

USB-3

Desenvolvimento de Dispositivos USB

Meios Eletrônicos I 2011

Objetivos de Aprendizado

- Como desenvolver dispositivos USB customizados
 - Hardware
 - Software
 - Dispositivo
 - Host
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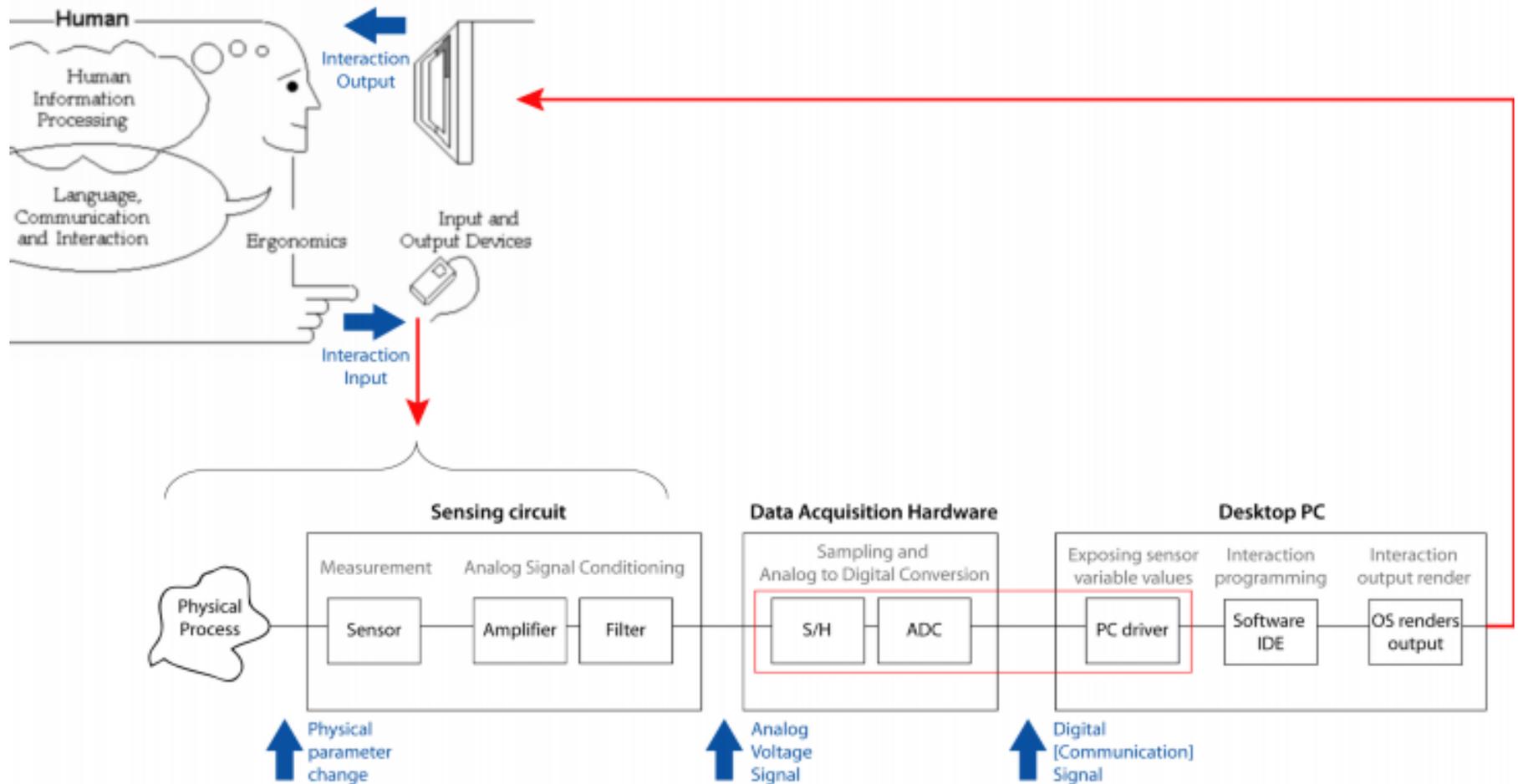
Abordagens

