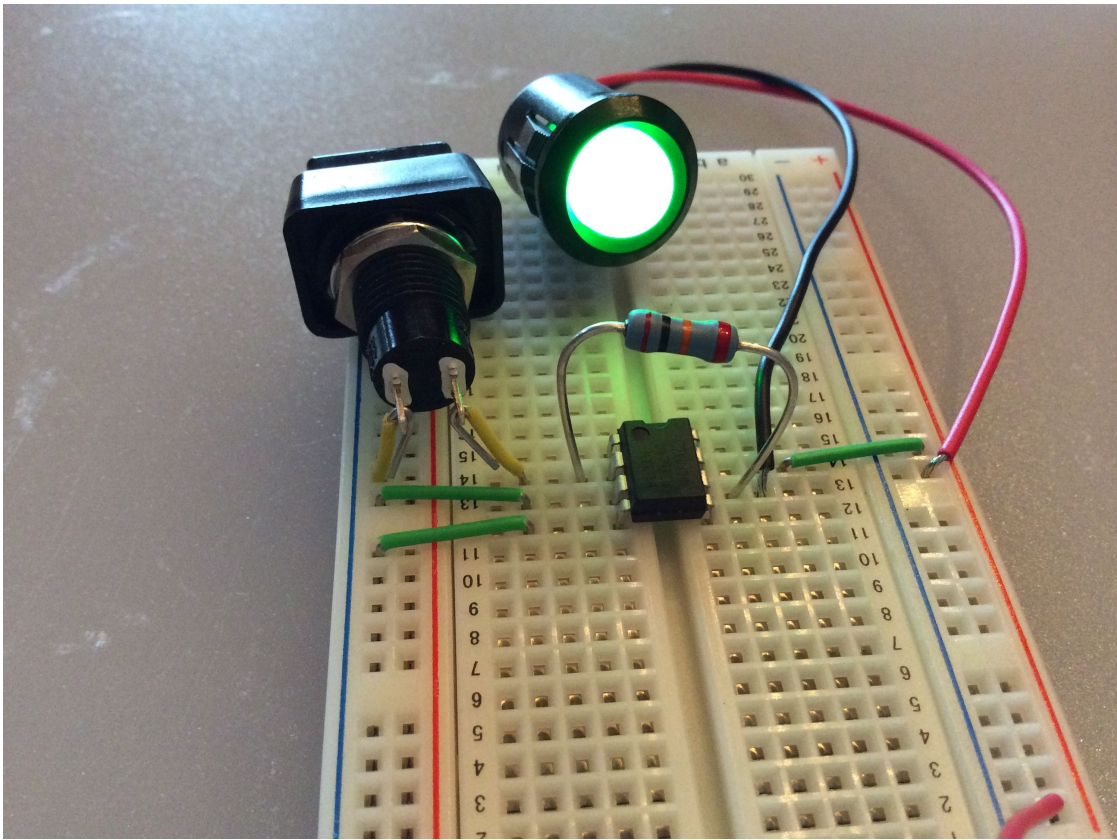




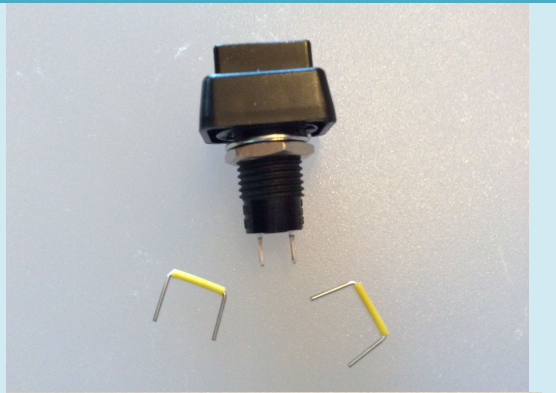
U-do-it: to illustrate the value of a physical model, electronic components “stand-in” for the bacterial photography system’s biological ones

