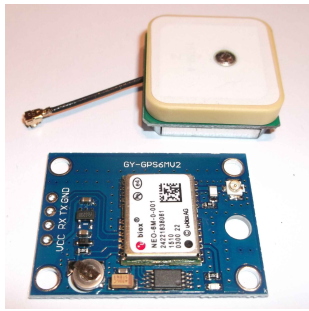


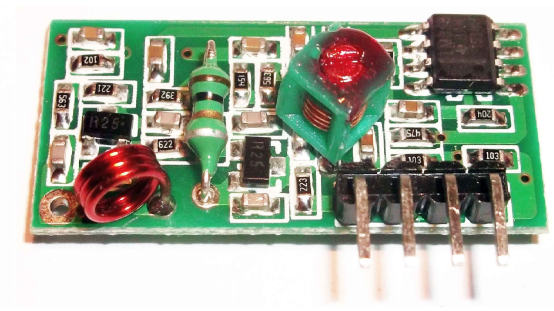
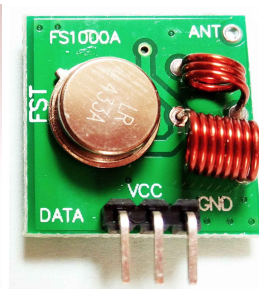
Remote sensor unit (alias GPS beacon)



- is intended for outdoor mounting
- is part of the WSPR-beacon project but can also be used by other devices
- comprises a NEO-6M GPS unit, a 18B20 temperature sensor, an Arduino NANO and a 433MHz ISM-band transmitter unit.
- can be equipped with other communication modules instead of the radio transmitter (e.g. optical, wired, ...)
- generates a Manchester coded (hence DC-free) output
- consumes about 100mA; power supply can be designed in different ways (the one depicted here employs a 9V switching-type wall power supply as well as a line regulator to get down to 5V)
- cyclically broadcasts position, speed over ground, altitude, temperature, Sun's and Moon's current altitude/azimuth, time of Sunrise & -set as well as Moonrise & -set, the Moon's current phase
- datastream includes CRC8-checking to prevent erroneous transmission.
- transmission consists of 2 datasets, sent at a 19s interval. Status LED will flash 1x during transmission of set 1 and 2x for set 2. High frequency blinking indicates faulty data / GPS not locked (no transmission will take place)



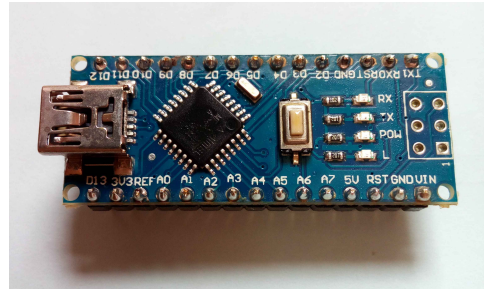
GPS-module



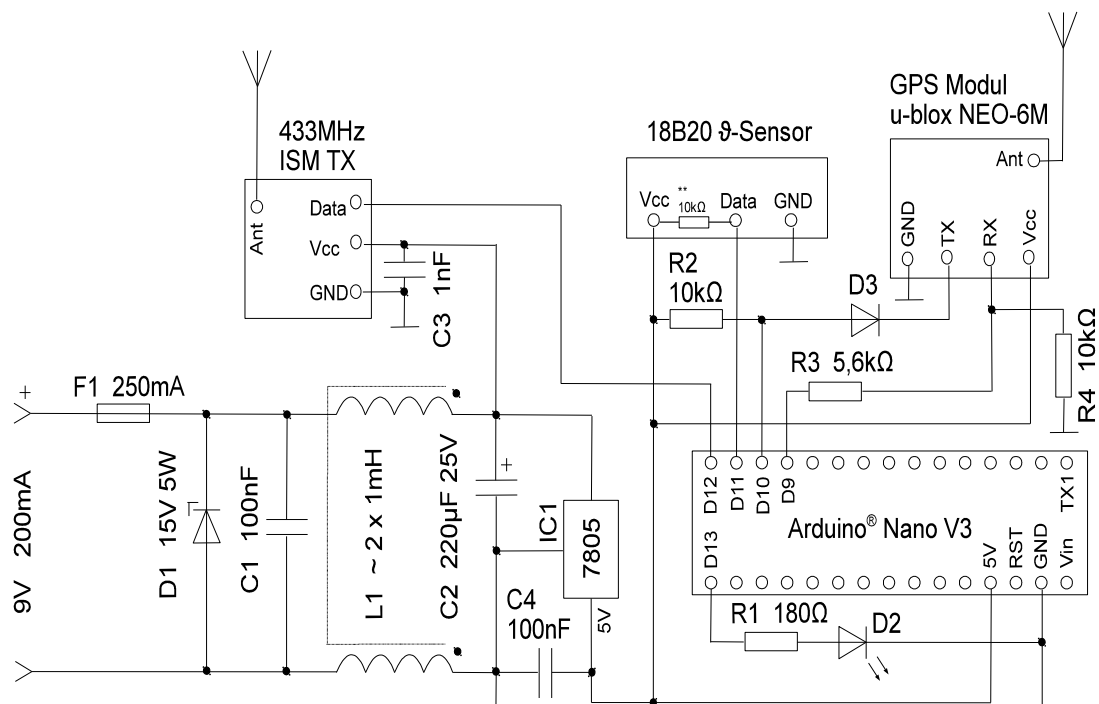
433MHz ISM transmitter (left) and receiver (right)



18B20 temp. Sensor



Arduino Nano clone



schematic of remote sensor unit (D3, R2, R3, R4 are for conversion from 5 to 3.3V; 18B20 requires 4.7...10k from Vcc to data / some modules already have that one onboard, some don't)

To check if the remote sensor unit is functioning properly,

- hook-up an 433MHz ISM-receiver unit to Pin 2 of an Arduino Uno or Nano (can be the one inside your WSPR-beacon if you've already built one)
- load the Arduino with the sketch „**GPS_beacon_receiver_demo.ino**“
- keep the Arduino connected to the PC and open the terminal program (Tools -> Serial Monitor) at 9600 Baud.
- once the sensor unit has started transmitting, you should see a messages similar to the one below on your PC's screen

Received dataset with ID 0:
Latitude: 51 deg 4 min 12 sec N
Longitude: 13 deg 39 min 46 sec E
Altitude: 150 meter
Speed over ground: 0 km/h
Number of satellites in use: 10
Maidenhead locator: JO61TB
Temperature: 18.7 °C
UTC: 9:24:44
Date: 9/14/2017

Received dataset with ID 1:
Speed over ground: 0 km/h
Sunrise: 9/14 4:39 UTC
Sunset: 9/14 17:21 UTC
Moonrise: 9/13 21:50 UTC
Moonset: 9/14 13:52 UTC
Sun's position at 9/14 9:25:0 UTC
Azimuth in degree (N=0, E=90, S=180, W=270): 149.0
Altitude in degree: 38.1
Moon's position at 9/14 9:25:0 UTC
Azimuth in degree (N=0, E=90, S=180, W=270): 251.4
Altitude in degree: 38.1
The Moon's phase is 37.2% decreasing.

The Nano has plenty of ports and memory yet unutilized. So if you'd like to re-program the unit or add some functions, feel free to do so. All underlying libraries are available at my homepage (follow the „Arduino“ link).

Good luck!

DL1DUZ