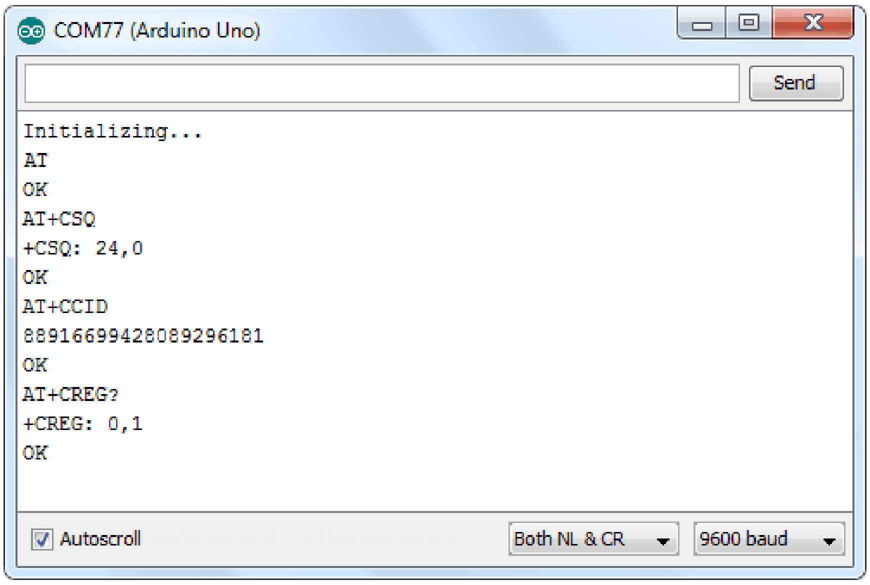
AT+CREG? Check that you're registered on the network. The second # should be 1 or 5. 1 indicates you are registered to home network and 5 indicates roaming network. Other than these two numbers indicate you are not registered to any network.

```
  mySerial.println("AT"); //Handshaking with SIM900
  updateSerial();
  mySerial.println("AT+CSQ"); //Signal quality test, value range is 0-31 ,
31 is the best
  updateSerial();
  mySerial.println("AT+CCID"); //Read SIM information to confirm whether
the SIM is plugged
  updateSerial();
  mySerial.println("AT+CREG?"); //Check whether it has registered in the
network
  updateSerial();
```

In the looping part of the code, we call custom function called updateSerial() which continuously waits for any inputs from the serial monitor and send it to the SIM900 shield through the D8 pin (Rx of shield). It also continuously reads the D7 pin (Tx of shield) if the shield has any responses.

```
void updateSerial()
{
  delay(500);
  while (Serial.available())
  {
    mySerial.write(Serial.read());//Forward what Serial received to
Software Serial Port
  }
  while(mySerial.available())
  {
    Serial.write(mySerial.read());//Forward what Software Serial received
to Serial Port
  }
}
```

You should see below output on serial monitor.



```
Initializing...
AT
OK
AT+CSQ
+CSQ: 24,0
OK
AT+CCID
8891669942808929618l
OK
AT+CREG?
+CREG: 0,1
OK
```

Autoscroll: ✓ | Both NL & CR | 9600 baud

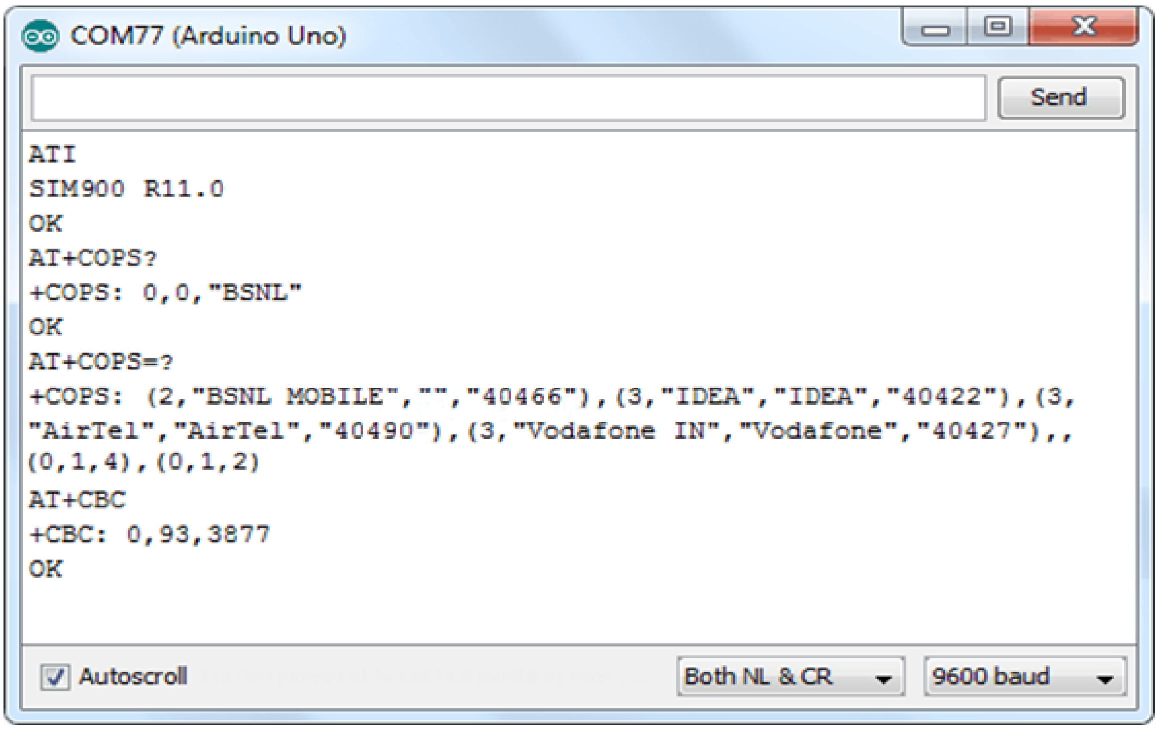
You are now free to send any commands through serial monitor like below which gives more information about network connection & battery status:

