

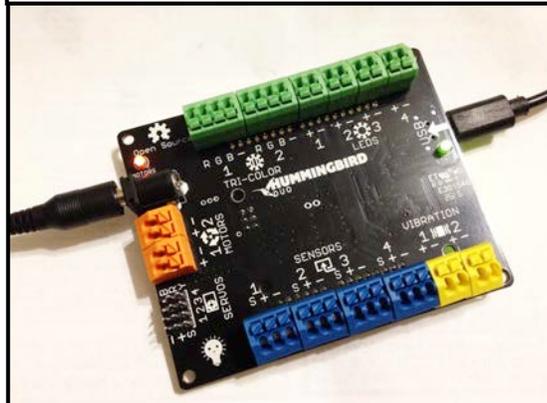
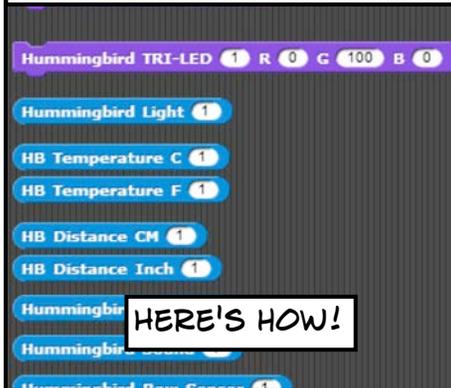
# SNAP PROGRAMMING

COPYRIGHT 2017 BIRDBRAIN TECHNOLOGIES LLC

ONE WAY YOU CAN CONTROL YOUR HUMMINGBIRD IS WITH **SNAP!** SNAP! IS A VISUAL PROGRAMMING LANGUAGE.

FIRST, CONNECT THE HUMMINGBIRD TO A COMPUTER AND SUPPLY POWER. MAKE SURE YOU HAVE BOTH THE USB CABLE AND THE POWER CABLE IN - THEY'RE BOTH NECESSARY.

ON THE COMPUTER, OPEN "BIRDBRAIN ROBOT SERVER".



THIS WINDOW WILL APPEAR, LETTING YOU KNOW IF YOUR HUMMINGBIRD (OR FINCH!) IS CONNECTED.

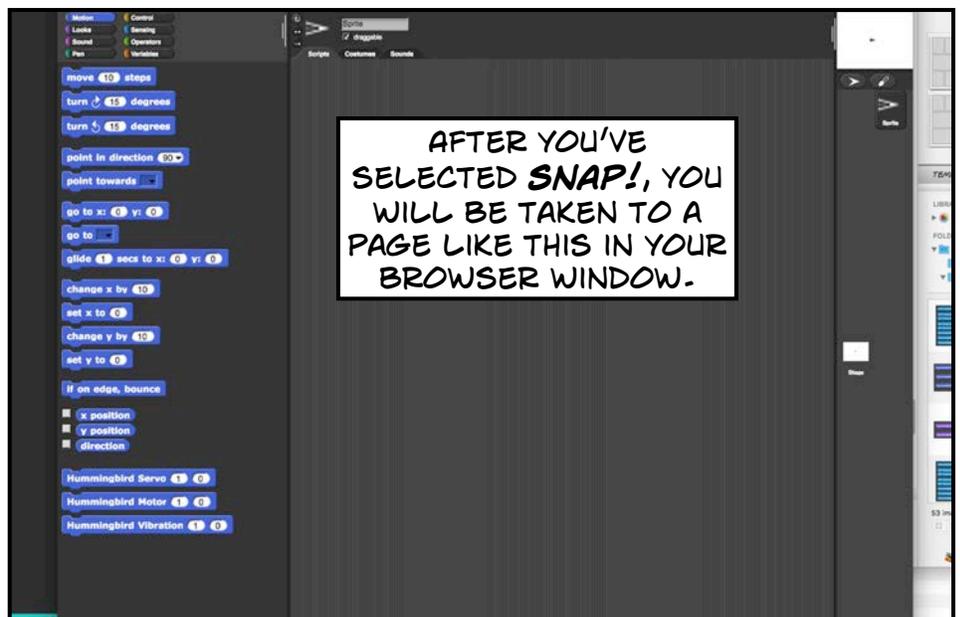
Open Snap!

