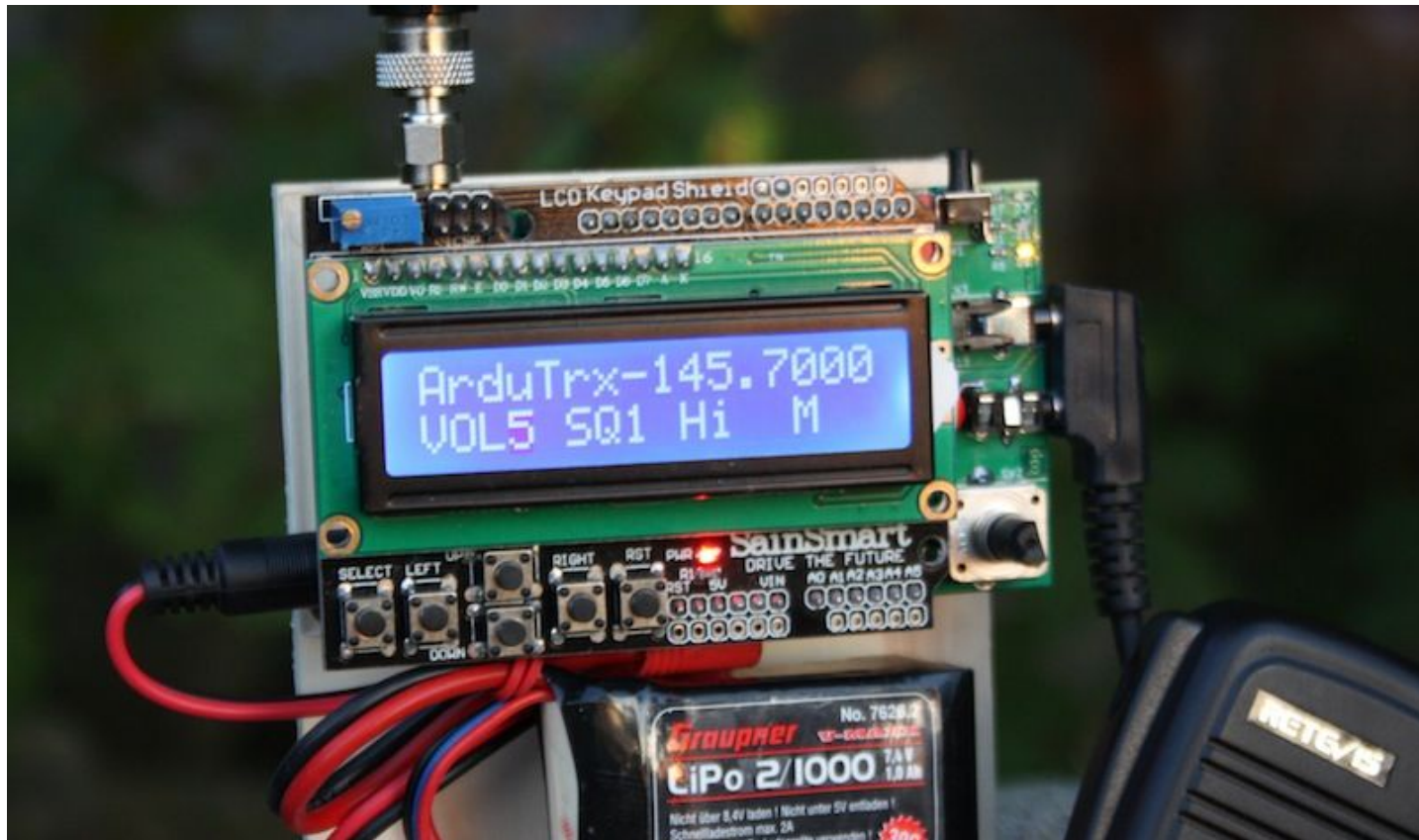


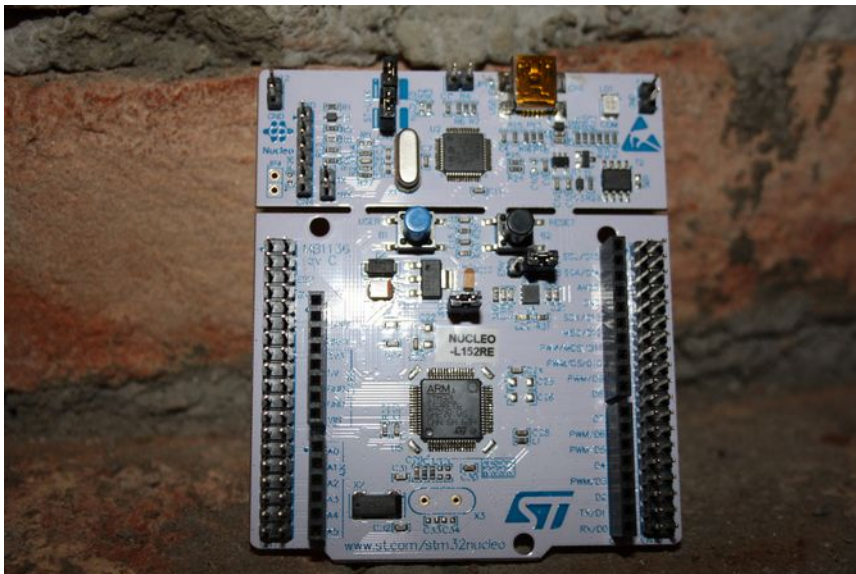
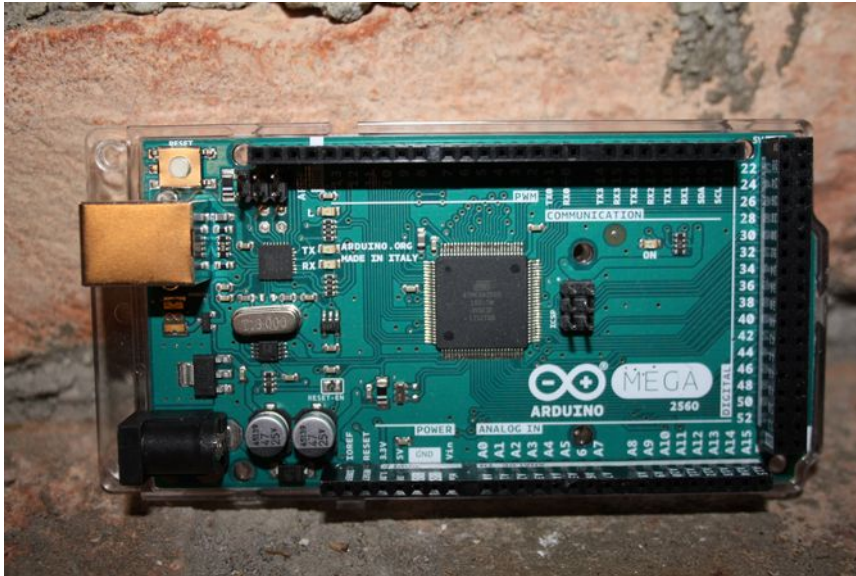
# ArduTRX



## Open Source Transceiver

Bernhard Mayer, DL1MAB, [bernhard@generationmake.de](mailto:bernhard@generationmake.de), Make Munich 2019

