ECSESS RoboElectronics

Breadboards and Power Supplies Build

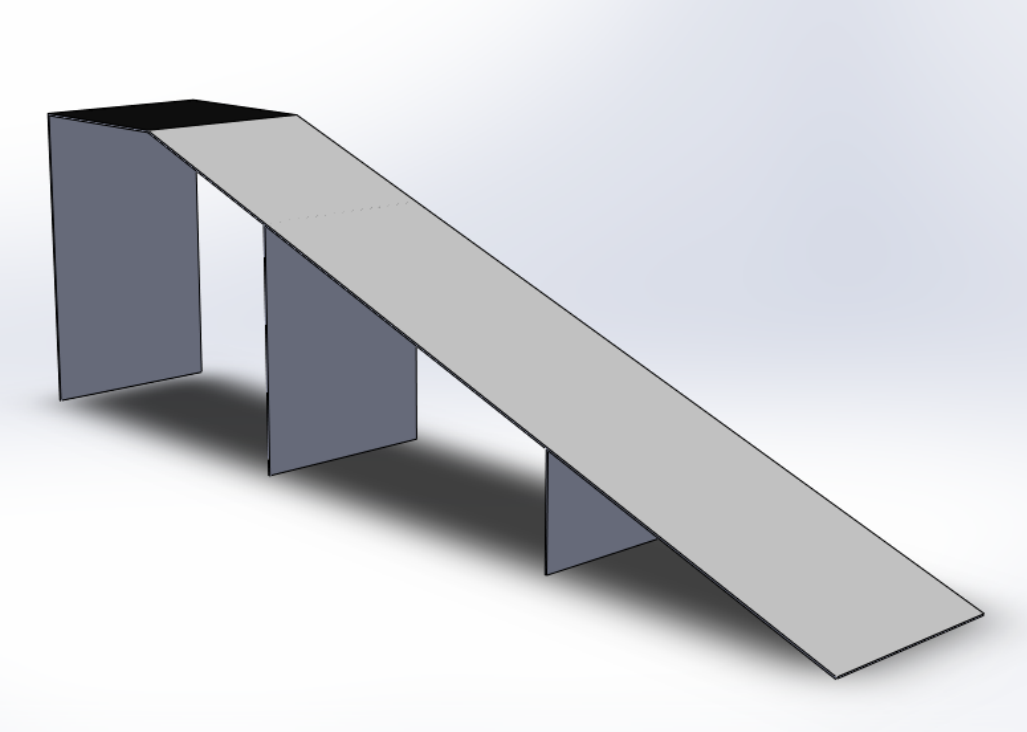
Robot Restrictions:

The robot must observe the following:

1. The entire robot must fit in the kit box, which is 20 cm x 13 cm
2. It must be designed to survive a 15 inch fall
3. It must stop in the “stop zone” at the top of the ramp
4. It must stay on the ramp
5. It must use an autonomous design, where there is no input from the user
6. There must be an ON/OFF switch between the battery and the board
7. There must be a LED between the battery and ground
8. There must be two modes of operation
    1. A STANDBY mode, where the robot is powered but not moving or sensing
    2. An ACTIVE mode, where the robot can move
9. There must be a delay between when the robot is powered up and starts to move.

Arena Setup

- The arena will be a ramp with no sides with the following dimensions.
  Robots will be placed at the bottom of the ramp.



Goals for Today

- Collect kits and ensure you have everything you need
- Build the power circuit with the voltage regulator
- Build LED circuit

Next Week

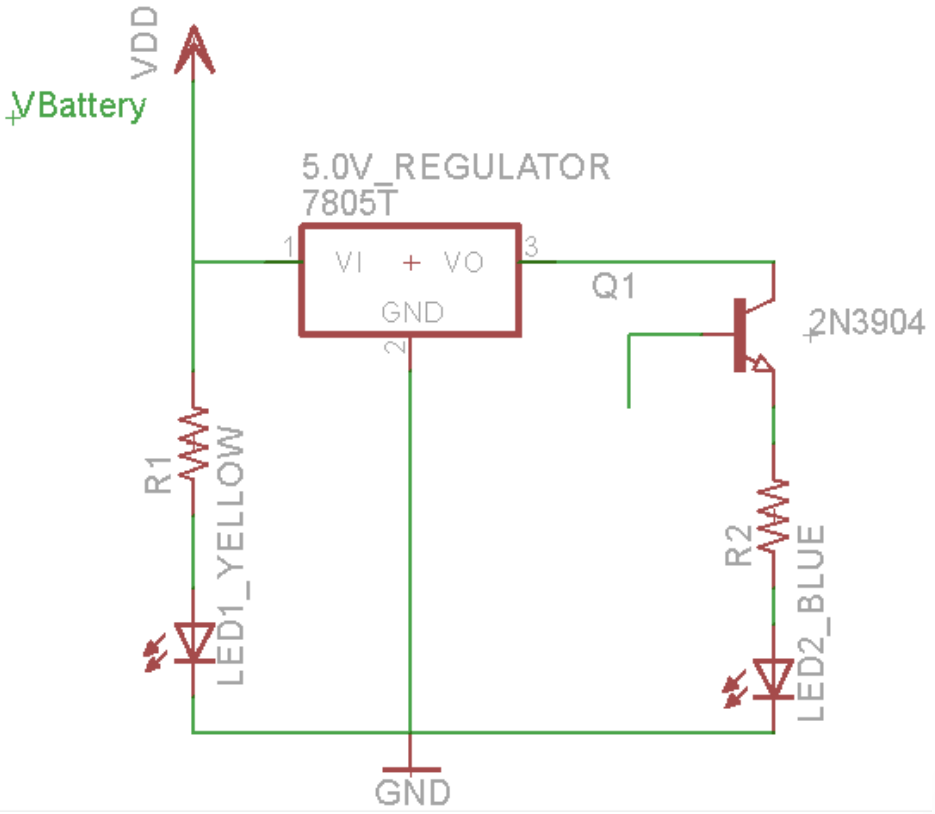
- Programming in C with microprocessors
- **Bring a laptop and install software from website ahead of time**

