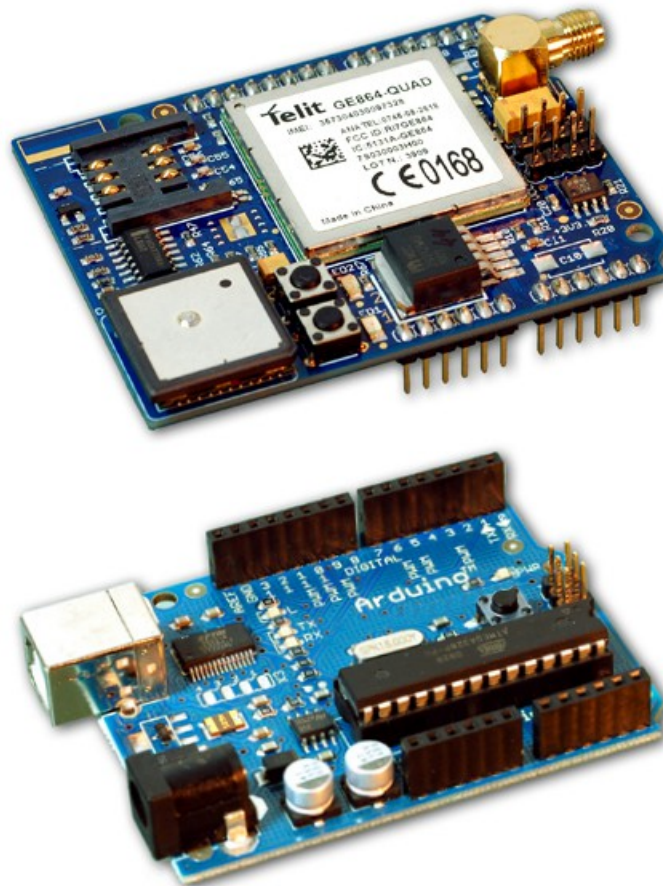




GSM/GPRS/GPS-Shield for *Arduino* (Rev. 7)

Arduino-Board Duemilanove (Atmega328)

Arduino-Board UNO (Atmega328)

Arduino-Board Mega2560 (Atmega2560)

Manual

24.01.2013



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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 by 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 our the **GSM/GPRS/GPS-Shield**, it is possible to use GSM (mobile phone) and GPS (navigation). With this for example, the current position can be determined by GPS and sent by short message service. Alarms can be sent and travelling routes can be tracked. The *Arduino* board in combination with the *GSM/GPRS/GPS-Shield* is used individually and can be customized to your needs. The *Arduino* board communicates with the **GSM/GPRS/GPS-Shield** over a serial interface and SPI.

Please read this manual completely and carefully before initial use. It describes correct use and includes important instructions for the installation of the **GSM/GPRS/GPS-Shields** 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/GPRS/GPS-Shield** unit contains:

- the **GSM/GPRS/GPS-Shield**
- this manual
- 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/GPRS/GPS-Shield**
- Example program for usage of the GSM and GPS module
- Design and schematic of the *Arduino* board and **GSM/GPRS/GPS-Shield**

NOTE: The link to the *Arduino* development (incl. Driver) is available here: [Links](#)

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: Telit GE865-QUAD
- 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 level)

GPS

- integrated GPS module (with integrated antenna): Fastrax UP501
- internal supply: 3,3V
- control via SPI



