



# AV Riot

[www.avriot.com](http://www.avriot.com)

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Alicia McBarron  
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## GeekGirlCon 2012

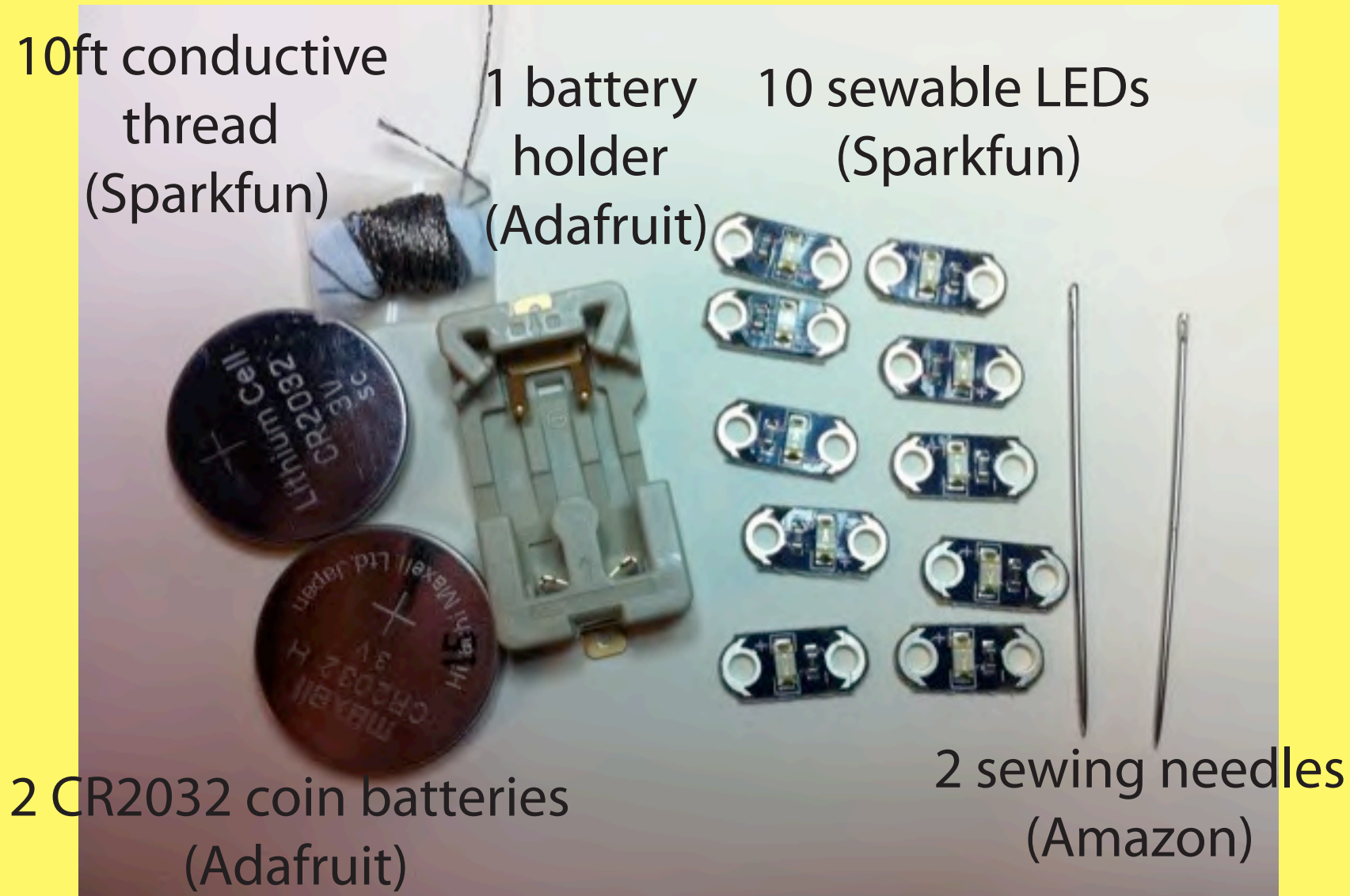
# What the heck are we doing?

Some assumptions:

- (I) You don't know anything about circuits
- (II) You do know how to sew (if not, don't worry, ask an assistant for a demo!)



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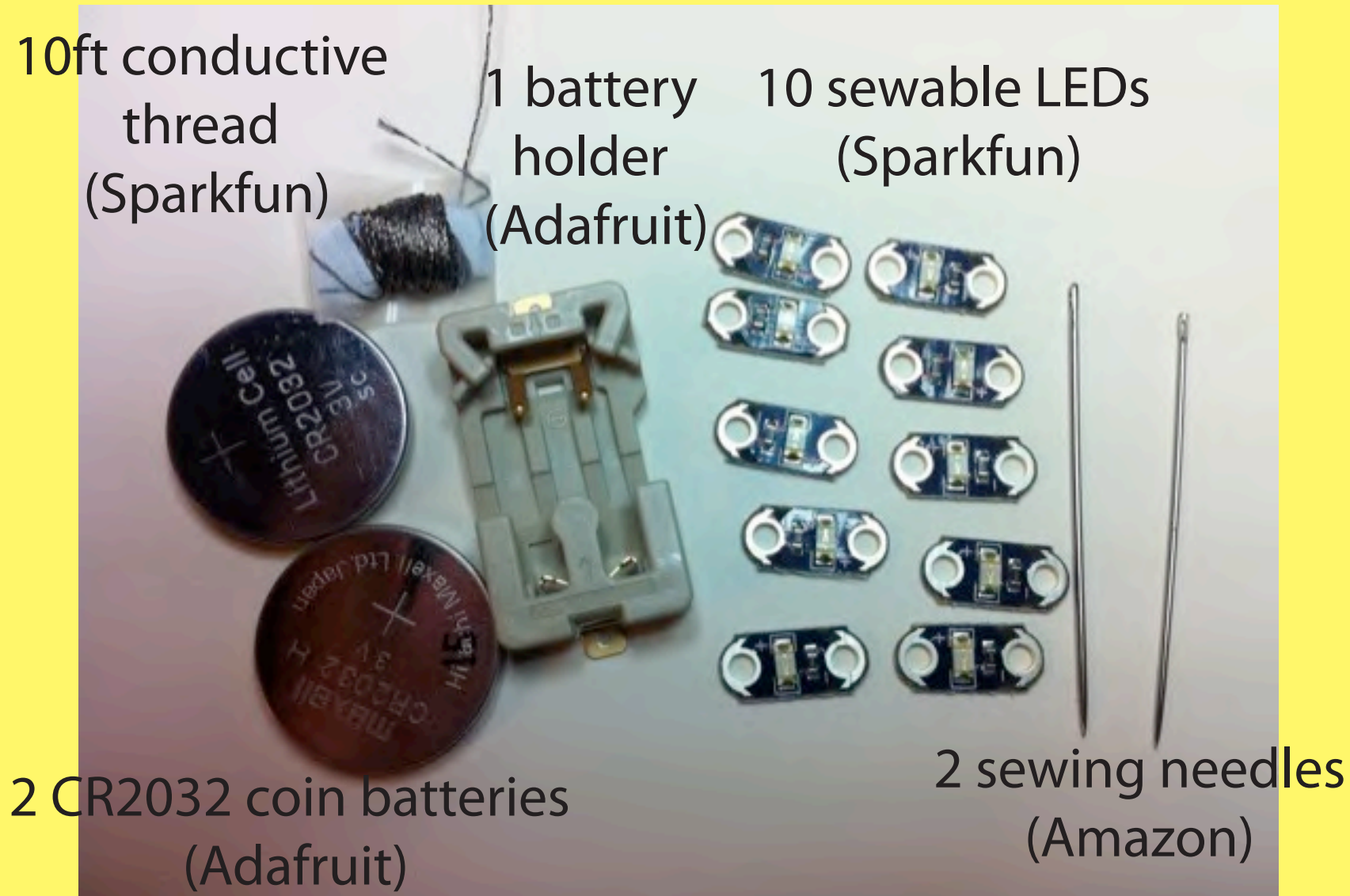


+ a knowledge of circuits

**Not pictured:** Scarf fabric (jersey material, local fabric store), random fabric pieces, regular thread, scissors

= awesome light up scarf thingy!

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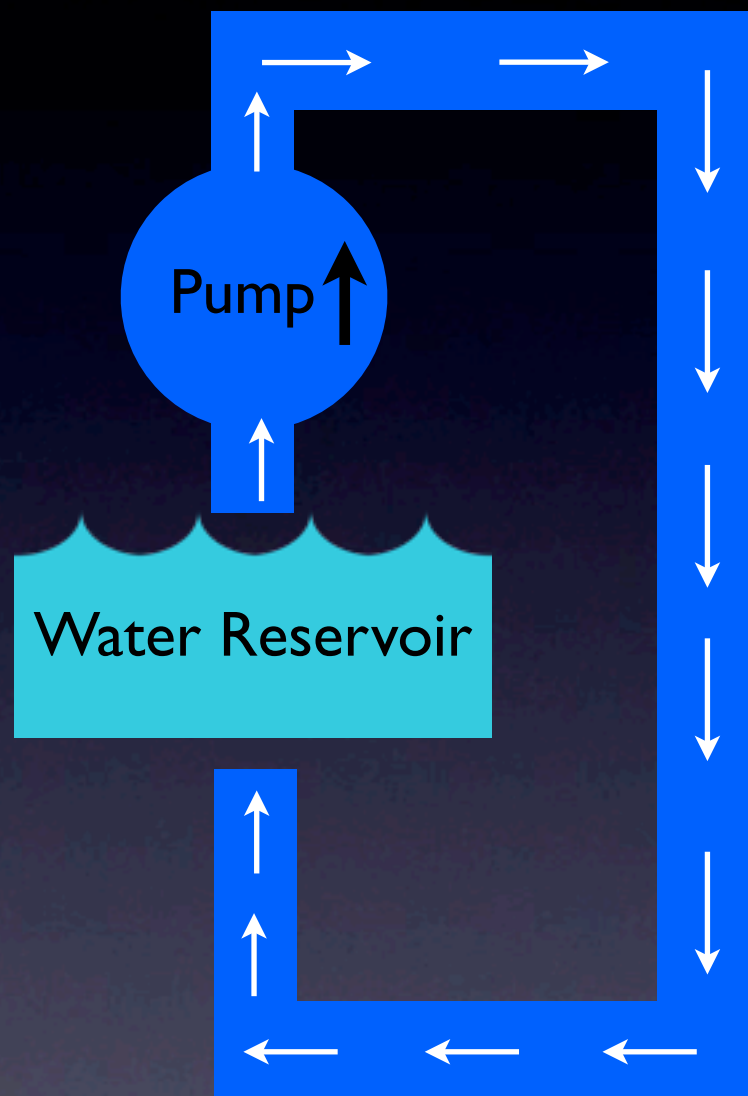
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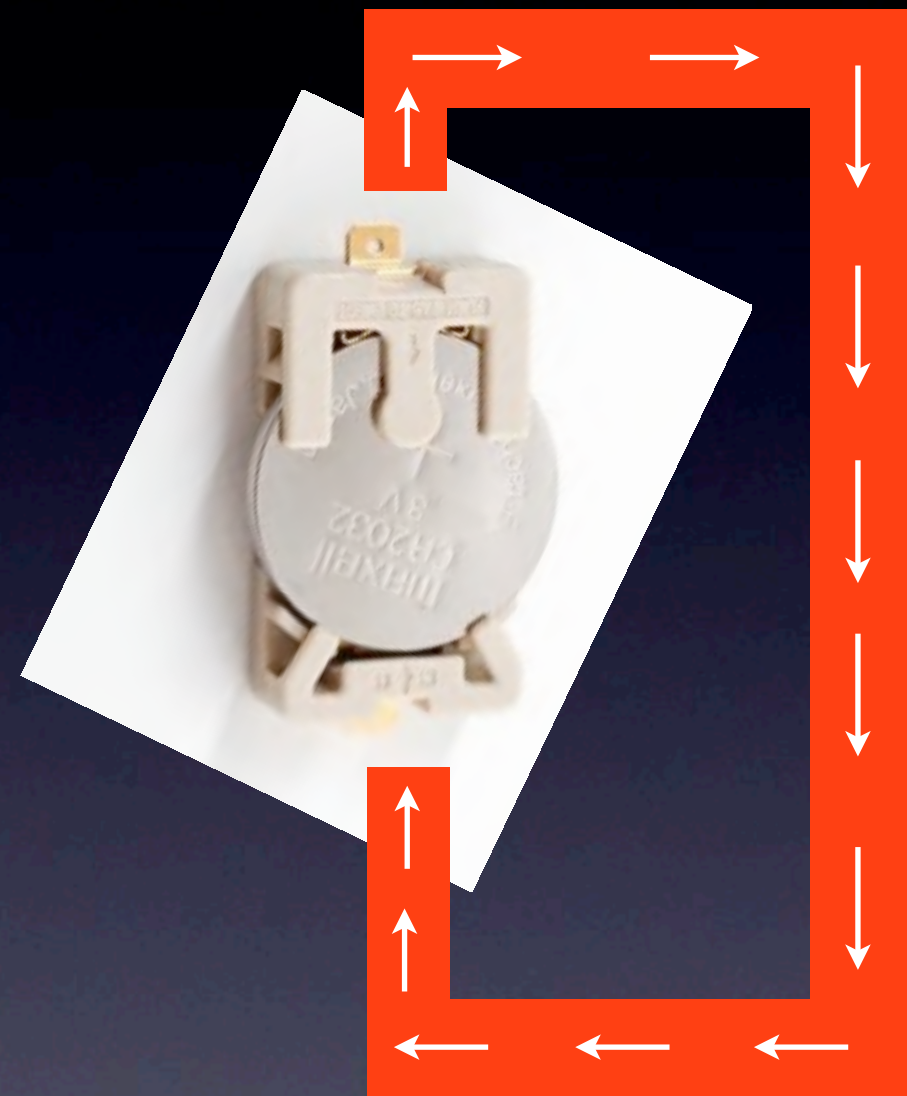
= awesome light up scarf thingy!