Required Material

- LED Circuit
  - Quadruple AA battery holder
  - 4 x AA batteries
  - Yellow LED
  - LM7805 5.0V Regulator
  - Resistors
  - Breadboard
  - Wire
  - Switch

Circuit to Build

- LED Circuit
  - Use the 4AA battery holder to create 6.0V
  - Connect the slide switch between the batteries and the bread board
  - Connect the LM7805 voltage regulator to get 5.0 V
  - Calculate the necessary resistance for the two voltages
  - Connect the loose wire of the transistor to the power rail to turn the blue LED on and off



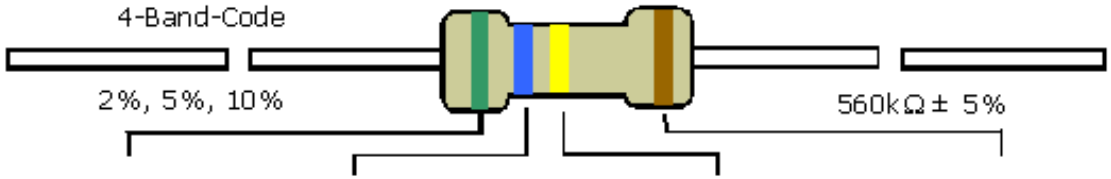
Common Mistakes

- Ground is the black wire of the battery pack. All grounds are the same and should be connected together
- Read the datasheet to know what pin corresponds to what.
  - The voltage regulator has 3 pins: V_{in}, V_{out}, and GND
- Put the LEDs in the right way, the flat side of the LED is the negative terminal
- When in doubt, feel free to ask questions! We are here to help ☺

LED Reference Sheet

1206 smd LEDs 3.2x1.6x1.1MM		Forward voltage		Dominant wavelength		Luminous Intensity		Viewing angle
Part number	Emitting Color	(V) IF=20mA		IF=20mA		(mcd) IF=20mA		
		TYP	MAX	MIN	MAX	TYP	MAX	(degree)
SS-1206R	Red	2.1	2.3	640	650	650	660	120
SS-1206Y	Yellow	2.2	2.8	590	600	550	560	120
SS-1206O	Orange	2.2	2.8	635	645	470	480	130
SS-1206B	Blue	3.2	3.4	465	475	650	660	120
SS-1206G	Plain Green	3.2	3.4	568	573	420	430	120
SS-1206JG	Jade-green	3.2	3.4	530	540	590	600	120
SS-1206W	White	3.2	3.4	X=0.285	Y=0.295	500	800	120
SS-1206P	Pink	3.2	3.4	----	---	300	400	120
SS-1206UV	UV(Purple)	3.2	3.4	380	400	120	160	120

Resistor Color Code Reference



COLOR	1st BAND	2nd BAND	3rd BAND	MULTIPLIER	TOLERANCE	
Black	0	0	0	1Ω		
Brown	1	1	1	10Ω	± 1%	(F)
Red	2	2	2	100Ω	± 2%	(G)
Orange	3	3	3	1KΩ		
Yellow	4	4	4	10KΩ		
Green	5	5	5	100KΩ	±0.5%	(D)
Blue	6	6	6	1MΩ	±0.25%	(C)
Violet	7	7	7	10MΩ	±0.10%	(B)
Grey	8	8	8		±0.05%	
White	9	9	9			
Gold				0.1	± 5%	(J)
Silver				0.01	± 10%	(K)

Electronix Express / RSR
http://www.elexp.com

1-800-972-2225
In NJ 732-381-8020

Resources

- Resources:
  - LM7805 5.0V Regulator Datasheet: https://www.sparkfun.com/datasheets/Components/LM7805.pdf
  - Yellow LED Datasheet: https://www.sparkfun.com/datasheets/Components/LED/COM-09594-YSL-R531Y3D-D2.pdf
  - 2N3604 Transistor:

    https://www.fairchildsemi.com/datasheets/2N/2N3904.pdf