Voltage modes

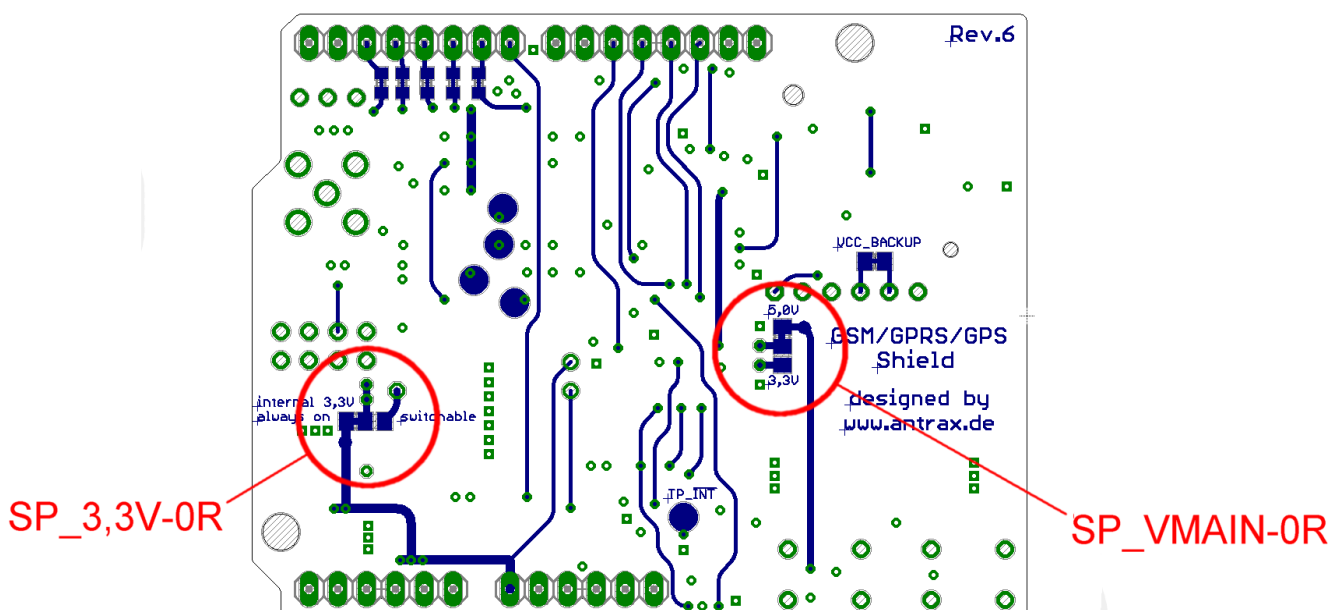
The **GSM/GPRS/GPS-Shield** can be operated in 3,3V or 5V mode. In doing so all voltage levels on the Shield are adjusted to the currently set voltage. The required mode can be set via a solder bridge on the **GSM/GPRS/GPS-Shield** (default: 5V). Thus, the **GSM/GPRS/GPS-Shield** is compatible with all Arduino-Boards (5V), but also with the so called "Arduino-Clones" with supply voltage of 3.3V, for example: Netduino, chipKIT, Amicus, Vinculo etc.

The requested voltage mode can be set via the solder bridge SP_VMAIN-0R (see figure below) on the GSM/GPRS/GPS-Shield. The default setting is 5V. If you want to change this setting, the existing 5V track bridge SP_VMAIN-0R needs to be separated and replaced by a small solder point from the center pad to the 3,3V pad.

Power modes

The **GSM/GPRS/GPS-Shield** offers two power modes:

- *Power modu 1:* Via pin "SHIELD_PWR_ON" (connector J1/pin 8) the wireless module can be switched ON/OFF. The GPS module is switched ON permanently.
- *Power modu 2:* Via pin "SHIELD_PWR_ON" (connector J1/pin 8) the complete Shield (wireless module, GPS) can be switched ON/OFF.





Stackability (simultaneous use of multiple Shields)

The **GSM/GPRS/GPS-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.

