

Arduino DCC Control

Session 3



What Will Be Covered

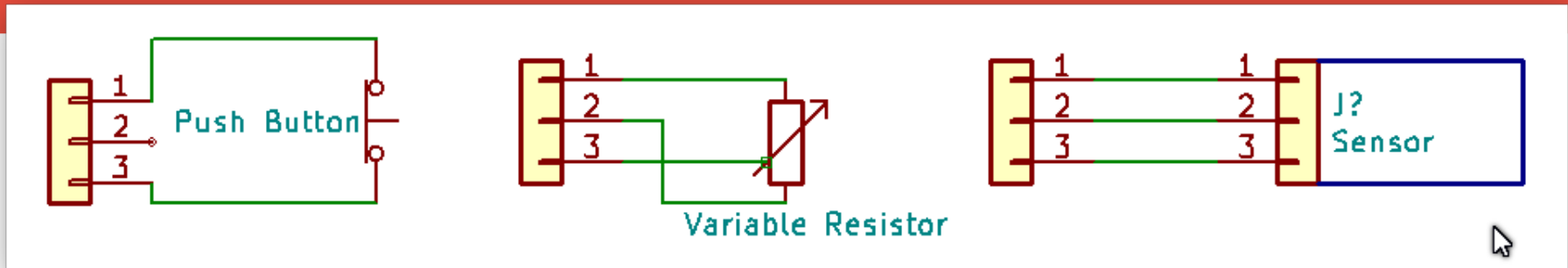
- Using an Arduino to calculate scale speed
- 2 types of sensors explained
- Connecting Devices to an Arduino
- DCC Controller/Throttle for automation
- A couple of demos

What we learned so far

- Arduino is a term that applies to an ecosystem of controllers in various sizes and shapes
- Arduino are all based on the same principals and code can migrate to all devices
- Arduino are expandable with shields
- Arduino are fantastic additions to our hobby
- There is a learning curve



Connecting Devices



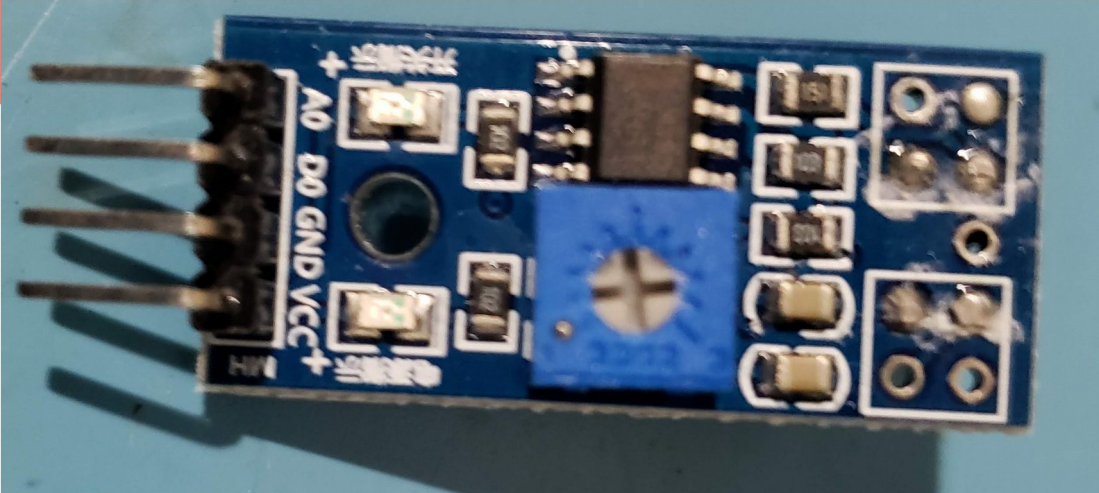
Pin Assignment

- 1 = Ground (black)
- 2 = VCC (5 volt positive) (red)
- 3 = Signal (white or Yellow)

Signal Type

- Push Button = Digital (on or off)
- Variable Resistor = Analogue
- Sensor = Digital or Analogue depending on sensor type