- Dispositivos simples USB
 - Dispositivos USB Programáveis
 - PIC 18F2550/18F4550
 - ARDUINO
 - Dedicado
 - FPGA simples
 - FPGA SoC
 - CI Full Custom
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DAQ simples baseado no FTDI

- Chip interface USB FTDI FT4232
 - Interfaces:
 - Serial
 - Paralela
 - Circuitos adicionais
 - Conversor A/D D/A serial
 - Conversor A/D D/A paralelo
 - Entradas e Saídas Digitais
 - Outros
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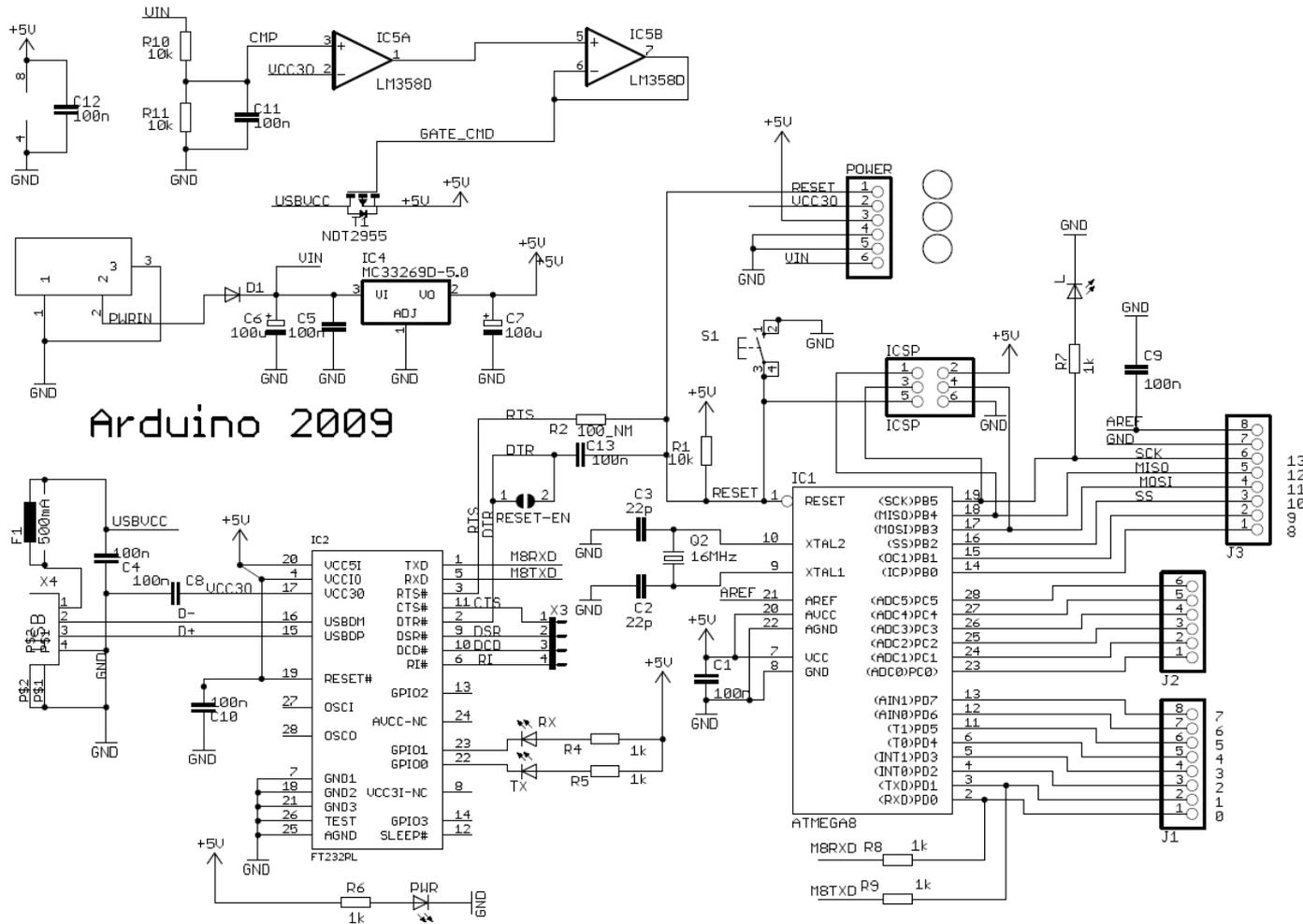
Exemplo de Aplicação