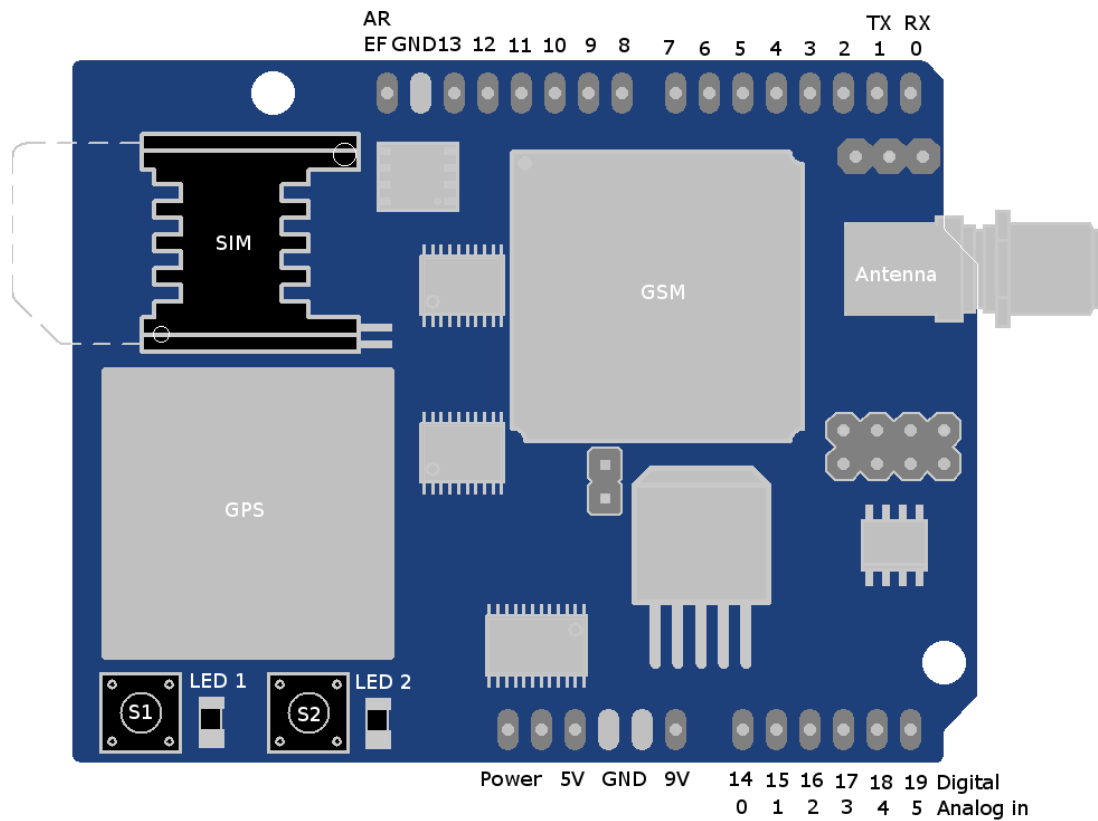
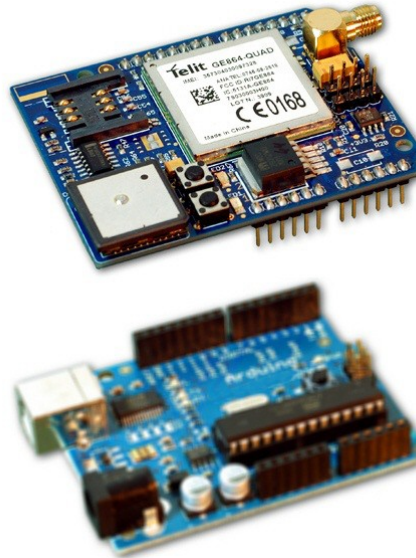
antrax-Shields with stackability technology:

