



# Important Lab Notes

- UNO board must be supplied from +10V at the Vin pin from the bench supply or from a battery. Use the same +10V supply voltage for the encoder.
- UNO board has an on-board +5V regulator, which can be used as the +5V power supply for the speed controller circuitry
- +5V from the UNO board and +5 V from an external supply must not be applied at the same time: use one or the other
- All circuitry must share the same ground

**If you have questions, stop and consult with TA or instructor**

- The UNO board will fail if:
  - The supply voltage at the Vin pin exceeds 12 V, or is reversed
  - If more than +5V or less than 0 is applied to any pin other than Vin



## Lab 4 Part A

1. If necessary, re-construct and re-test complete Lab 3 speed controller: do not proceed before your Lab 3 speed control is completely functional
2. Connect UNO and test a simple example (Blink)
3. Use UNO to control speed, in both directions

**Reminder:** both partners should read and understand page 1. Always double check your power supply connections. If you have questions, consult with TA or instructor



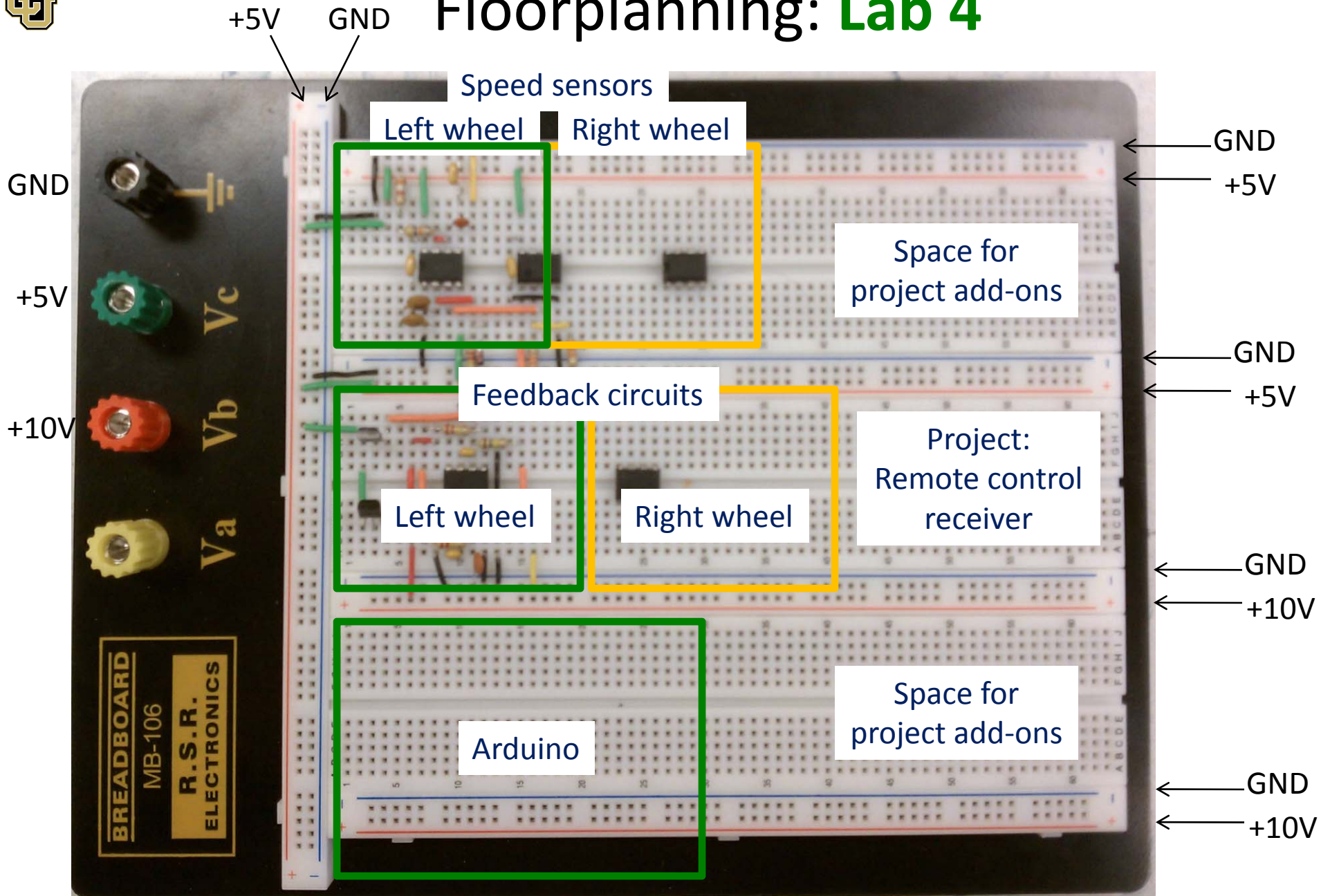
# Lab 4 Part A Task 1

Note: this Task, you are not using the UNO board yet.

1. Construct and test complete Lab 3 speed controller
  - Follow the required floorplan if not done already (see next page)
  - Follow standard design practices: use decoupling capacitors, low-profile component placement, neat wiring, short ground loops
  - Have complete circuit design captured in LTspice
  - Test the complete speed controller as in the Lab 3 demo
  - Have your work checked by TA or instructor before moving to Task 2
  - In the report include a copy of the complete LTspice schematic and summarize any modifications you made compared to your Lab 3 circuit design



# Floorplanning: Lab 4





## Lab 4 Part A Task 2

Note: in this Task, the UNO is powered from the USB. Do not connect any external power supplies

- Plug in the UNO board, follow the USB driver install instructions
- Test the Blink example
- Modify the Blink example to have the LED on for 2 seconds, and off for 0.2 seconds
- Modify the Blink example to include an external switch: blinking should stop or start depending on the external switch

Include a copy of your code in the report



## Lab 4 Part A Task 3

- Use UNO to control the speed. Follow the setup shown on the next page
- Test using the example **speed control** code
- Modify the **speed control** code to perform the following in void loop():
  - Stop, wait for the switch to be in the ON position
  - Wait 1 second
  - 360° clockwise rotation of the robot (not the wheel)
  - Stop and wait 1 second
  - 360° counter clockwise rotation of the robot (not the wheel)
- In the report, include a copy of your code
- With robot on the bench use scope to capture signals  $V_{o1}$ ,  $V_{o2}$  (see next page) during one execution of the loop. Include this result in your report

