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## General

*Arduino* is an open-source physical computing platform based on flexible and easy-to-use hardware and software which is used to for the development of prototypes. The *Arduino* board is composed of a microcontroller with several digital and analog inputs and outputs and interfaces. Including JAVA based development environment, based on processing and other open-source software. Developed programs can directly be loaded to the *Arduino* board.

*Arduino* has a great fan community.. and of course their own website with many example applications as well as an extensive forum → <http://www.arduino.cc/>

To extend the functionality of the *Arduino* board and to control other devices, so-called Shields (extension boards) are plugged to the *Arduino* board. By using the **GSM-easy! - Shield**, it is possible to use mobile communication . For example, Voicecall, SMS, Internet (TCP/IP, HTTP, PING, etc.). Alarms and measured data can be sent or switching or similar information can be received. The *Arduino* board in combination with the **GSM-easy! - Shield** is used individually and can be customized to your needs. The *Arduino* board communicates with the **GSM-easy! - Shield** over a serial interface.

Please read this manual completely and carefully before initial use. It describes correct use and includes important instructions for the installation of the **GSM-easy! - Shield** with the **Arduino-Board**. The manufacturer accepts no liability for damage resulting from improper use. All guarantee claims are then void.



## Scope of delivery

### Hardware

Everything there? The delivery of a **GSM-easy! - Shield** unit contains:

- the **GSM-easy! - Shield**
- this manual (as [download](#))
- the *Arduino* board (optional)
- one mobile radio antenna (optional)
- power supply (optional)

### Software

Software pack (available for download) containing:

- A library to use the **GSM-easy! - Shield**
- Example programs for using Voice, SMS, E-Mail, HTTP, FTP, Ping, etc.
- Datasheets and "Application Notes" for the wireless module **Quectel M95**
- *Arduino* board / **GSM-easy! - Shield** design and schematics

## System requirements

### General

- *Arduino* board "Duemilanove" (Atmega328) / *Arduino* board "UNO" (Atmega328) / *Arduino*-Board "Mega2560" (Atmega2560)
- SIM card (pre-paid or contract)

### Programming

- [Arduino development environment](#)
- USB interface
- Windows / Mac OS X / Linux: 32 or 64 bit



## Technical specification

### General

- Operating voltage: 5VDC ... 9VDC
- 14 (Duemilanove/Uno) or 54 (Mega2560) digital in- and outputs
- 6 (Duemilanove/Uno) or 16 (Mega2560) analogue inputs

### GSM

- Integrated GSM module: [Quectel-M95](#)
- internal supply voltage: 4V
- can be operated with pre-paid or contract SIM cards of any provider, no SIM lock
- control via the serial interface (TTL/CMOS level)

### Antenna

- antenna connector: SMA
- connectivity for stubby antenna (directly attached) or external antenna (for example magnetic mount antenna) see [here](#)



## Stackability (simultaneous use of multiple Shields)

The **GSM-easy! - Shield** can be used simultaneously with other [antrax Shields](#).

When stacked together, all antrax shields can be switched ON/OFF via an own select line. Thus it is possible that multiple shields can share the few interfaces of one Arduino motherboard, without blocking each other.

*antrax* shields with stackability technology:

- **GSM/GPRS/GPS-Shield**
- **GSM-easy! - Shield**
- **Iridium-Shield**
- **OBD2-Shield**

## Firmware update of the wireless module *Quectel-M95*

Use the X24 connector of the **GSM-easy! - Shield** in order to perform and transfer a firmware update to the wireless module.



## Installation

### Hardware

- Place SIM card in the SIM card holder on the **GSM-easy! - Shield**
- Connect mobile radio antenna
- Plug the **GSM-easy! - Shield** on the *Arduino* board. Because of the RF characteristics the the **GSM-easy! - Shield** must be placed as topmost shield.
- Connect the power supply to the *Arduino* board or use an USB cable to connect the *Arduino* board with a PC

**NOTE:** The wireless Quectel-M95 module has a dynamic transmission power control. In poor reception conditions, the transmission power is increased accordingly. In this case, a relatively high current is required from the power supply. Please use a sufficiently sized external power supply. The exclusive use of the USB power supply may result in interruptions when sending or "resetting" the wireless module.

**CAUTION:** Before inserting/removing the SIM card please switch OFF (de-energise) the **GSM-easy! - Shield** (e.g. interrupt power supply). Otherwise the complete content of the SIM card can be destroyed, which may lead to a fee for exchange by the provider.

### Software

If required please load drivers needed by the *Arduino* board from the directory of the *Arduino* development environment.

