CMRS 2560 System

Introduction

The CMRS 2560 System is an integrated signal and turnout control system based on the Arduino microcontroller and the JMRI communications standards. The system has been designed to integrate turnout controls, turnout position, and track occupancy sensors to drive signal operations. Both Automatic Block Signals (ABS) and Centralized Traffic Control (CTC) signal operations are supportable through the architecture.

Scope

This guide is intended to provide a basic understanding of the architecture and design of the overall system, a walkthrough the operational software found on the Arduino microcontrollers, and a discussion of the communications interface defined by JMRI version 4.

Architecture and Design Considerations

The development of the CMRS 2560 System is motivated by multiple objectives for the Carquinez Model Railroad Society:

* To improve the reliability of the infrastructure of the layout to increase the longevity of the system
* Provide a system that can built incrementally to provide signal “animations” that can be extended to full blown solution for the entire layout.
* Support the development of CTC using JMRI-based communications

While designing a system to meet these objectives, one major constraint has been not to replace the DCC system or cause extra load on the existing system. This limits the scope and expense of the signal and turnout solution. We will discuss the interconnection to the NCE DCC system later in this guide.

Architecturally, the CMRS 2560 System consists of a number of “stations,” where each station consists of an Arduino 2560 MEGA microcontroller and a number of input/output (I/O) expansion boards. The Arduino communicates to the I/O expansion boards through the Inter-Integrate Circuit (I2C) serial communications standard. There are several I/O expansion board types, including:

* Turnout Control Boards (quad channel)
* Toggle Switch Input Boards (quad channel)
* Indicator LED Driver Boards (dual quad channel)
* Sensor Input Boards (quad channel)
* Signal Output Boards (can drive four three-color plus four additional outputs).