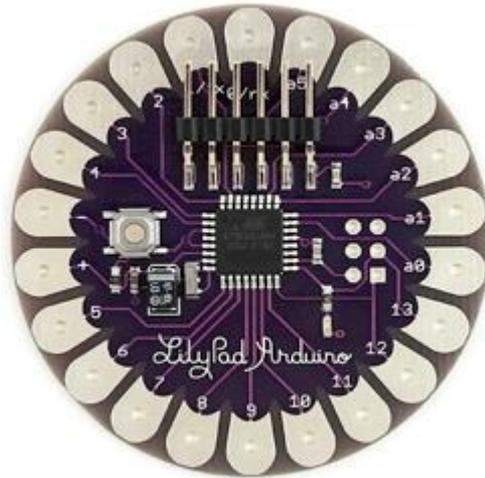
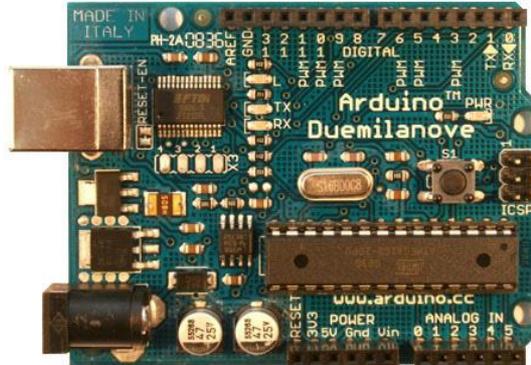
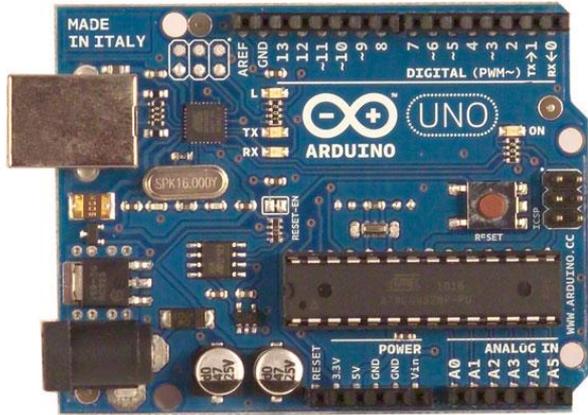
Arduino

