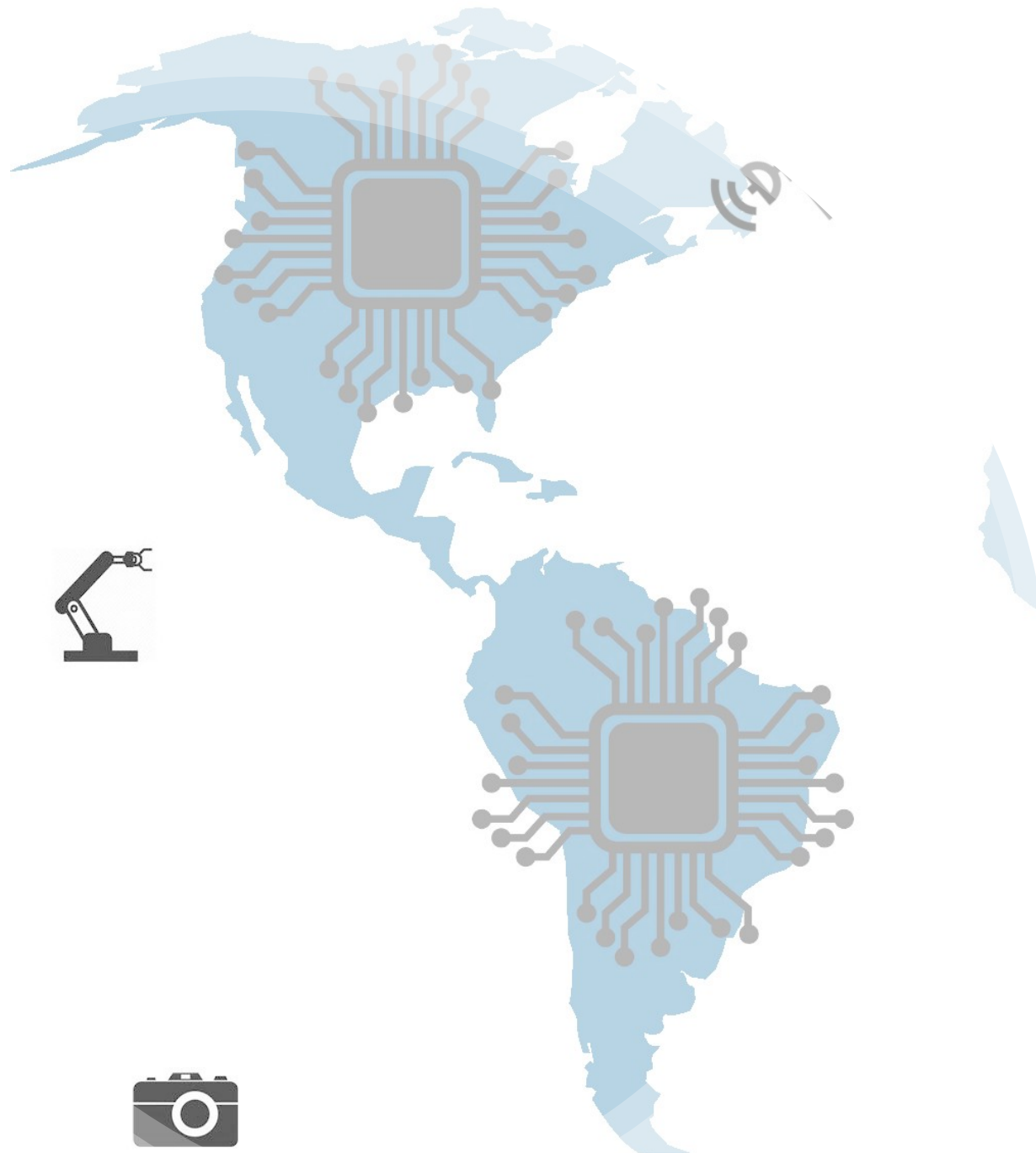# NuttX for ESP32: current status and next developments

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August 15-16 2020

NuttX Online Workshop

Who am I?

- Computer Scientist with hardware experience;

- Embedded System developer (Baremetal, Linux/uClinux, RTOS, etc);

- NuttX Contributor/Developer (since 2010);

- Senior Embedded System Eng. at Espressif.