- GSM/GPRS/GPS-Shield
- Iridium Shield
- OBD2 Shield



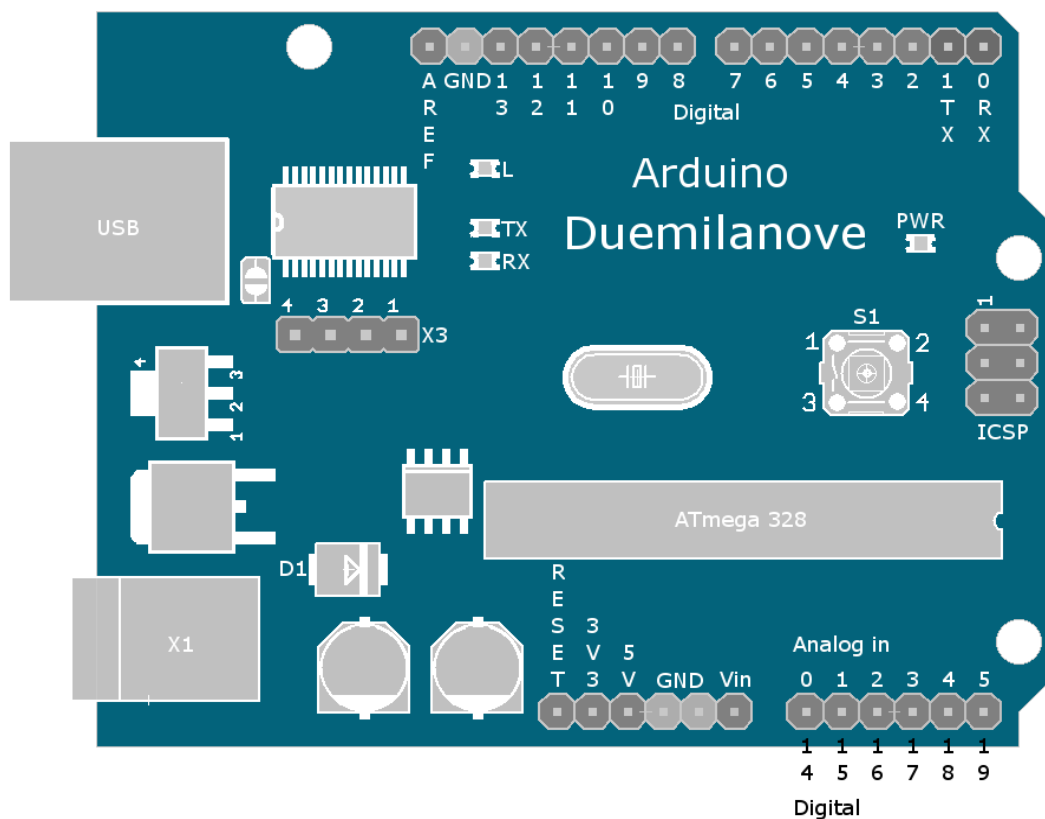
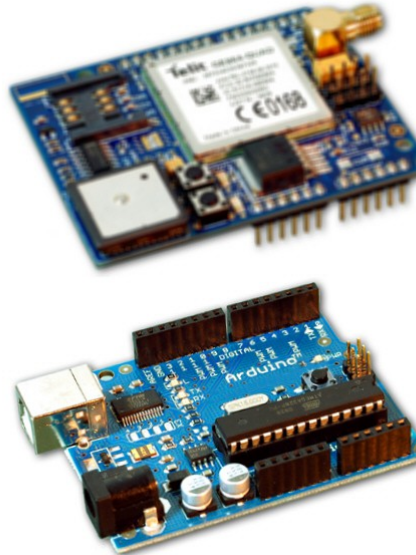
Board overview

GSM/GPRS/GPS-Shield



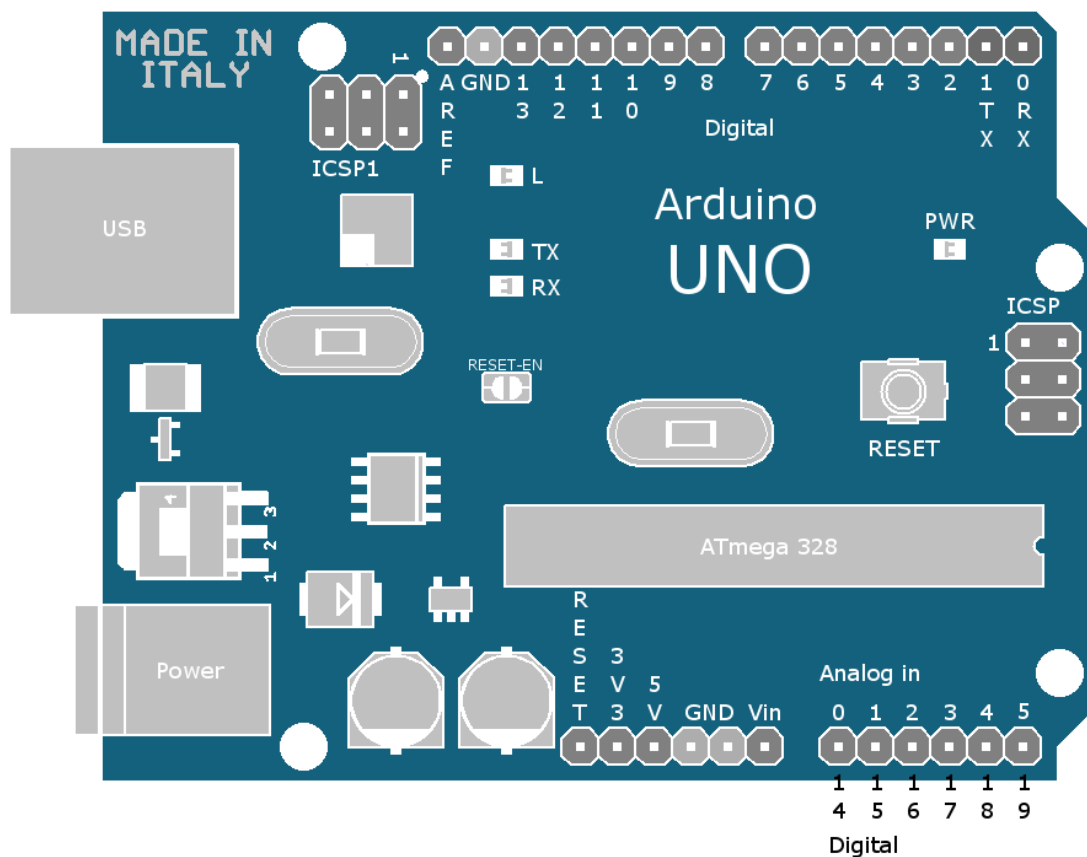
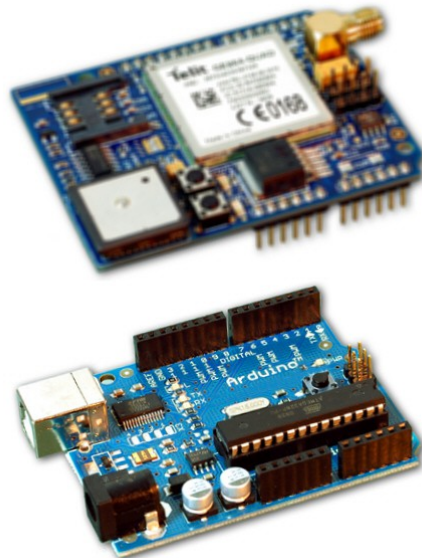