ATI – Get the shield name and revision

AT+COPS? – Check that you're connected to the network

AT+COPS=? – Return the list of operators present in the network

AT+CBC – will return the lipo battery state. The second number is the % full (in this case its 93%) and the third number is the actual voltage in mV (in this case, 3.877 V)



```
ATI
SIM900 R11.0
OK
AT+COPS?
+COPS: 0,0,"BSNL"
OK
AT+COPS=?
+COPS: (2,"BSNL MOBILE","","40466"),(3,"IDEA","IDEA","40422"),(3,
"AirTel","AirTel","40490"),(3,"Vodafone IN","Vodafone","40427"),,
(0,1,4),(0,1,2)
AT+CBC
+CBC: 0,93,3877
OK
```

Autoscroll: ✓ — Both NL & CR — 9600 baud

Arduino Code – Sending SMS

Let’s move on to the interesting stuff. Let’s program our Arduino to send an SMS to any phone number you wish. Before trying the sketch out, you need to enter the phone number. Search for the string ZZxxxxxxxxxx and replace ZZ with county code and xxxxxxxxxx with the 10 digit phone number.

```
#include <SoftwareSerial.h>

//Create software serial object to communicate with SIM900
SoftwareSerial mySerial(7, 8); //SIM900 Tx & Rx is connected to Arduino #7
& #8

void setup()
{
  //Begin serial communication with Arduino and Arduino IDE (Serial
Monitor)
  Serial.begin(9600);

  //Begin serial communication with Arduino and SIM900
  mySerial.begin(9600);

  Serial.println("Initializing...");
  delay(1000);

  mySerial.println("AT"); //Handshaking with SIM900
  updateSerial();

  mySerial.println("AT+CMGF=1"); // Configuring TEXT mode
  updateSerial();
  mySerial.println("AT+CMGS=\"+ZZxxxxxxxxxx\"");//change ZZ with country
code and xxxxxxxxxxx with phone number to sms
  updateSerial();
  mySerial.print("Last Minute Engineers | lastminuteengineers.com"); //text
content
  updateSerial();
  mySerial.write(26);
}

void loop()
{
}

void updateSerial()
{
  delay(500);
  while (Serial.available())
  {
    mySerial.write(Serial.read());//Forward what Serial received to
Software Serial Port
  }
  while(mySerial.available())
  {
    Serial.write(mySerial.read());//Forward what Software Serial received
to Serial Port
  }
}
```

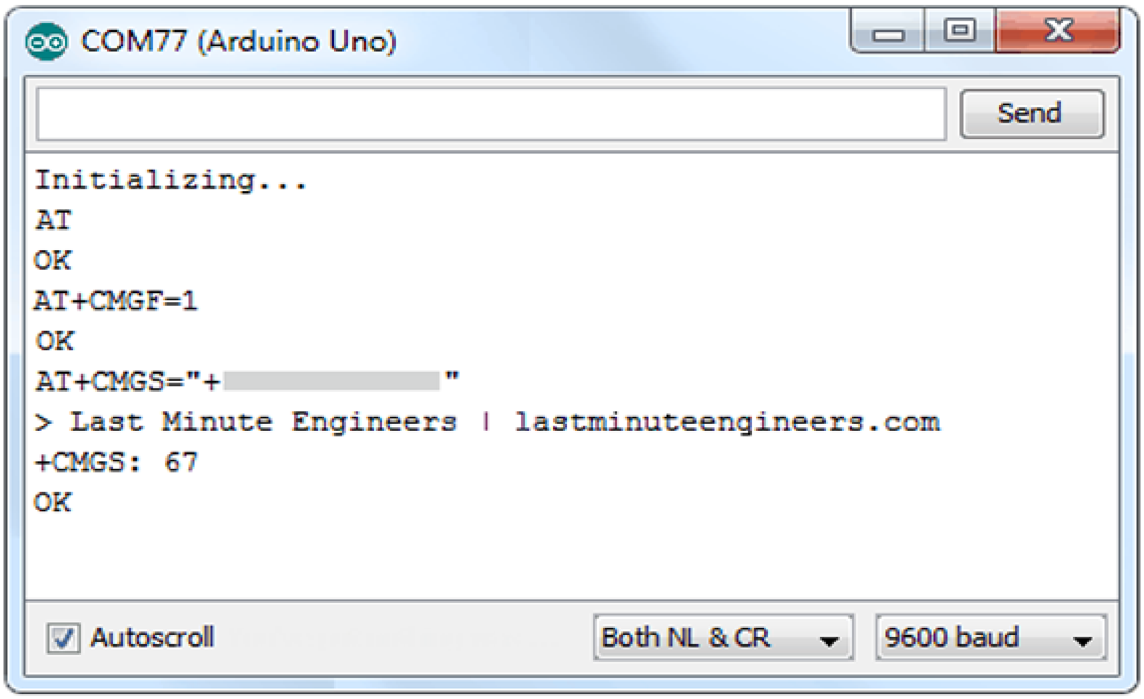
The sketch is almost same as earlier except below code snippet. Once the connection is established, we send below AT commands:

AT+CMGF=1 – Selects SMS message format as text. Default format is **P**rotocol **D**ata **U**nit (PDU)

AT+CMGS=+ZZxxxxxxxxxx – Sends SMS to the phone number specified. The text message entered followed by a 'Ctrl+z' character is treated as SMS. 'Ctrl+z' is actually a 26th non-printing character described as 'substitute' in ASCII table. So, we need to send 26_{Dec} ($1A_{Hex}$) once we send a message.

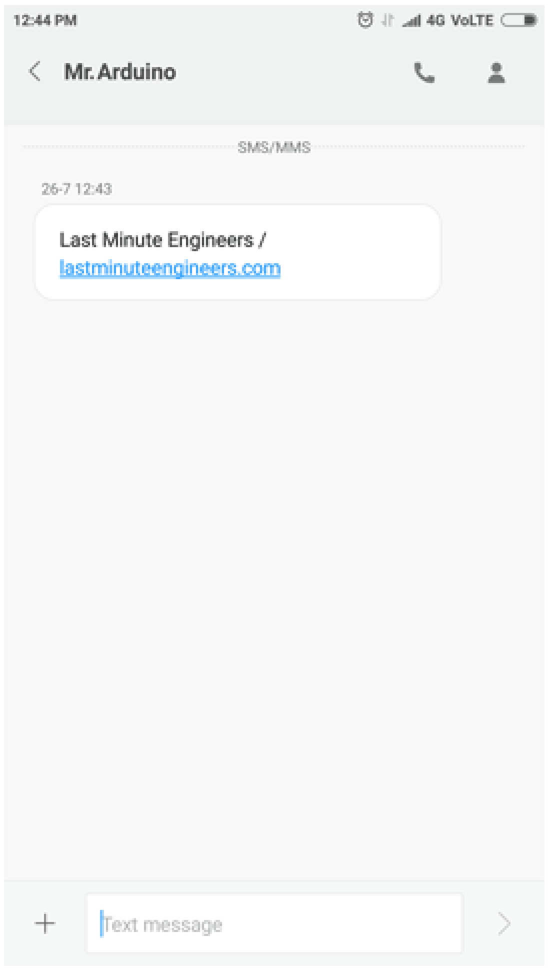
```
  mySerial.println("AT+CMGF=1"); // Configuring TEXT mode
  updateSerial();
  mySerial.println("AT+CMGS=\"+ZZxxxxxxxxxx\"");//change ZZ with country
code and xxxxxxxxxxx with phone number to sms
  updateSerial();
  mySerial.print("Last Minute Engineers | lastminuteengineers.com"); //text
content
  updateSerial();
  mySerial.write(26);
```

The loop is kept empty as we want to send SMS only once. If you wish to send SMS one more time, just hit the RESET key on your Arduino. Below screenshot shows SMS sent from SIM900 GSM/GPRS shield.



```
Initializing...
AT
OK
AT+CMGF=1
OK
AT+CMGS="+[redacted]"
> Last Minute Engineers | lastminuteengineers.com
+CMGS: 67
OK
```