- Chip de interface USB: FTDI 232
 - Microcontrolador: ATMEL 8 bits
 - uCs: ATMEGA 8/128/328 etc
 - E/S paralelas digitais
 - Conversor A/D integrado
 - “Hardware Livre”: Esquemático e PCB aberto
 - Placas Comerciais: grande variedade de uC e interfaces/sensores
 - Software:
 - Windows: Compiladores e Ambiente de Desenvolvimento
 - Linux: Compiladores
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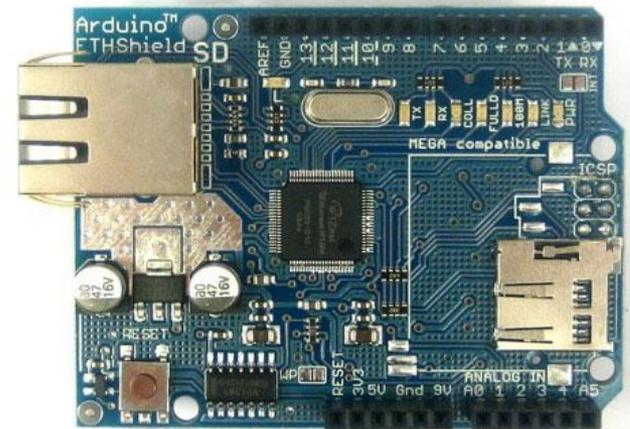
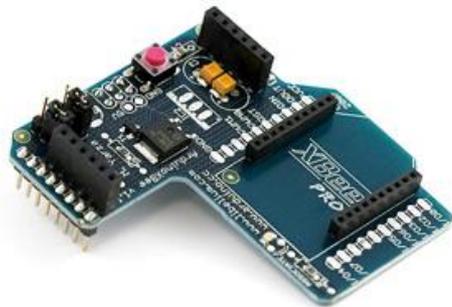
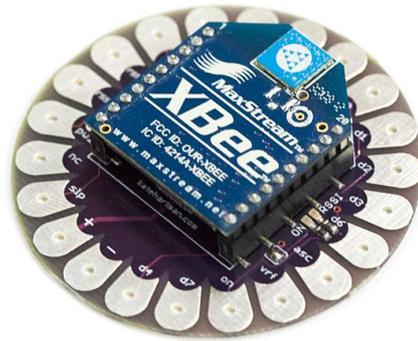
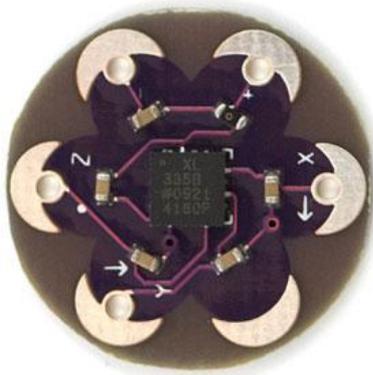
Esquemático do Arduino Duamilanove