About Espressif (public info only)

- Funded on 2008 as a Startup;
- First very successful device: ESP8266;
- Very innovative and dynamic company;
- Many developers comming from open-source projects;
- Current chips: ESP32 and ESP32-S2 (oh boy, I cannot say too much about new products)
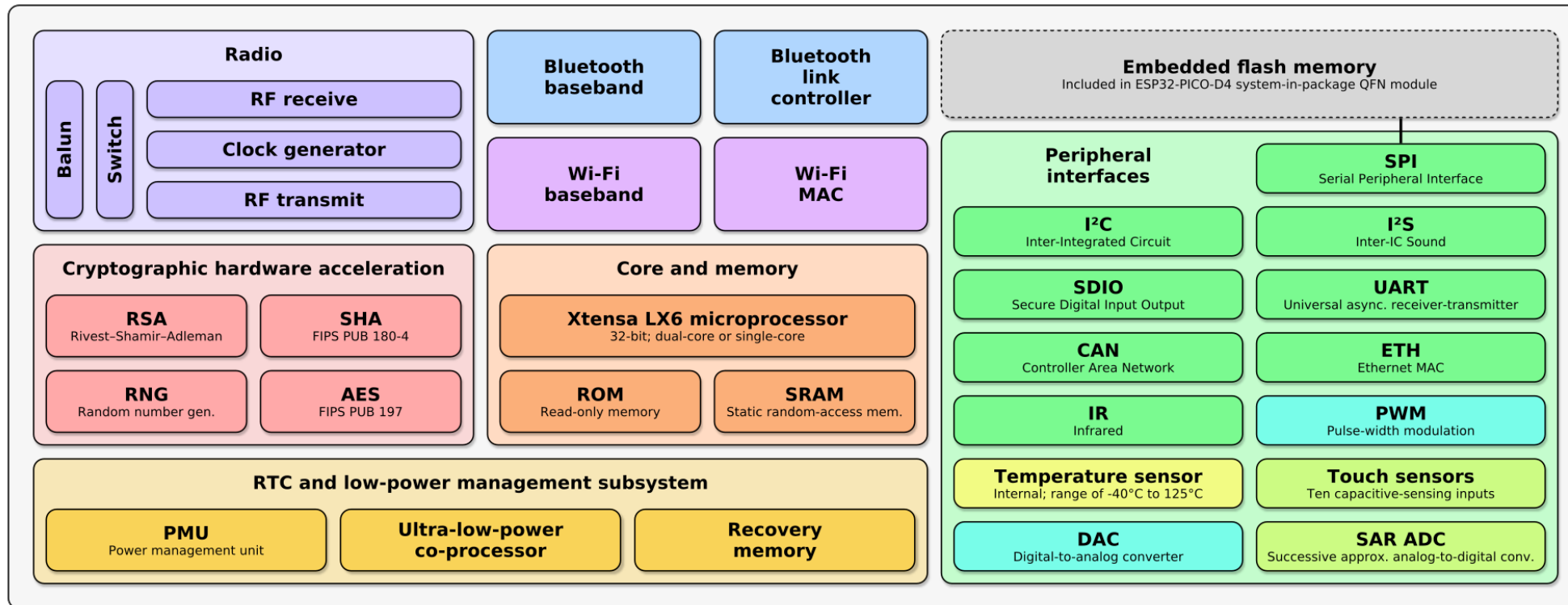
About ESP32 MCU

- Based on Xtensa LX6 Core

- Run up to 240MHz with performance up to 600 DMIPS

- 512 KiB SRAM

- Connectivity: WiFi 802.11 b/g/n and Bluetooth v4.2 BR/EDR

- Many Peripherals: 4 SPIs, 2x I2C, 2x I2S, 12-bit ADC with 18 CH, 2x DACs, 3x UART, Ethernet, SDIO, CAN, PWM, Touch Interface, etc
- Security: Flash Encryption; Secure boot; Crypto HW: AES, SHA-2, RSA, Elliptic Curve, RNG

ESP32 Features:

Espressif ESP32 Wi-Fi & Bluetooth Microcontroller — Function Block Diagram

NuttX for ESP32 (Out. 2016)

- Port started around Out 2016;

- Basic support to GPIO and UART around that time;

- Development stalled: some HW informations wasn't available at that time;

- I created a tutorial in my blog https://acassis.wordpress.com showing how to install NuttX.