# Arduino



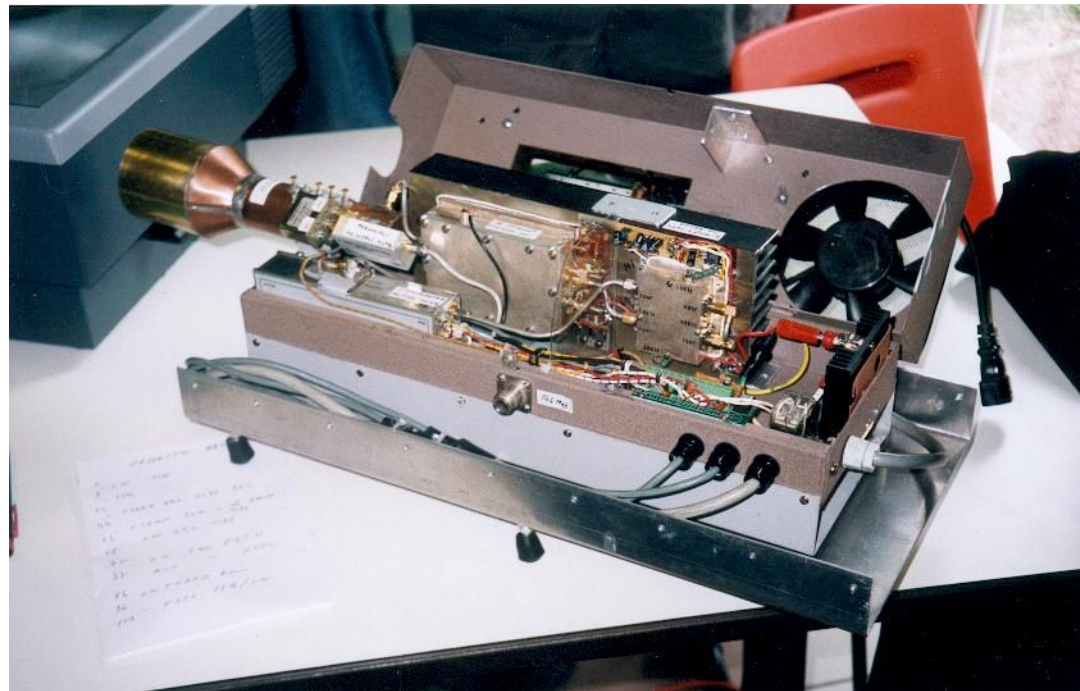
```
ardutr | Arduino 1.8.6
File Edit Sketch Tools Help
ardutr
/* software for arduino shield ArduTrx with Dorji or NiceRF HF modules
 * http://ardutr.generationmake.de
 * bernhard@generationmake.de
 *
 * supported HF modules:
 * - NiceRF S818-V (134 - 174 MHz) http://www.nicerf.com/product/151_104.html
 * - NiceRF S818-U (400 - 480 MHz) http://www.nicerf.com/product/151_104.html
 * - Dorji DRA818V (134 - 174 MHz) http://www.dorji.com/docs/data/DRA818V.pdf
 * - Dorji DRA818U (400 - 470 MHz) http://www.dorji.com/docs/data/DRA818U.pdf
 *
 * Version 0.1 - 16.05.2016 - initial version
 * Version 0.2 - 19.05.2016 - corrected frequency string to DRA818
 *                          - set PD, H/L and PTT to defined levels
 *                          - added 1750 Hz tone
 *                          - added rx/tx split from 145.600 to 145.800
 * Version 0.3 - 25.03.2018 - corrected 1750 Hz tone: now it stops after releasing the
 *                          - added boot up message with version
 *                          - added callsign
 *                          - updated menu and selection of options
 *                          - added software switch to change power level
 *                          - display rx/squelch in display (* at last position)
 * Version 0.4 - 27.03.2018 - added power level switch - by Mathias Metzner DH7AHO
 *                          - added defines for input and output pins
 * Version 0.5 - 04.04.2018 - added functions to store data in eeprom
 *                          - simplified encoder switch functions
 *                          - pullups on encoder inputs
 *                          - restore factory settings when encoder pressed during start
 * Version 0.6 - 06.04.2018 - added simple menu
 *                          - menu option for factory setting
 *                          - filter can be set
 *                          - added strings for ctcss and on/off
 * Version 0.7 - 25.04.2018 - scan frequencies
 *                          - defines for tune and split limit
 * Version 0.8 - 27.04.2018 - check communication with dra818 with handshake command
 *                          - now compatible with Arduino Leonardo
 *                          - changed encoder from pin change interrupt to timer interrupt
 * Version 0.9 - 13.08.2018 - support for DRA818U
 *                          - changed type of frequency variable to unsigned to have enough
 *                          - support for NiceRF S818 HF modules
 *                          - S818 function: display version of module
 *                          - S818 function: display RSSI in menu and on main screen
 * Version 0.11 - 24.11.2018 - S818 function: configure tail tone
 *                          - measure input voltage
 *                          - shutdown at undervoltage
 * Version 0.12 - 27.12.2018 - internal update: receive all bytes from HF module
 *
 * #define MY_CALLSIGN "ArduTrx" // callsign here will display on line 1
 */

lib(1), 512K (no SPIFFS), 2, v2 Lower Memory, Disabled, None, Only Sketch, 115200 on /dev/ttyUSB0
```



