



模块 1

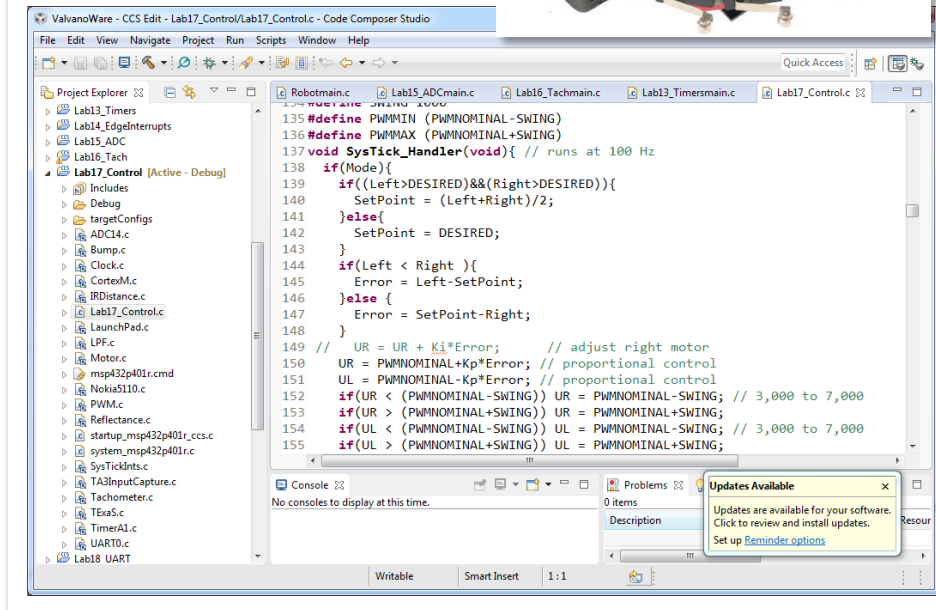
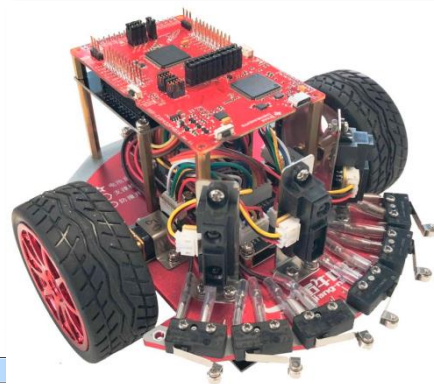
讲解：使用CCS在LaunchPad上进行编程



使用CCS在LaunchPad上进行编程

在本模块中您将学到

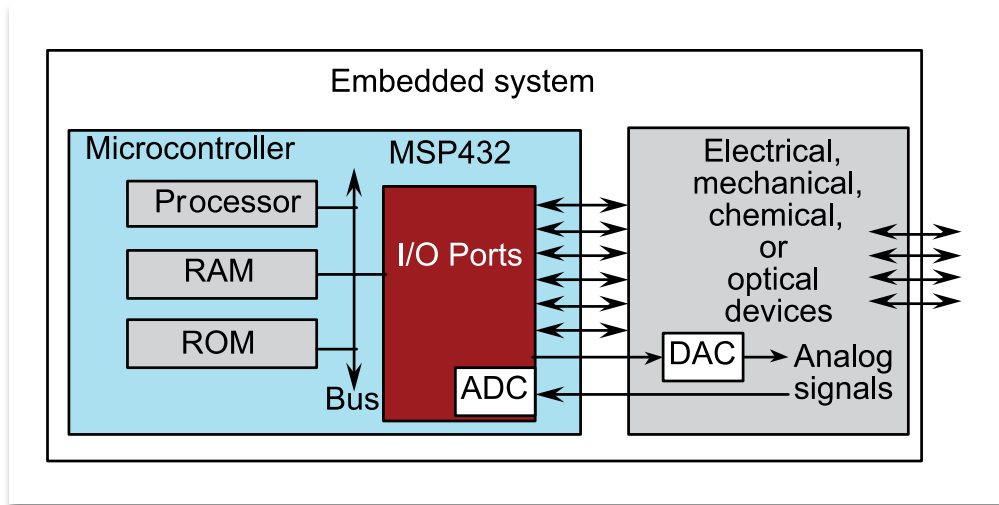
- 嵌入式系统简介
- Code Composer Studio
 - 安装CCS软件
 - 编译-链接-下载-调试
- TI-RSLK中国版
 - 安装软件开发包
 - 文档
 - 参考资料