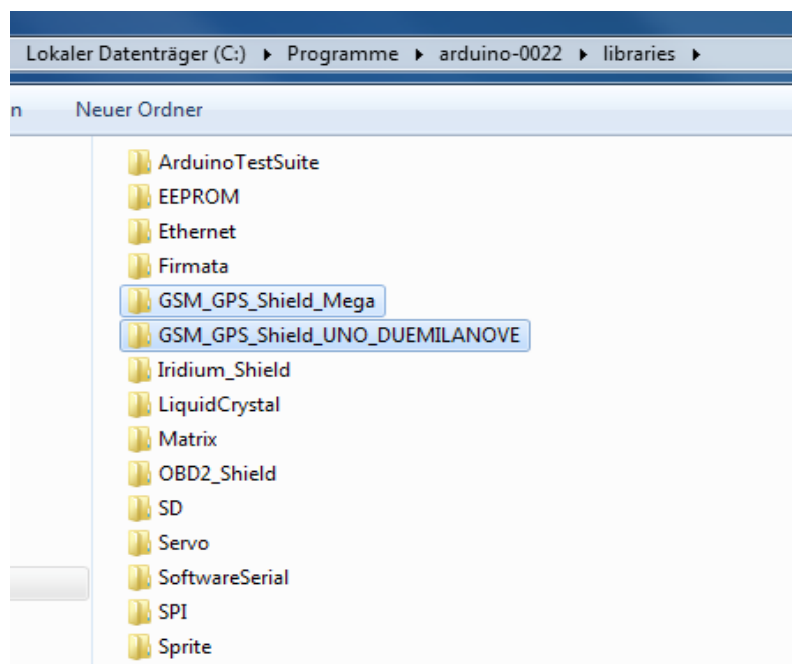


## Initial operation

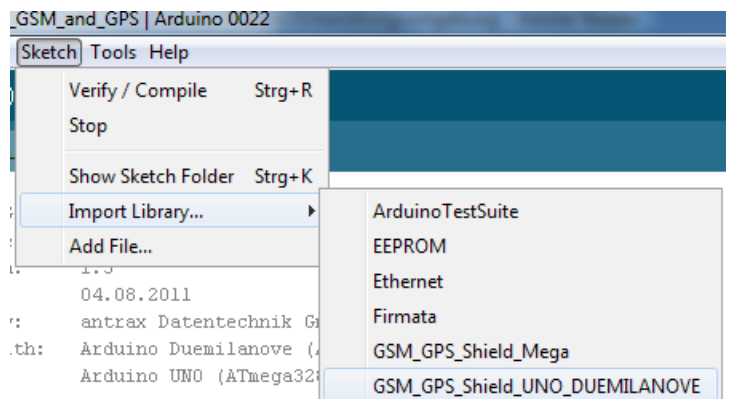
### Library

To make working with the **GSM-easy! - Shield** as simple as possible, a library was developed for this shield.

Please copy the files **gsm\_easy.cpp**, **gsm\_easy.h** und **keywords.txt** to the "libraries" file of the Arduino development environment (e.g. "c:\arduino-0022\libraries").



The library can be added to the current open program in just 3 clicks. Of course, this library can be changed or extended to your own needs.







## Programming the *Arduino*-Board

The **GSM-easy! - Shield** is always addressed and controlled by the software used on the *Arduino* board. It is very easy to transfer a software to the *Arduino* board with the *Arduino* development environment.

The required steps are described here below:

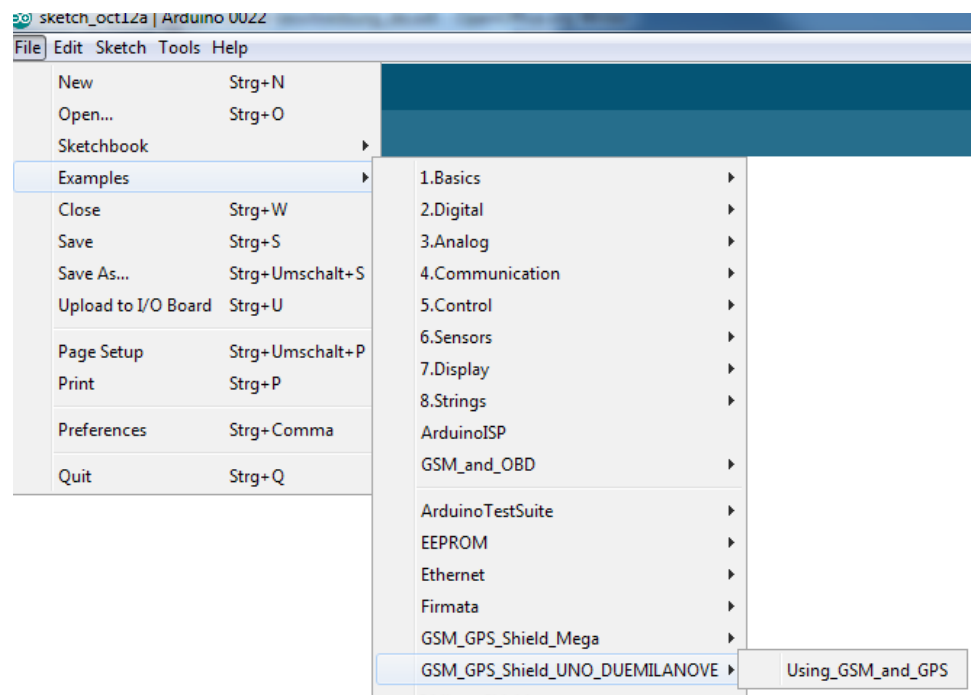
- connect the *Arduino* board with the already plugged **GSM-easy! - Shield** to the PC via USB interface

