Market Research Lightning Talk

sdmay25-27

Project Overview

- Design a microcontroller with radio communication capabilities
- Open-source
- Can be fabricated
- Will be used by ISU ChipForge group
- Designed using the Caravel platform from Efabless
- Inspired by the TI CC1352P (block diagram shown to the right)

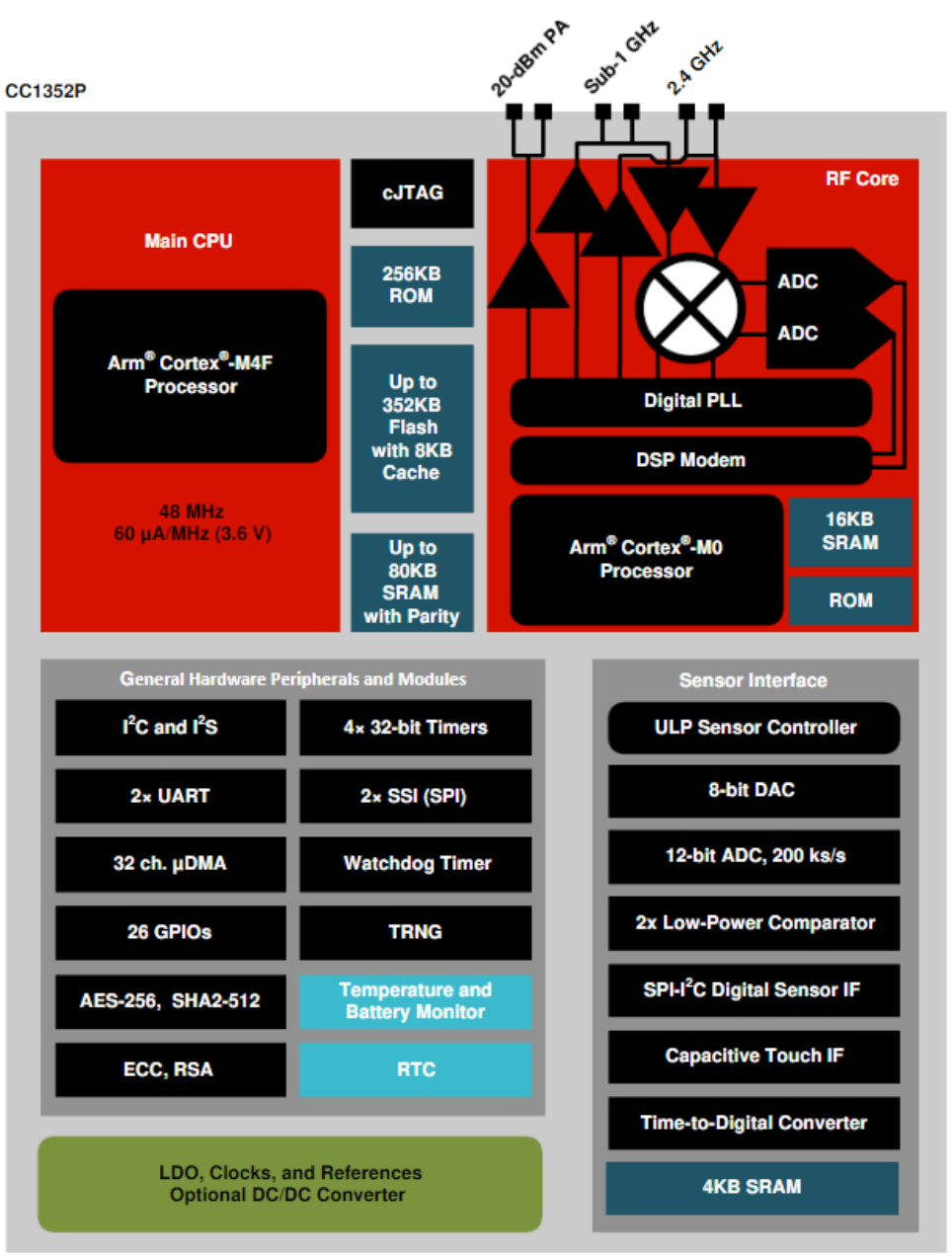


Figure 4-1. CC1352P Block Diagram

Image Source: https://www.ti.com/lit/ds/symlink/cc1352p.pdf?ts=1727935470469&ref_url=https%253A%252F%252Fwww.mouser.es%252F

Problem Statement

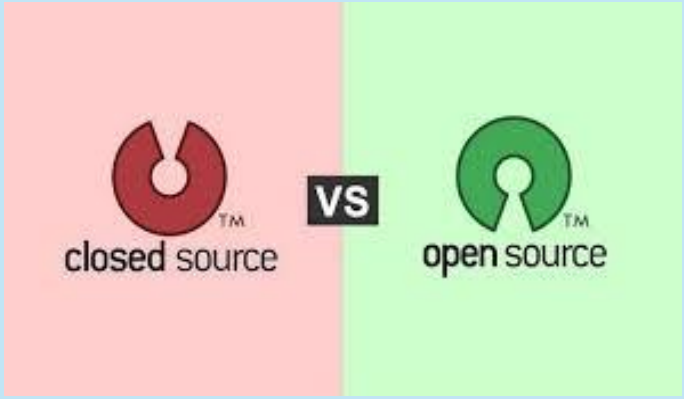
Create an open-source microcontroller with an integrated radio that can be used in a wide variety of applications tailored to a user's specific needs. It should interface with various devices both with physical connections and wirelessly. The end goal is to create a design that can be fabricated.

Related Products and Features

- CC1352P
  - Dual-core
  - Bluetooth, Zigbee, and other radio protocols
- Espressif ESP-32
  - Wi-Fi and Bluetooth
  - Dual-core
  - Programmable in Arduino IDE
- Pi Pico W
  - Wi-Fi and Bluetooth
  - Dual-core
  - Easy program uploading without programmer or special software
- STM32 w/ Wireless
  - Low power mode

Market Gap Description

- All the products available on the market are closed source
  - Users cannot tweak hardware designs
- Many products on market require special software to program
  - Not many on market that allow for intuitive ways to program the microcontroller
- Power consumption varies across existing products



New Ideas

- Importance of low power consumption to consumer
- Have different cores for MCU and RF to have faster response time
- Scope down the project to realistically design working building analog/RF blocks.

Conclusion

- Based on the CC1352, we are considering using the Zigbee protocol because of its sub-GHz capability
- Due to the lack of open-sourced designs on the market we will have to design many of our own components
- We will likely need to design a second core to run the RF portion of the microcontroller