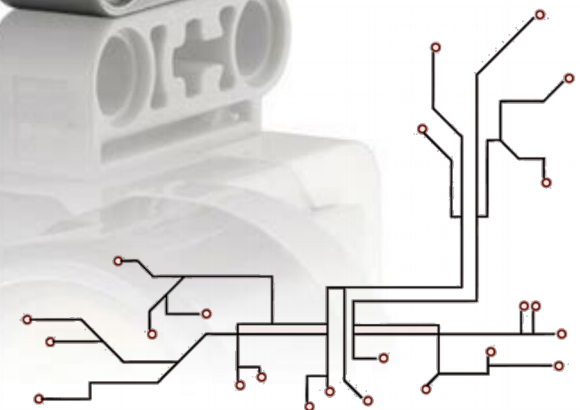
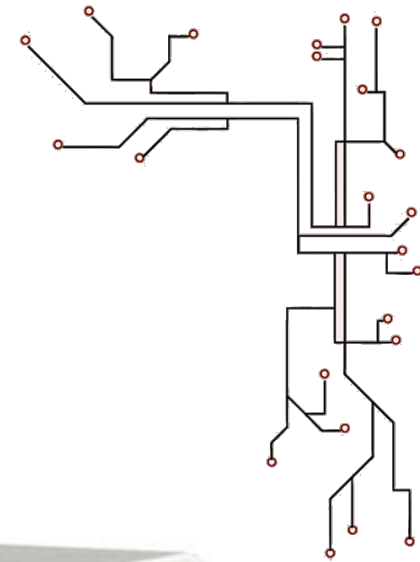


Ultrasonic Sensor

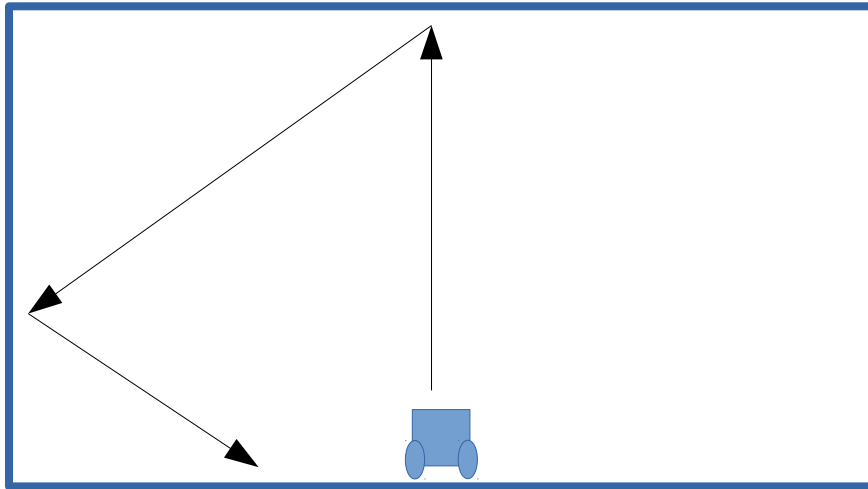
- Touch Sensor (Review)
- Ultrasonic Sensor
- Conga Line!



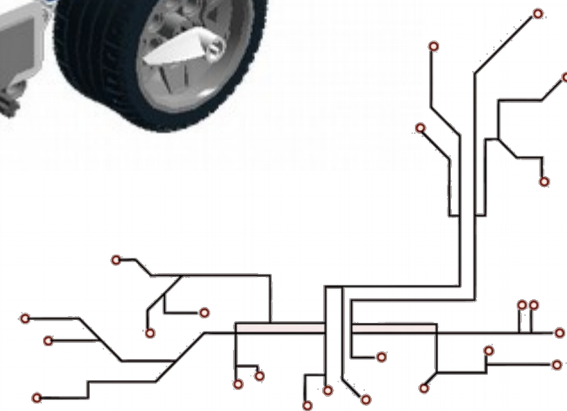
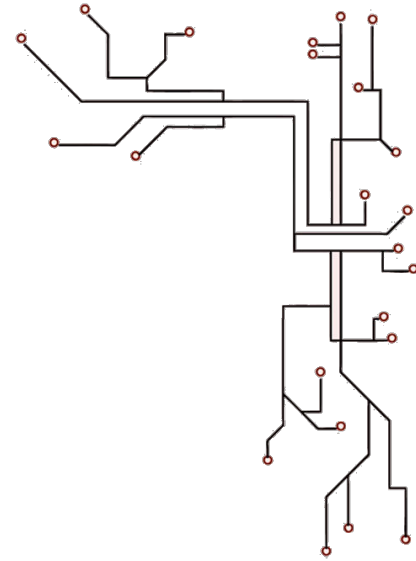
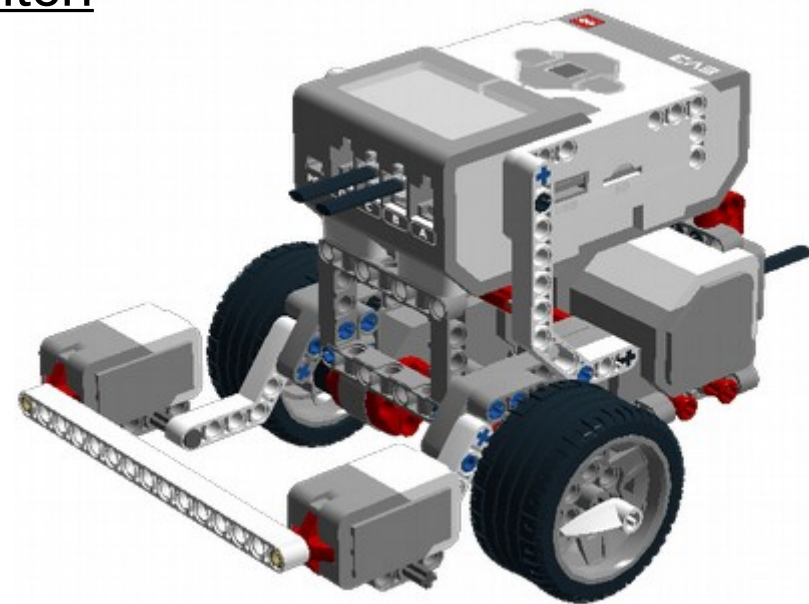
Review Touch Sensor

Last Week's Challenges

- Touch Sensor as Button (Trigger Display)
- Touch Sensor as Bumper Limit Switch
- Drive around like a Roomba!



