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Open Control System Version 1 Project Specifications

Design Goals:

* Basic Goal:
  + Hardware and Software System capable of controlling and collecting data from an experiment.
* In depth specifications:
  + Update rate of system:
    - On the order of a few milliseconds per operation
  + Asynchronous:
    - This version will not have a synchronous clock line.
    - Timing will be delayed by communication between controller and connected devices.
  + Communication:
    - Able to pass integer and floating point data to set and get values from peripheral devices.
    - Able to pass bit masks to set channels
    - Able to trigger connected devices into certain modes
    - Controller able to get a manifest text from a connected device. Manifest will contain:
      * Type of Device
      * Available functions:
        + Data Types of Parameter and return values of functions on the device.
        + Memory mapping to registers to get/set values on the device.
        + Other metadata.
  + Control Software:
    - Object oriented control software:
      * Software object for each device:
      * Methods in each object that mirror device functions
      * Use basic queues to allow asynchronous communication:
        + Deferred communication if device is busy.
    - Code easy to understand, modify and extend:
      * Well commented/documented
      * Abstract away the communication:
        + To allow different physical layers later
    - Data collection:
      * Ability to store collected data in:
        + Structured text files

XML

CSV

JSON

* + - * + Database:

MySQL

MongoDB

* + Device/Card software:
    - Easy to understand, modify and extend
      * Well commented/documented
      * Make libraries where ever possible
        + Makes code more reusable.
      * Template code to build new types of devices from
    - Test code:
      * Microcontroller C code is in general hard to debug
        + Create unit tests in C.
        + Create systems tests to test whole system operation across all possible functions.
        + Send **informative** errors to controller when they occur.