# Amateurfunk-Selbstbau

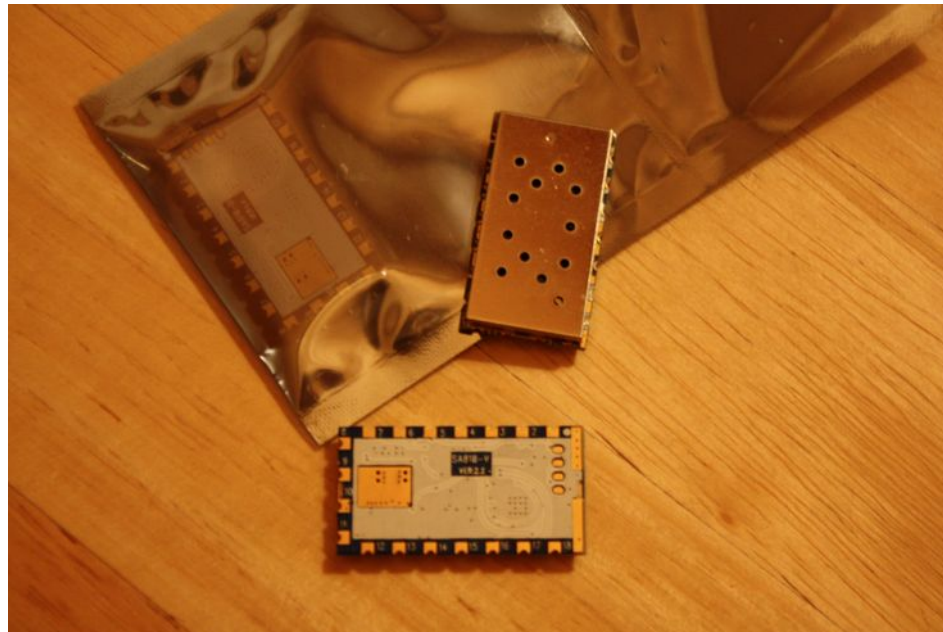
- früher sehr schwierig
- wenig Funktionen
- komplex
- fehlerträchtig
- langwierig
- teuer



© Cabellic in der Wikipedia auf Französisch [Public domain]

# HF Module

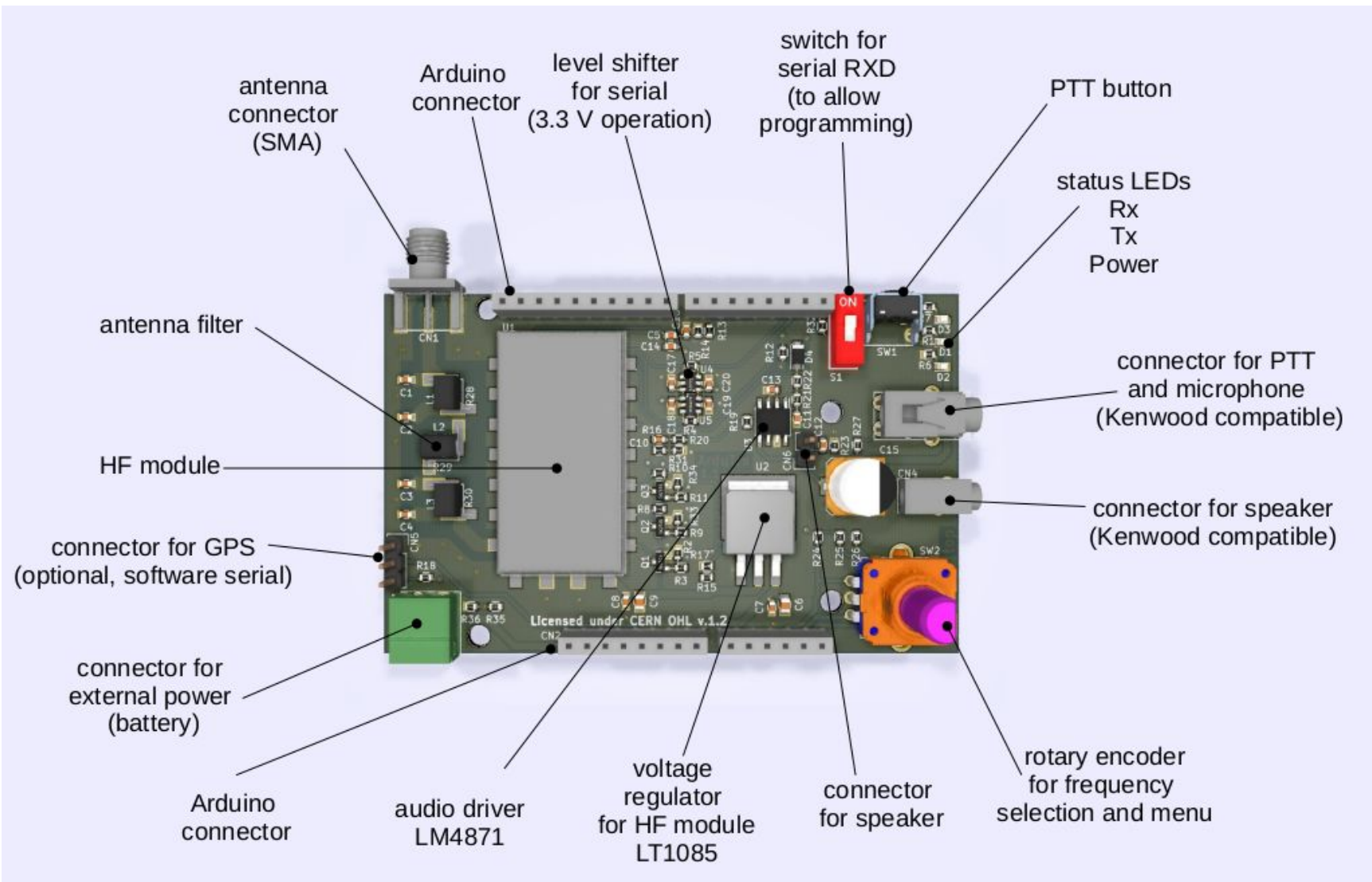
- seit einigen Jahren günstige HF-Module verfügbar
- Hersteller unter anderem Nice RF und Dorji
- komplettes Funkgerät in einem Modul