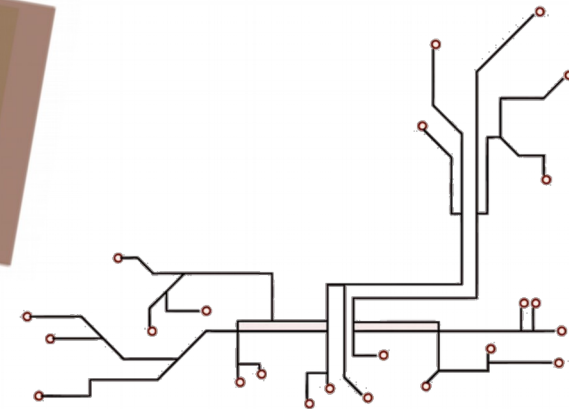
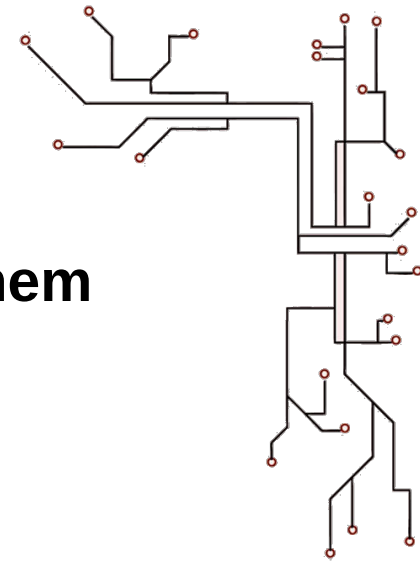
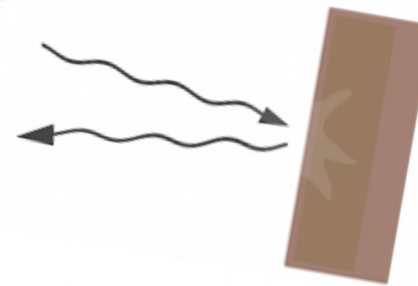
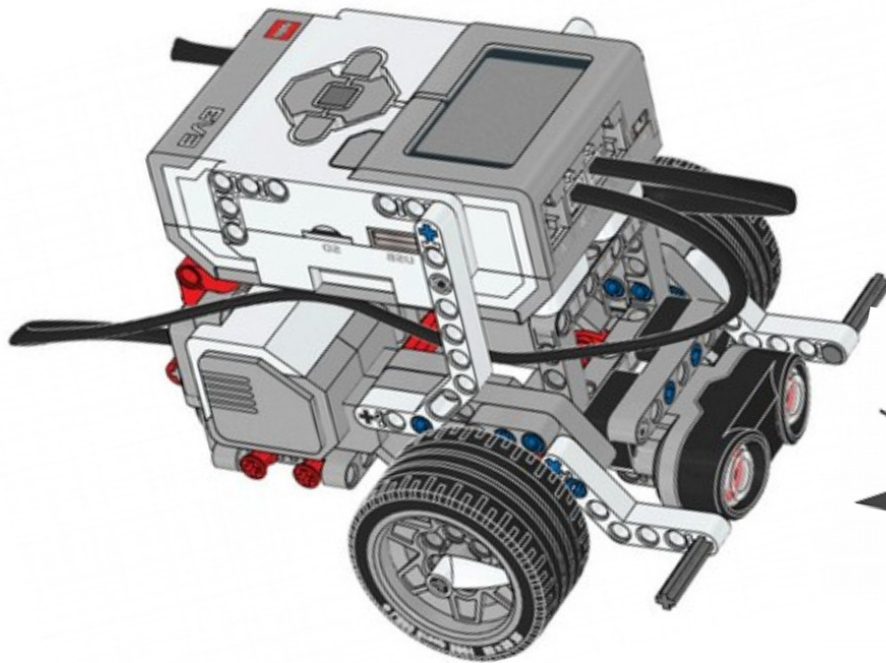
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Ultrasonic Sensors

Ultrasonic Sensors Can “Hear Obstacles” In Front of Them

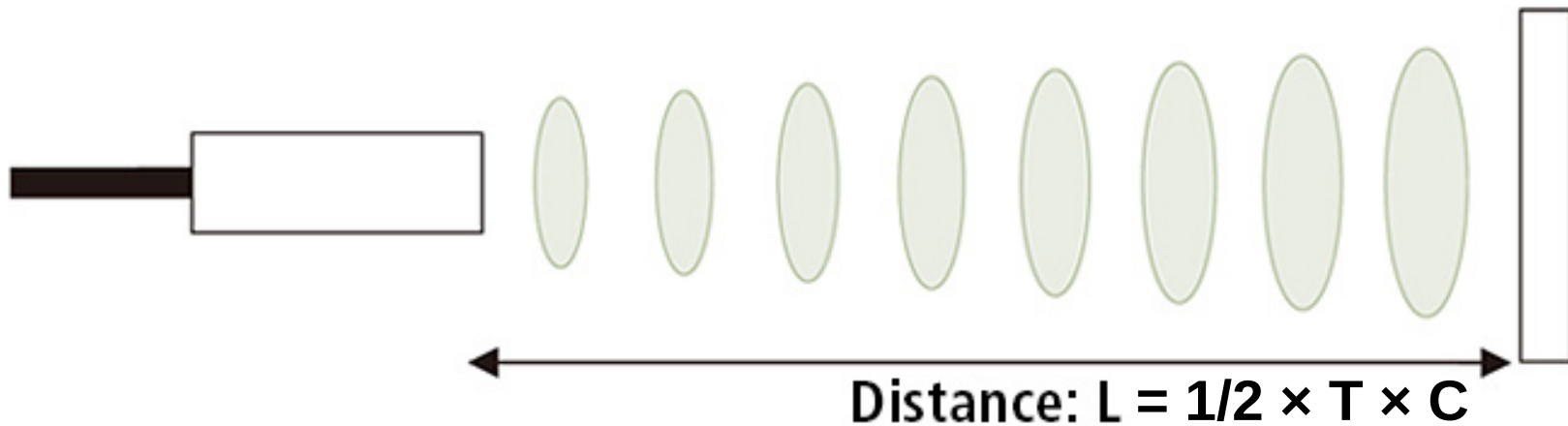
- Can see further than touch sensor – we will test how far!
- Can be used to map the world around you (like Radar)