Arduino-Board Duemilanove (Atmega328)



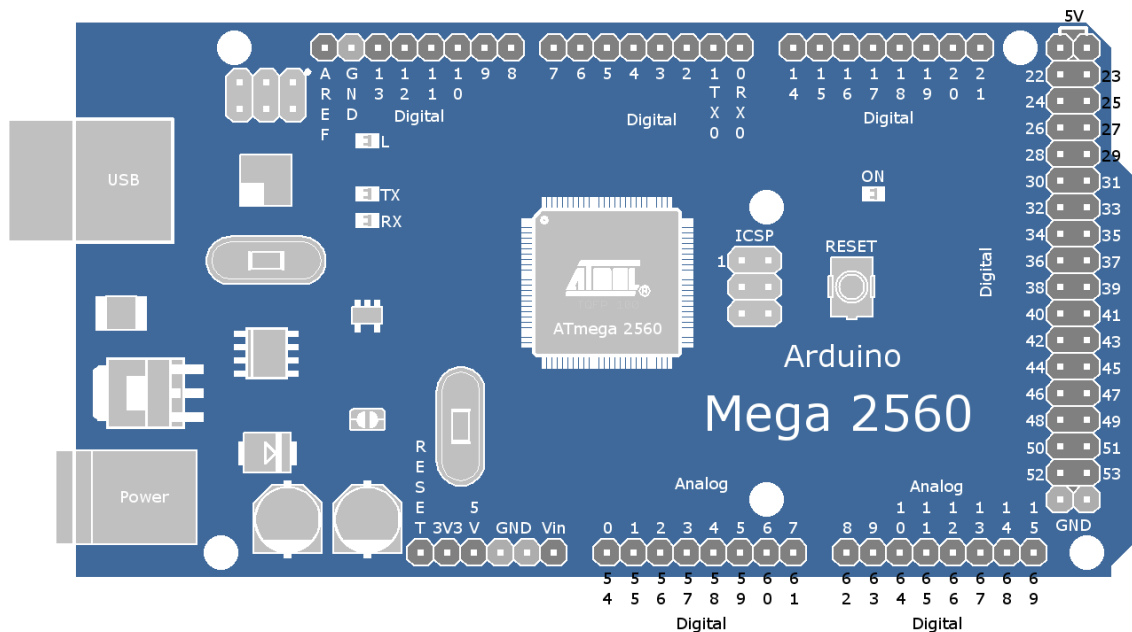
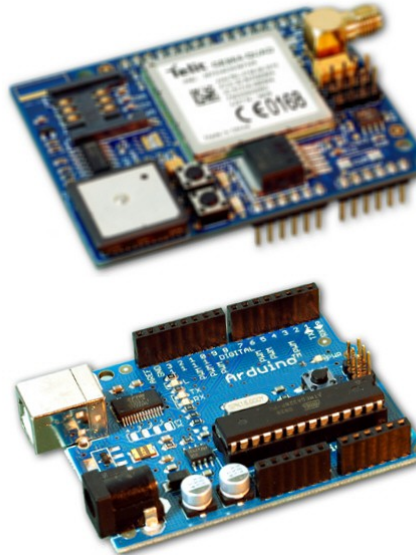