☑ Autoscroll   Both NL & CR   9600 baud


12:44 PM

Mr.Arduino

SMS/MMS

26-7 12:43

Last Minute Engineers / lastminuteengineers.com

Arduino Code – Reading SMS

Now let’s program our Arduino to read incoming messages. This sketch is very useful when you need to trigger an action when a specific SMS is received. For example, when the Arduino receives an SMS, you can instruct it to turn on or off a relay. You got the idea!

```
#include <SoftwareSerial.h>

//Create software serial object to communicate with SIM900
SoftwareSerial mySerial(7, 8); //SIM900 Tx & Rx is connected to Arduino #7
& #8

void setup()
{
  //Begin serial communication with Arduino and Arduino IDE (Serial
Monitor)
  Serial.begin(9600);

  //Begin serial communication with Arduino and SIM900
  mySerial.begin(9600);

  Serial.println("Initializing...");
  delay(1000);
  mySerial.println("AT"); //Handshaking with SIM900
  updateSerial();

  mySerial.println("AT+CMGF=1"); // Configuring TEXT mode
  updateSerial();
  mySerial.println("AT+CNMI=1,2,0,0,0"); // Decides how newly arrived SMS 
messages should be handled
  updateSerial();
}

void loop()
{
  updateSerial();
}

void updateSerial()
{
  delay(500);
  while (Serial.available())
  {
    mySerial.write(Serial.read());//Forward what Serial received to 
Software Serial Port
  }
  while(mySerial.available())
  {
    Serial.write(mySerial.read());//Forward what Software Serial received 
to Serial Port
  }
}
```

The sketch is similar as earlier except below code snippet. Once the connection is established, we send below AT commands:

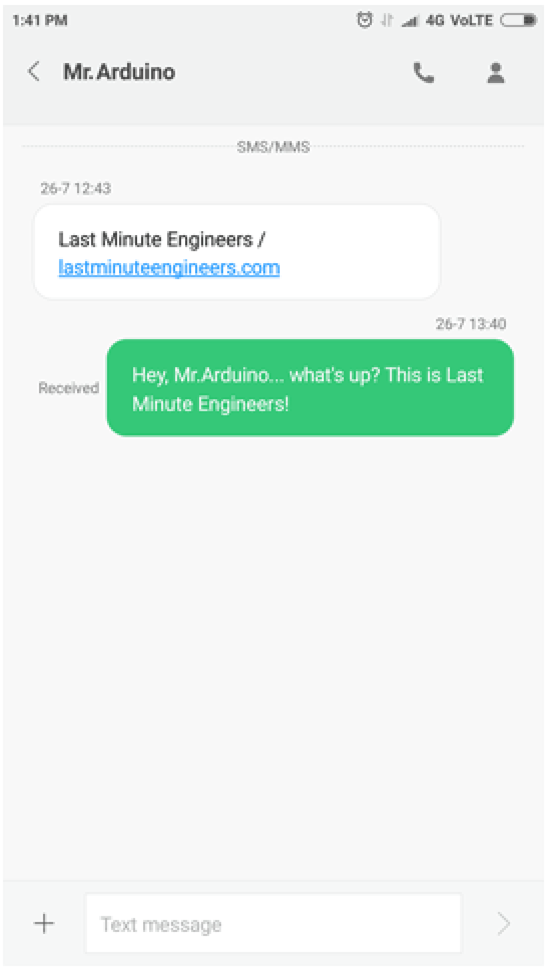
AT+CMGF=1 – Selects SMS message format as text. Default format is **P**rotocol **D**ata **U**nit (PDU)

AT+CNMI=1,2,0,0,0 – specifies how newly arrived SMS messages should be handled. This way you can tell the SIM900 shield either to forward newly arrived SMS messages directly to the PC, or to save them in message storage and then notify the PC about their locations in message storage.

Its response starts with **+CMT:** All the fields in the response are comma-separated with first field being phone number. The second field is the name of person sending SMS. Third field is a timestamp while forth field is the actual message.

```
  mySerial.println("AT+CMGF=1"); // Configuring TEXT mode
  updateSerial();
  mySerial.println("AT+CNMI=1,2,0,0,0"); // Decides how newly arrived SMS 
messages should be handled
  updateSerial();
```

Note that **this time we have NOT kept the loop function empty** as we are polling for newly arrived SMS messages. Once you send the SMS to SIM900 GSM/GPRS shield, you will see below output on serial monitor.