# Electricity = Water Flow



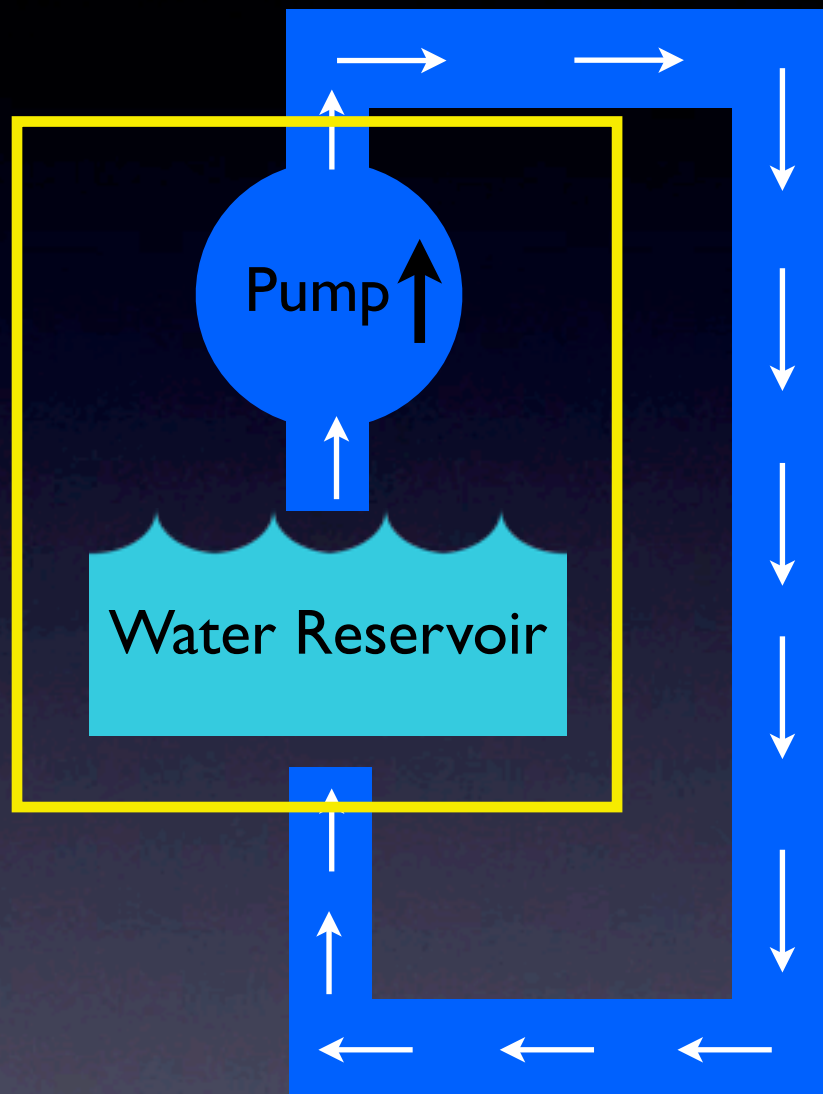
Water-Pump System



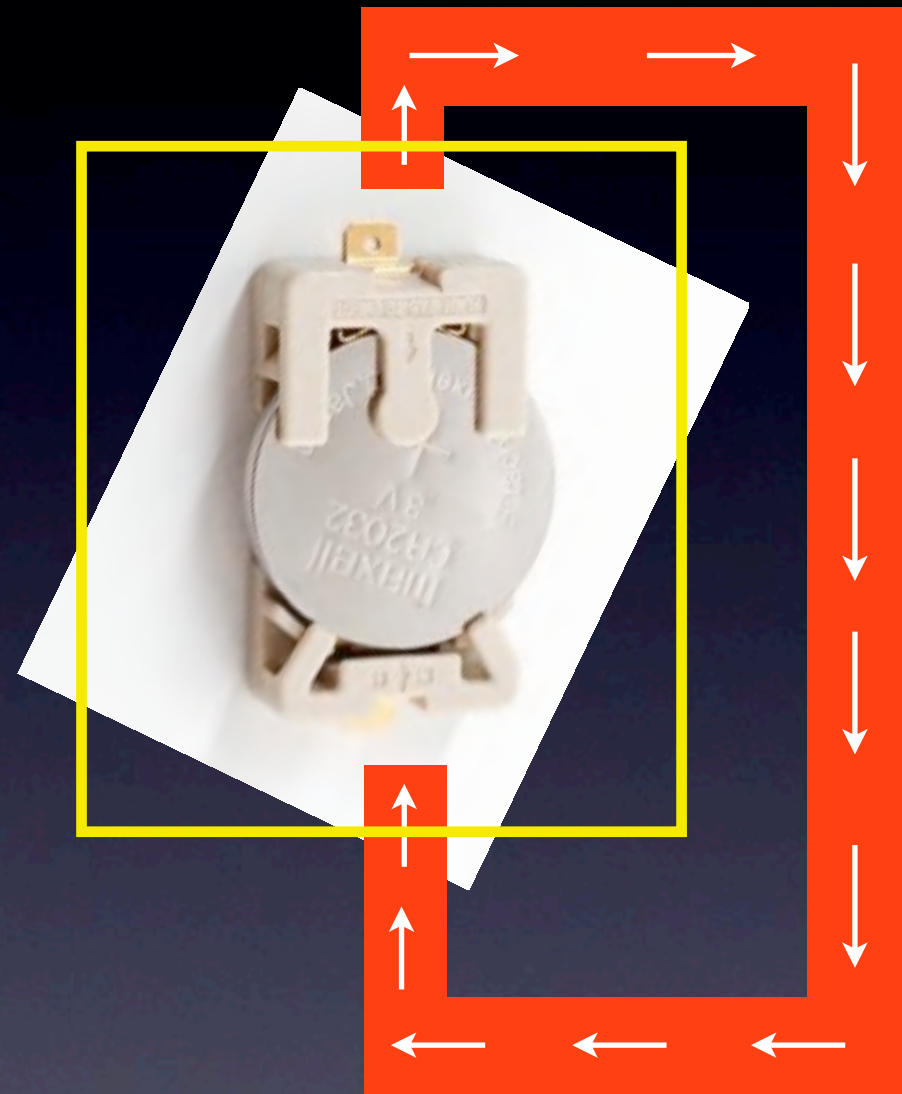
Battery System

# Electricity = Water Flow

## Battery = Pump+Reservoir



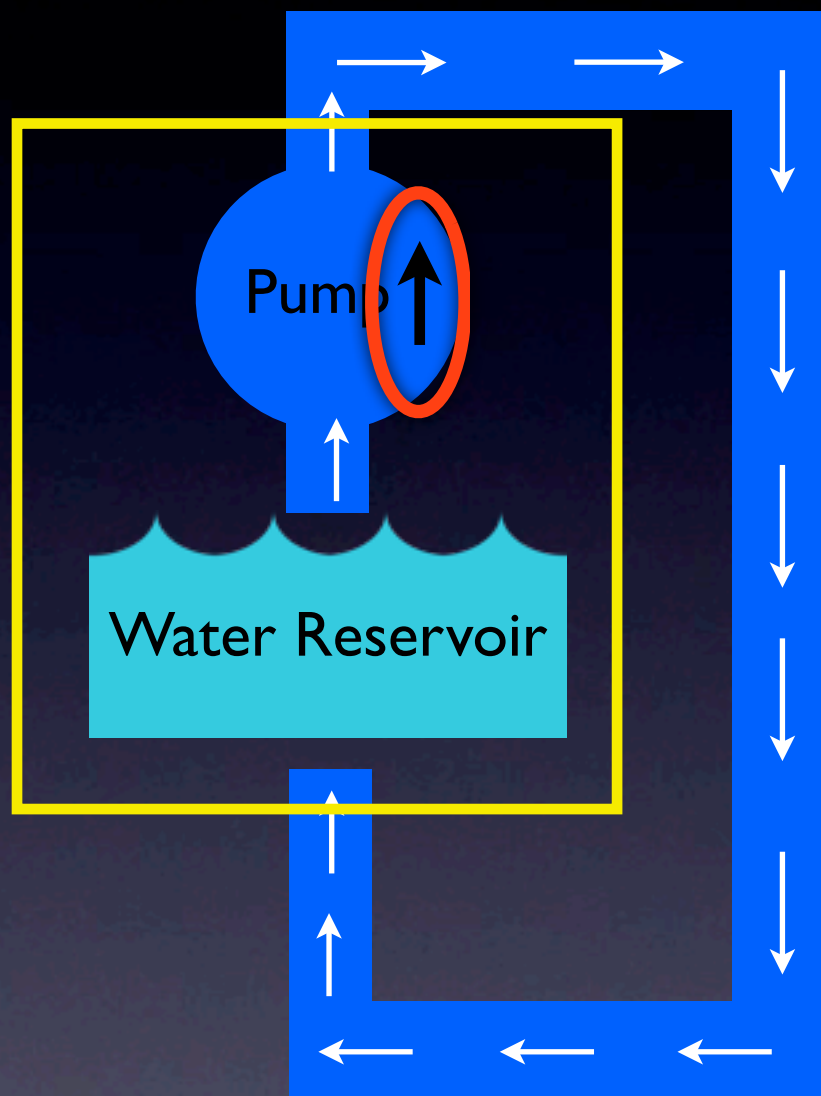
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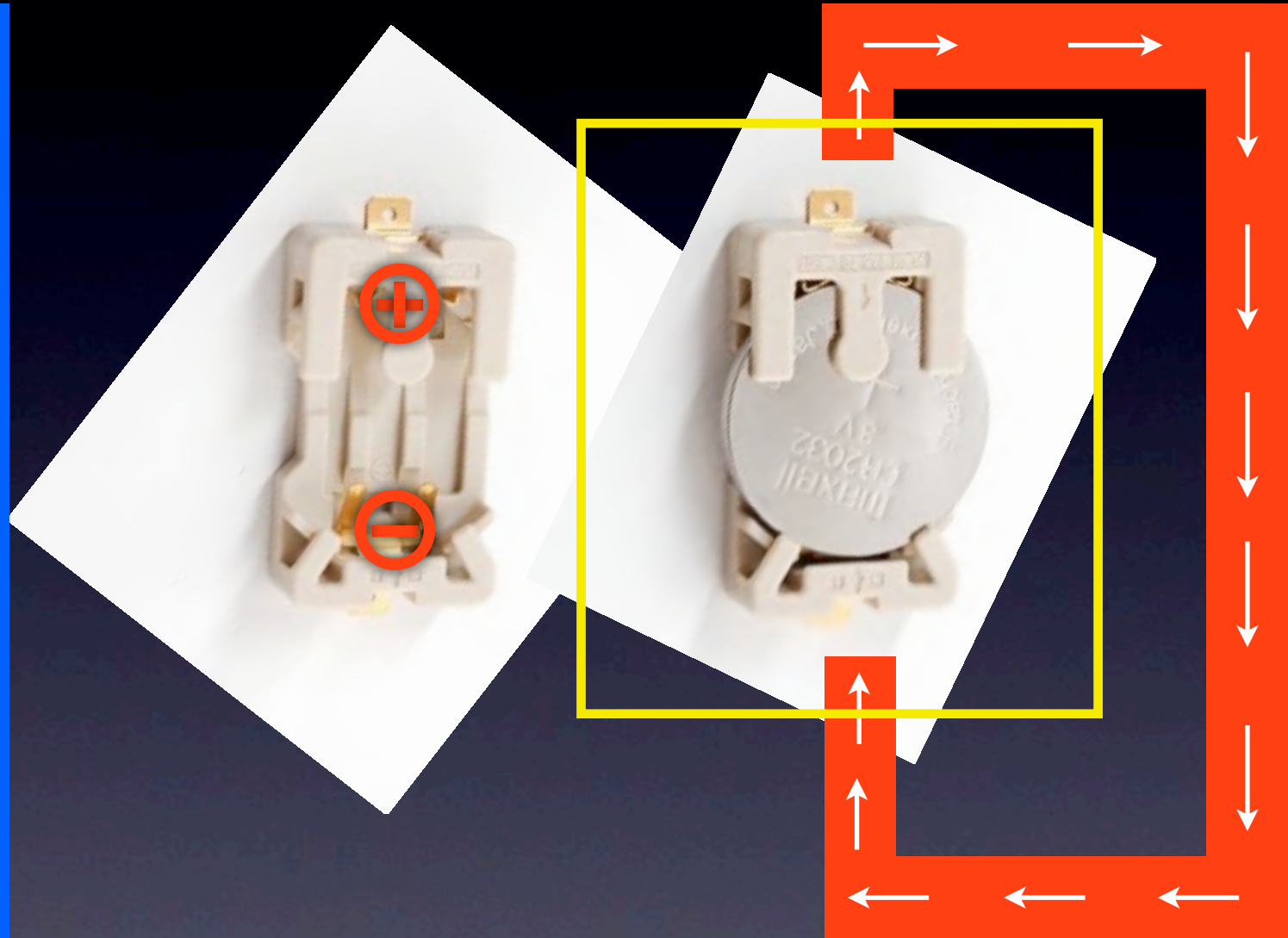