Electronics kit

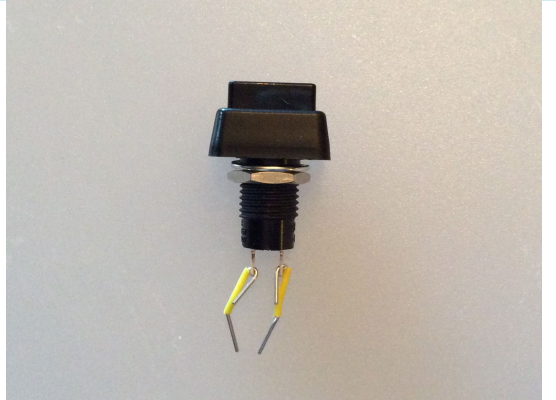
<u>PART</u>	<u>Catalog #</u>
breadboard	64
LED	B4383H5 -ChicagoMiniature/IDI
Push Button Switch	54-390 NTE
Compensated OpAmp	Jim-Pak LM741CN-6
Jumper wires	JW-70
20K ohm resistor	HW320
9V battery leads	090-805
9V battery	

IN ADVANCE

(1) Unpack switch and two small wires from the jumper kit

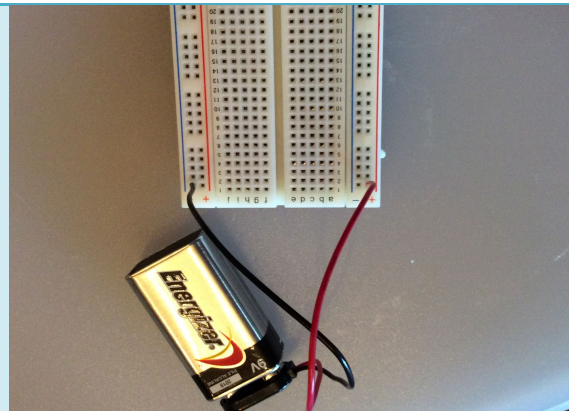


(2) Thread wires through the posts at base of the switch. Connect them so the metal portion of the wires is in direct contact with the metal posts on switch.

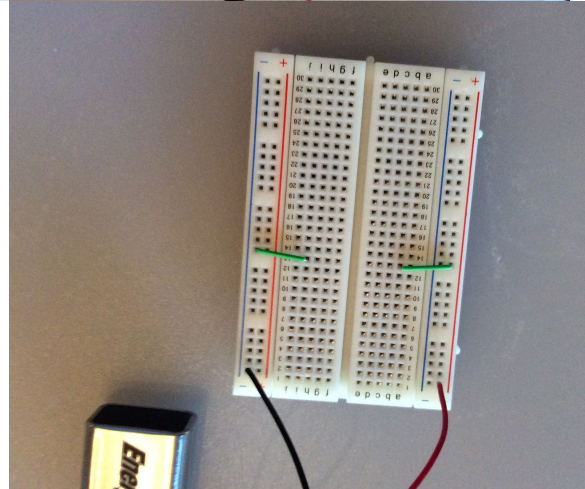


WARM UP ACTIVITY

(1) Power the breadboard by connecting ground from a 9V battery to the blue (-) rail of the breadboard and connecting the plus side of the battery to the red (+) rail on the opposite side of the breadboard

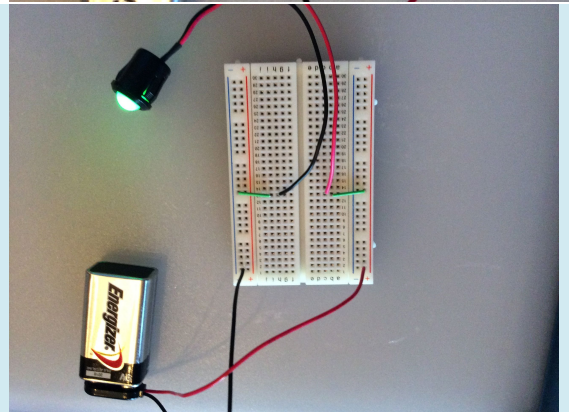


(2) Run power to the central portions of the breadboard using two small wires



(3) Power the LED

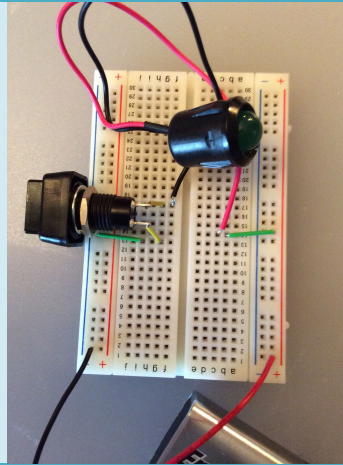
Besides unplugging things, is there a way to turn the light on/off?