1:41 PM 4G VoLTE

Mr.Arduino

SMS/MMS

26-7 12:43

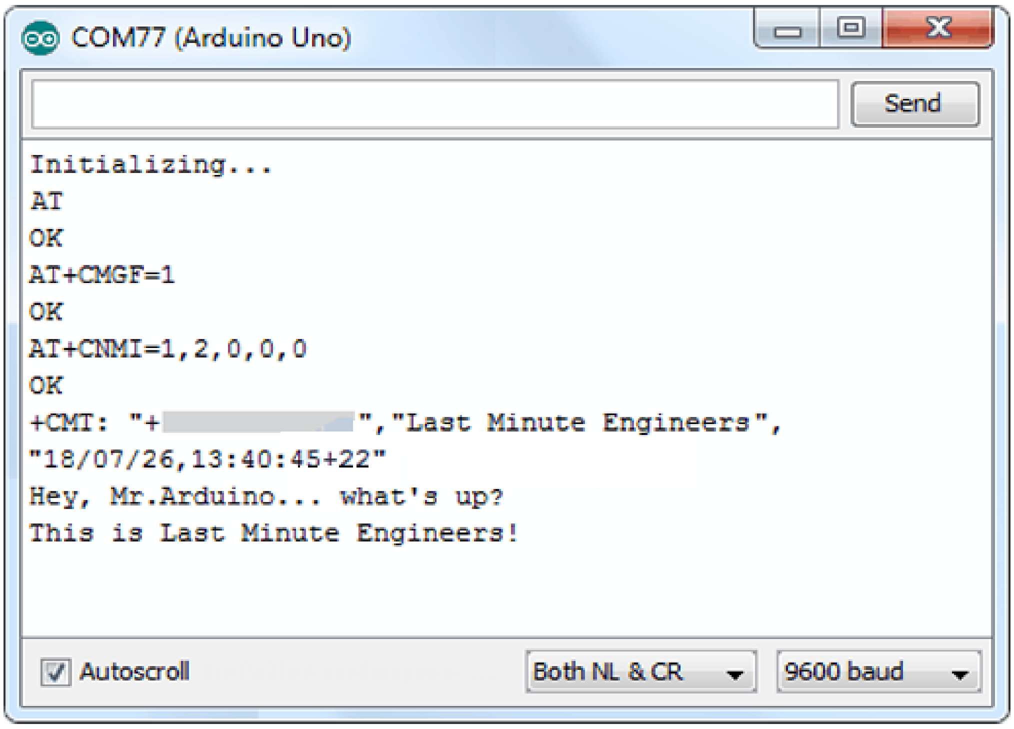
Last Minute Engineers / lastminuteengineers.com

26-7 13:40

Received

Hey, Mr.Arduino... what's up? This is Last Minute Engineers!

Text message



```
Initializing...
AT
OK
AT+CMGF=1
OK
AT+CNMI=1,2,0,0,0
OK
+CMT: "+[redacted]","Last Minute Engineers",
"18/07/26,13:40:45+22"
Hey, Mr.Arduino... what's up?
This is Last Minute Engineers!
```

☑ Autoscroll   Both NL & CR   9600 baud

Expanding Arduino SoftwareSerial Buffer Size

If your message is long enough just like ours, then you'll probably receive it with some missing characters. This is not because of a faulty code. Your SoftwareSerial receive buffer is getting filled up and discarding characters. You are not reading fast enough from the buffer.

The simplest solution to this is to increase the size of the SoftwareSerial buffer from its default size of 64 bytes to 256 bytes (or smaller, depending on what works for you).

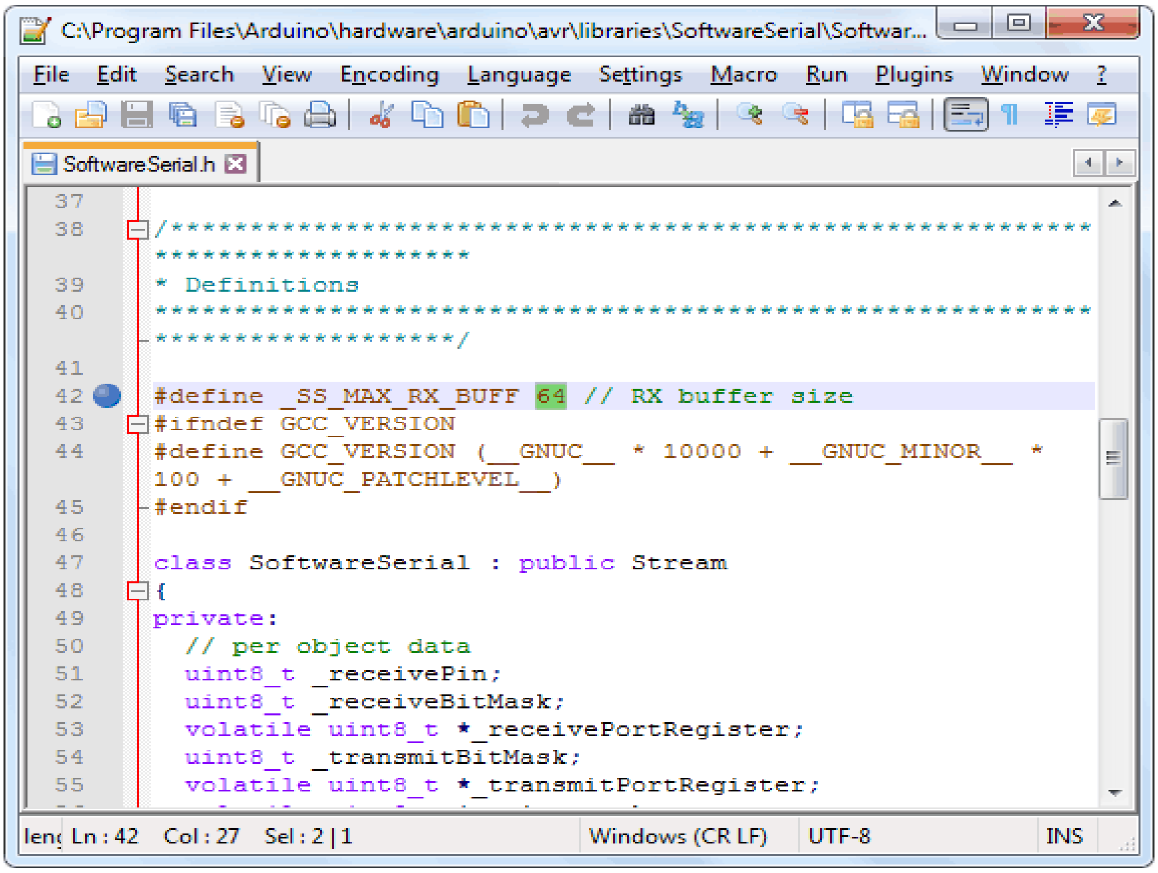
On a Windows PC, go to **C:\Program Files (x86)** -> **Arduino** -> **hardware** -> **Arduino** -> **avr** -> **libraries** -> **SoftwareSerial** (-> src for newer version of Arduino IDE) Open SoftwareSerial.h and change the line:

```
// RX buffer size
#define _SS_MAX_RX_BUFF 64
```