Ultrasonic Sensor

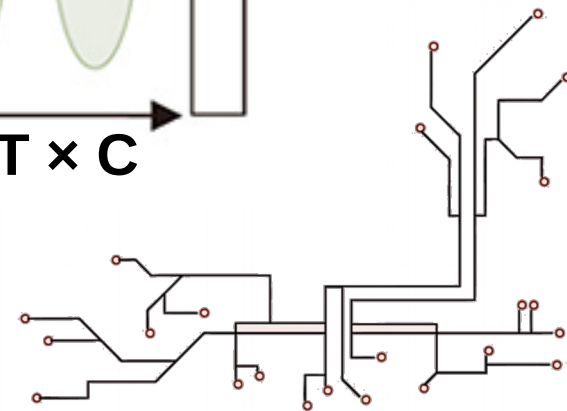
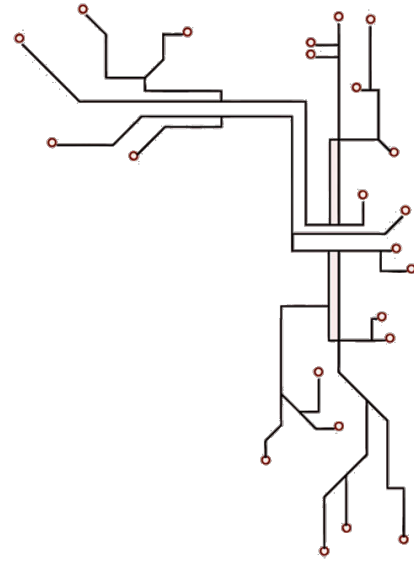
Measuring Distance

- Send a signal out
- Measure the time to come back
- Multiply by speed of sound (343 meters per second)



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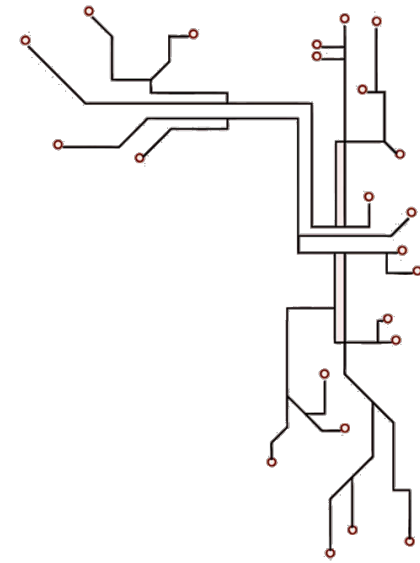
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Ultrasonic Sensor

Measuring Distance

- Look at Port View on Brick



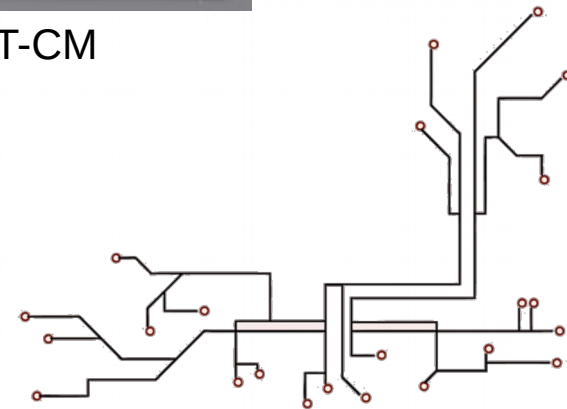
Ultrasonic Sensor has 3 functions



Let's use US-DIST-CM

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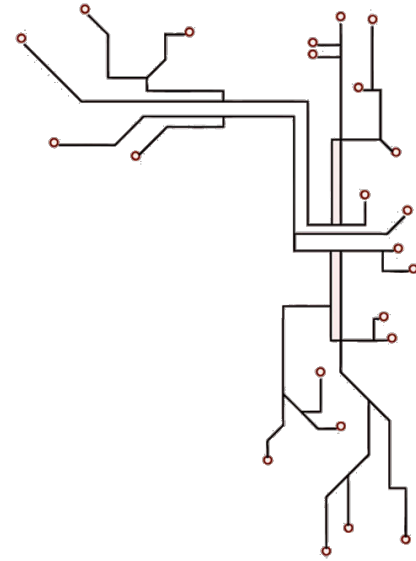
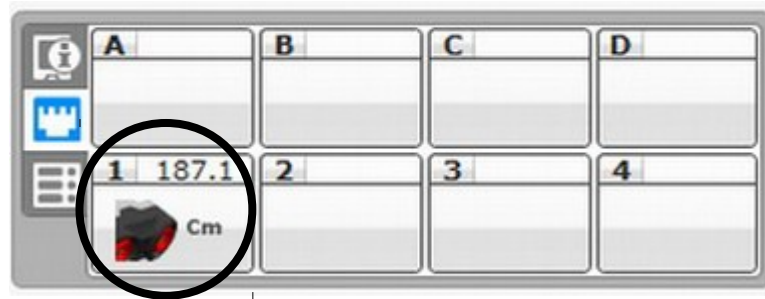
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Ultrasonic Sensors

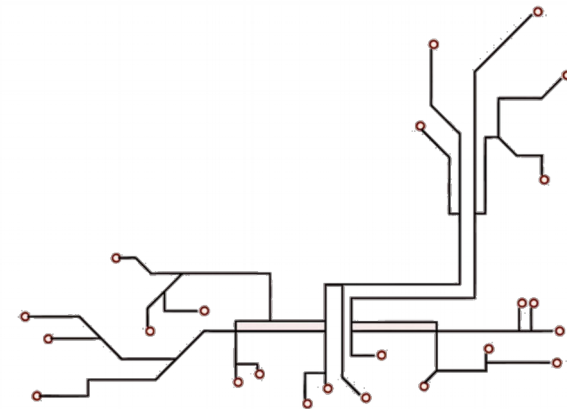
Measuring Distance

- Look at Port View on EV3 Development Environment



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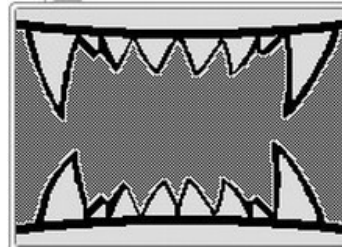
Play · Experience · Learn



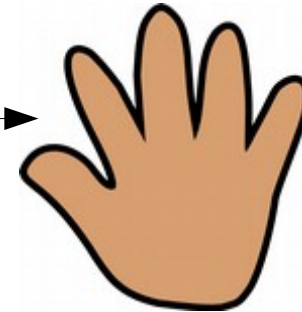
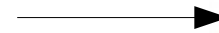
Ultrasonic Sensor