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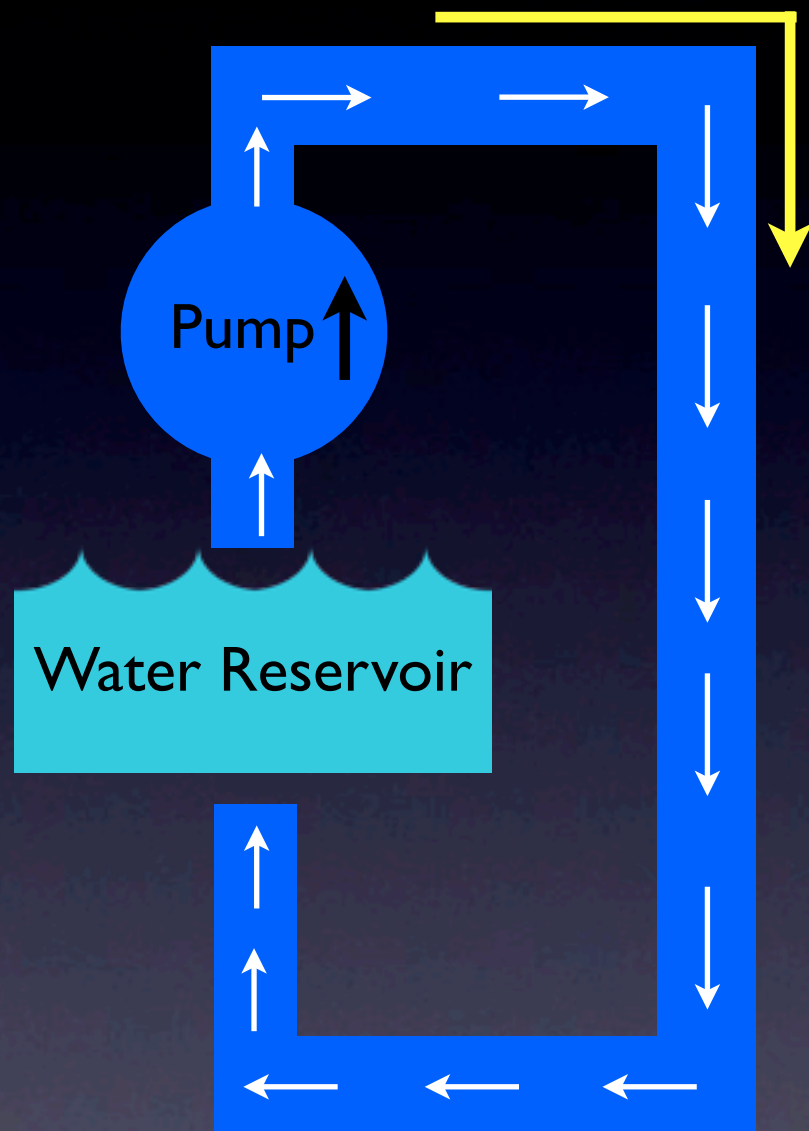
Battery System

(Due to a poor naming decision by Benjamin Franklin, the actual flow of electricity is in the opposite sense of our water diagram, but we don't have to worry about that now.)

