

Educational Countdown Timer

- As a high school STEM mentor, designed 7-Seg countdown timer with *FIRST Robotics* students as an electronics project
- Arduino counts down the seconds until a programmed time (e.g., competition day) via battery-backed RTC
- Gives students sense of scale when creating competition robot
- Used to teach circuit design, prototyping, & troubleshooting, power requirements, PCB fabrication & rework, soldering, Arduino programming, clock accuracy, and serial communication in an engaging and non-intimidating way

FIRST 2605 Brian Willis

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Direct Messages

- Slackbot
- Brian Willis (you)
- Harry Conover
- Heather Steele
- Jaechan Lee
- James Gill
- Kazimierz Piroz
- Klara Schwarz
- Mila Brooks
- Nikolai McCarthy
- Serena Tyrant

Apps

#electronics 8.0 | 1.0 | Electronics

December 9th, 2018

Trent Bultsma 1:00 PM
I got my board working, my battery pack stopped working which is why I thought the board was broken. I also had to change the code I put up there because I accidentally added an extra input at the start instead of the end for each number which made it really wonky.

MPEG 4 Video

20181209_125358.mp4
26 MB MPEG-4 Video

0:08 / 0:20

2 replies Last reply 1 month ago

Trent Bultsma 1:32 PM
@Brian Willis do the arduinos need more power to run both 7 seg displays? because that might be why my 2 AA battery power supply didnt work.

Brian Willis 1:47 PM
Yes, I think AA batteries can output maybe 50mA at full charge, so it wouldn't take much time before the LEDs are demanding more than the batteries can source. This is why we'll be using a wall wart in the end. (edited)

Ben Mathews 2:09 PM
@Brian Willis My board runs your code, except the leds in the corners are constantly on. I tried testing @Trent's code and the board showed no response except lighting up the top row on the left. Code I wrote also does nothing, although there may be errors in it as I haven't been able to debug.

Trent Bultsma 2:12 PM
My code was broken @Ben Mathews but should have done something. Did you try connecting the unregulated input to the VIN pin and is the serial input on the right connected to ground?

Ben Mathews 2:17 PM
Tried connecting right serial in to ground. No change

2 replies Last reply 1 month ago

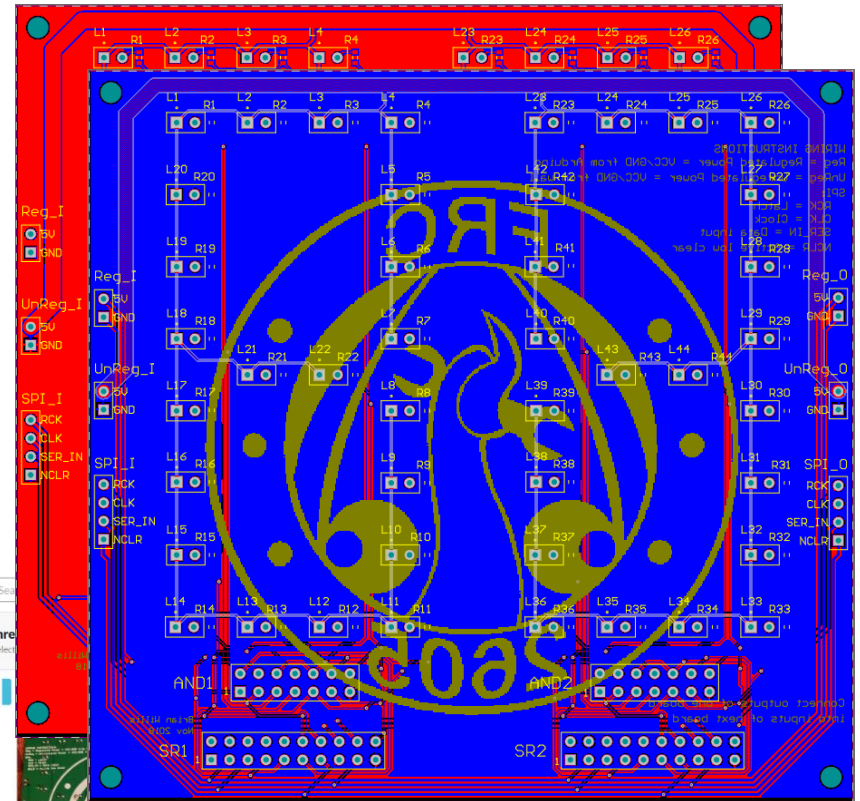
Ben Mathews 2:46 PM
Image from Android

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Students take PCBs home and troubleshoot programming and rework with me via Slack team messaging



11 replies

Brian Willis 1 month ago
Hard to say for sure. Double check unregulated input, check your wires, get it working it's drop off a working