- Now Let's Make a Simple Program

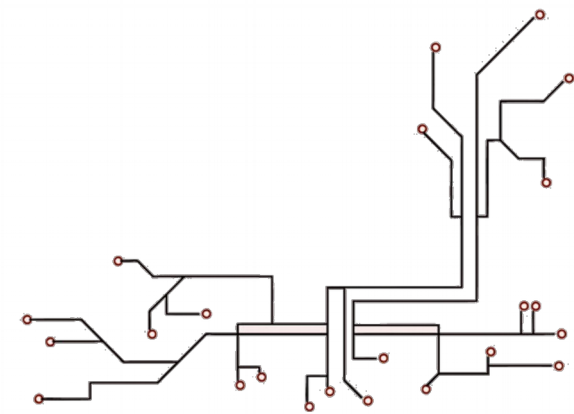
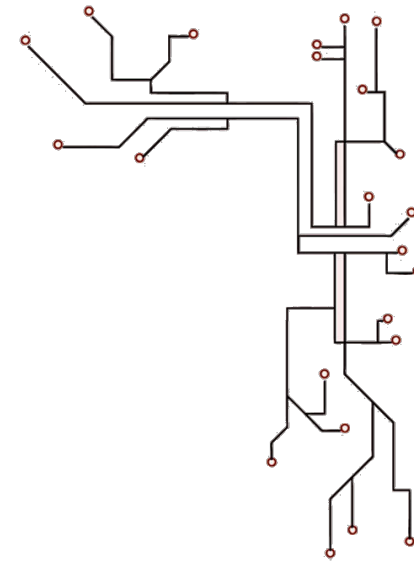
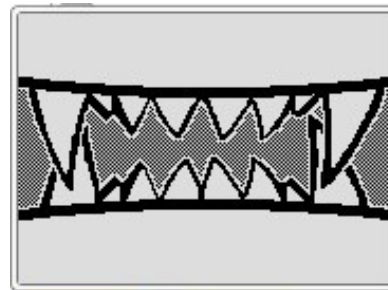
1) Show open menacing mouth...



2) Wait till hand gets near...



3) Then... Snap teeth shut!



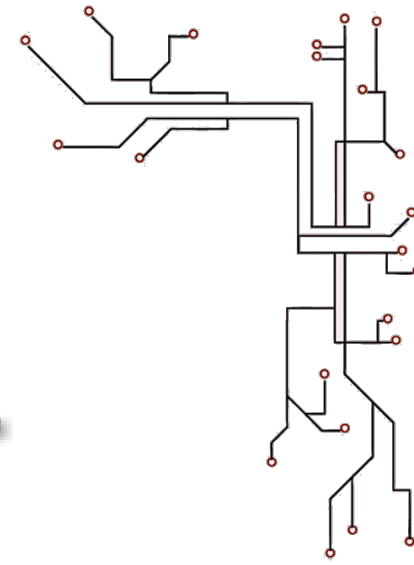
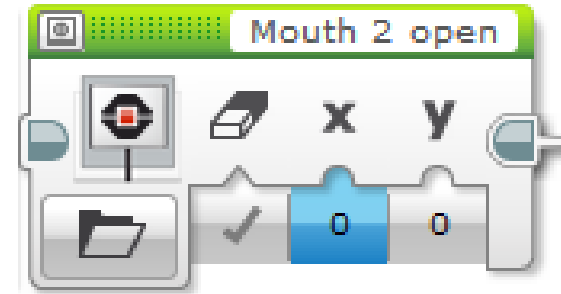
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Ultrasonic Sensor

- Now Let's Make a Simple Program

1) Show open menacing mouth...

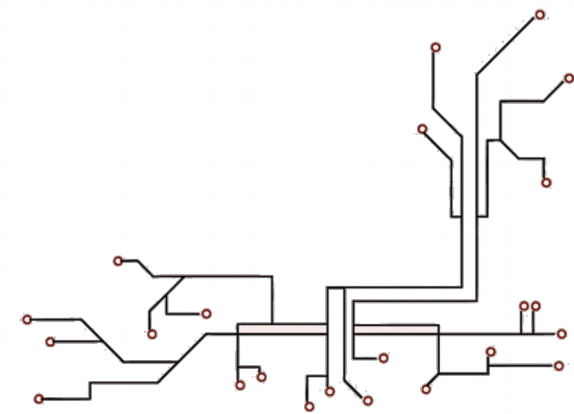
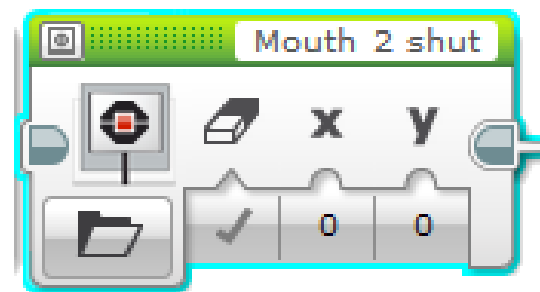


2) Wait till hand gets near...



Choose how far or close...

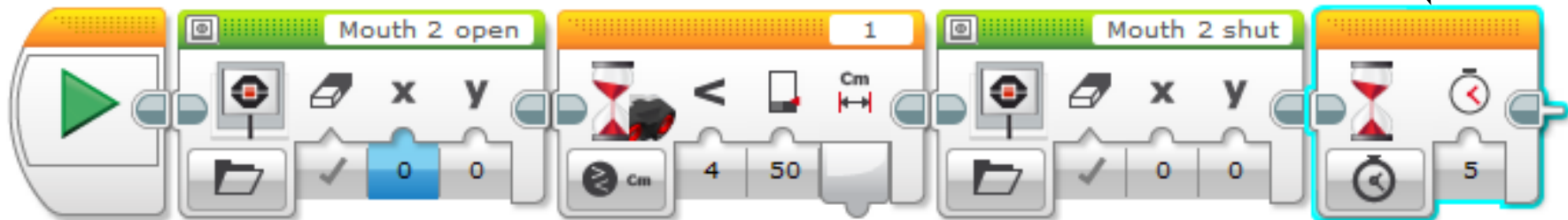
3) Then... Snap teeth shut!



Ultrasonic Sensor

As a Trigger

- Here's a sample solution

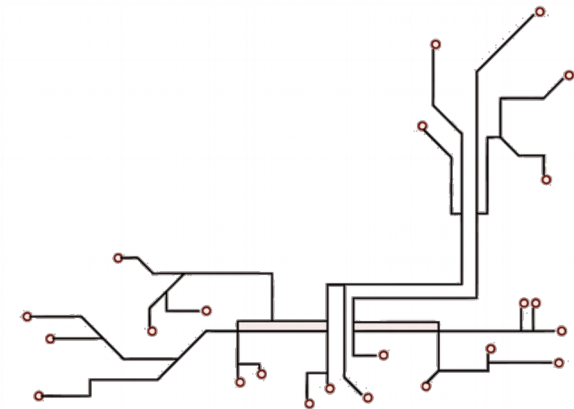


Prevent program
Stopping and
screen resetting

- You can use this basic idea to make an intruder alarm!
With SOUND instead of DISPLAY block