什么是嵌入式系统？

- 包含一个微控制器，例如 MSP432
- 用于执行某个特定的应用
- 软件程序被烧写到片上存储器中
- 该设备的用户无法对设备中的软件进行读取或写入
- 设备中的软件功能仅限于解决有限的问题
- 微处理器是嵌入或是隐藏在系统当中的

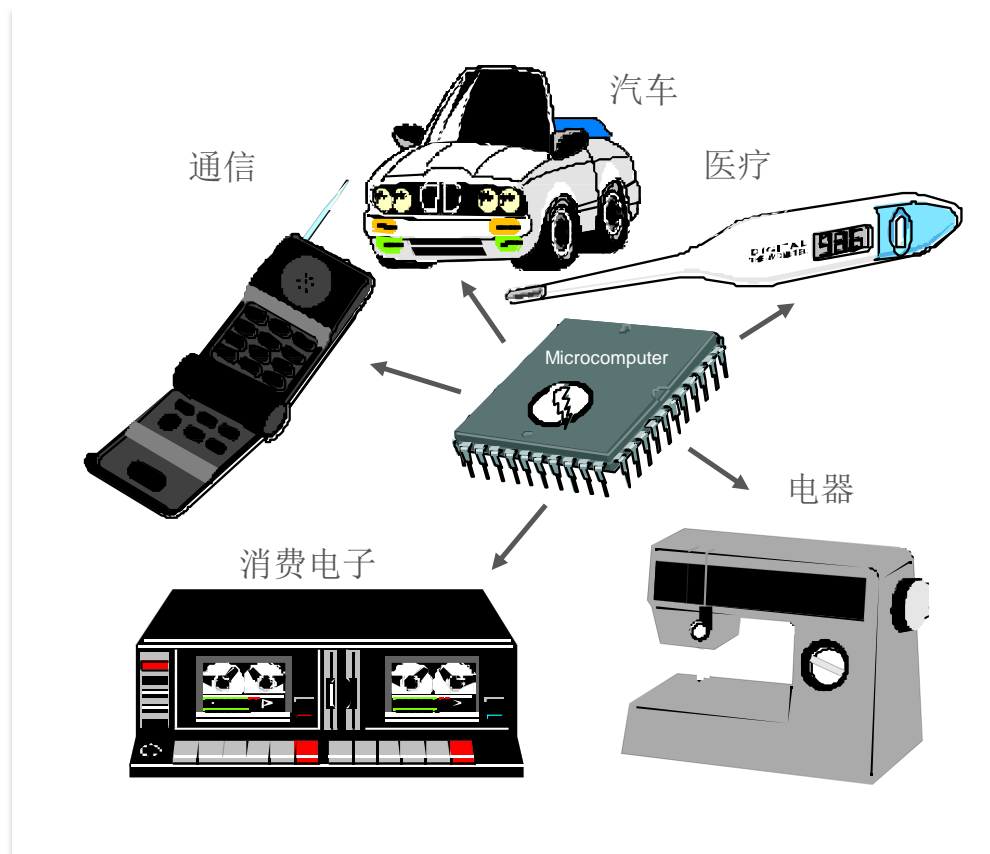




嵌入式系统应用

- 通信
- 汽车, ~20/车
- 军事
- 医疗
- 消费电子, ~150/家庭
- 机器人控制

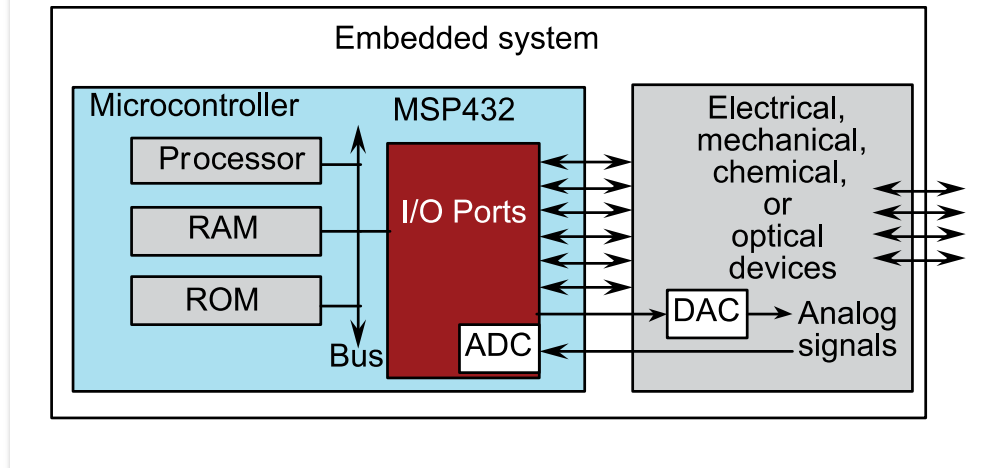
您每天可能使用超过300个
嵌入式系统





嵌入式系统特征

- 持续不断地针对现实世界做出反应和交互
 - 接收输入
 - 进行运算
 - 产生输出
- 必须在一定的时间内完成输入/运算/输出的过程
- 系统包括：
 - 子系统
 - 子系统之间的接口