# Leistungsdaten HF Modul

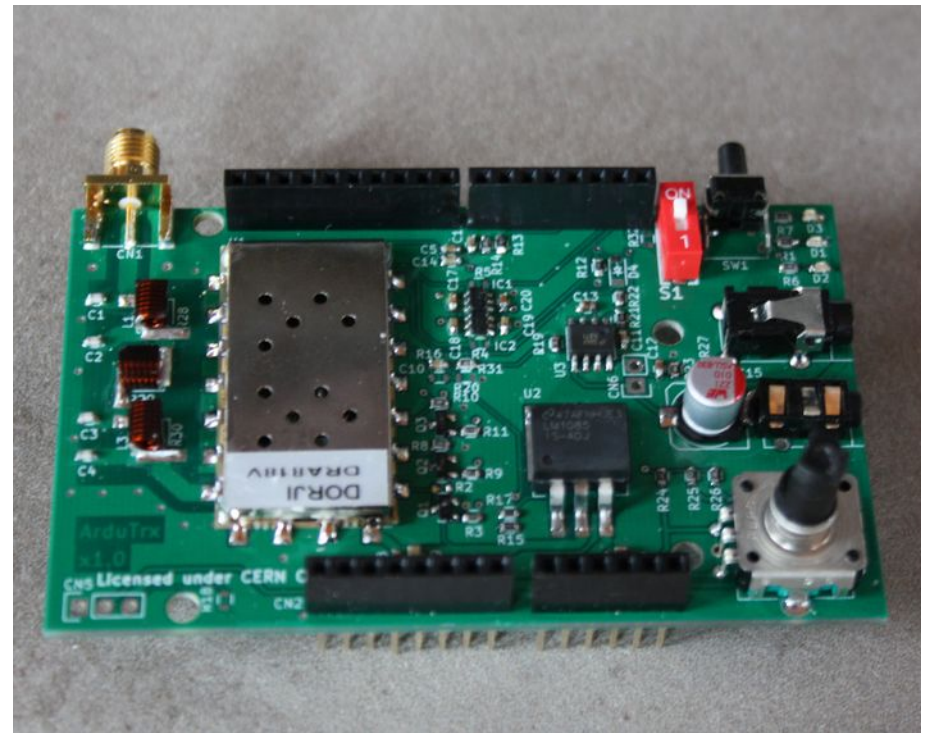
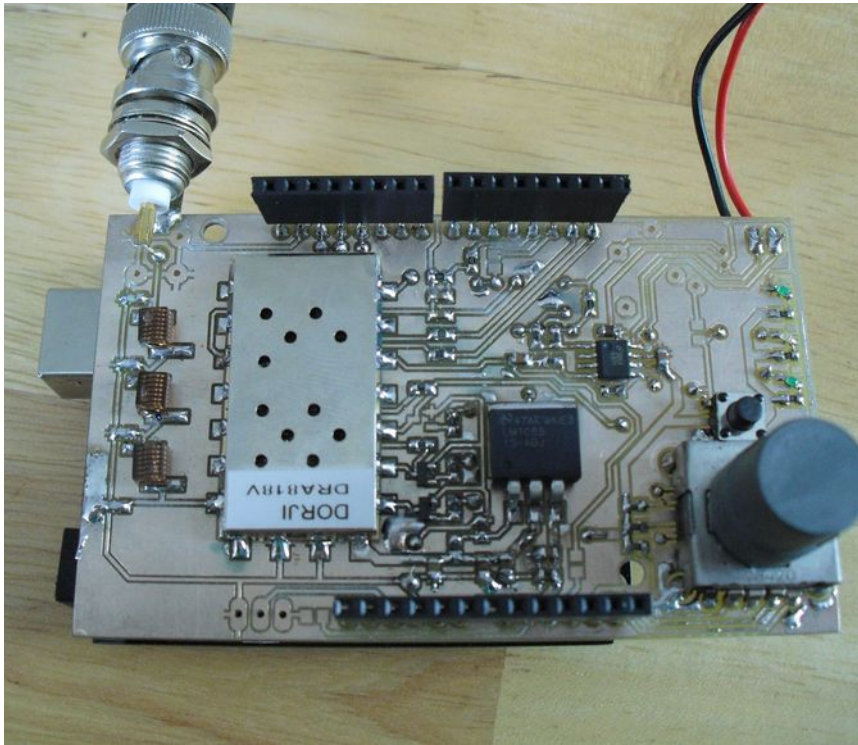
- 2m (144 MHz) oder 70cm (430 MHz)
- 1W oder 2W Sendeleistung
- NBFM-Modulator und -Demodulator
- Audio-Teil, direkter Anschluss von Mikrofon und Kopfhörer bzw. Lautsprecherverstärker
- bereits diverse Projekte damit im Internet und Zeitschriften
- leider zu hohe Nebenaussendungen und deshalb Einsatz eines Filters nötig