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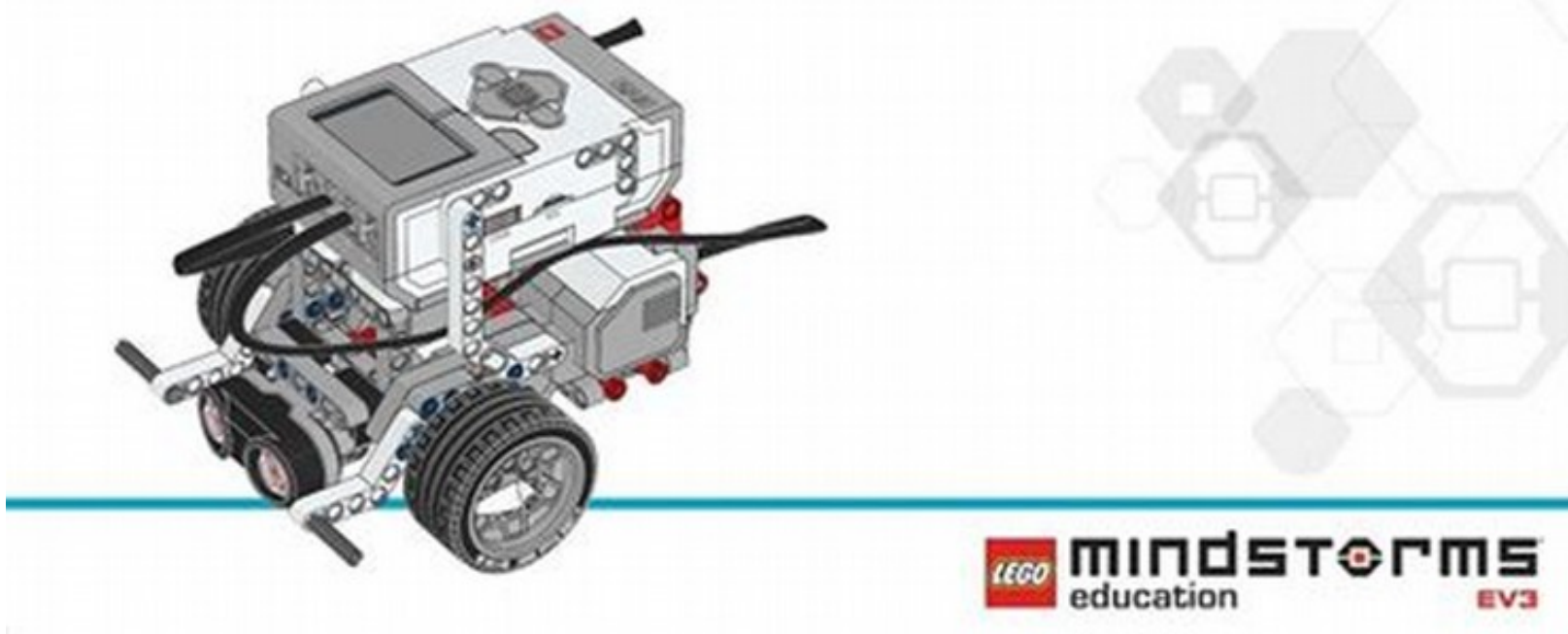
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Stop / Go

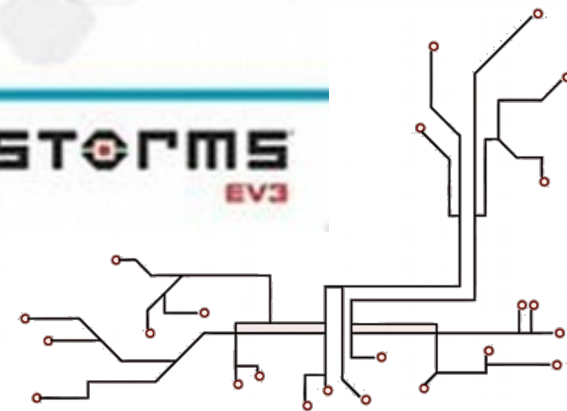
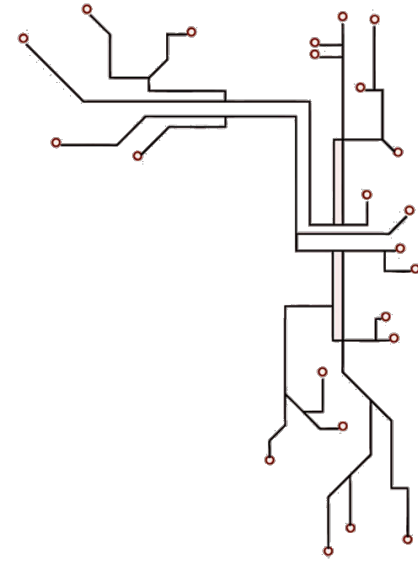
As a Limit Switch

- Mount the Ultrasonic Sensor on your 2-Wheel Robot



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Stop / Go

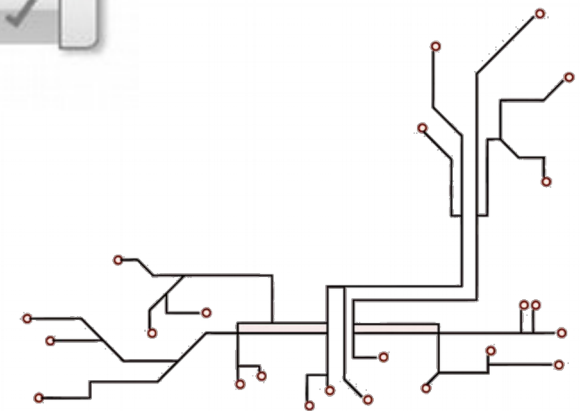
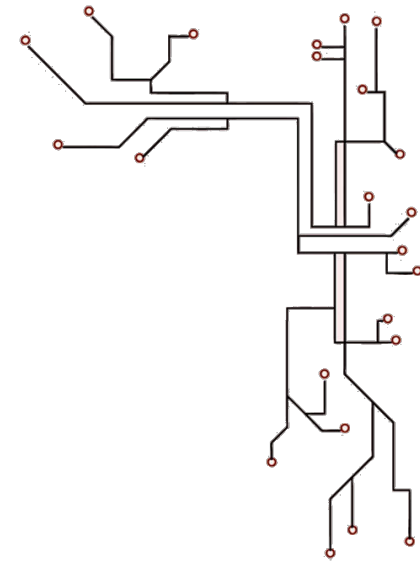
As a Limit Switch

- Make another Simple Program
 - 1) Drive FWD
 - 2) When Ultrasonic Sensor detects nearby obstacle
 - Stop