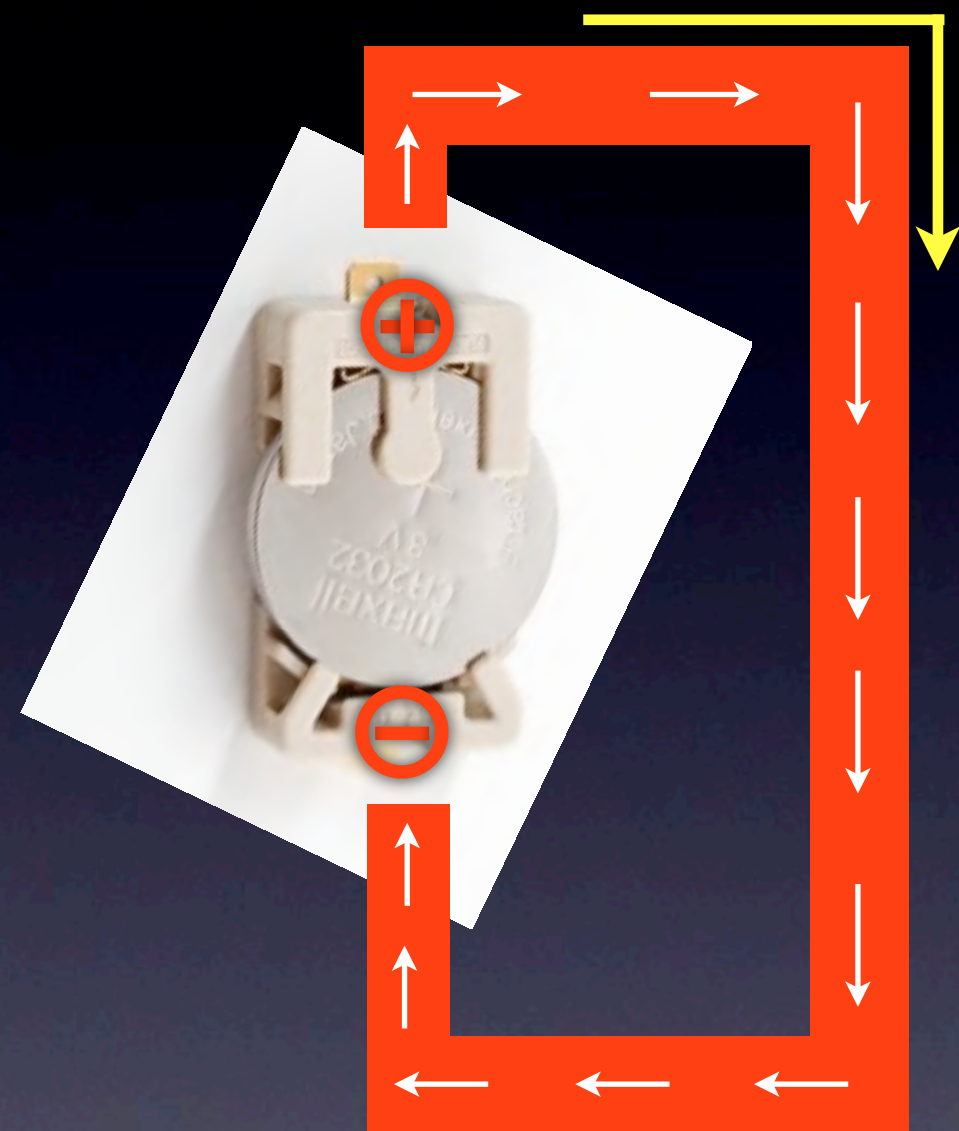


# Electricity = Water Flow

## Flow of Electricity = Flow of Water



Water-Pump System

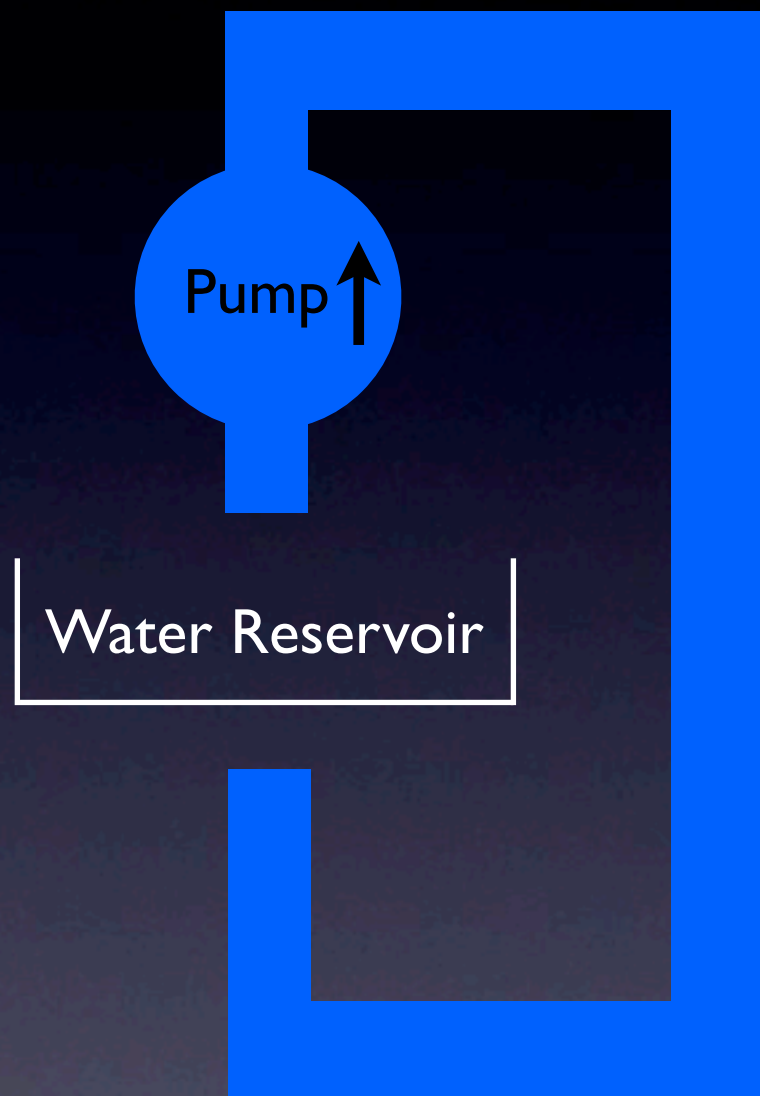


Battery System



# Electricity = Water Flow

If nothing resists the flow of water in our pump system, we'll quickly run out of water in our reservoir without anything to show for it!



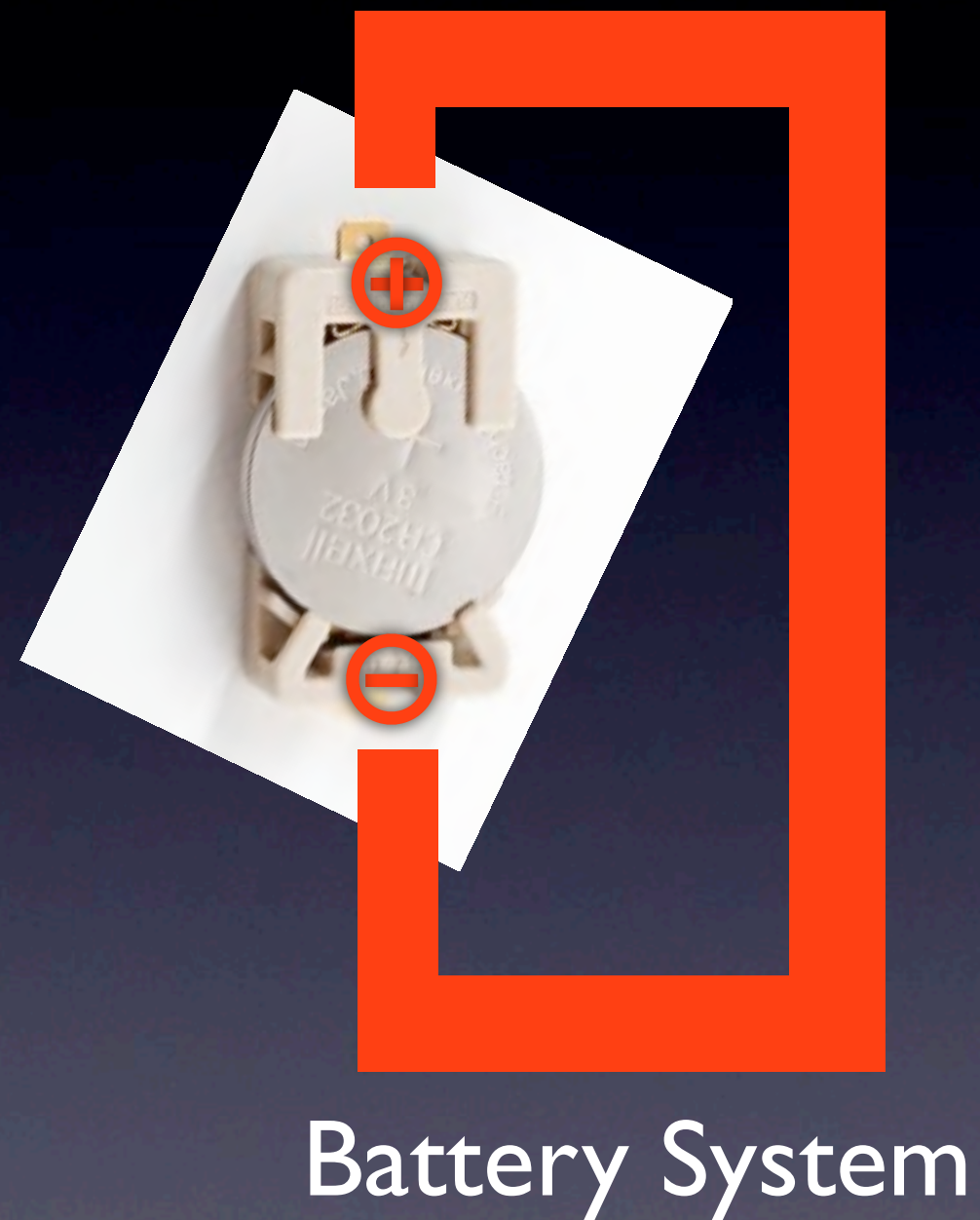
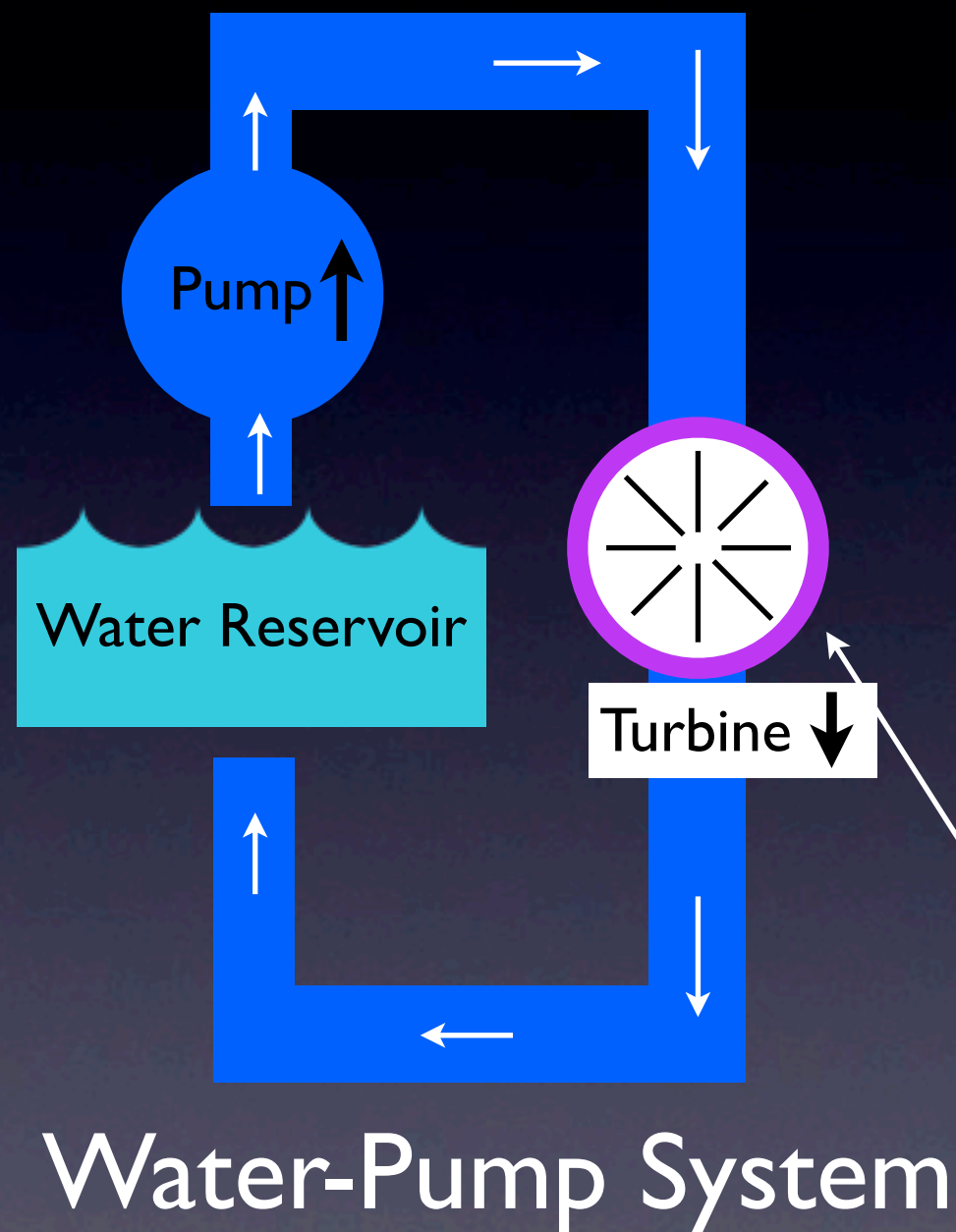
Water-Pump System



Battery System

This is equivalent to *shorting* our battery by simply connecting the positive (+) and negative (-) ends.