To

```
// RX buffer size
#define _SS_MAX_RX_BUFF 256
```

Save the file and try your sketch again.


C:\Program Files\Arduino\hardware\arduino\avr\libraries\SoftwareSerial\Softwar...
File Edit Search View Encoding Language Settings Macro Run Plugins Window ?
SoftwareSerial.h

```
/*****************************************************************************
*********************
* Definitions
*****************************************************************************
********************/

#define _SS_MAX_RX_BUFF 64 // RX buffer size
#ifndef GCC_VERSION
#define GCC_VERSION (__GNUC__ * 10000 + __GNUC_MINOR__ *
100 + __GNUC_PATCHLEVEL__)
#endif

class SoftwareSerial : public Stream
{
private:
  // per object data
  uint8_t _receivePin;
  uint8_t _receiveBitMask;
  volatile uint8_t *_receivePortRegister;
  uint8_t _transmitBitMask;
  volatile uint8_t *_transmitPortRegister;
```

leng Ln : 42 Col : 27 Sel : 2 | 1
Windows (CR LF)
UTF-8
INS

Expanding Arduino SoftwareSerial Buffer Size

Arduino Code – Making Call

Now let's program our Arduino to make call. This sketch is very useful when you want your Arduino to make an SOS/distress call in case of emergency like temperature being exceeded or someone breaks into your house. You got the idea!

Before trying the sketch out, you need to enter the phone number. Search for the string ZZxxxxxxxxxx and replace ZZ with county code and xxxxxxxxxx with the 10 digit phone number.

```
#include <SoftwareSerial.h>

//Create software serial object to communicate with SIM900
SoftwareSerial mySerial(7, 8); //SIM900 Tx & Rx is connected to Arduino #7
& #8

void setup()
{
  //Begin serial communication with Arduino and Arduino IDE (Serial
Monitor)
  Serial.begin(9600);

  //Begin serial communication with Arduino and SIM900
  mySerial.begin(9600);
  Serial.println("Initializing...");
  delay(1000);

  mySerial.println("AT"); //Handshaking with SIM900
  updateSerial();

  mySerial.println("ATD+ +ZZxxxxxxxxxx;"); //  change ZZ with country code
and xxxxxxxxxxx with phone number to dial
  updateSerial();
  delay(20000); // wait for 20 seconds...
  mySerial.println("ATH"); //hang up
  updateSerial();
}

void loop()
{
}

void updateSerial()
{
  delay(500);
  while (Serial.available())
  {
    mySerial.write(Serial.read());//Forward what Serial received to
Software Serial Port
  }
  while(mySerial.available())
  {
    Serial.write(mySerial.read());//Forward what Software Serial received
to Serial Port
  }
}
```