# ArduTrx



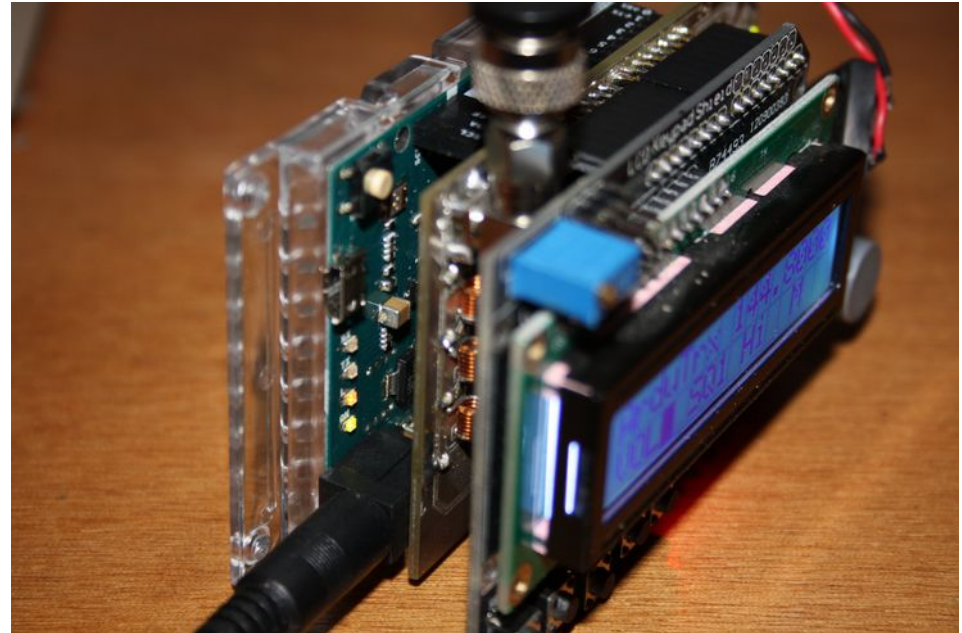


# ArduTrx



# Arduino-Kompatibilität

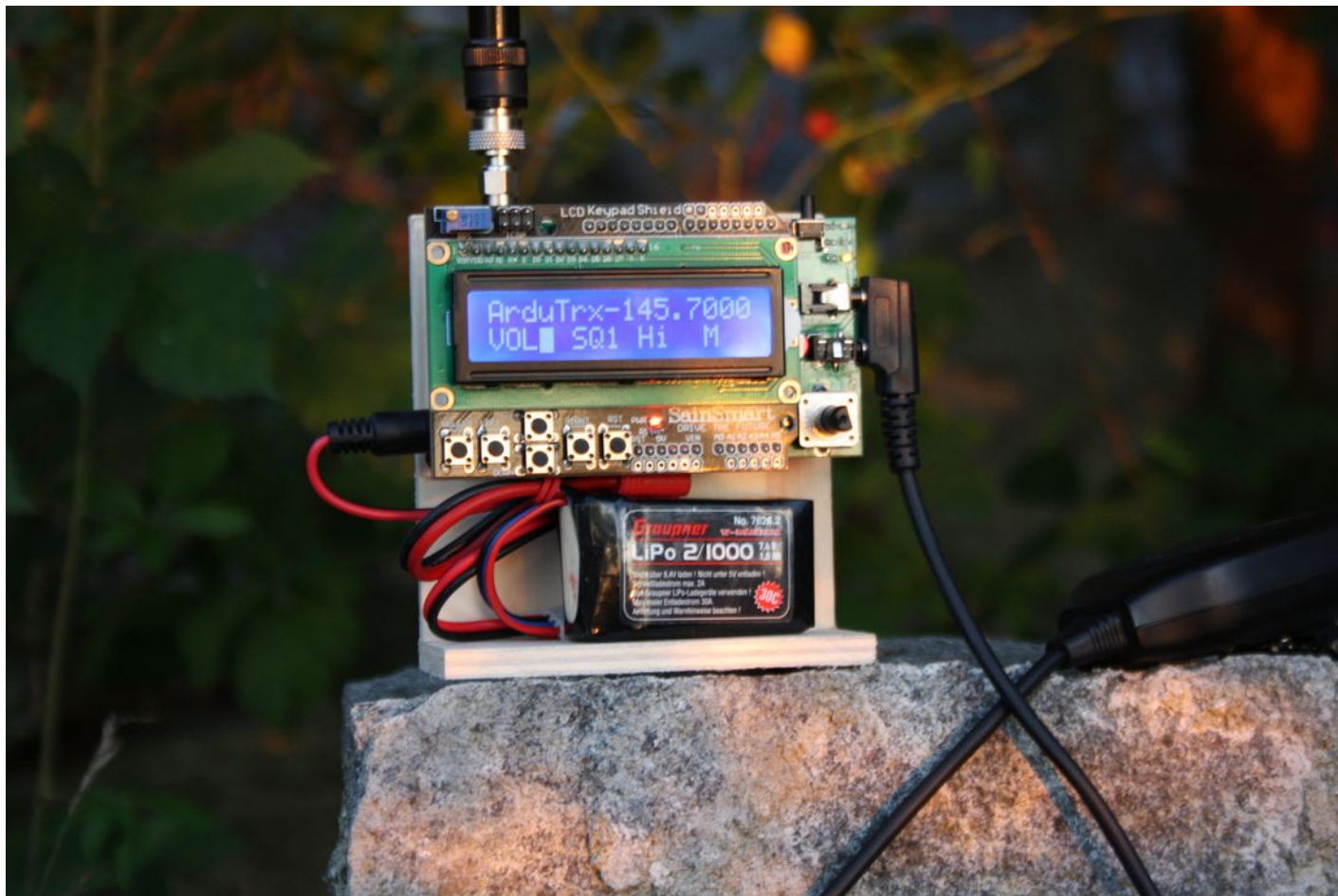
- 5V-Arduinos:
  - Arduino Uno
  - Arduino Mega
  - Arduino Leonardo
- 3,3V-Arduinos:
  - Arduino Due
  - ST Nucleo
  - ESP32
- und weitere





# komplettes Funkgerät

- mit Arduino Leonardo und HMI-Keypad-Shield



# Funktionen

- Frequenzwahl mit Drehencoder
- Display mit Menu
- CTCSS
- 1750 Hz-Ton
- Sendersuchlauf
- Speichern der Einstellungen

# alternative Konfiguration

- ESP32 und Grafik-LCD





# weitere Möglichkeiten

- Frequenzüberwachung
- Bakensender
- Fuchsjagdsender
- POCSAG-Receiver (Pager, DAPNET)
- APRS-Tracker
- TNC für Packet Radio

# Open-Source

- Hardware

- mit KiCAD erzeugt
- unter Cern OHL v1.2 lizenziert
- <http://ardutrx.generationmake.de/>