(4) Add the switch to the circuit so that the LED can be turned on and off

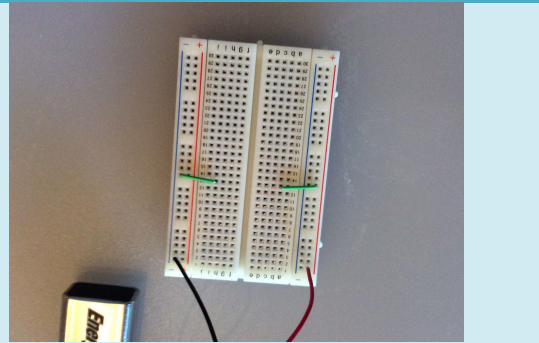
(photo is on the next page— but you should try it first!)

(4) Add the switch to the circuit so that the LED can be turned on and off

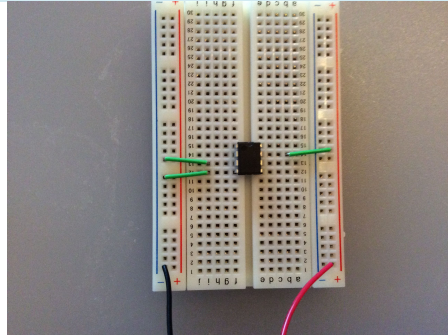
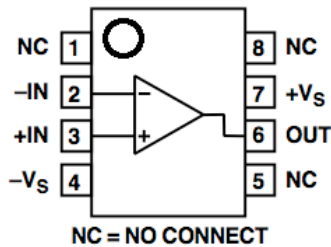


MODELING THE BACTERIAL PHOTOGRAPHY GENETIC CIRCUIT WITH ELECTRONICS

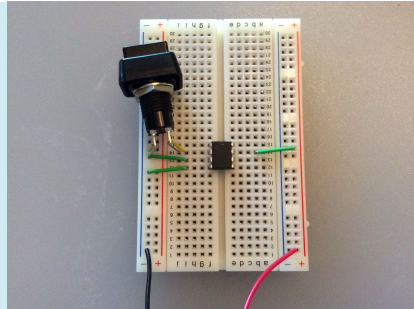
(1) Start as you did in the warm up activity



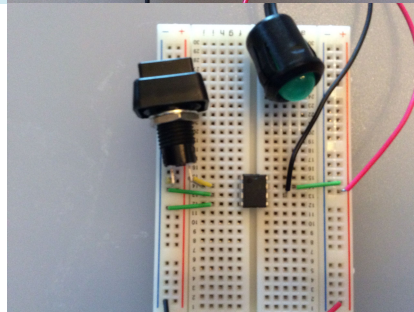
(2) Add an Op Amp across the trench so pins 3 and 4 are to ground (you'll need one more wire) and pin 7 is to power.



(3) Connect the switch to the ground and to pin 2 on the Op Amp



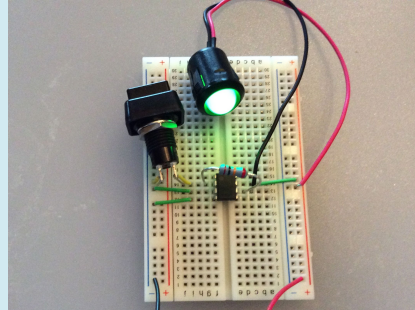
(4) Connect the LED to pin 6 on the Op Amp and to the power



Does the LED turn on/off with the switch?

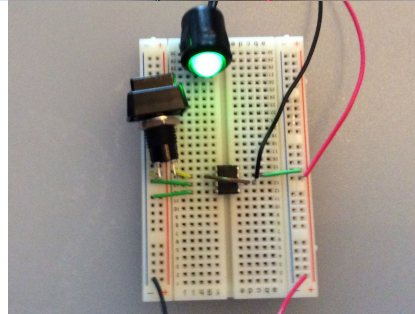
(5) Connect a 20K Ohm resistor across the Op Amp from pin 2 to pin 6

Does the LED turn on/off with the switch?



(6) Connect the Op Amp's pin 2 and pin 6 with a wire instead of the resistor

Does the LED turn on/off with the switch?



Use the behavior you've observed in this electronic model to think about the genetic circuitry and the flow of information through it