# Electricity = Water Flow



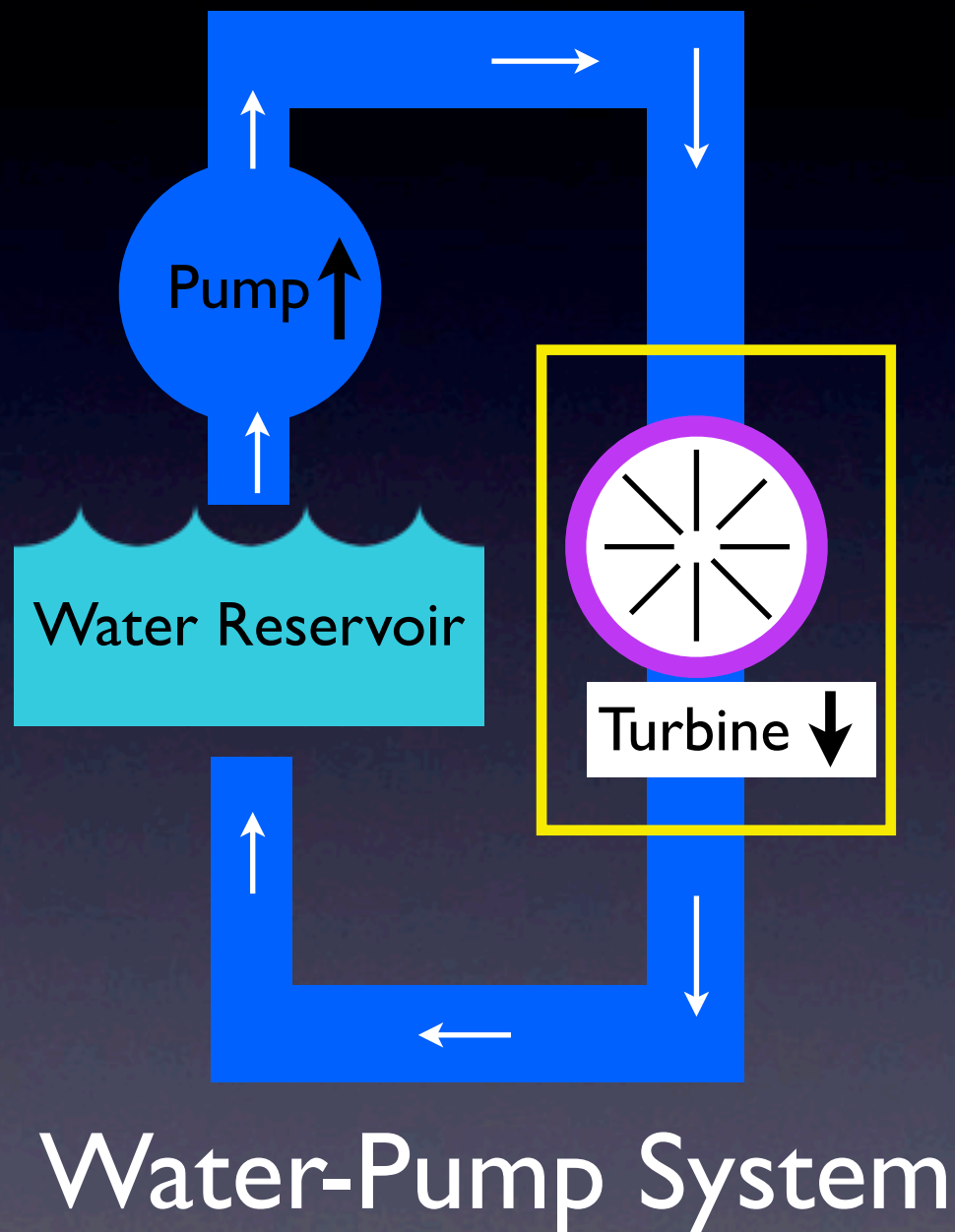
Now we are actually doing something with our water pump, and slowing down the depletion of our water reservoir too!



# Electricity = Water Flow

## LED = Turbine

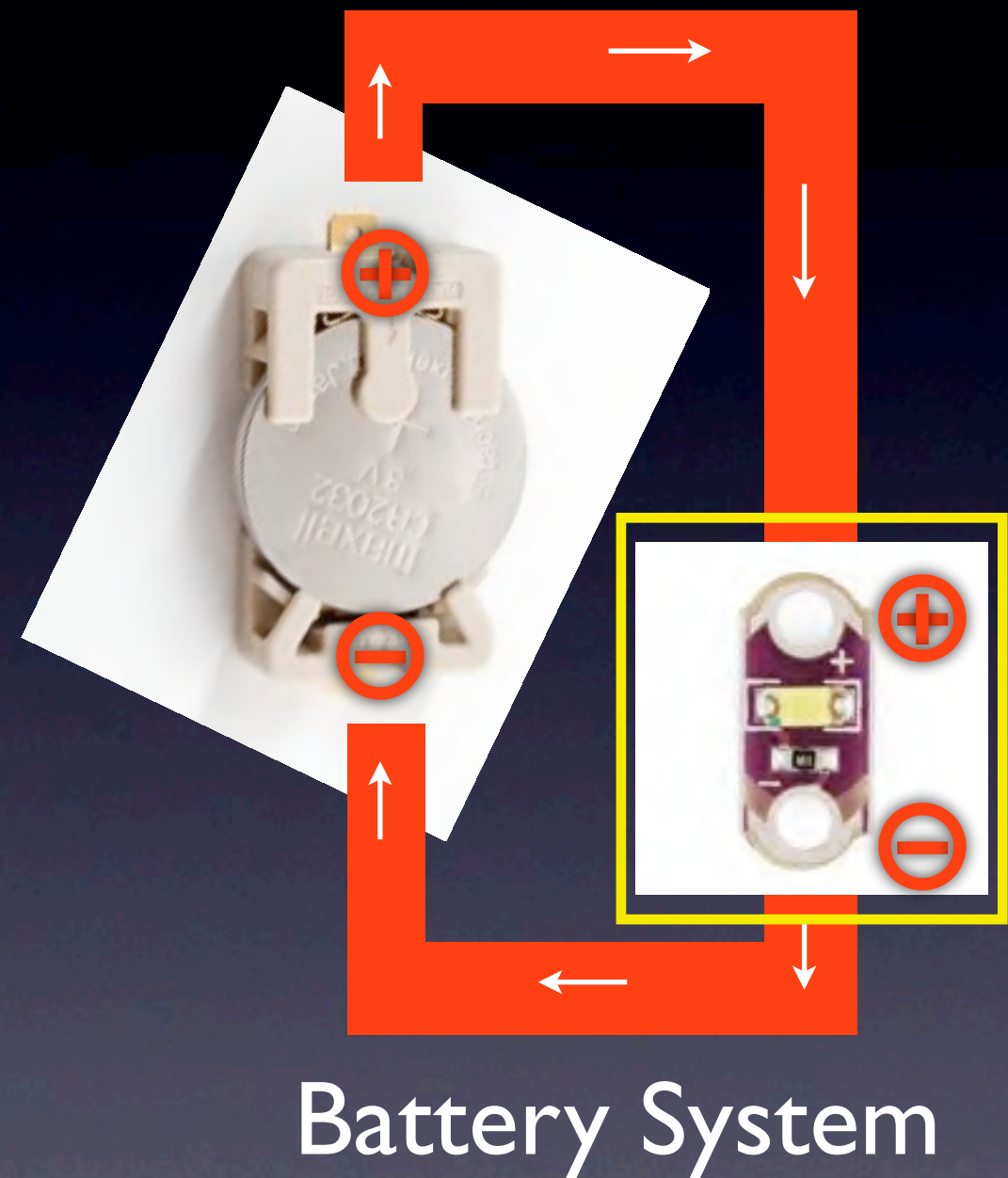
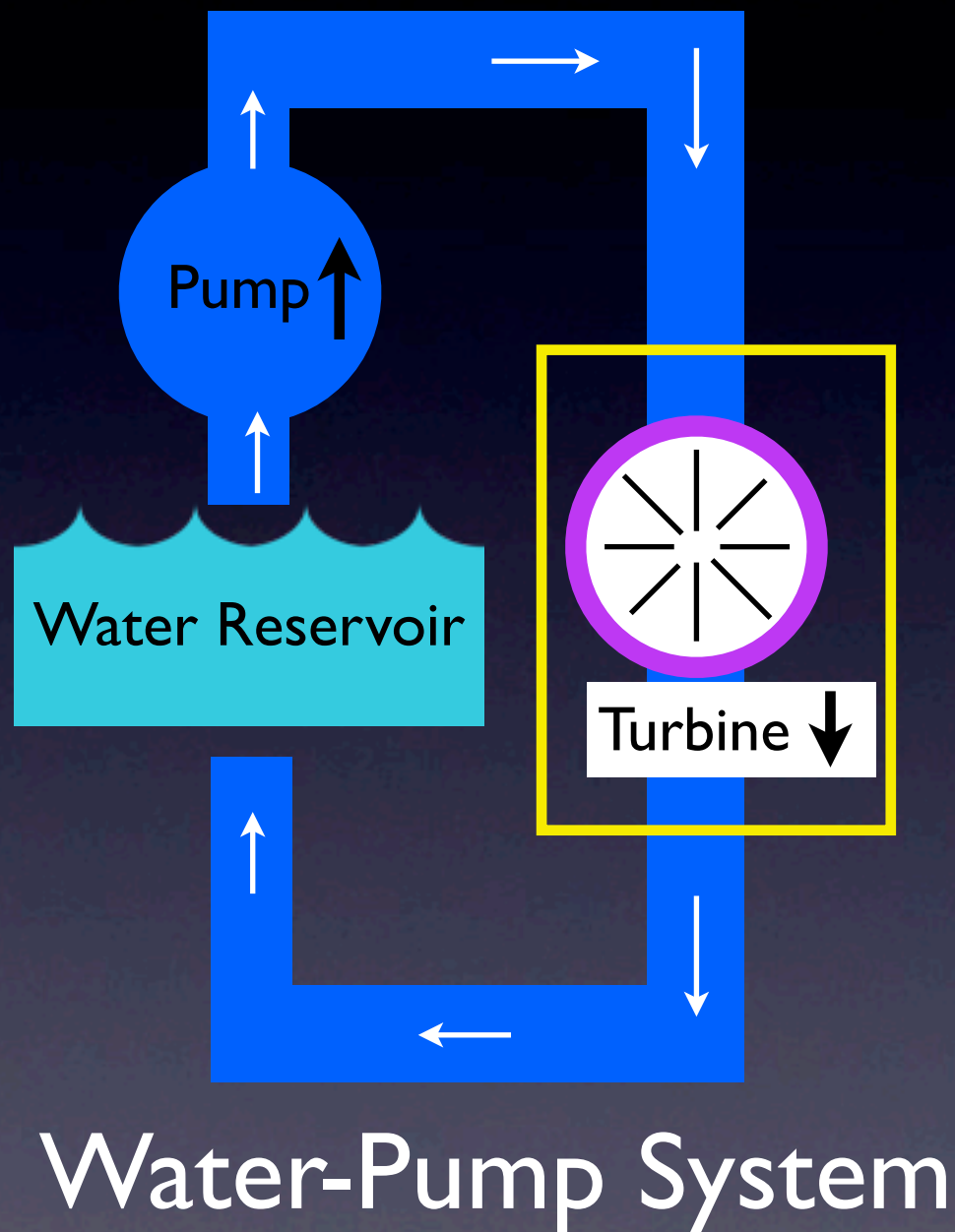
### These resist the flow of electricity (or water)



# Electricity = Water Flow

## LED = Turbine

### These resist the flow of electricity (or water)





# Lets sew some LEDs!

First, lets sew one end of our battery holder onto our scarf by sewing conductive thread through one of the little holes at the end of the holder.



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Then we'll sew a connection to the LED (here, negative battery end to negative LED end).



