### Arduino DCC Control

#### How do we use the Arduino Ecosystem for our DCC layouts

# What Will be Covered

- Quick Arduino review
- DCC and DCC++ concepts
- Arduino Hardware for DCC++
- Arduino Software
- Automating our scenes with Arduino
- DCC++ demo
- Automation Demo

# Arduino Overview

- Arduino is an open source computer hardware and software company out of Italy
- Original product was developed for education by offering a low cost development product
- Rapidly grew into a DIY ecosystem with a large product range and following.

# Arduino Overview

- "Arduino" commonly refers to the hardware and software platform
- The company also developed software to ease the development (programming) process
- There are many components or shields available to address many sensing and automation needs

# **DCC** Concept

- Digital Command Control
- Originally Developed by Lenz in Germany
- NMRA Standard
- Standard consist of 2 parts
  - electrical
  - communication
- Many vendors have followed
- Most have stayed with the standards

# DCC++ Concept

- Open Source software and hardware system
- Follows the NMRA standards and guidelines for DCC
- Hardware specific
- Runs on Arduino Uno or Mega
- Requires an Arduino Motor Shield
- Supports all gauges and handles about. 3 amp

#### DCC++ Hardware

DCC++ can use either an UNO or MEGA
We will use a Mega for our implementation



# DCC++ Hardware

- DCC++ requires a motor shield to drive the rail power
- There are two types of shields available

   Arduino Motor Shield R3
   Pololu Dual MC33926 Motor Shield
- We will use the Arduino Motor Shield for our implementation

# **Arduino Motor Shield**

DCC++ Base Station Signal Name	Arduino Motor Shield
SIGNAL_ENABLE_PIN_MAIN	3
SIGNAL_ENABLE_PIN_PROG	11
CURRENT_MONITOR_PIN_MAIN	AO
CURRENT_MONITOR_PIN_PROG	A1
DCC_SIGNAL_PIN_MAIN	12
DCC_SIGNAL_PIN_PROG	2
DIRECTION MOTOR CHANNEL PIN A	12
DIRECTION_MOTOR_CHANNEL_PIN_B	13



Pin Mappings for Arduino MEGA with Arduino Motor Shield

### **Motor Shield Modification**



# DCC++ Software

- The software is Open Source
- The design concept consists of 2 modules
  - DCC++ Base Station
  - DCC++ Controller
- The DCC++ Base Station is a combination of the hardware and the software loaded on the Arduino
- The DCC++ design uses software rather than a throttle to control the Base Station

# DCC++ Software

- The developers provide a controller package that is very fundamental but requires lots of modifications since it is intended for the developers layout
- JMRI is also supported and that is what we will be using in our demo
- The demo keeps it simple by using the USB port to access the Base Station.
   Other connection options are available.

### DCC++ Demo

# **Scene Automation**

- Uses Arduino Nano and WT588D Sound Chip
- Wired on custom boards
- External signal for night time detection
- Switched relay for larger number of LED
- Power module 24v DC bus to 5v DC
- Controlled via DCC

#### Scene Demo

# Where to Buy

- Arduino
- SparkFun
- Adafruit
- Amazon
- ebay

http://www.arduino.cc http://www.sparkfun.com http://www.adafruit.com http://www.amazon.com http://www.ebay.com

or you can order them from me

#### **Thank You for your time**

If you have any further questions you can reach me at

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#### Credits

- DCC Library NMRA
- DCC++ Library Gregg
- WT588D Library Thomas Ose