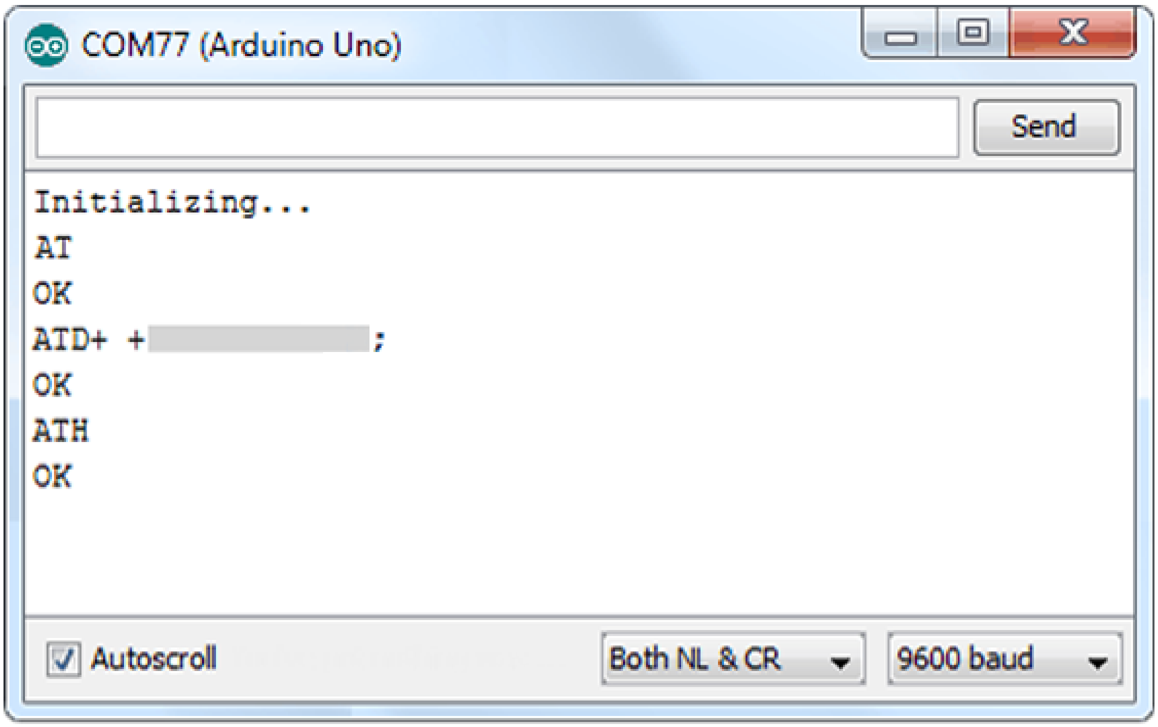
To place a call following AT commands are used:

ATD+ +ZZxxxxxxxxxx; – Dials a specified number. The semicolon ; modifier at the end separates the dial string into multiple dial commands. All but the last command must end with the semicolon ; modifier.

ATH – Hangs up the call

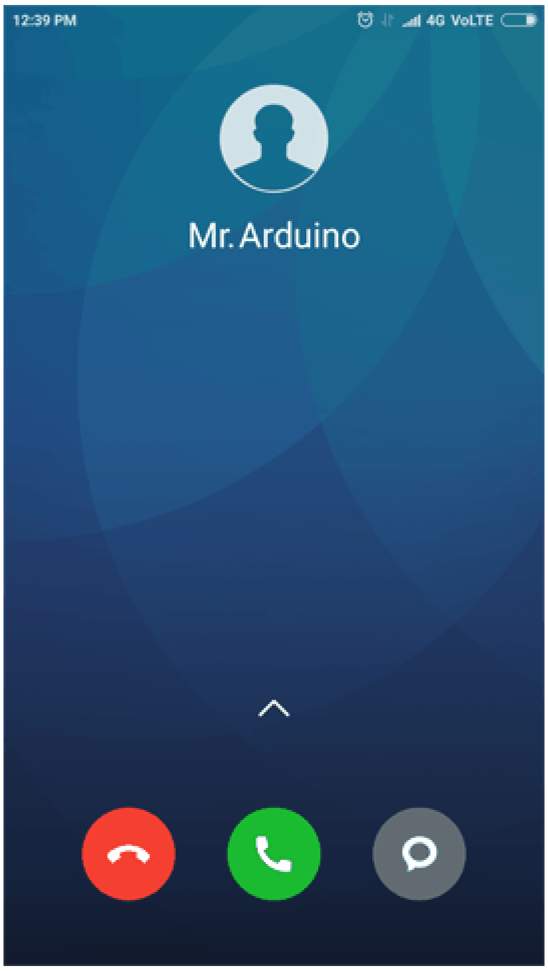
```
  mySerial.println("ATD+ +ZZxxxxxxxxxx;"); //  change ZZ with country code
and xxxxxxxxxxx with phone number to dial
  updateSerial();
  delay(20000); // wait for 20 seconds...
  mySerial.println("ATH"); //hang up
  updateSerial();
```

Below screenshot shows call made from SIM900 GSM/GPRS shield.



```
Initializing...
AT
OK
ATD+ +[redacted];
OK
ATH
OK
```

Autoscroll [✓]
Both NL & CR
9600 baud



Arduino Code – Receiving Call

Receiving call doesn’t require any special code; you just have to keep listening to the SIM900 shield. Yet, you may find this sketch very useful, when you need to trigger an action when a call from specific phone number is received.