- please have the drivers installed already

- open the *Arduino* development environment
  - see: file → "Examples"
  - GSM-easy!
  - Example program

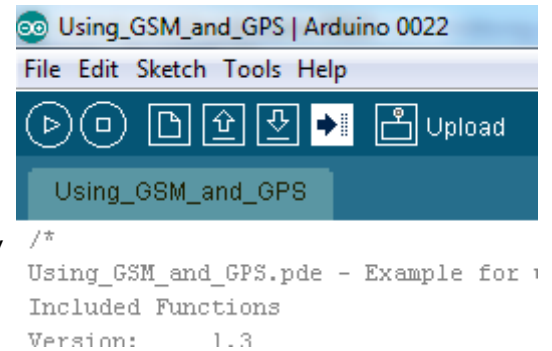
- since the *Arduino* board (despite USB connection) is shown as serial device to the PC, please choose
  - Tools → Serial Portas used interface

- Changes to the example software needed:
  - SIM-Pin (if available)
  - target telephone number





- use the upload button (highlighted in white in this picture) to directly upload the the modified program to the *Arduino* board
- after the message "done" is shown at the lower end of the window the transfer has been completed successfully
- the program is automatically started



**NOTE:** The USB connection shall now be disconnected and a power supply can be plugged instead.



## Example programs

The following [example programs](#) are available via download:

- |                               |  |
|-------------------------------|--|
| <b>GSM_easy_dialvoicecall</b> | <ul style="list-style-type: none"><li>• log in to the GSM network</li><li>• set up voice call</li><li>• send DTMF-tones, as soon as the remote station has answered the call</li></ul>                                   |
| <b>GSM_easy_recvvoicecall</b> | <ul style="list-style-type: none"><li>• log in to the GSM network</li><li>• wait for an incoming voice call</li><li>• pick up incoming voice call</li><li>• respond with a DTMF tone</li><li>• end voice call</li></ul>  |
| <b>GSM_easy_sendSMS</b>       | <ul style="list-style-type: none"><li>• log in to the GSM network</li><li>• send an SMS to a telephone number</li></ul>  |
| <b>GSM_easy_recvSMS</b>       | <ul style="list-style-type: none"><li>• log in to the GSM network</li><li>• determine number of existing/stored SMS</li><li>• read out latest SMS</li><li>• delete all SMS</li></ul>                                     |
| <b>GSM_easy_sendmail</b>      | <ul style="list-style-type: none"><li>• log in to the GSM / GPRS network</li><li>• set/configure all information to the SMTP server</li><li>• set/configure all required e-mail information</li><li>• send e-m</li></ul> |
| <b>GSM_easy_ping</b>          | <ul style="list-style-type: none"><li>• log in to the GSM / GPRS network</li><li>• send a PING to a server / an IP address</li></ul>   |
| <b>GSM_easy_httpget</b>       | <ul style="list-style-type: none"><li>• log in to the GSM / GPRS network</li><li>• send a HTTP-GET to a specified server (for testing we recommend the antrax - see below)</li></ul>                                     |



## **GSM\_easy\_ftp**

- log in to the GSM / GPRS network
- load a FTP test file from a specified server (for testing we recommend the antrax - see below)

## **GSM\_easy\_status**

- display all current states
- GSM logged in?
- GPRS logged in?
- current signal field strength
- number of the used base station
- network used
- number of stored SMS

Please visit our [website](#) for further examples



## LEDs

There are two LEDs on the **GSM-easy! - Shield** :

### LED\_POWER

permanently OFF	<b>GSM-easy! - Shield</b> currentless or deactivated
permanently ON	<b>GSM-easy! - Shield</b> switched on

### NETLIGHT (see also "[M95\\_HardwareDesign\\_V1.2.pdf](#)", page 56)

permanently OFF	wireless module inactive
64 ms ON / 800 ms OFF	wireless module not yet logged in
64 ms ON / 2000 ms OFF	wireless module is logged in
64 ms ON / 600 ms OFF	GPRS data transfer in process



## Signals between Arduino and Mainboard

For operating the **GSM-easy! - Shield** a total of 5 single signals plus power supply are required:

Connector J1	Signal
1	serial interface, direction <b>GSM-easy! - Shield</b> ---> <b>Arduino</b> (default)
2	serial interface, direction <b>Arduino</b> ---> <b>GSM-easy! - Shield</b> (default)
3	alternatively for Pin 1 when using a software interface
4	alternatively for Pin 2 when using a software interface
5	PWRKEY (default)
6	EMERG (default)
7	GSM_ON (default)
8	

Connector J2	Signal
1	
2	
3	
4	
5	
6	

Connector J3	Signal
1	alternatively for signal PWRKEY
2	alternatively for signal EMERG
3	alternatively for signal GSM_ON
4	
5	
6	
7	
8	

Power	Signal
1	
2	
3	+5V
4	GND
5	GND
6	Vin



## **Schematics / Layouts**

Please find the [schematics](#) und PCB layouts of the module on our website.