Algumas Placas Comerciais



Módulos adicionais para Arduino



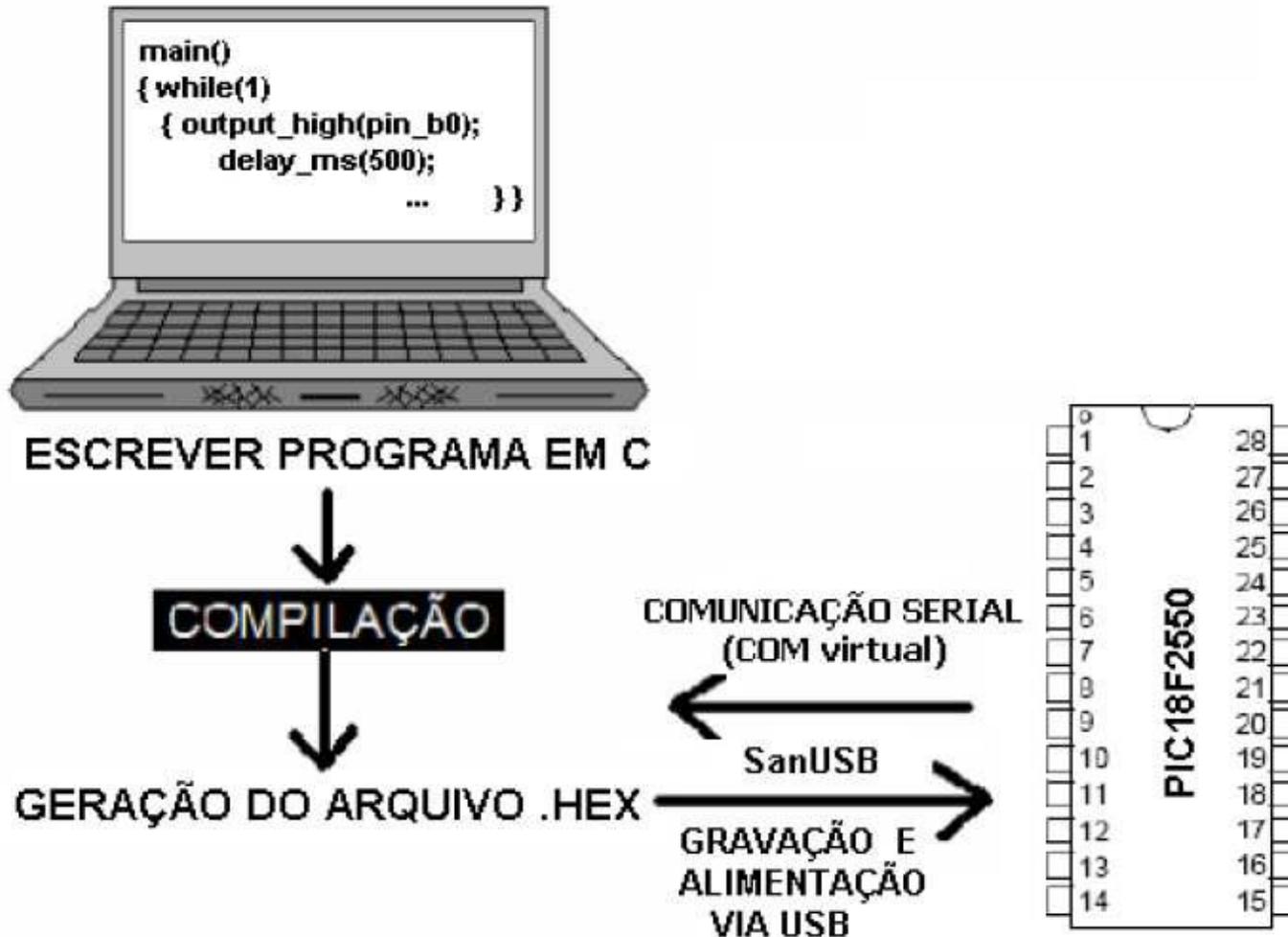
PIC

- PIC 18F4550
 - Interface USB
 - E/S paralela digital
 - N entradas analógicas + 1 Conversor A/D 10 bits
