Driving one of those cheap RF1101SE boards with a Arduino or Teensy

arduino teensy cc1101 cc1110 radio yardstick opensesame mcu microcontroller chip manchester ghsk texas-instruments

94 commits 1 branch 0 releases 2 contributors

Branch: master New pull request Find file Clone or download

gyaresu typo Latest commit 0ece3e1 on 26 Feb 2017

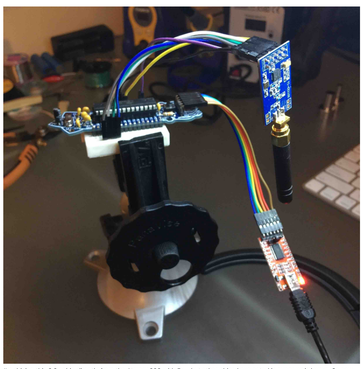
files	still working on discrepancies with tx width	3 years ago
panstamp	added macros	3 years ago
rx_tx_combined	remove individual tx/rx files	3 years ago
README.md	typo	3 years ago
yardstick.py	Added GFSK	3 years ago

README.md

rf1101se-teensy

Hi! This is my repo for learning about microcontrollers and packetised radio with the CC1101 by Texas Instruments chip driven by 'Arduino-compatible' devices.

You're going to want to have at least one (or a dozen) of these really really cheap RF1101SE radio module based on a Texas Instruments CC1101 chip (that's the one with no MCU and no USB, just the radio).



I'm driving this 3.3v chip directly from the Atmega328 with 5v... but other chips have acted in super weird ways. So now you've been warned(!), it really shouldn't work. YMMV ¯\(ツ)/¯

- cc1101 — Just the radio
- cc1110 — radio and MCU (Radica IM-ME used in OpenSesame)
- cc1111 — radio, mcu, usb (YARD Stick One)

You're also going to want to have a Teensy, Arduino or basically any microcontroller that can speak SPI.

Now all of this works with the Arduino 'whatever' but if you have a 'whatever' then you'll need Logic Converters because "whatever's" do 5V on the digital pins and the Teensy can deal with either 3.3V or 5V because...

Teensy don't care.

Teensy is your basic honey badger of small inexpensive microcontroller boards. It runs a Cortex-M4 which comes with a whole bunch of functionality built right into the chip.

Please note that the cheap rf1101se-v3.1/whatever radio board you got from Aliexpress is probably only good for 433MHz because they all seem to be missing resistors on the circuit board that would enable it to be useful at any other frequencies. So it's not the chip that's at fault, just the cheap board design.

Encode all the things!

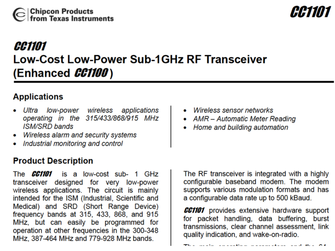
The example presented currently enables:

- 16 bit preamble
- 2 byte Sync Word (0xEEEE)
- CRC Checking
- Gaussian frequency-shift keying
- Manchester encoding
- Address filtering (byte after sync word for specific device selection)

Read The Fine Manual

I've tried to document what the registers do in the Arduino code. You really need to read the manual though to understand what's going on.

- http://www.ti.com/lit/ds/symlink/cc1101.pdf



Chipcon Products from Texas Instruments

CC1101

CC1101
Low-Cost Low-Power Sub-1GHz RF Transceiver
(Enhanced CC1100)

Applications

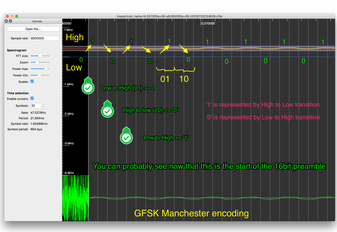
- Ultra low-power wireless applications operating in the 315/433/868/915 MHz ISM/SRD bands
- Wireless alarm and security systems
- Industrial monitoring and control
- Wireless sensor networks
- AMR – Automatic Meter Reading
- Home and building automation

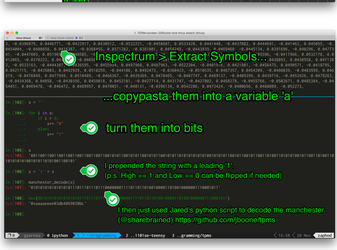
Product Description

The CC1101 is a low-cost sub- 1 GHz transceiver designed for very low-power wireless applications. The circuit is mainly intended for the ISM (Industrial, Scientific and Medical) and SRD (Short Range Device) frequency bands at 315, 433, 868, and 915 MHz, but can easily be programmed for operation at other frequencies in the 300-348 MHz, 387-464 MHz and 779-928 MHz bands.

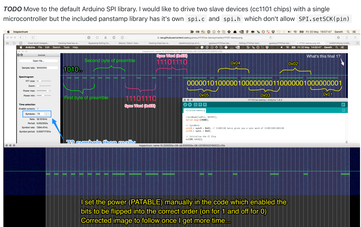
The RF transceiver is integrated with a highly configurable baseband modem. The modem supports various modulation formats and has a configurable data rate up to 500 kBaud.

CC1101 provides extensive hardware support for packet handling, data buffering, burst transmissions, clear channel assessment, link quality indication, and wake-on-radio.





TODO Move to the default Arduino SPI library. I would like to drive two slave devices (cc1101 chips) with a single microcontroller but the included panstamp library has it's own `spi.c` and `spi.h` which don't allow `SPI.setSCK(pin)`



I include Yardstick One (YS1) code in this repo because I have one. If you don't have one then get one because they're awesome.

Links to things

- Jared Boone's manchester decoding function
- YARD Stick One
- gareth_ on the twitters
- Freenode IRC — gareth_ on #HackRF #RFCat etc.