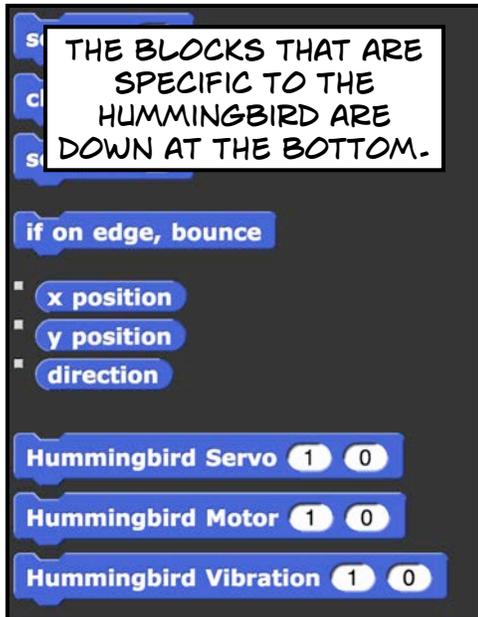
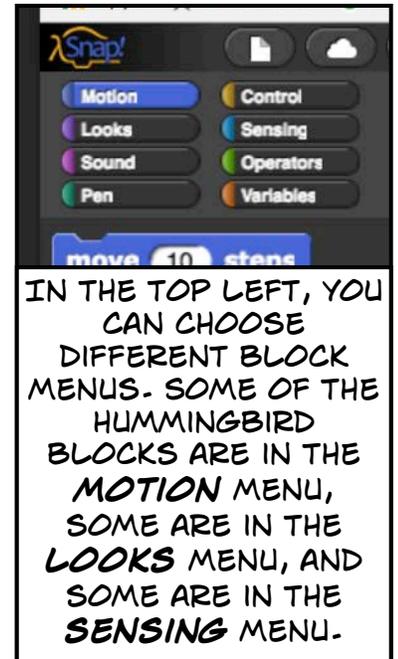
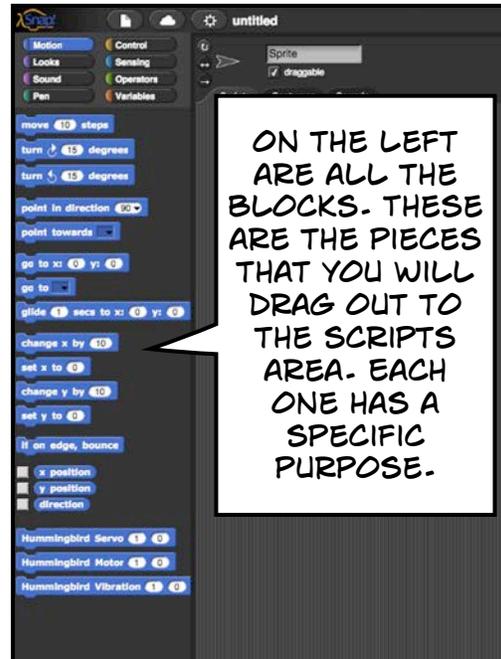
Open Snap! locally (no cloud storage)

Open Scratch

CLICK "OPEN SNAP!" IF YOU DON'T HAVE INTERNET ACCESS, CHECK THE "OPEN SNAP! LOCALLY" BOX.

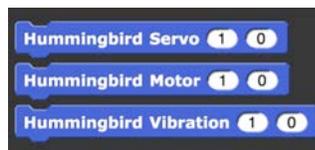
AFTER YOU'VE SELECTED **SNAP!**, YOU WILL BE TAKEN TO A PAGE LIKE THIS IN YOUR BROWSER WINDOW.





THERE ARE THREE MAIN TYPES OF HUMMINGBIRD BLOCKS.

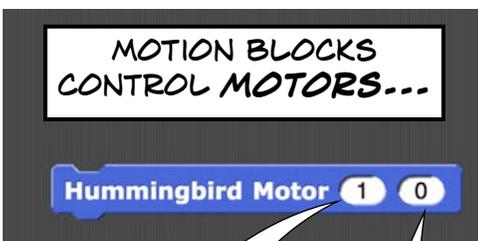
**MOTION BLOCKS**



**LOOKS BLOCKS**



AND **SENSING** BLOCKS:



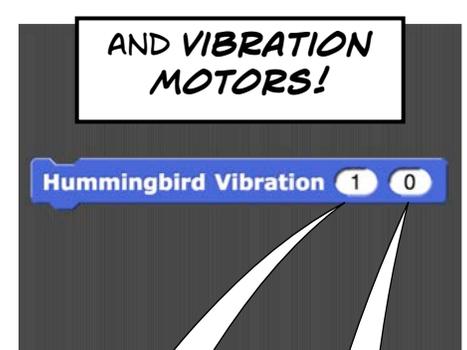
THE **FIRST** NUMBER SAYS WHICH MOTOR PORT WE'RE TALKING ABOUT, #1 OR #2.