TCRT5000 Photoelectric Switch



- Reflective Infrared Sensor
- Readily Available
- Allows for Analogue and Digital feedback
- Adjustable trigger depth
- Reliable but has issues with pure black
- Sensor bulky and hard to conceal
- Separating sensor and module helps

Introduction to Speed Calculation

- In our case it is really scale speed calculation
- For prototypical representation speed is critical
- Speed matching is important for consisting
- Speed calculation is based on
 - Start point
 - Distance
 - Time
 - End point

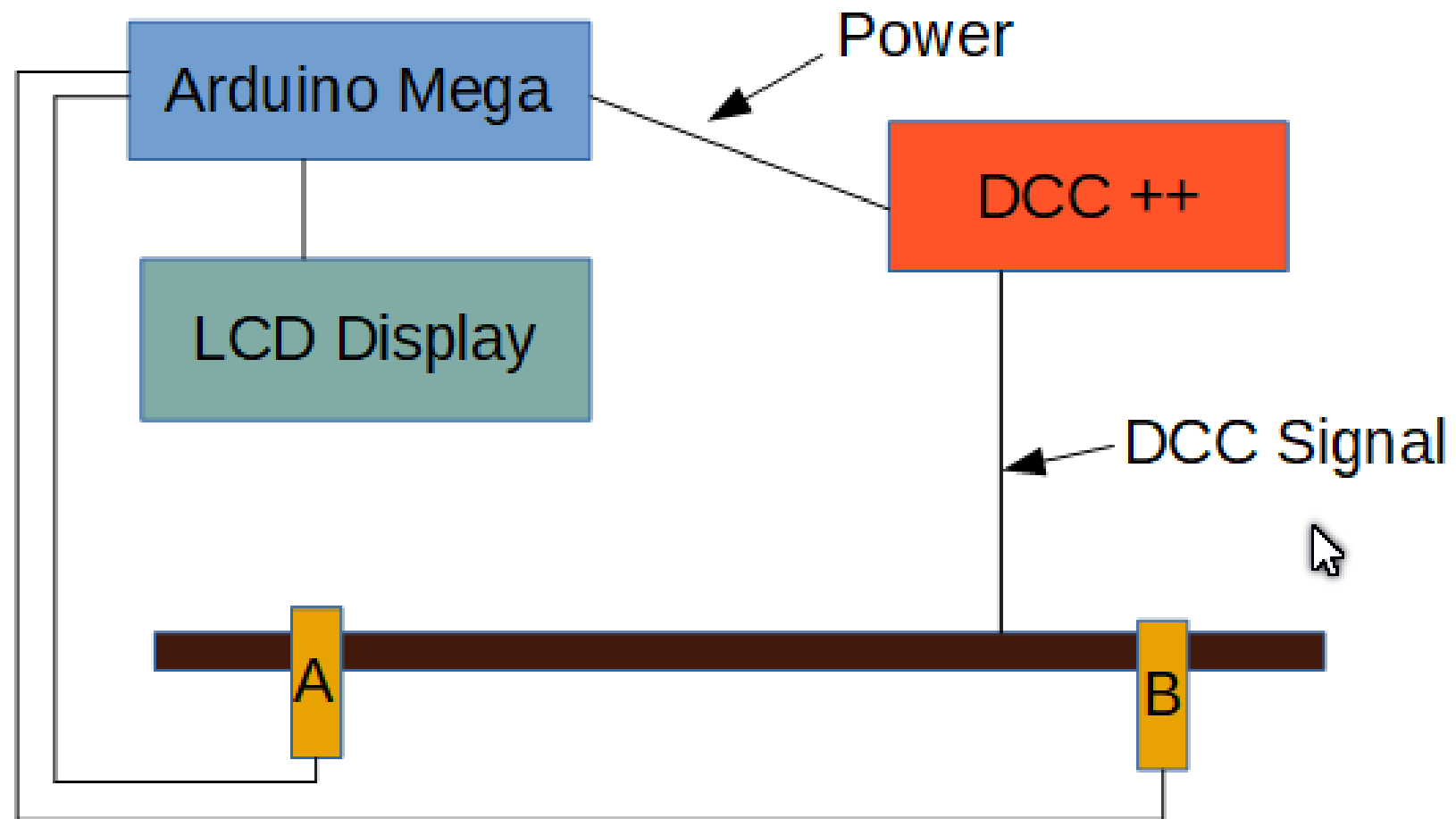
Speed Calculation Continued

- So we can base the speed calculation on the following
 - **$\text{Speed} = (\text{Distance} * \text{Time}) / \text{Scale}$**
- In order to calculate Speed to MPH we need other variables

Speed Calculation Continued

- L = length of travel in inches
- F = scale factor
- T = time in seconds for locomotive to travel length.
- **Scale MPH = $((L \times F/12)/5280) \times 3600/T$**