Arduino-Board UNO (Atmega328)





Arduino-Board Mega2560 (Atmega2560)



To provide the whole range of functionalities of the **GSM/GPRS/GPS-Shield** combined with the Arduino Mega2560, it is necessary to perform a few modifications. The manual for the rework instructions is available at: http://www.antrax.de/downloads/arduino-gsm-gprs-gps-shield-mega2560-rework_en.pdf



Installation

Hardware

- Place SIM card in the SIM card holder on the **GSM/GPRS/GPS-Shield**
- Connect mobile radio antenna
- Plug the **GSM/GPRS/GPS-Shield** on the *Arduino* board. Since the GPS patch antenna would 'look up in the sky', the **GSM/GPRS/GPS-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 Telit GE864 GSM 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 (due to voltage drops when sparking).

CAUTION: Before inserting/removing the SIM card please switch off (de-energise) the **GSM/GPRS/GPS-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 the drivers needed to the *Arduino* board from the directory of the *Arduino* development environment.

Operation

Various inputs can be set via the available push buttons S1 and S2.



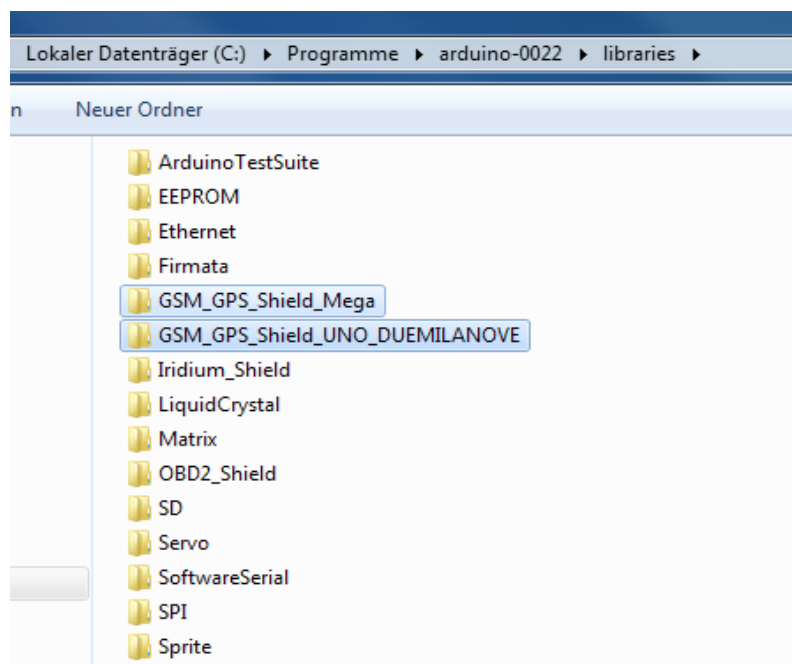
Inbetriebnahme

Library

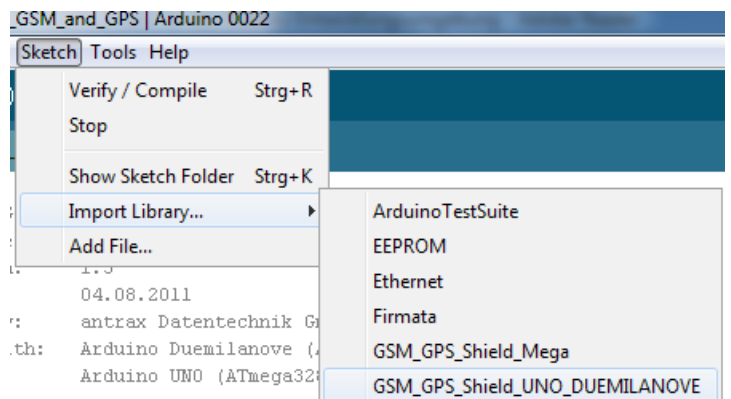
To make working with the **GSM/GPRS/GPS-Shield** as simple as possible, a library was developed for this shield.