THE **SECOND** NUMBER SETS THE SPEED, FROM 0 (STOPPED) TO 100 (FULL), TO -100 (REVERSE FULL)



PORT NUMBER (1-4)

ANGLE (0-180)



PORT NUMBER (1-2)

SPEED OF MOTOR (INTENSITY OF VIBRATION) (0-100)

TO TEST THE BLOCKS OUT (FOR NOW), DRAG THEM INTO THE CENTER SCRIPTS AREA AND CLICK ON THEM.

IF YOU WANT TO DELETE A BLOCK, DRAG IT BACK OVER TO THE LEFT SECTION.

NEXT ARE THE **LOOKS** BLOCKS, WHERE YOU CAN CONTROL REGULAR LEDs...

PORT NUMBER

LIGHT (0-100)

...OR TRICOLOR LEDs!

CHANGE THE AMOUNT OF RED, GREEN, AND BLUE LIGHT TO MIX A NEW COLOR!

NOTE: MIXING LIGHT TO MAKE NEW COLORS IS DIFFERENT THAN MIXING PAINT.

A QUICK CHEAT SHEET:

- RED+GREEN = YELLOW
- RED+BLUE = PURPLE
- GREEN + BLUE = TEAL
- RED+GREEN+BLUE = WHITE

FINALLY, THERE ARE THE **SENSING** BLOCKS. THESE GIVE YOU ("RETURN") INFORMATION ABOUT THE WORLD AROUND YOU.

Hummingbird Light 1

RETURNS THE VALUE OF A LIGHT SENSOR. (0-100)

FOR EACH SENSING BLOCK, YOU WILL NEED TO GIVE THE PORT NUMBER (1-4)

HB Temperature C 1

HB Temperature F 1

RETURNS THE TEMPERATURE VALUE IN CELSIUS (C) OR FAHRENHEIT (F).

HB Distance CM 1

HB Distance Inch 1

RETURNS THE DISTANCE IN CENTIMETERS TO AN OBJECT.

Hummingbird Raw Sensor 1

RETURNS THE RAW ANALOG VOLTAGE READING AT THE SENSOR PORT

Hummingbird Sound 1

RETURNS THE VALUE OF SOUND SENSOR. (0-100)

Hummingbird Knob 1

RETURNS THE VALUE OF THE HUMMINGBIRD'S KNOB. (0-100)

WHAT WE WANT TO DO IS TO WRITE **STATEMENTS** THAT SNAP! WILL UNDERSTAND. FOR EXAMPLE, WE COULD TRY TO TELL IT:

"WHEN SOMETHING GETS TOO CLOSE TO THE DISTANCE SENSOR, FLASH THE LIGHTS AND VIBRATE THE MOTOR."

BUT IN ORDER TO DO THAT, WE NEED MORE THAN JUST THE SENSOR BLOCKS. WE'LL ALSO NEED THE YELLOW **CONTROL** BLOCKS.

THE YELLOW **CONTROL** BLOCKS ARE USED TO MAKE STATEMENTS.



FOR THIS ACTIVITY, WE'LL MOSTLY LOOK AT TWO BLOCKS:

"WHEN SPACE KEY PRESSED"

AND

"IF, ELSE"



FIRST, THERE'S THE "WHEN SPACE KEY PRESSED" BLOCK. YOU CAN CHANGE IT FROM THE SPACE BAR TO ANY KEY ON THE KEYBOARD.

TO USE THIS BLOCK, DRAG IT OUT TO THE SCRIPTS AREA AND SNAP IT TO AN ACTION.



HERE'S AN EXAMPLE. WHEN I SNAP THESE TWO TOGETHER, PRESSING THE SPACE BAR WILL MAKE LED #1 TURN TO 50.

THE "IF, ELSE" BLOCK IS A LITTLE MORE COMPLICATED. IT'S LIKE A LITTLE SENTENCE:

**IF** (SOME CONDITION IS MET), THEN DO THIS **ACTION**, OR **ELSE** DO THIS OTHER **ACTION**.

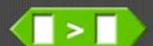
THE **ACTION** PART OF THE SENTENCE IS PRETTY SIMPLE. JUST SNAP AN ACTION BLOCK (LIKE A MOTION OR A LOOKS BLOCK) INTO THE MOUTH OF THE "IF" BLOCK.



BUT WHAT GOES IN THE **FIRST** PART OF THE "IF" BLOCK?