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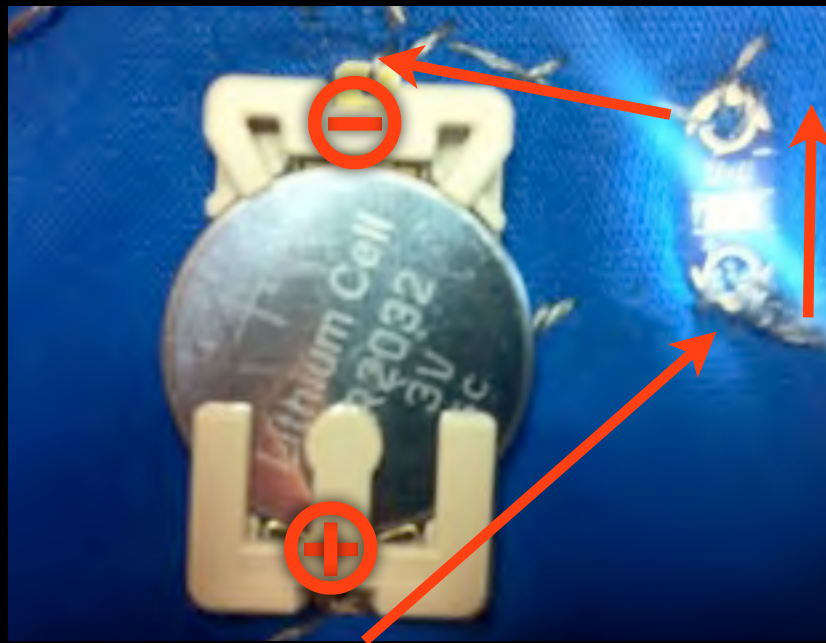
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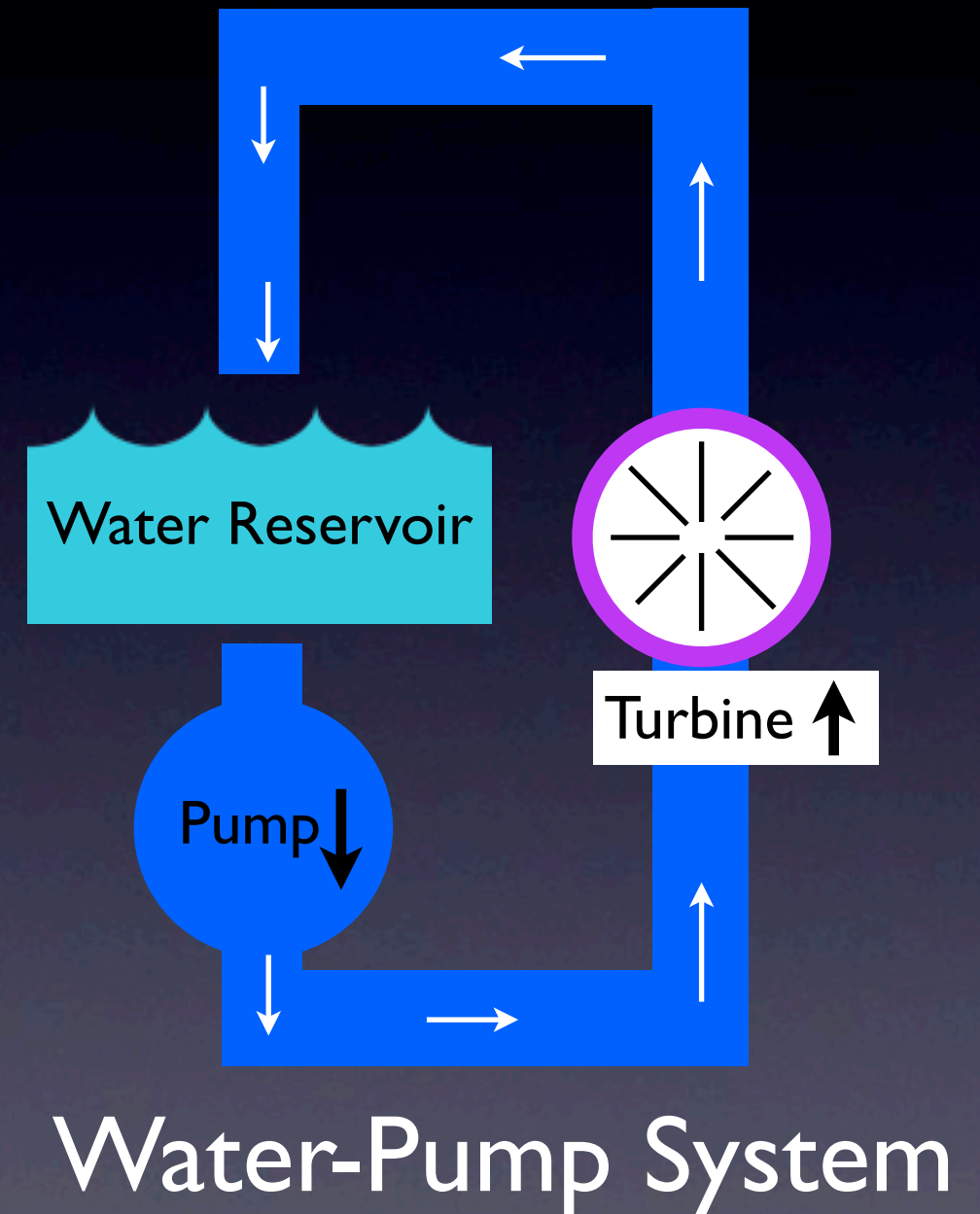
Then we'll sew a connection to the LED (here, negative battery end to negative LED end).

Repeat the same process to connect the positive battery end to the positive LED end.

# Lets sew some LEDs!

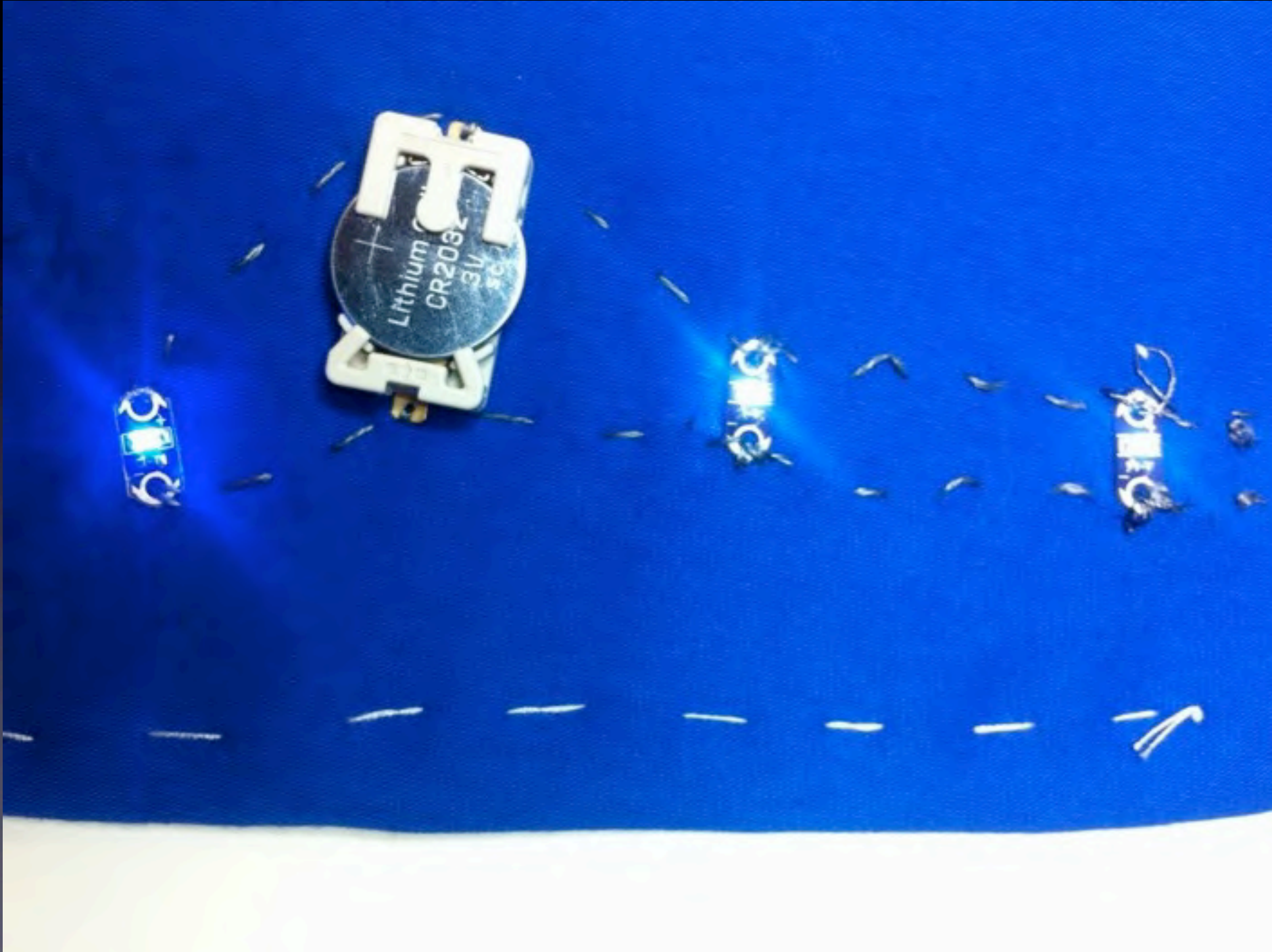


Electricity will flow in the direction shown





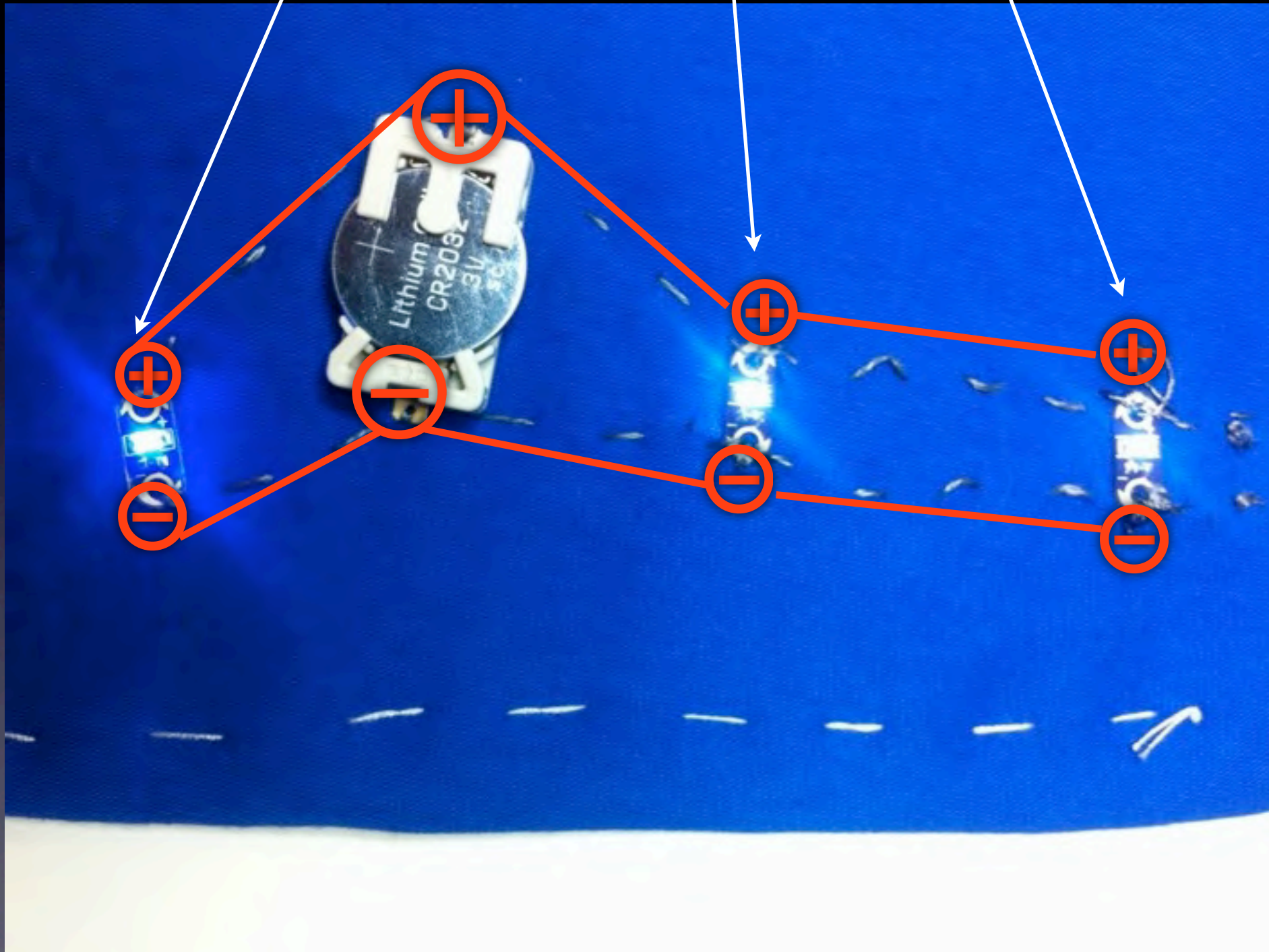
# Lets sew some LEDs!