嵌入式系统总览

- 硬件/软件架构
 - 非处理器中心架构
 - 微控制器，FPGA，模拟电路
- 深入了解操作系统
 - 特别是操作系统底层
 - 并发，并行，同步
- 真实世界中的设计
 - 性能 vs. 成本的折中，限制条件
- 可分析性
 - 证明您用杜邦线搭建的系统可以正常运行
- 应用层设计技巧
 - 编写代码时考虑对功耗的影响



嵌入式系统分类

- 通用计算
 - 类似于桌面电脑应用，但基于嵌入式处理器
 - 游戏，机顶盒，可穿戴设备，ATM
- 控制系统
 - 实时系统的闭环反馈控制
 - 车辆引擎，化学品处理，核动力，飞行控制
- 信号处理
 - 大型数据流计算
 - 雷达，声纳，视频压缩
- 通信 & 网络
 - 交换机
 - 电信系统，互联网

基于SimpleLink的物联网应用

- Wi-Fi
- 低功耗蓝牙
- Sub-1 GHz



嵌入式系统的限制

- 体积和重量限制
 - 手持式电子设备
 - 便于运输和携带
- 低功耗
 - 电池寿命从8小时到10年（笔记本电脑通常只有2小时左右）
 - 冷却手段有限，限制了使用交流电源时的功耗
- 恶劣的使用环境
 - 高温，振动，冲击
 - 电源波动，射频干扰，光线
 - 水，腐蚀，物理碰撞
- 安全性要求
 - 必须保证正常运行
 - 应对失效状况
- 极度成本敏感
 - 单价低至\$.05，总量超过1,000,000个



实时系统

- 强实时系统（**Hard real time**）
 - 不允许任何任务超时
 - 安全关键系统（**Safety-critical systems**）
- 准实时系统（**Firm real time**）
 - 若任务超时，该任务的计算结果没有任何意义，但对系统安全无害
 - 音频/视频传输
- 弱实时系统（**Soft real time**）
 - 任务的计算结果随超时时间的增加而下降
 - **Email**，网络服务器



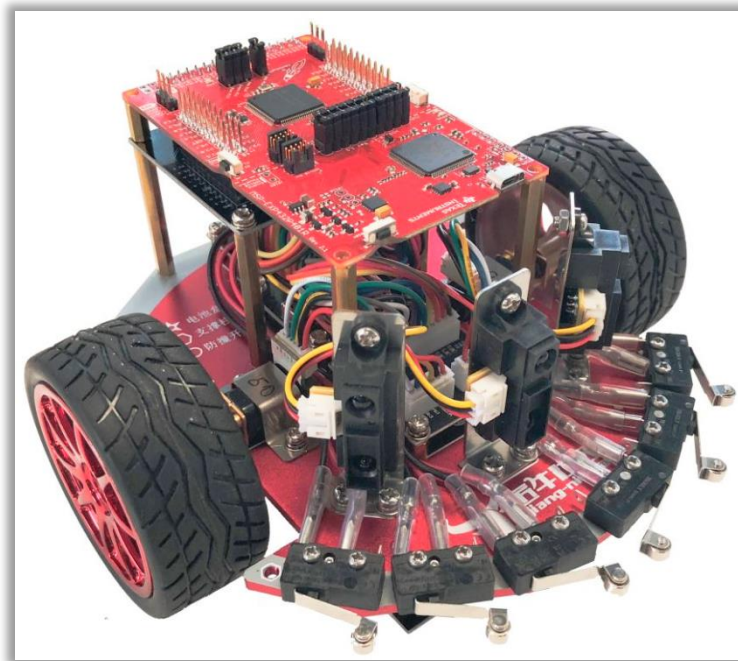
嵌入式系统

总结

- 嵌入式系统
 - 反应性
 - 实时
 - 限制条件
 - 普及性
- 系统
 - 模拟/数字/软件混合系统
 - 子系统
 - 接口
 - 可靠性验证

实时性

- 强实时
- 准实时
- 弱实时



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