Hummingbird Knob 1

Hummingbird Light 1



THAT'S WHERE WE'LL PUT THE SENSING BLOCKS...AS WELL AS SOME GREEN BLOCKS CALLED **OPERATORS**.

WITH THE GREEN OPERATOR BLOCKS, WE'RE GOING TO LOOK AT TWO SYMBOLS YOU MIGHT REMEMBER FROM MATH CLASS:

< (LESS THAN)  
> (GREATER THAN)



9 IS LESS THAN 10



4 IS MORE THAN 3

IF YOU PUT IN SOMETHING FALSE...LIKE THAT 9 IS MORE THAN 10, IT WILL TELL YOU WHEN YOU CLICK ON IT!



WE CAN PUT OUR **SENSORS** IN THESE BLANKS! FOR EXAMPLE, THIS IS SAYING "THE LIGHT HITTING OUR SENSOR IS LESS THAN 50"!



TIP: MAKE SURE THE NUMBER HERE MATCHES THE PORT YOU HAVE THE SENSOR PLUGGED INTO!

IS THAT TRUE OR FALSE? DEPENDS ON HOW BRIGHT THE ROOM IS!

WE CAN HAVE THE SENSOR CHECK THE LIGHT IN THE ROOM - TO DO THAT, WE'LL PUT OUR OPERATOR INSIDE THE "IF, ELSE" BLOCK DIAMOND.



DRAG THE GREEN BLOCK HERE

NOW YOU HAVE THIS STATEMENT:

IF THE LIGHT HITTING OUR SENSOR IS LESS THAN 50, TURN THE LED TO 100!



DOES IT WORK? IF NOTHING CHANGES, TRY TURNING OFF THE LIGHTS IN THE ROOM AND TRYING AGAIN!

BUT, WHAT IF YOU TURN THE LIGHTS BACK ON? HOW DO YOU GET THE LED TO TURN OFF WHEN IT'S NOT NEEDED?



THIS IS WHERE THE ELSE STATEMENT COMES IN.

WE WANT TO CREATE A STATEMENT THAT SAYS: IF THE LIGHT HITTING OUR SENSOR IS **LESS** THAN **50**, TURN THE LED TO 100. **OTHERWISE**, TURN THE LED TO ZERO.

THE **ELSE** IS THE SECOND PART OF THIS STATEMENT. **ELSE** APPLIES WHEN THE FIRST **IF** CONDITION IS NOT MET.

ADDING THE **ELSE** ACTION IS EASY - IT'S JUST LIKE ADDING THE FIRST **IF** ACTION.

```
if Hummingbird Light 1 < 50
  Hummingbird LED 1 100
else
  Hummingbird LED 1 50
```

SNAP AN ACTION BLOCK INTO THE MOUTH OF THE "ELSE."

THIS TIME, WE'LL SET THE LED INTENSITY TO ZERO - COMPLETELY OFF.

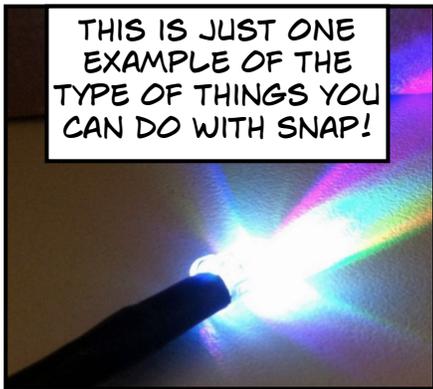
```
if Hummingbird Light 1
  Hummingbird LED 1 100
else
  Hummingbird LED 1 0
```

AS IT STANDS, THAT STATEMENT WILL ONLY CHECK THE ROOM **ONCE**. TO HAVE IT CONSTANTLY CHECK, PUT EVERYTHING INSIDE A "FOREVER" BLOCK. THE "FOREVER" BLOCK CAN BE FOUND IN THE CONTROL MENU.

```
when space key pressed
  forever
    if Hummingbird Light 1 < 50
      Hummingbird LED 1 100
    else
      Hummingbird LED 1 0
```

TIP: SNAP ON A "WHEN SPACE KEY PRESSED" AT THE TOP TO BE AN ON SWITCH!

LET'S TEST IT AGAIN! TRY THE FLIPPING LIGHTS ON AND OFF.



THIS IS JUST ONE EXAMPLE OF THE TYPE OF THINGS YOU CAN DO WITH SNAP!