 - Software
 - Windows:
 - Comercial: MPLAB
 - Compiladores e Ferramentas para Linux
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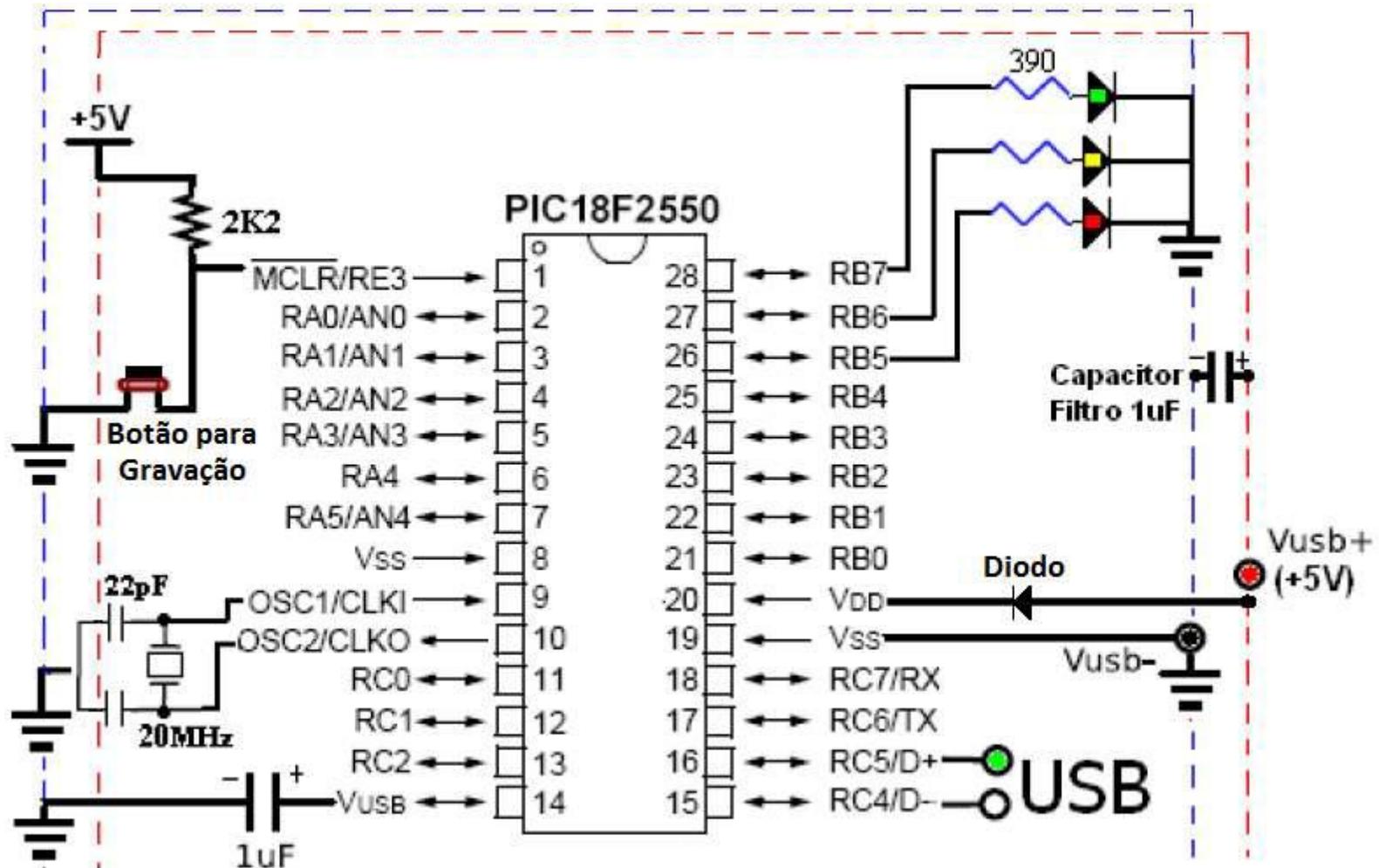
Algumas propostas c/ PIC