Ben Mathews 1 month ago
Checked everything

Brian Willis 1 month ago
I'll try to drop off a grab. I'll keep you

Ben Mathews 1 month ago
Ok thanks

Ben Mathews 18 days ago
Could you take a

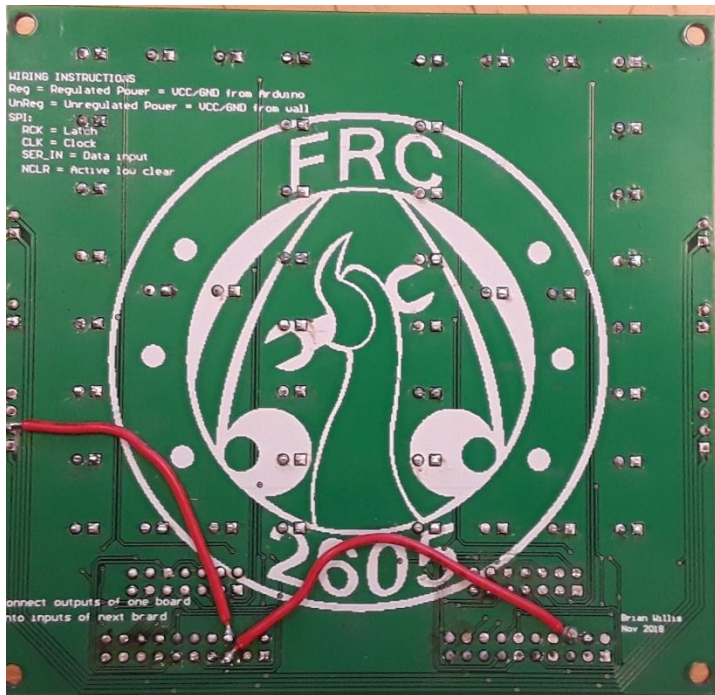
7segino

```

1 #define RC
2 #define CLK
3 #define SER_IN 5
4 #define NCLR 4
5 String num[] = {"1111111", "0100000", "1101101",
  "1111001", "0110011", "1011011", "1011111",
  "1110000", "1111111", "1110011"};
  
```

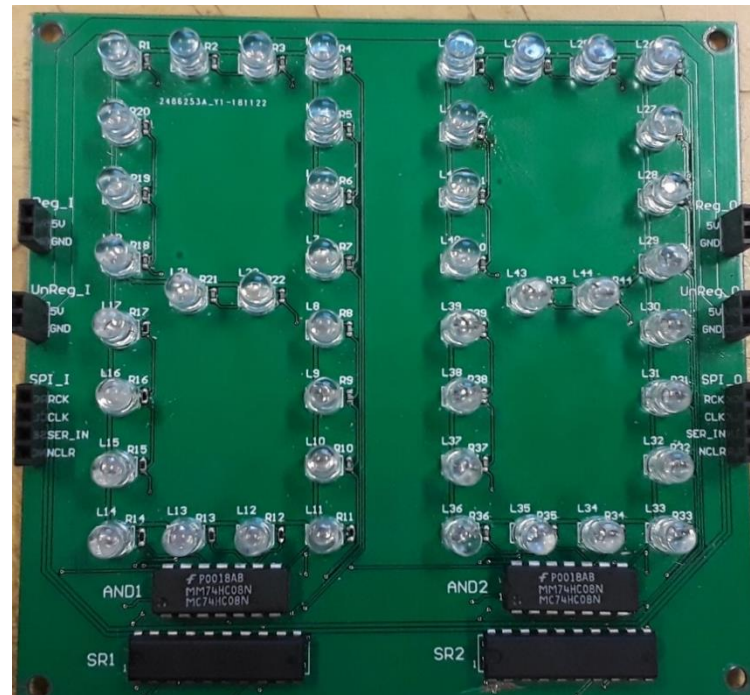
Brian Willis 18 days ago
So I ran your code and found that SER_IN never goes high due

Image of the 7-segment display showing the time 3:40:10.22.08. Below the display are labels for Days, Hours, Minutes, Seconds, and CentiSeconds. A handwritten note below the display reads 'Days Until Bag & Tag'.



7-Seg Module (Green)

- Design incrementally taught to students over the course of ~6 weeks by breaking up into sections (power reqs., digital logic, programming, etc.)
- Soldering, troubleshooting, rework, and programming completed with direct student contribution
- Error in trace placement led to PCB rework training



Controller Module (Purple)

- PCB incorporating Arduino, RTC, and I/O headers used as an introduction to PCB fabrication via KiCAD
- Instructed schematic & PCB design with best practices
- Constructed entirely by students from project creation to purchasing with regular feedback