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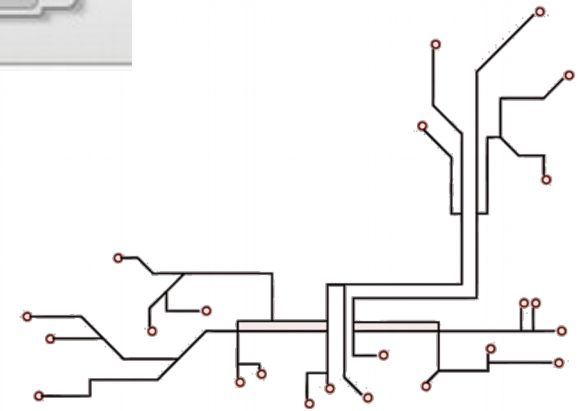
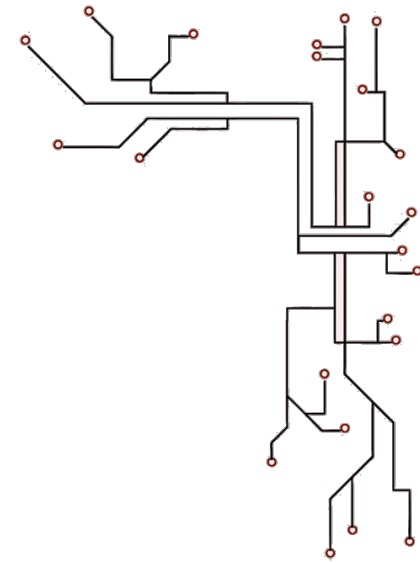
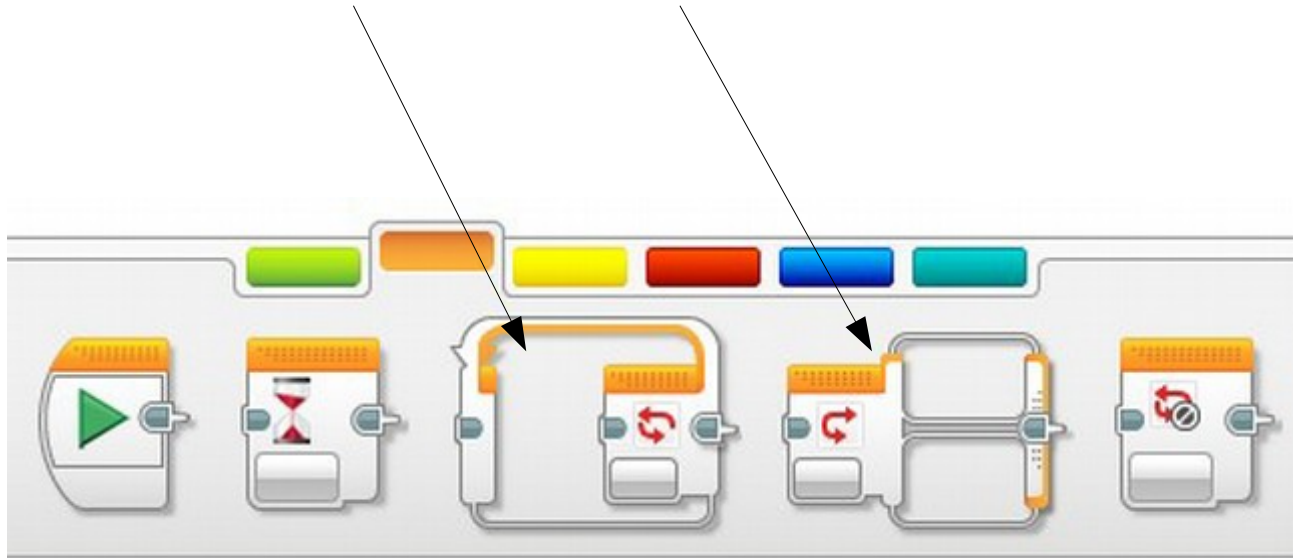
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Stop / Go – Loop & Switch

As a Limit Switch

- Now Use a LOOP & SWITCH



Stop / Go – Loop & Switch

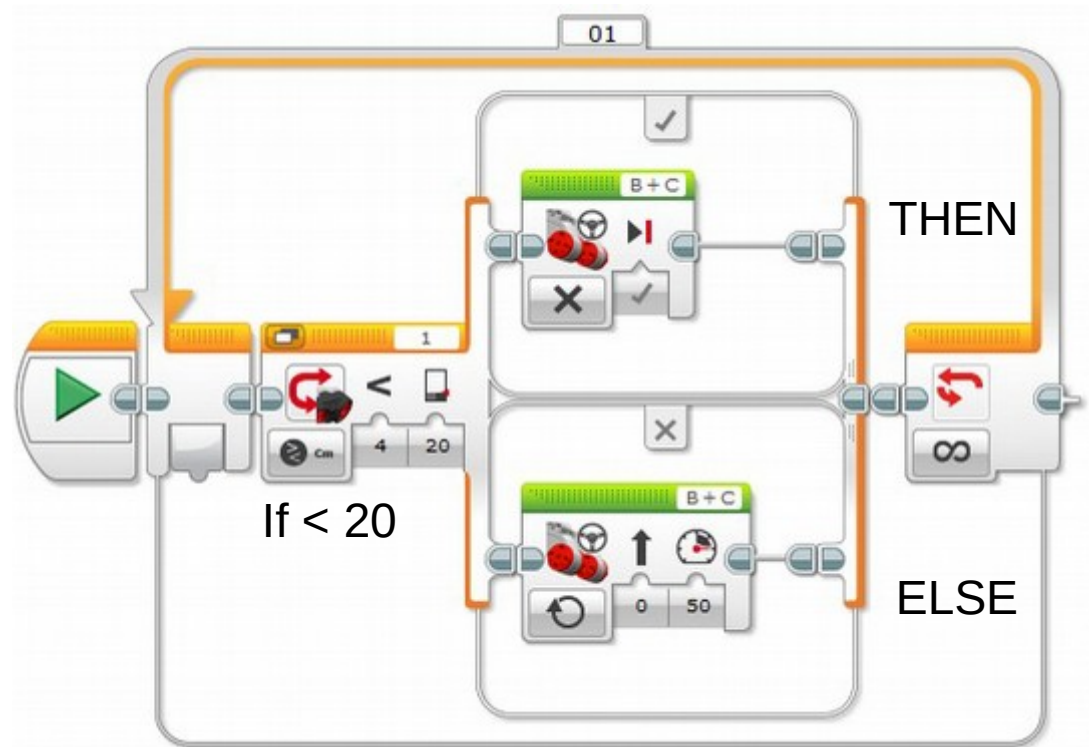
Ultrasonic Follower

Try this out:

Put hand/foot in front of Robot to Stop.