- SANUSB
 - Solução brasileira
 - Permite fácil programação do PIC através da interface USB
 - Suporte a Depuração do Código no próprio PIC
 - Código aberto
 - www.tinyurl.com/sanusb
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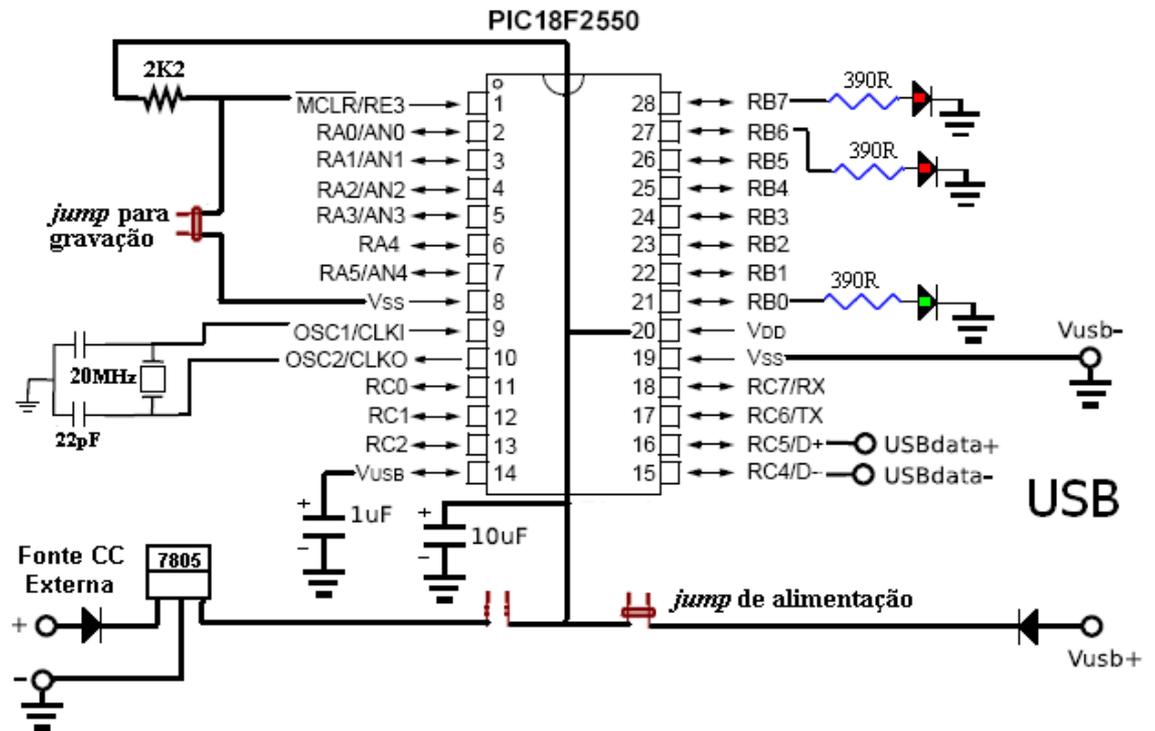
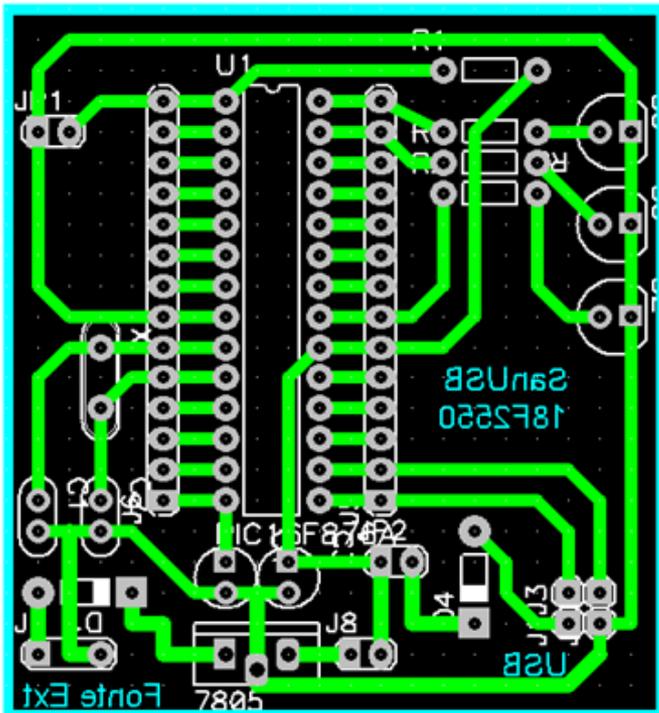
SANUSB