Please find the URL for the download here: [Links](#)

Please unzip the zip file after downloading the content and then copy into the libraries folder that is located in the Arduino development directory (e.g. "C:\Programme\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.



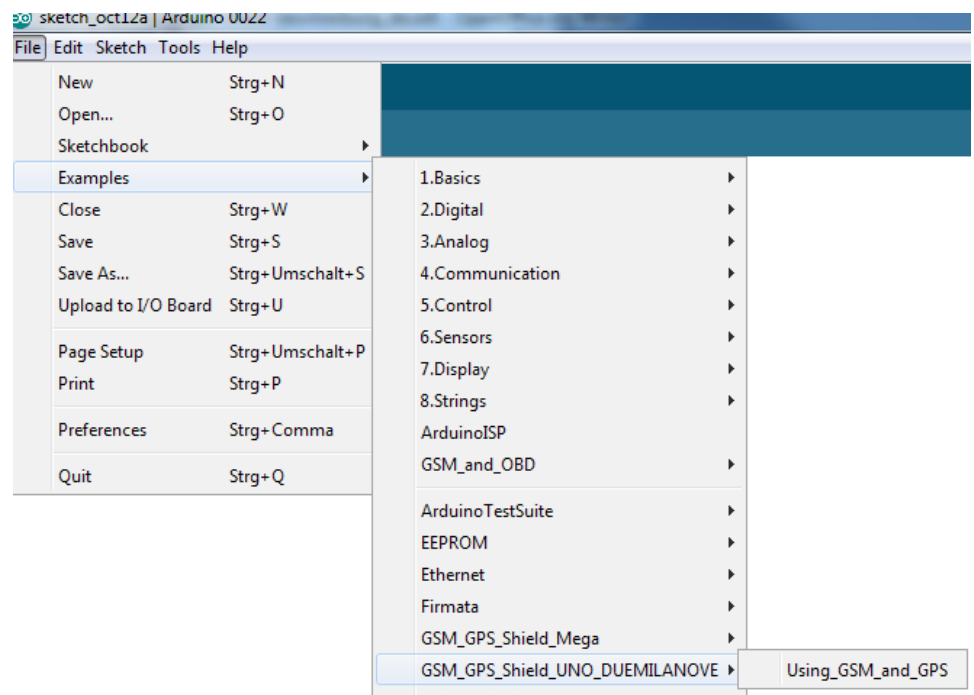


Programming the *Arduino*-Board

The **GSM/GPRS/GPS-Shield** is always addressed and controlled by the software used on the *Arduino* board. An example program is supplied. It is very easy to transfer a software to the *Arduino* board with the *Arduino* development environment. The required steps are described as follows:

- connect the *Arduino* board with the already plugged **GSM/GPRS/GPS-Shield** to the PC via USB interface
- please have the drivers installed already

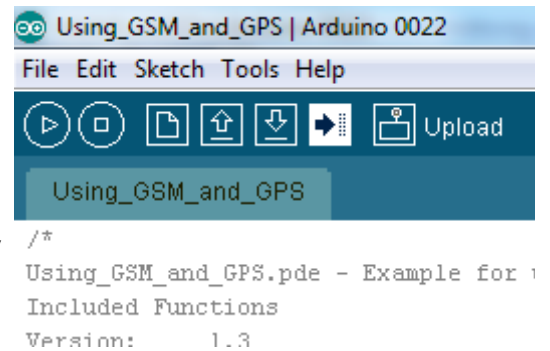
- open the *Arduino* development environment
 - see: File → Examples
 - GSM_GPS_Shield
 - Examples
- since the *Arduino* board (despite USB connection) is shown as serial device to the PC, please choose
 - Tools → Serial Portas used interface



- 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 program

The example program shows the use of the individual functions of the library. After initialisation the example program permanently tracks the current GPS data. LED1 indicates if valid coordinates are received (the GPS receiver shall need several minutes after Power-ON to do so).

By pressing push button **S1** a test call is set-up to the phone number specified in the example program. The GSM module is turned ON (connector J1/pin 8) and initialised. Then the phone number will be dialed and automatic hang-up after 10 seconds of calling time is processed.

