Agenda

- Origins
- (Very) quick demo
- Users and usages
- Contents – hw and sw
Origins

Problem: how to get a credible, decent-looking functional prototype?

...Ended up with a platform that seemed worth sharing

Product Idea: a wearable configurable connected device
What is it? - Quick Demo

- Full-color OLED display
- USB-rechargeable LiPo battery
- Processing & Storage
  - ARM 32bits
  - 64 Mbit
- Many Sensors
  - rad/s², m/s², Gs, m/s², hPa, dBa, Gs, lux, mbar, T, C/°F
- Connectivity
  - Bluetooth 4.0
  - USB
  - Extension pins for connection to external system

Limifrog – Eclipse IoT Days 2016, Grenoble
For whom?

Start-up entrepreneurs, Labs (industrial/academic)

' Makers' 

Higher Education

Convincing proofs of concept with minimal investment

New possibilities for original or ambitious projects

Single platform for multiple projects + smooth introduction to ARM 32-bit programming.
Usages

- On breadboard or embedded in prototype
- With or without display

- 3D-printable model of protective case available, open-source (*STL*, *OpenScad*)
  - Several variants available
  - « Ready-made » 3D-printed case also available
Contents (hardware)

- **Rechargeable battery**
  - LiPo, 500mA.h

- **Power Management & USB Charging**

- **STM32-L4**
  - ultra-low power
  - 32-bit micro-controller
  - 100μA/MHz, up to 80MHz

- **160x128, full color OLED display**

- **Panasonic PAN1740**
  - BlueTooth Low-Energy Module

- **ST VL6180X**
  - Ambient Light Sensor
  - Proximity/Distance Sensor

- **ST LSM6DS3**
  - 3-axis accelerometer
  - 3-axis gyroscope

- **ST LIS3MDL**
  - 3-axis magnetometer

- **ST SLPS25H**
  - Atmospheric Pressure (and Altitude) Sensor

- **Knowles SPU0414HR5H-SB**
  - Microphone
  - (as ambient sound sensor)

- **Adesto AT45DB641E**
  - 64Mbit Data Flash

- **Switches & LED**

- **Extension Pins**
  - on dual entry header

- **incl. GPIO, IRQ, I2C, SPI, U(S)ART, CAN, Timer/PWM, ADC, DAC, OpAmp**
Software

Example application code is provided
> Unitary Tests
> Full Demos

« Pre-integrated » middleware
- Data Flash ready to use as File System
- Data Flash ready to use as USB drive
- Display ready to use with Gfx library

Libraries made specifically for LimiFrog, to ease exploiting its resources

Generic library to drive all on-chip peripherals.
HAL : higher-leve and polyvalent, but sometimes heavy
LL drivers : faster, denser but lower level

Low-level library (uC register abstraction etc.)
Software (cont'd)

- MicroPython support: delayed but upcoming
  - "lean and fast implementation of Python 3, optimized to run on a micro-controller"
    -- see micropython.org
  - Using terminal or scripts on file system (flash drive)
  - Ported to STM32L4 and LimiFrog by Tobias Badertscher
  - Merge into main MicroPython repo ongoing

- RIOT OS ported to early version (STM32L1)
  by RIOT Team @ Hamburg University

- Porting to STM32L4-based LimiFrog tbc
Take-Aways

• A compact, low-power, fully-featured platform, intended to be both powerful and easy to master

• Usable for quick demos as well as serious embedded programming

• Especially suited to produce credible demonstrators when integration, size or weight matter
THANK YOU

http://LimiFrog.io