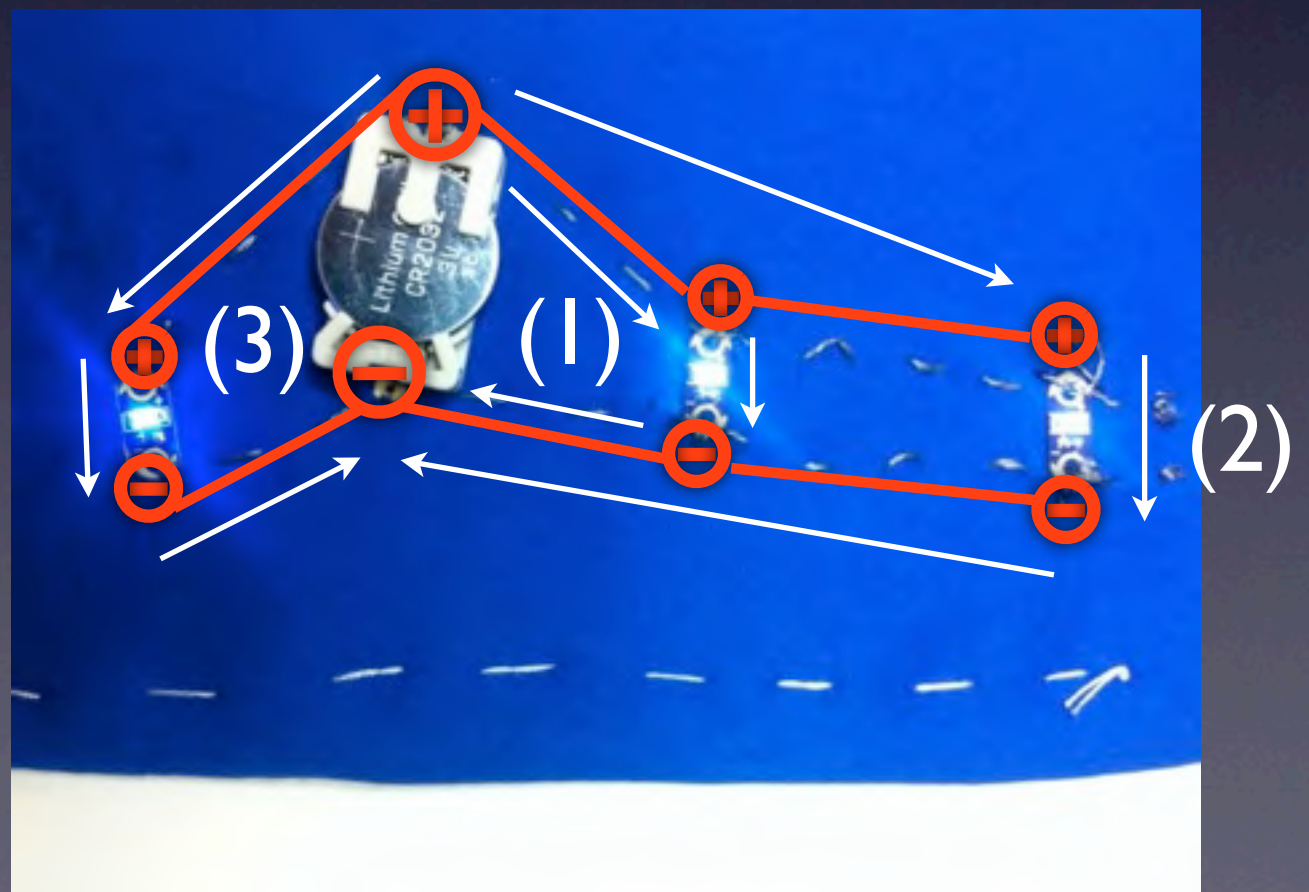
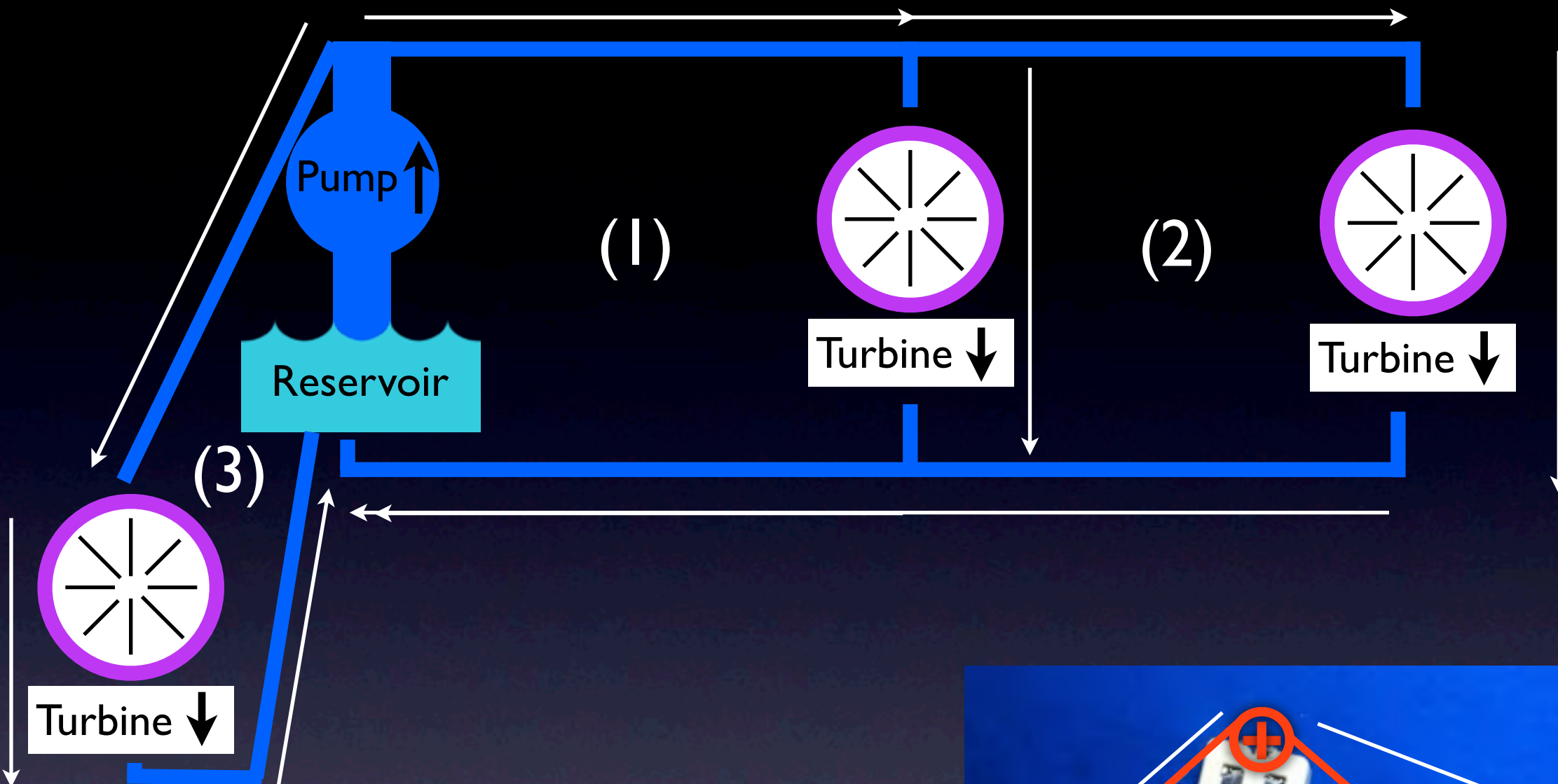
# Lets sew some LEDs!

Notice that all of the LEDs' positives hook up to the battery positive, and negatives with the battery negative!