NuttX for ESP32 (Aug. 2020)

- Added support to SPI;

- Added support to SPI Flash;

- Added support to I2C;

- Added support to Ethernet;

(these driver were ported by Dong Heng and I work with him to fix and submit it)

NuttX for ESP32 (next)

- Add DMA support;
- DMA support for SPI and other drivers;
- Add I2S support;
- Add SDIO support;
- Add CAN and other drivers;
- Add support to security HW;
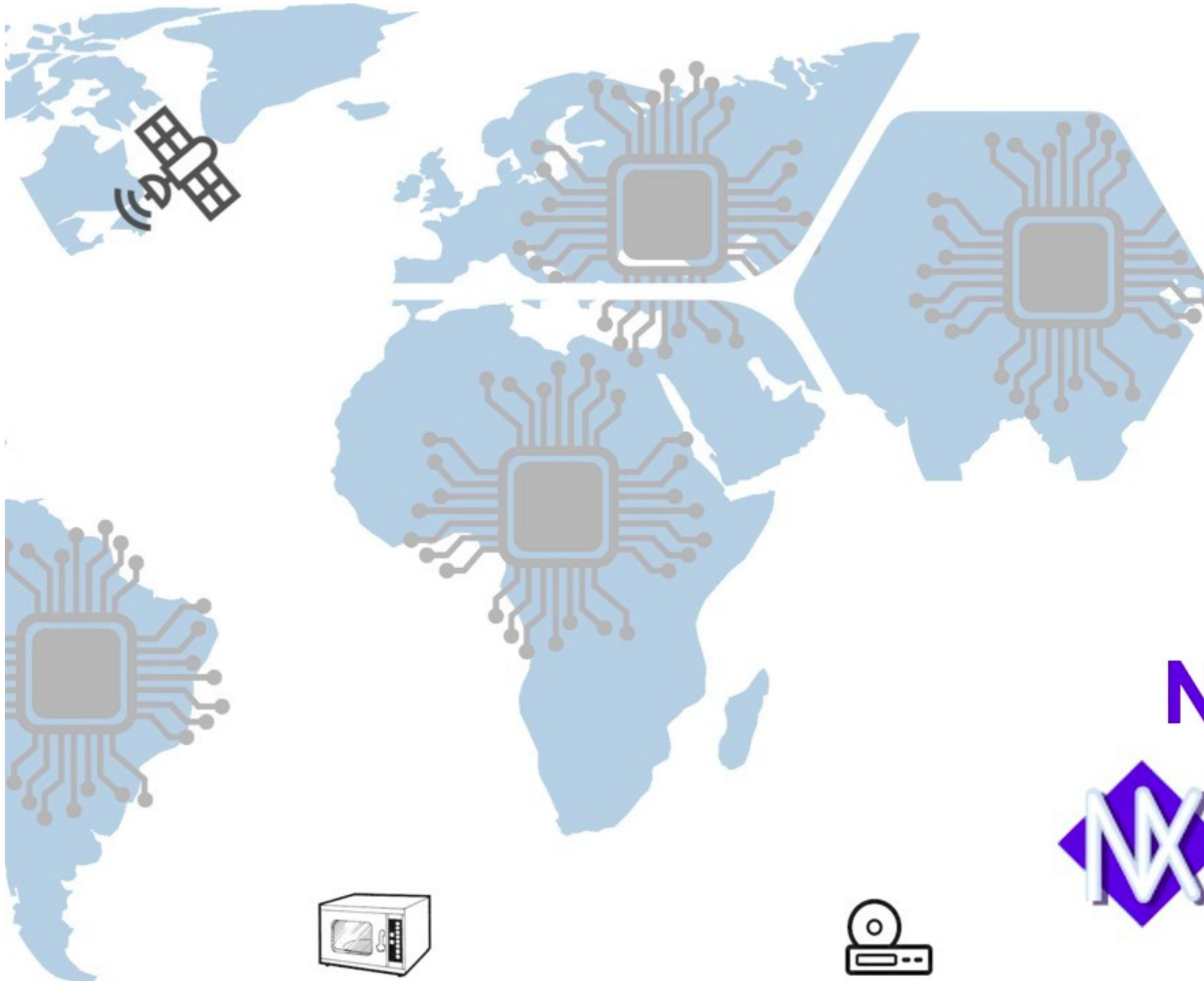- Other drivers! ;-)

And what about WiFi and BT/BLE?

- We are working on it too, some issue:
  - It depends to much of IDF/FreeRTOS functions;
  - We need to reimplement its timer and event layer to work on NuttX;
  - We need to update all the code style to NuttX standard.

Thank you!

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Thank you!