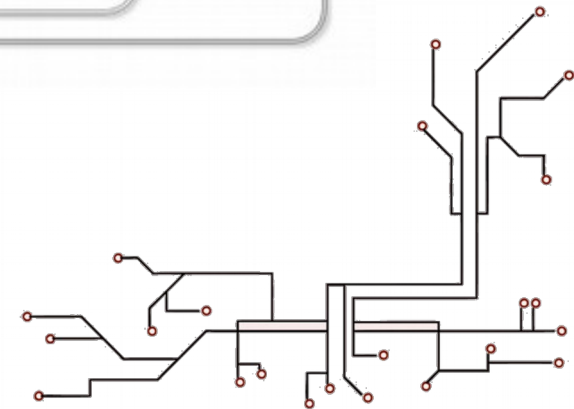
Then move hand away.

Robot should follow...



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Convoy

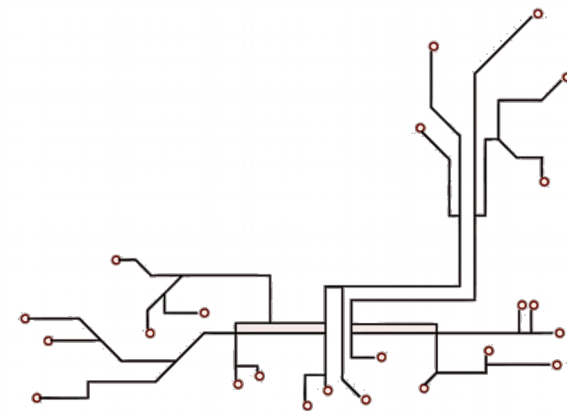
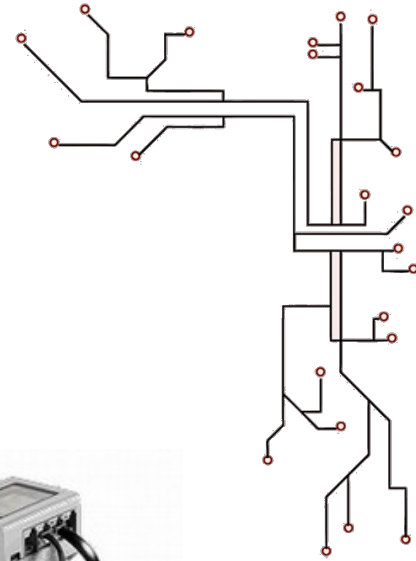
Ultrasonic Follower

Try this out:



Put 2 or more robots in a line, and start them all at the same time...

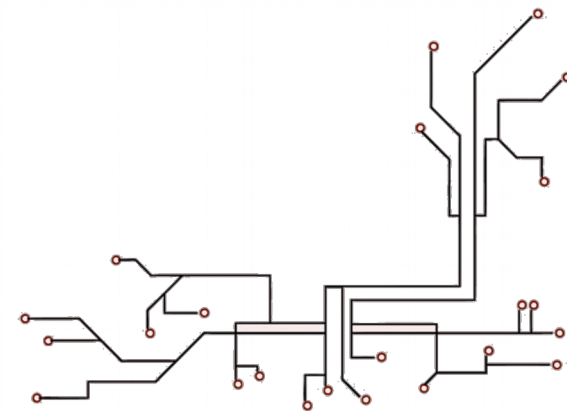
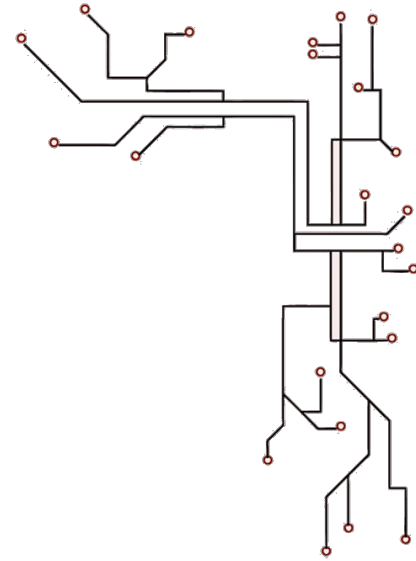
Should look like a **Train** (with invisible links!)