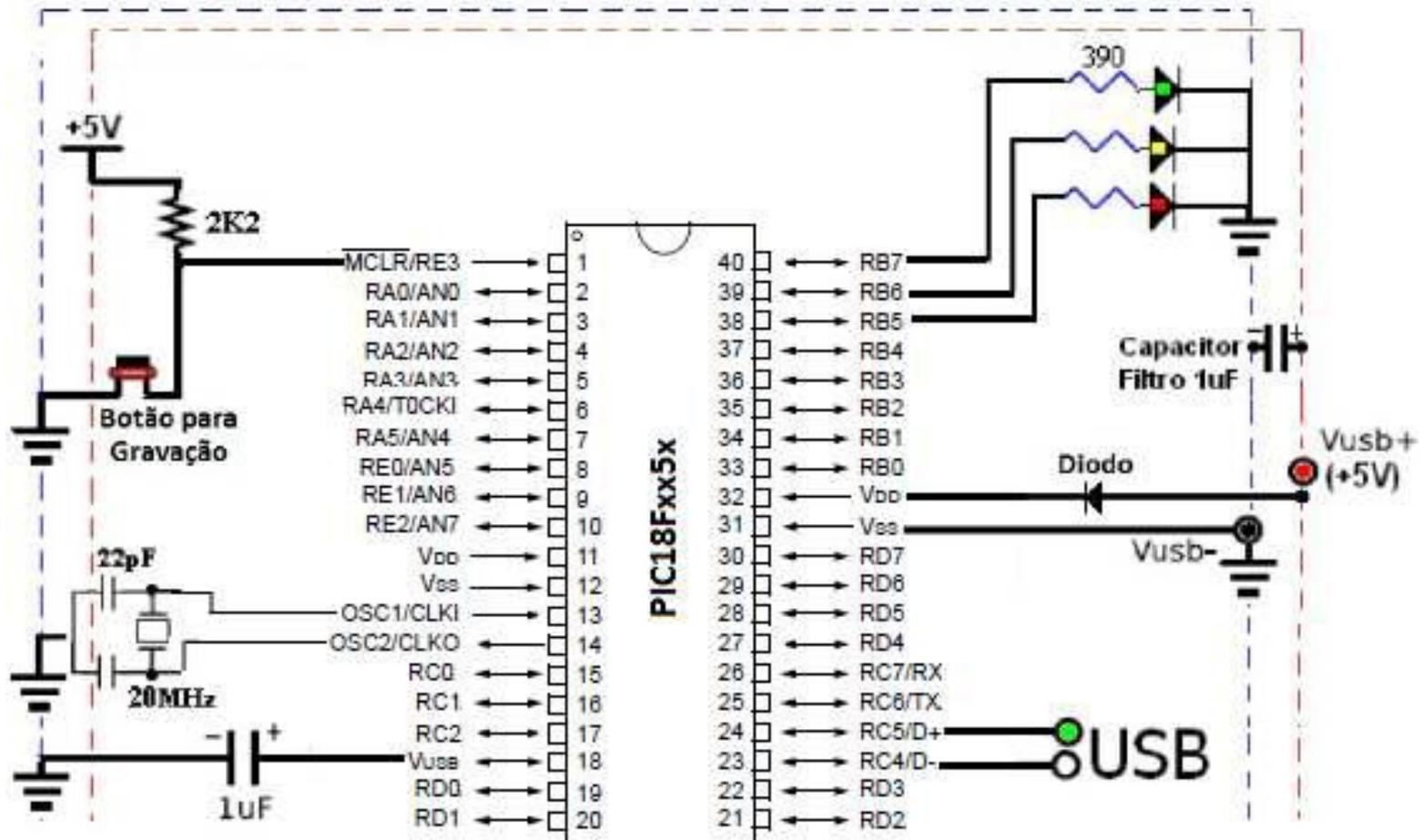
Esquemático SANUSB



Circuito Impresso



SANUSB



Outros Sistemas Customizados

- FPGA
 - Modulo USB (externo) + FPGA
 - FPGA com modulo USB (open core) + funcionalidade
 - FPGA SoC: processor Core (nios, uBrazes etc) + modulos E/S + memoria + barramento (AMBA). Exemplo: Leon2/3
 - CI dedicado
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