- Software

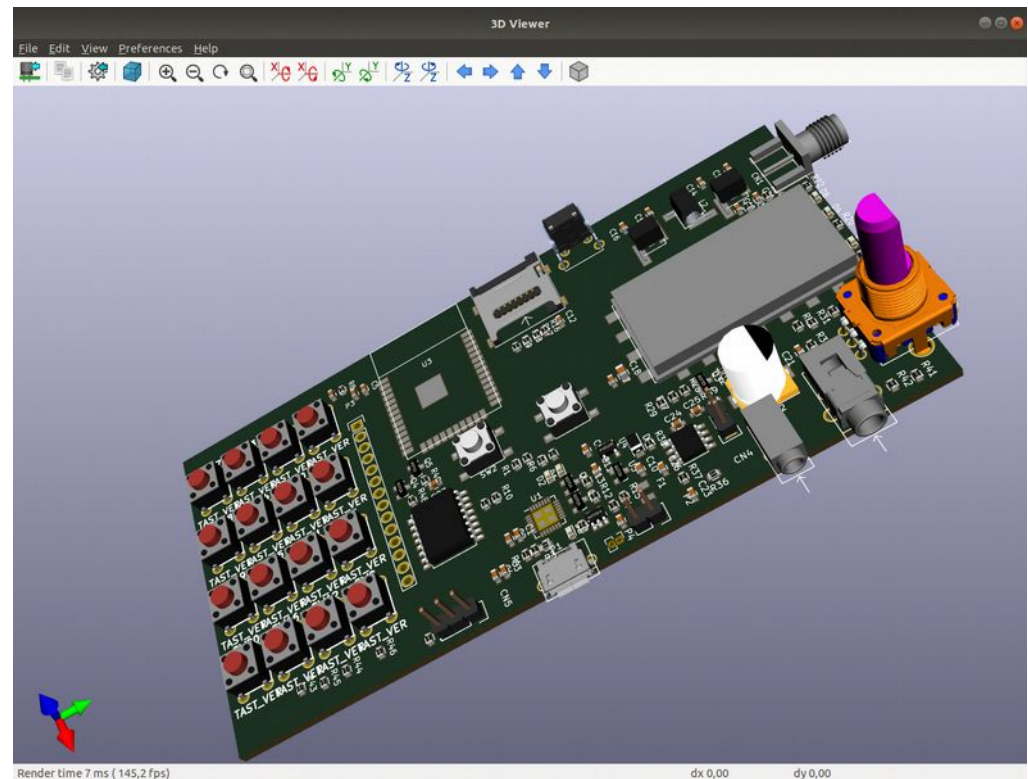
- mit Arduino erzeugt
- Lizenz GPL
- <https://github.com/generationmake/ArduTrx>

The image shows a 3D rendering of a custom printed circuit board (PCB) within a software application titled "3D Viewer". The PCB is green and populated with various electronic components. On the left side, there is a 4x4 grid of red push-buttons, each labeled "TAST\_VERAST\_VERAST\_VER". Other components include a large black integrated circuit (U1), several smaller chips (U2, U3, U4, U5, U6, U7, U8, U9, U10, U11, U12, U13, U14, U15, U16, U17, U18, U19, U20, U21, U22, U23, U24, U25, U26, U27, U28, U29, U30, U31, U32, U33, U34, U35, U36, U37, U38, U39, U40, U41, U42, U43, U44, U45, U46, U47, U48, U49, U50, U51, U52, U53, U54, U55, U56, U57, U58, U59, U60, U61, U62, U63, U64, U65, U66, U67, U68, U69, U70, U71, U72, U73, U74, U75, U76, U77, U78, U79, U80, U81, U82, U83, U84, U85, U86, U87, U88, U89, U90, U91, U92, U93, U94, U95, U96, U97, U98, U99, U100), resistors (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100), capacitors (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100), and connectors (CN1, CN2, CN3, CN4, CN5, CN6, CN7, CN8, CN9, CN10, CN11, CN12, CN13, CN14, CN15, CN16, CN17, CN18, CN19, CN20, CN21, CN22, CN23, CN24, CN25, CN26, CN27, CN28, CN29, CN30, CN31, CN32, CN33, CN34, CN35, CN36, CN37, CN38, CN39, CN40, CN41, CN42, CN43, CN44, CN45, CN46, CN47, CN48, CN49, CN50, CN51, CN52, CN53, CN54, CN55, CN56, CN57, CN58, CN59, CN60, CN61, CN62, CN63, CN64, CN65, CN66, CN67, CN68, CN69, CN70, CN71, CN72, CN73, CN74, CN75, CN76, CN77, CN78, CN79, CN80, CN81, CN82, CN83, CN84, CN85, CN86, CN87, CN88, CN89, CN90, CN91, CN92, CN93, CN94, CN95, CN96, CN97, CN98, CN99, CN100). The PCB is shown at an isometric angle. The software interface includes a menu bar (File, Edit, View, Preferences, Help) and a toolbar with icons for file operations, editing, and viewing. A 3D coordinate system is visible in the bottom left corner. The status bar at the bottom indicates "Render time 7 ms (145,2 fps)" and "dx 0,00 dy 0,00".



# Hack A Radio

- alles auf einer Platine
- Grafikdisplay
- Tastatur
- SD-Card
- ESP32
- GPS-Empfänger
- Laden über USB
- Bausatz
- voraussichtlich 2019 auf Kickstarter



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<https://www.generationmake.de>  
[https://twitter.com/generation\\_make](https://twitter.com/generation_make)  
<https://www.facebook.com/Generationmake-213849749494723/>