FOR MORE IDEAS, GO TO [HUMMINGBIRDKIT.COM](http://HUMMINGBIRDKIT.COM)



AND SCROLL DOWN TO THE "EXAMPLES" SECTION!

BE SURE TO SAVE YOUR WORK!

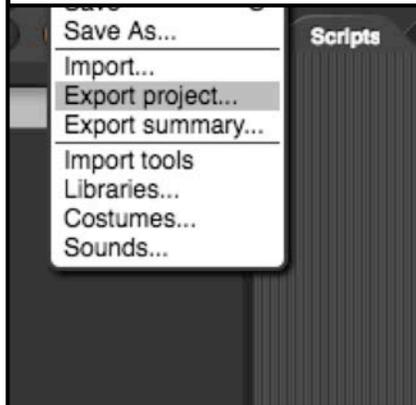


THERE ARE A FEW WAYS TO DO THAT. FIRST, YOU CAN CHOOSE "SAVE PROJECT IN THE CLOUD." YOU'LL NEED TO CLICK "SIGN UP" AND CREATE AN ACCOUNT TO DO THAT.

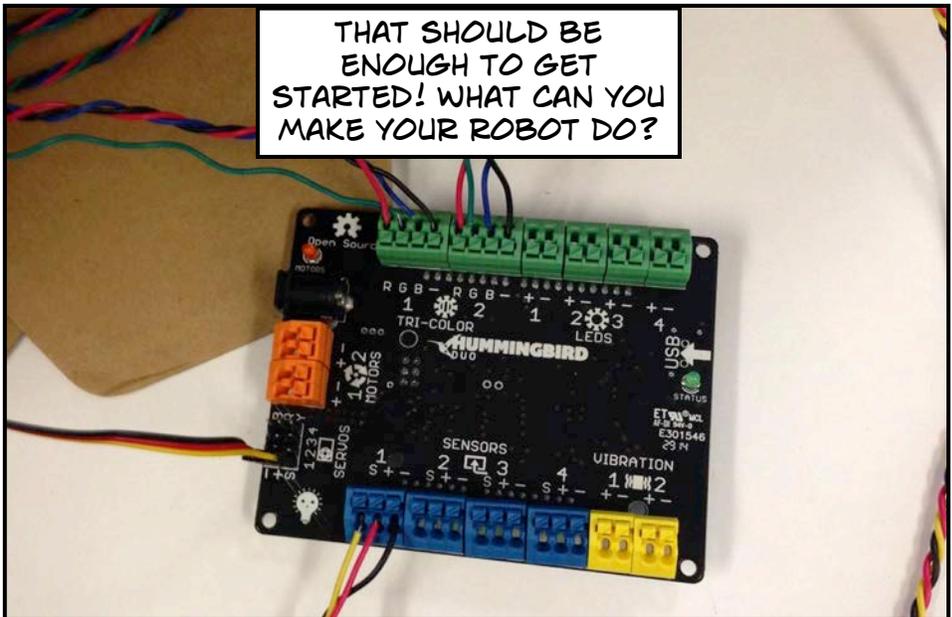
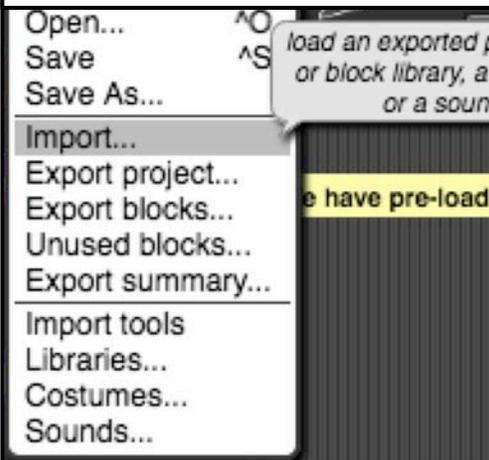
YOU CAN CHOOSE "SAVE PROJECT IN THE BROWSER". THIS ONE IS A LITTLE RISKY BECAUSE IT ONLY SAVES TO ONE COMPUTER AND CAN DISAPPEAR IF SOMEONE CLEARS THE CACHE.



FINALLY, YOU CAN EXPORT THE PROJECT AS AN XML FILE. THIS FILE CAN BE SAVED ON THE COMPUTER AND SHARED WITH OTHERS.



TO OPEN A PROJECT FROM AN XML FILE, CLICK ON IMPORT AND THEN CHOOSE THE .XML FILE YOU WANT.



THAT SHOULD BE ENOUGH TO GET STARTED! WHAT CAN YOU MAKE YOUR ROBOT DO?