ColdFire® Embedded Controllers

MCF52211 Low Cost RFID Tag Reader
Application Fact Sheet

Overview

Radio Frequency Identification (RFID) involves contact-less reading and writing of data into an RFID tag's nonvolatile memory through an RF signal. An RFID system consists of an RFID reader and an RFID tag. The reader emits an RF signal and data is exchanged when the tag comes in proximity to the reader signal.

When designing an RFID system, designers must address the fundamental issues of cost and connectivity. In addition, another design challenge arises from the fact that many next generation systems have become portable. These portable solutions add the requirement of low power consumption and USB host capabilities to the standard RFID reader application. Freescale's ColdFire MCF5221x family of embedded controllers is a great fit for these next generation portable designs due to the low cost, low power and flexible USB connectivity.

Key Features

- V2 ColdFire® Core
  - Up to 76 MIPS (Dhrystone 2.1) at 80MHz
- Connectivity options
  - Full speed USB On-The-Go (OTG)
  - Two I^2C modules
  - Queued serial peripheral interface (QSPI)
  - Three universal asynchronous receiver/transmitters (UARTs)
- On-Chip Memory
  - Up to 128 KB of flash memory
  - 16 KB of internal SRAM
- Timers
  - Second watchdog timer with independent clock
  - Real Time Clock (RTC) with 32 kHz oscillator
- Package Type
  - MAPBGA, LQFP and QFN packages

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Design Challenges

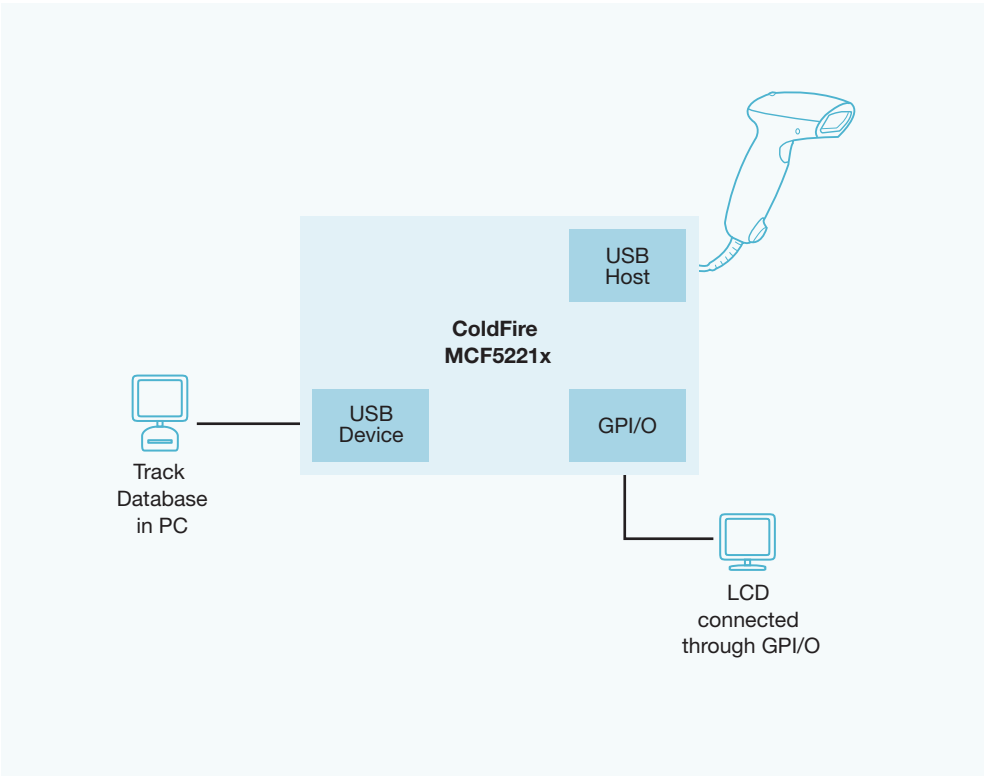
The most significant design challenge in creating an RFID reader system is maintaining low cost while keeping the requirement of USB host capability. In order to develop a competitive application, the design has to be portable. The user needs to be empowered with the ability to move from one place to another without carrying a database. This requires a small design and very low power consumption. USB OTG-enabled microcontrollers allow the user to save and process a large amount of information. USB OTG devices make it possible to read information directly from the RFID sensor before returning to the database. External memory in the system is an added benefit, enabling the user to have more mobility. This memory is usually serial-based and often interfaces though a communication port such as an I²C module.

Freescale Solution

The MCF5221x represents a family of highly-integrated 32-bit microcontrollers based on the V2 ColdFire microarchitecture. Featuring 16 Kbytes of internal SRAM and up to 128 Kbytes of flash memory, a USB OTG controller, four 32-bit timers with DMA request capability, a 4-channel DMA controller, two I²C modules, up to three UARTs and a queued SPI, the MCF5221x family has been designed for general-purpose industrial control applications.

The ColdFire MCF5221x microcontrollers are ideal for power conscious designers who want the performance and flexibility of a 32-bit microcontroller plus a rich set of on-chip peripherals, including USB OTG, at a low cost. These small, highly integrated microcontrollers open the door to expanding application capabilities while driving down the total system cost.

MCF52211 Low Cost RFID Tag Reader Block Diagram



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