Speedometer Demo

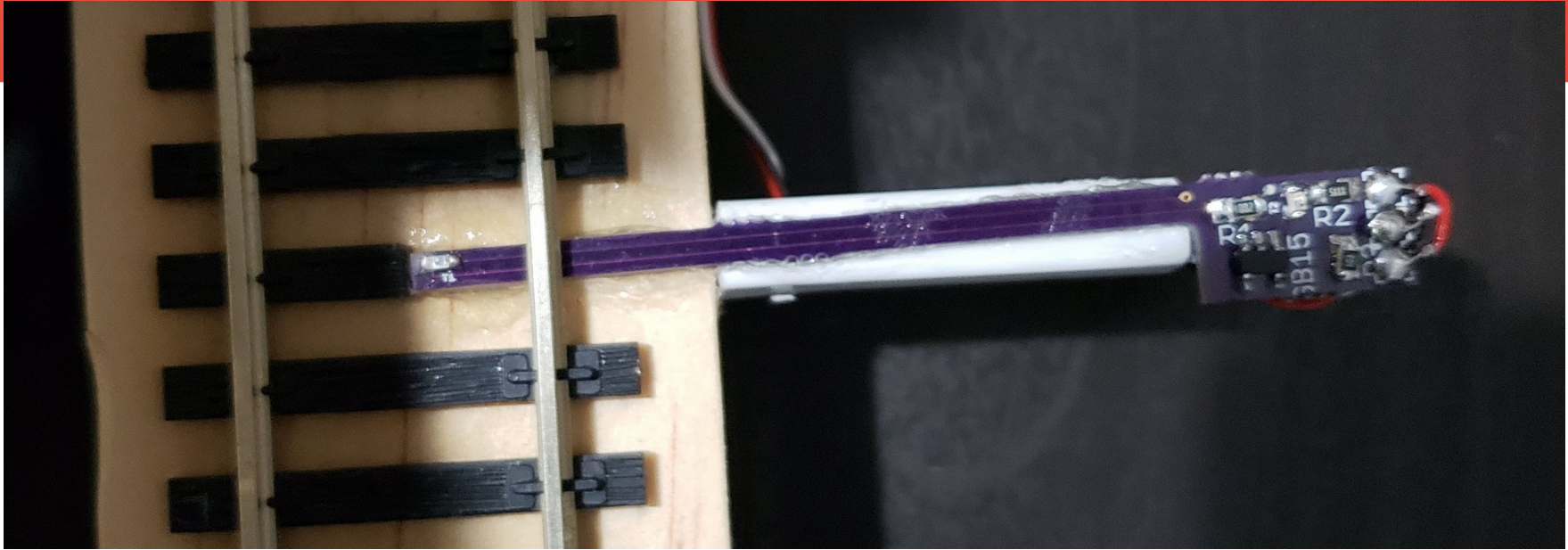


Comparative Photo Sensor



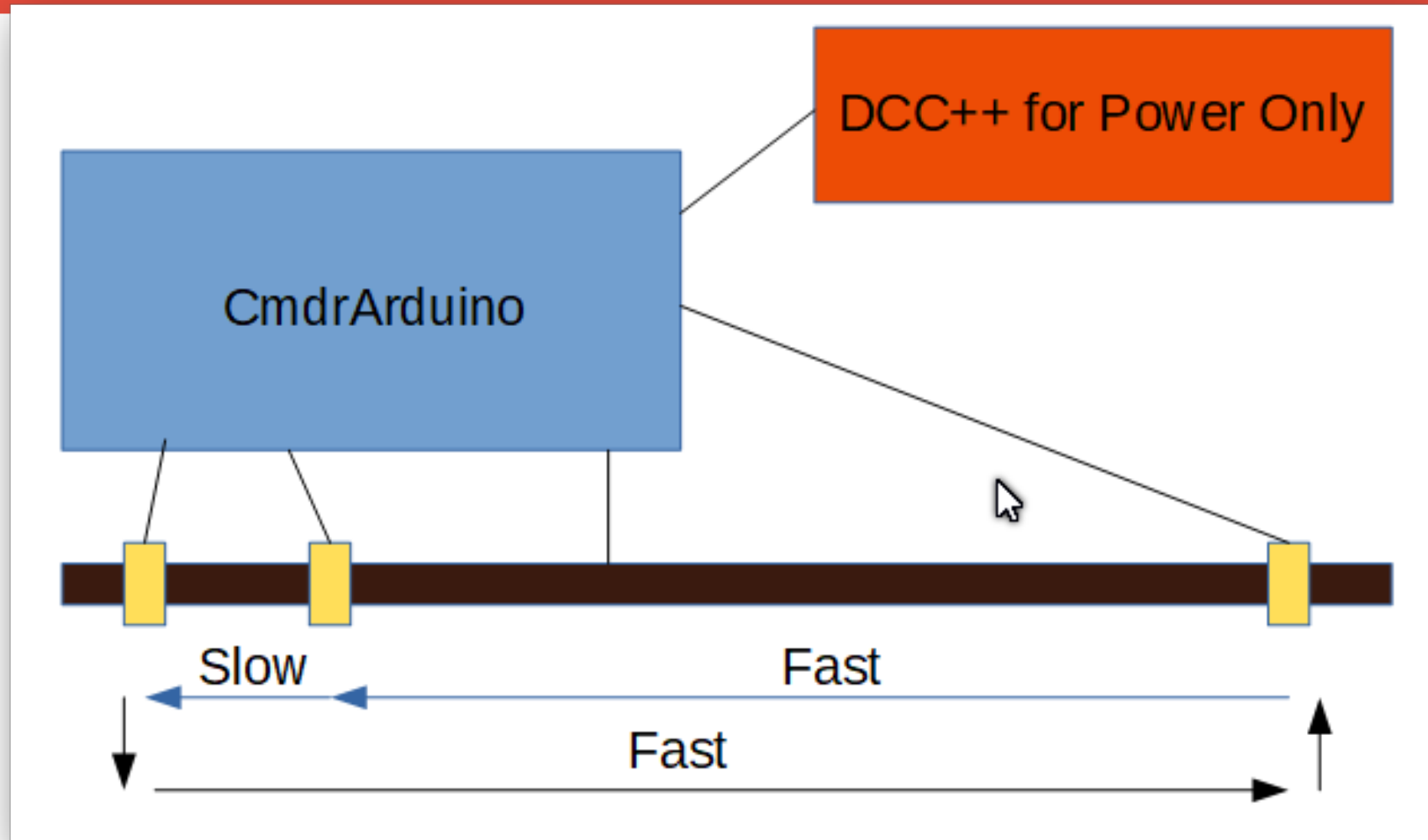
- Uses 2 photo sensors
- Compares T1 with T2
 - if T1 is less than T2 than something is covering T1
- Very compact and reliable
- Originally designed by Geoff Bunza
- Assembly Required

Comparative Photo Sensor



- Designed to replace ties
- Can be painted as long as the lenses are clear
- Can be buried or hidden in other ways
- Solid state so long life span

CmdrArduino Demo



Thank You for your time

**If you have any further questions you may reach me
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