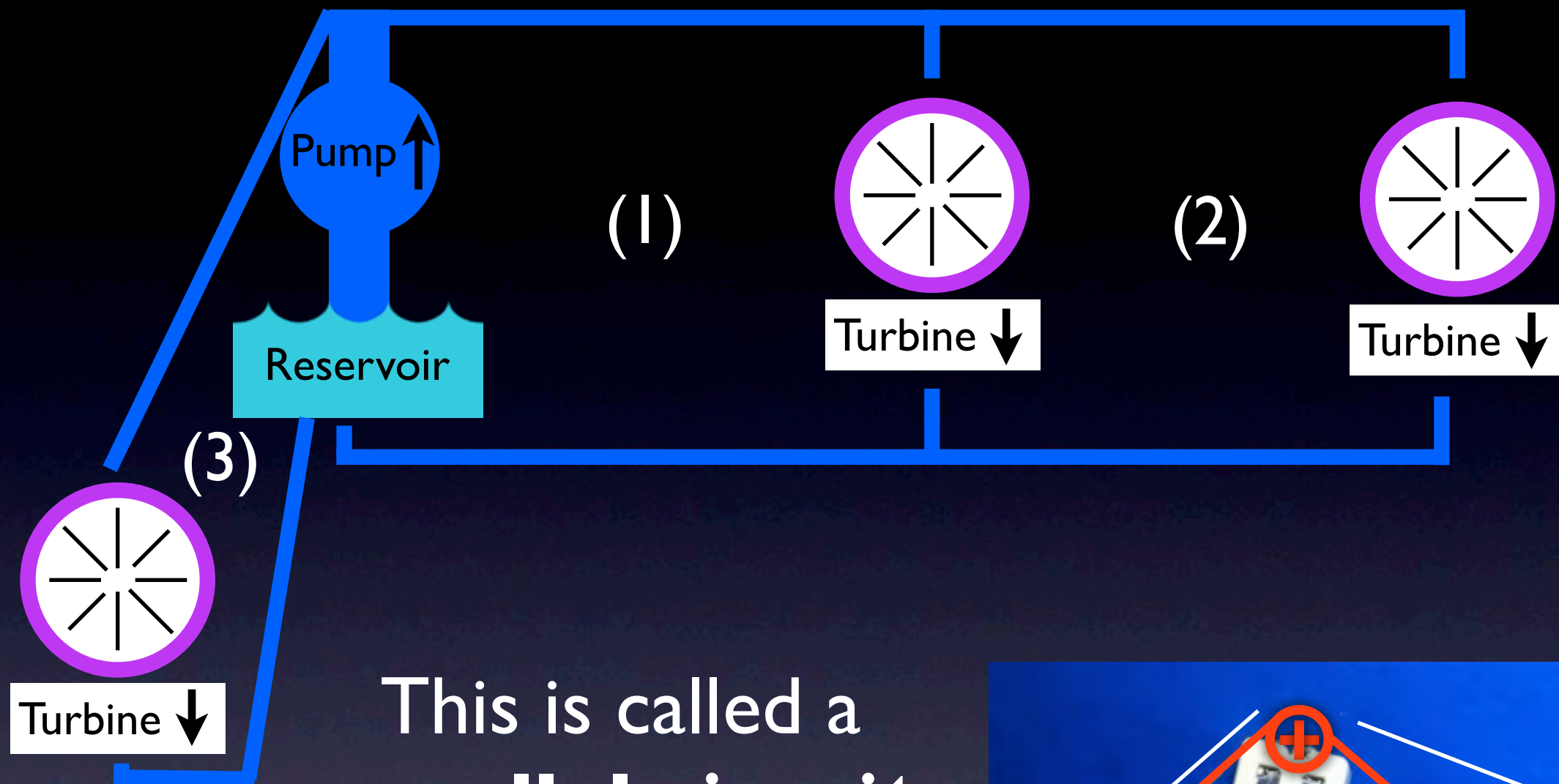




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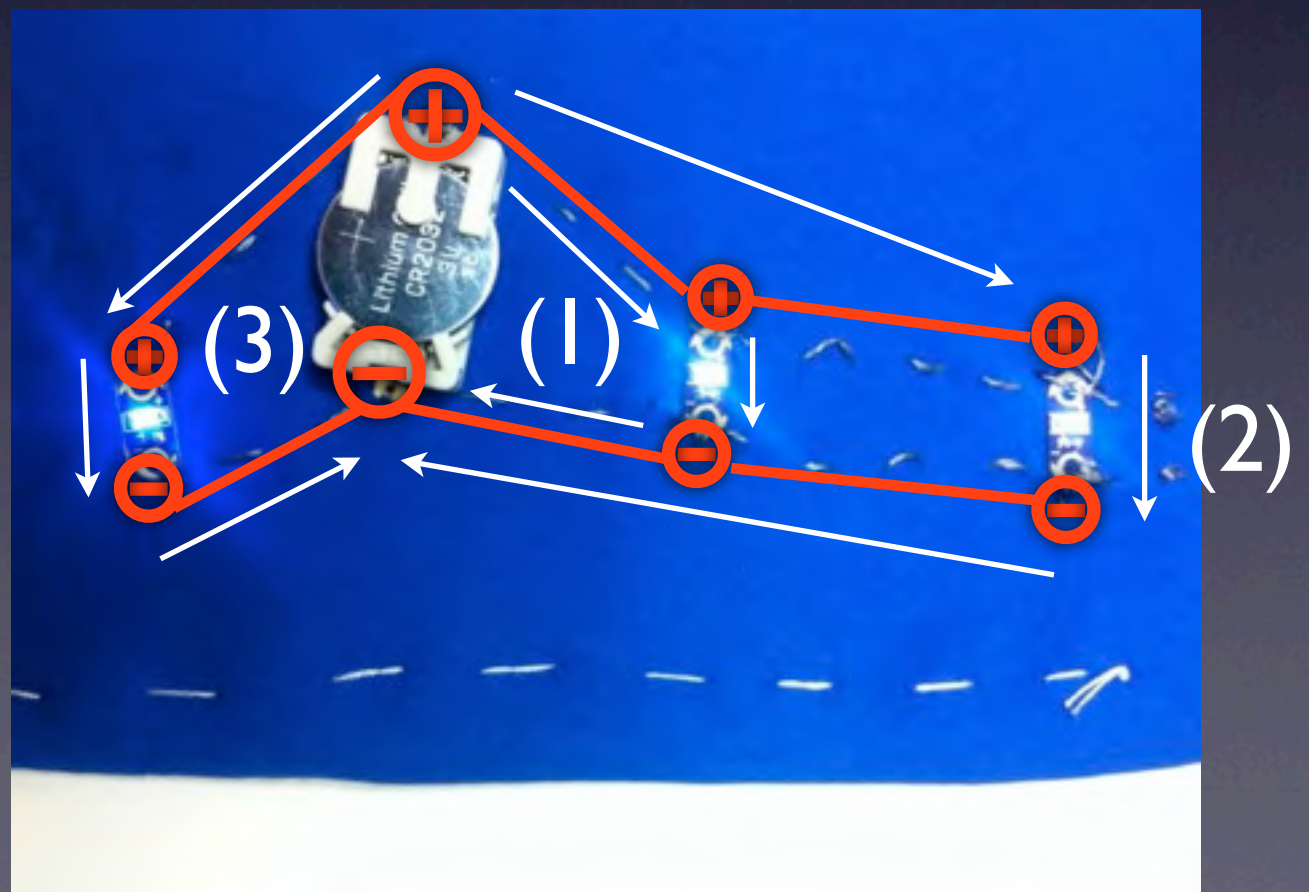


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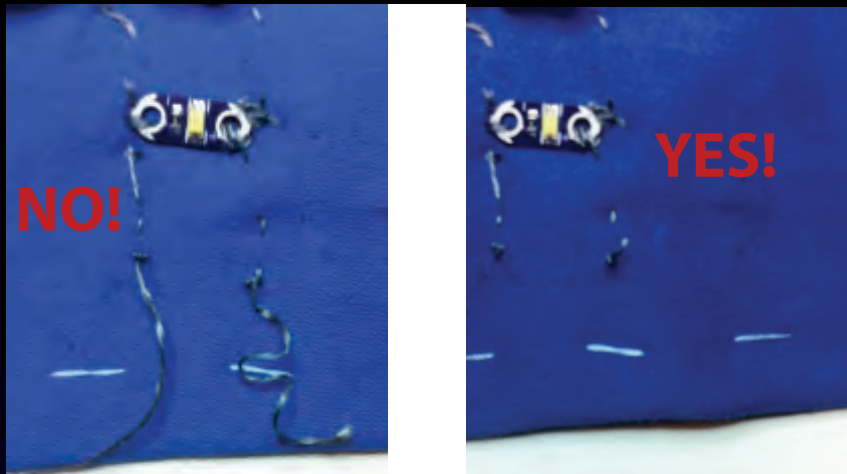
This is called a  
**parallel circuit**

Always connect your  
LEDs in parallel!



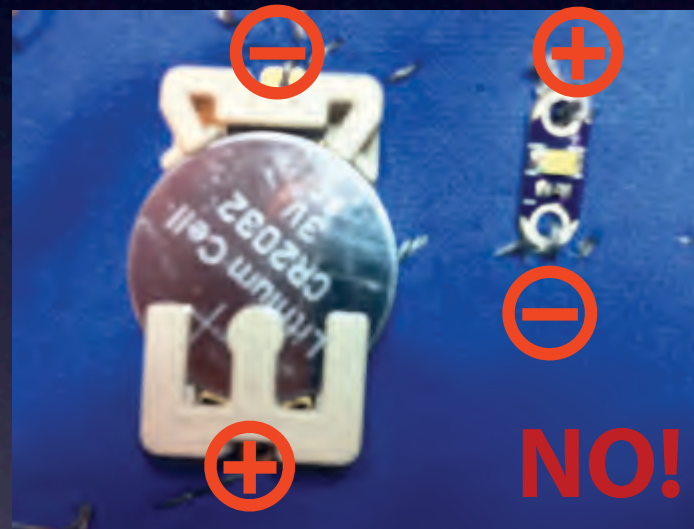


# So, you're LEDs don't light up...



(Check the back of your piece too)

(1) Long conductive thread tails can lead to accidental shorting! Lop off leads close to knots.

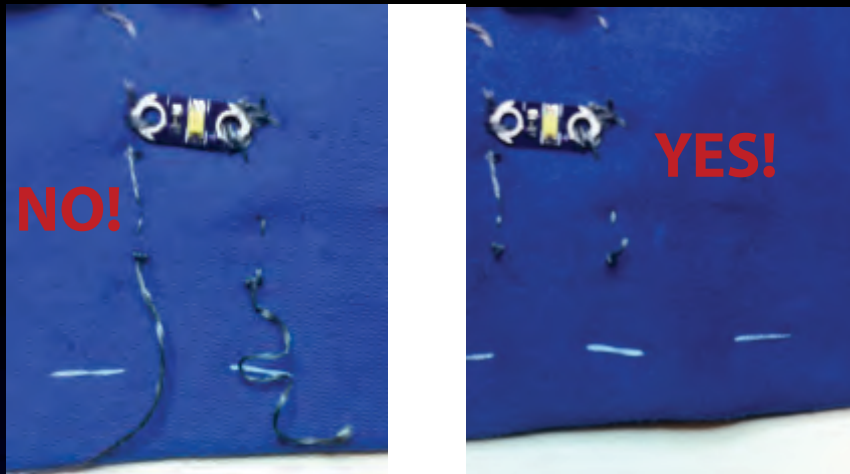


(2) Are the LEDs facing the right way? Make sure (+) LED leads connect to the (+) of the battery (and same for (-) leads).



(3) Are there any crossed leads? This will cause shorting and draining of battery (and maybe a fire!). Never cross (+) and (-) leads.

# So, you're LEDs don't light up...



(1) Long conductive thread tails can lead to accidental shorting! Lop off leads close to knots.

(Check the back of your piece too)



(2) Are the LEDs facing

If you put in the battery and your creation doesn't light up **take out the battery immediately!** Then check connections for crossed (+) and (-) leads - shorts will drain the battery and can start fires!



(3) Are there any crossed leads? This will cause shorting and draining of battery (and maybe a fire!). Never cross (+) and (-) leads.



# Tips & Tricks

- (1) Is battery in the right way?
- (2) Conductive thread can be tricky (and limited)- use only a little bit at a time!
- (3) Lay out LEDs before you sew - make sure you can sew (+) and (-) leads to the battery from where you've placed your LEDs
- (4) Jersey material tends to roll up - consider sewing on a backing.
- (5) The more conductive thread between the battery and the LED, the dimmer the LED will be - usually, this is unnoticeable, but can be an issue for really long circuits.
- (6) You may not want to use all the LEDs - for example the RED LEDs can make other LEDs in your circuit dimmer, depending on your specific circuit layout.

# Other Materials

- (1) other fabric
- (2) regular thread
- (3) plastic sheets
- (4) Lovely assistants!



Alicia



Donut (Matt)



Go to it!

# Wrap Up

## Resources

These slides (and possibly a video of the talk) will be online at [www.avriot.com](http://www.avriot.com) in the next few days

Big thanks to Ada's Technical books for their donation and Adafruit ([www.adafruit.com](http://www.adafruit.com)) for a discount on the batteries and holders!

Other resources (also on back of I-sheet):

- (1) [www.sparkfun.com](http://www.sparkfun.com) (sewable LEDs)
- (2) [www.instructables.com](http://www.instructables.com)
- (3) Maker Magazine
- (4) Hack-a-day
- (5) Jameco