By pressing push button **S2** the GSM module (connector J1/pin 8) is also switched ON (if not done already) and initialised. The current GPS coordinates are setn via SMS to the number specified in the example program. A SMS sent from the **GSM/GPRS/GPS-Shield** includes following information:

GSM/GPRS/GPS-Shield	
---GPS---	
52 06.4379N, 08 39.8609E	latitude, longitude of the current position

LED1

Permanently OFF	GPS coordinates are being sent
1 x short (approx. 500ms) with 1 Hz repetition rate	Valid GPS coordinates received
2 x short light (approx. 20ms) with 2 Hz repetition rate	Valid GPS coordinates not yet received

LED2

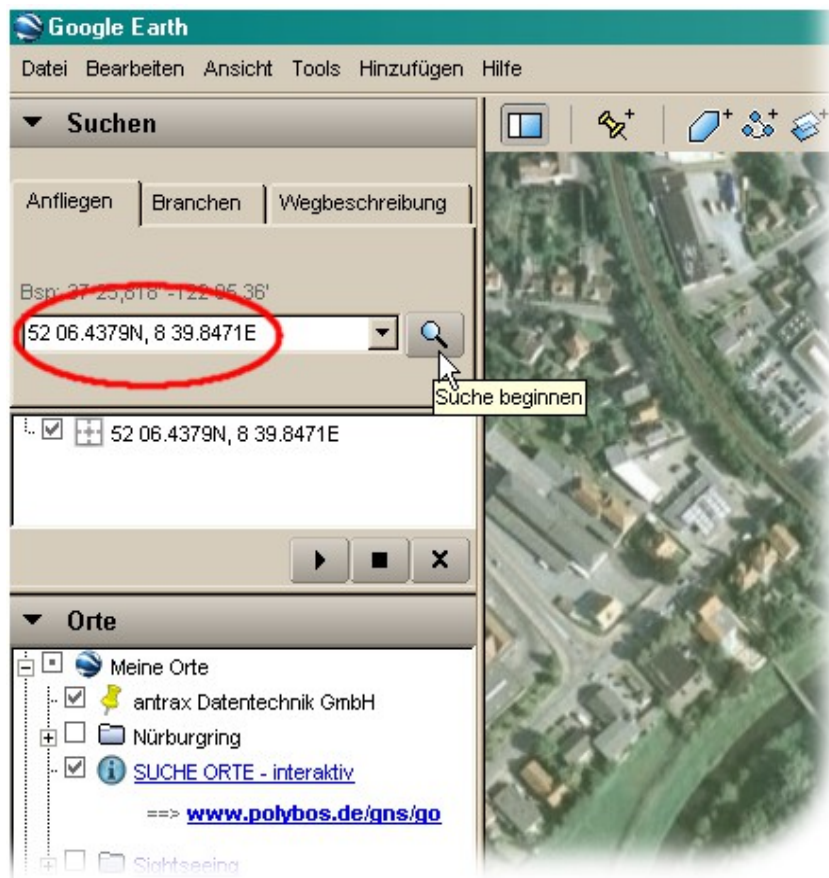
Permanently ON	Sending a SMS Call is in progress
1 x short light with 0,5 Hz repetition rate	GSM module booked in
1 x short light with 2 Hz repetition rate	GSM module not booked in



Google Maps/Earth

The longitude and latitude values can be inserted into "Google Earth" or "Google Maps" without any conversion..

Example for the input of the coordinates "52 06.4379N, 008 39.8609E" (= 52°... north latitude and 8°... eastern longitude) in "Google Earth":



IMPORTANT: When submitting the angles into "Google Earth" and "Google Maps" please separate these characters with a blank (in this case 52 and 8). In addition, longitude and latitude are separated by a comma.



Links

Please find more useful information:

at our website → <http://www.antrax.de>

Example program → <http://www.antrax.de/de/support?coID=17#arduino>

Arduino development environment → <http://arduino.cc/en/Main/Software>

Wireless module Telit GE865 → <http://www.telit.com/>

Atmega328 → http://www.atmel.com/dyn/products/product_card.asp?PN=ATmega328P

GPS module Fastrax UP501 → <http://www.fastraxgps.com>



Schematics / Layouts

Please find the schematics and PCB layouts of the modules on our website by using the following link:

http://www.antrax.de/site/Onlineshop/Downloads:::370_435.html?language=en#arduino