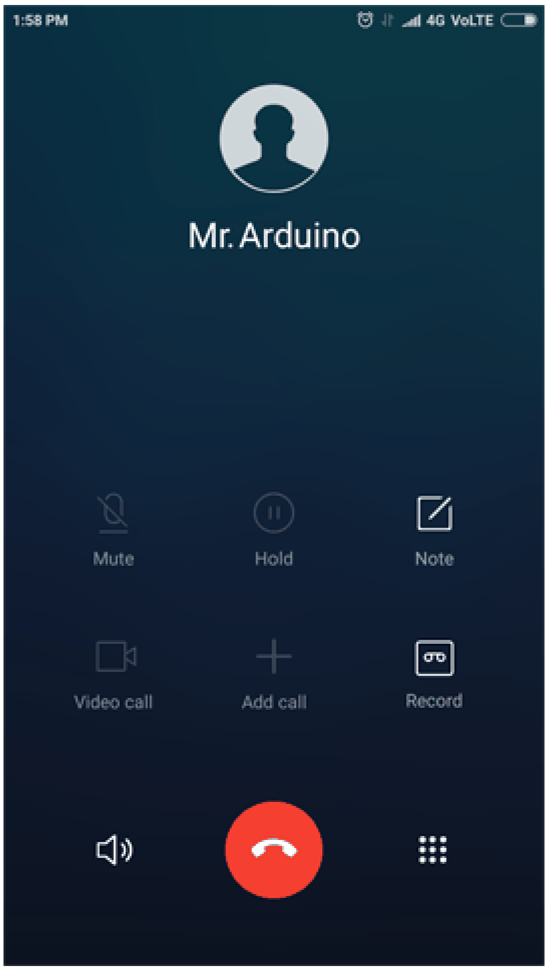
```
#include <SoftwareSerial.h>

//Create software serial object to communicate with SIM900
SoftwareSerial mySerial(7, 8); //SIM900 Tx & Rx is connected to Arduino #7
& #8

void setup()
{
  //Begin serial communication with Arduino and Arduino IDE (Serial
Monitor)
  Serial.begin(9600);

  //Begin serial communication with Arduino and SIM900
  mySerial.begin(9600);

  Serial.println("Initializing...");
}

void loop()
{
  updateSerial();
}

void updateSerial()
{
  delay(500);
  while (Serial.available())
  {
    mySerial.write(Serial.read());//Forward what Serial received to
Software Serial Port
  }
  while(mySerial.available())
  {
    Serial.write(mySerial.read());//Forward what Software Serial received
to Serial Port
  }
}
```

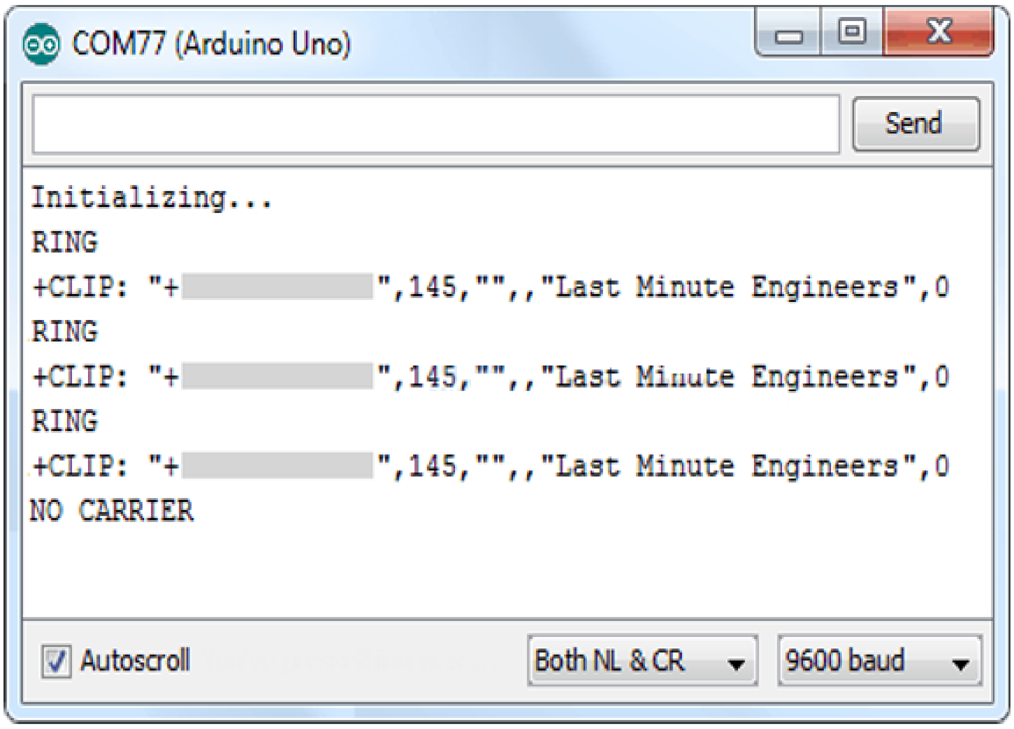
Incoming call is usually indicated by ‘RING’ on serial monitor followed by phone number and caller ID. To accept/hang a call following AT commands are used:

ATA – Accepts incoming call.

ATH – Hangs up the call. On hanging up the call it sends NO CARRIER on the serial monitor indicating call couldn’t connect.

Below output on serial monitor shows call received by SIM900 GSM/GPRS shield.





COM77 (Arduino Uno)

```
Initializing...
RING
+CLIP: "+[redacted]",145,"",,"Last Minute Engineers",0
RING
+CLIP: "+[redacted]",145,"",,"Last Minute Engineers",0
RING
+CLIP: "+[redacted]",145,"",,"Last Minute Engineers",0
NO CARRIER
```

[✓] Autoscroll   Both NL & CR   9600 baud