

⚡ We have released a new firmware update! [Check it out on GitHub](#) and get the latest version now.



## FREE-WILi Overview

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# FREE-WILi Overview



*Make Embedded Systems Fun Again.*

## Overview



### *FREE-WILi Overview*

FREE-WILi is a embedded development tool for helping test, debug, and develop electronic systems.

## Use Cases

- I2C USB interface
- SPI USB interface
- UART USB interface
- Generic Digital Protocol development (script protocol)
- USB attached screen and buttons
- Uart based protocol tool support
- TPMS fuzzer or simulator
- Keyless Entry simulator/monitor
- Cybersecurity penetration testing
- Development platform that 80% done
- Learning platform for Embedded Systems CPU, FPGA or Hybrid

## Software Features

- USB Serial console API to control from host PC without installing any software
- [WASM \(webassembly\) scripting](#) engine with examples for C/C++, Rust, Zig and Tiny Go
- [Host API Python](#) software
- FAT File system
- Sigrok Pulse view [Logic Analyzer](#) support
- host binary API for Graphical User Interface
- WASM API to control all device features
- [ZoomIO scripting engine](#) controls IO pins with nanosecond precision
- [GUI Software](#) with custom panels and graphical controls
- Integrated [sounds](#) and [images](#) in ROM for enhancing user apps

[Numbers To Speech](#) feature to speak numbers

- File formats compatible with existing market devices
- Standard [USB boot-loader](#) for firmware updates
- Raspberry Pi Pico (RP2040) Open Micro Platform for specific applications or custom code with C/C++, Micro- python or Circuit Python
- Open source [github](#) software for updates

## Hardware Features

- SPI, I2C, PIO, and UART available on [GPIO](#)
- 3 USB interfaces (Integrated HUB with 2 FS, 1 HS) for communication and power
- 11 GPIO programmable voltage level for 1.1 to 5.5V with 24ma@3V or 32ma @5v (sn74lxc1t45)
- 2 GPIO for I2C voltage level between 0.9V to 5.5V with software enabled 10K pulls (PCA9517)
- GPIO front end includes ICE40UP5k [FPGA](#) with 8MByte SRAM and High Speed USB (FT232H)
- Two SMA connectors for antenna for longer range
- 320 x 240 Color Display
- 5 [User configurable buttons](#)
- 7 [Full color LEDs](#)
- IR [transmitter and receiver](#)
- Digital [Speaker](#) and [Microphone](#)
- [Orca](#) modules plug into GPIO header allows expansion for specific use cases
- 16 Mbyte x 2 on board storage (22 MByte usable)
- 1000 ma Lithium ION battery with integrated charger
- Real Time Clock (RTC)
- [Accelerometer](#)

## Radio Versions



*FREE-WILi contains two radios.*

FREE-WILi currently has one radio option:

**Black** contains two CC1101 Sub Ghz Radios with programmable filter ranges for 300-348, 387-464, 779-928 bands.

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