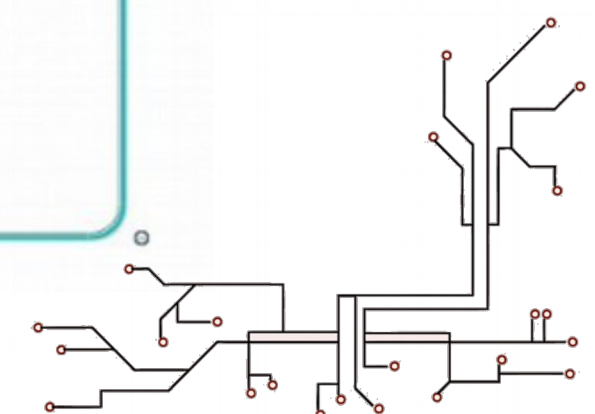
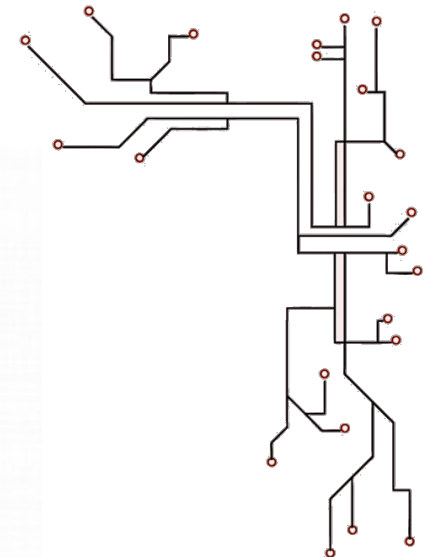
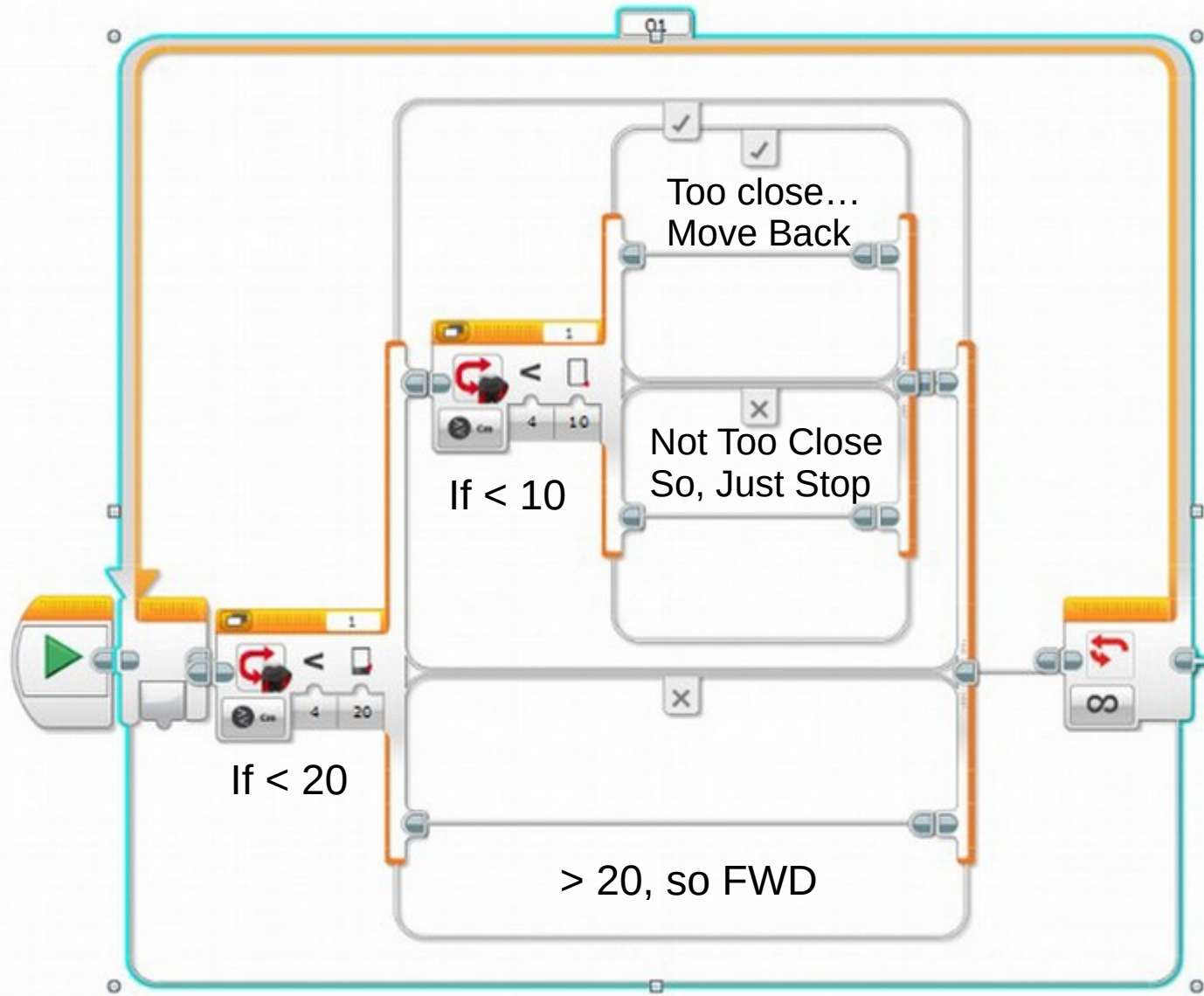
What About Reverse?

Ultrasonic Follower

- Now, Make your Robots all **move back** too...
- Need a **Switch in a Switch**...



What About Reverse?

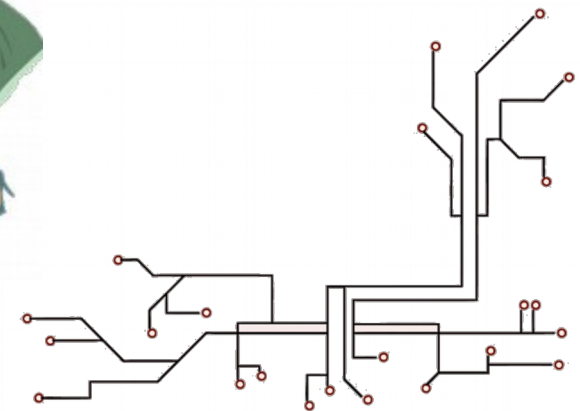
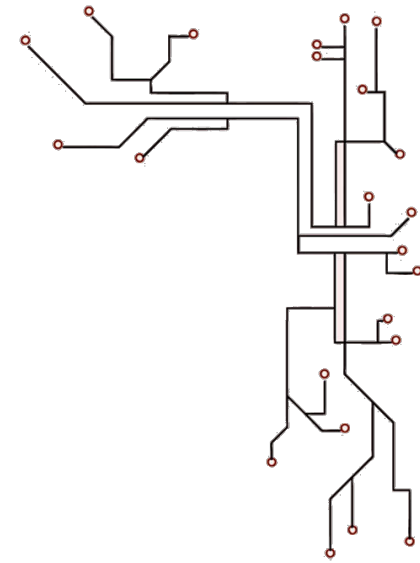


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Conga Line

- Now, Make your Robots Cha Cha Cha!!!
- Use your body as the front of the line
 - One Step Forward
 - Two Steps Back...

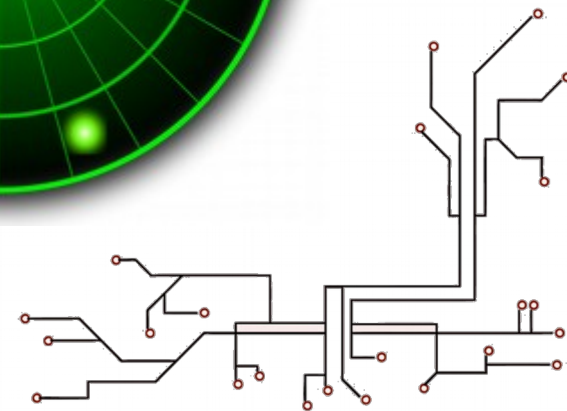
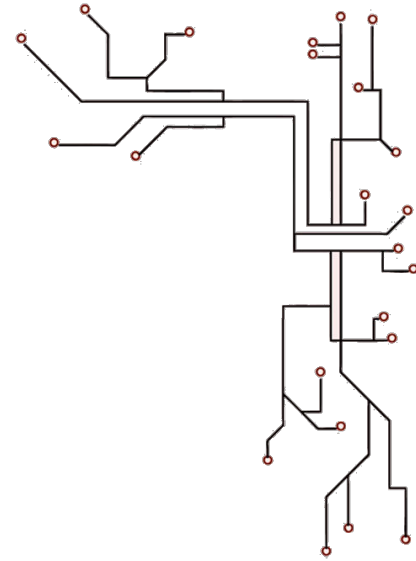


RADAR

Can you use what we've learned to make Radar Robot?

- Turn around and around
- Wait until you see something close by
- Stop to Point at the nearby object

- And CHARGE!!!!
(SumoBots next week...)



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