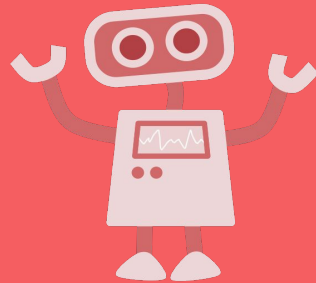


Day Four

Functions



Today's Plan

Learn about functions

Incorporate functions in our programs

Learn how to remotely control our robots

What is a Function?

A function is a group of related code that performs a specific task

You run the code in a function with a single “function call” instead of retyping and repeating the same code over and over.

Functions makes your program easier to read and improve its design!

Example

Let's sing together!

I am not throwin' away my shot
I am not throwin' away my shot
Hey yo, I'm just like my country
I'm young, scrappy and hungry
And I'm not throwin' away my shot

I'ma get a scholarship to King's College
I probably shouldn't brag, but dang, I amaze and astonish
The problem is I got a lot of brains but no polish
I gotta holler just to be heard
With every word, I drop knowledge
I'm a diamond in the rough, a shiny piece of coal
Tryna reach my goal my power of speech, unimpeachable
Only nineteen but my mind is older
These New York City streets get colder, I shoulder
Every burden, every disadvantage
I have learned to manage, I don't have a gun to brandish
I walk these streets famished
The plan is to fan this spark into a flame
But damn, it's getting dark, so let me spell out my name
I am the A-L-E-X-A-N-D-E-R we are meant to be

A colony that runs independently
Meanwhile, Britain keeps shittin' on us endlessly
Essentially, they tax us relentlessly
Then King George turns around, runs a spendin'
spree
He ain't ever gonna set his descendants free
So there will be a revolution in this century
Enter me, he says in parentheses
Don't be shocked when your history book
mentions me
I will lay down my life if it sets us free
Eventually, you'll see my ascendancy and

I am not throwin' away my shot
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Another Example

Boom, boom, ain't it great to be crazy
Boom, boom, ain't it great to be crazy
Giddy and foolish all day long
Boom, boom, ain't it great to be crazy?

Way down South where bananas grow
An ant stepped on an elephant's toe
The elephant cried with tears in his eyes
"Why don't you pick on someone your own size?"

Boom, boom, ain't it great to be crazy
Boom, boom, ain't it great to be crazy
Giddy and foolish all day long
Boom, boom, ain't it great to be crazy?

Way up North where there's ice and snow
There lived a penguin and his name was Joe
He got so tired of black and white
He wore pink pants to the dance last night!

Boom, boom, ain't it great to be crazy
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Giddy and foolish all day long
Boom, boom, ain't it great to be crazy?



Chorus

Chorus:

Boom, boom, ain't it great to be crazy

Boom, boom, ain't it great to be crazy

Giddy and foolish all day long

Boom, boom, ain't it great to be crazy?

(Chorus)

Way down South where bananas grow

An ant stepped on an elephant's toe

The elephant cried with tears in his eyes

"Why don't you pick on someone your own size?"

(Chorus)

Way up North where there's ice and snow

There lived a penguin and his name was Joe

He got so tired of black and white

He wore pink pants to the dance last night!

(Chorus)

Functions

- ❖ Calling functions are just like saying “(Chorus)”
- ❖ Suppose we wanted to change the chorus by a few words
- ❖ We would only have to change it once rather than several times
- ❖ Functions provide the same capabilities in our programs

Baby shark, doo, doo, doo, doo, doo, doo
Baby shark, doo, doo, doo, doo, doo, doo
Baby shark, doo, doo, doo, doo, doo, doo
Baby shark

Mommy shark, doo, doo, doo, doo, doo, doo
Mommy shark, doo, doo, doo, doo, doo, doo
Mommy shark, doo, doo, doo, doo, doo, doo
Mommy shark

Daddy shark, doo, doo, doo, doo, doo, doo
Daddy shark, doo, doo, doo, doo, doo, doo
Daddy shark, doo, doo, doo, doo, doo, doo
Daddy shark

Grandma shark, doo, doo, doo, doo, doo, doo
Grandma shark, doo, doo, doo, doo, doo, doo
Grandma shark, doo, doo, doo, doo, doo, doo
Grandma shark

Grandpa shark, doo, doo, doo, doo, doo, doo
Grandpa shark, doo, doo, doo, doo, doo, doo
Grandpa shark, doo, doo, doo, doo, doo, doo
Grandpa shark



Functions

- ❖ Would functions help?
- ❖ Why or why not?
- ❖ Why is this different?

Baby shark, doo, doo, doo, doo, doo, doo

Baby shark, doo, doo, doo, doo, doo, doo

Baby shark, doo, doo, doo, doo, doo, doo

Baby shark

Mommy shark, doo, doo, doo, doo, doo, doo

Mommy shark, doo, doo, doo, doo, doo, doo

Mommy shark, doo, doo, doo, doo, doo, doo

Mommy shark

Daddy shark, doo, doo, doo, doo, doo, doo

Daddy shark, doo, doo, doo, doo, doo, doo

Daddy shark, doo, doo, doo, doo, doo, doo

Daddy shark

Functions

- ❖ Sometimes we need to pass additional information to our functions
- ❖ What might we pass to our “chorus” function for Baby Shark?

Baby shark, doo, doo, doo, doo, doo, doo

Baby shark, doo, doo, doo, doo, doo, doo

Baby shark, doo, doo, doo, doo, doo, doo

Baby shark

Mommy shark, doo, doo, doo, doo, doo, doo

Mommy shark, doo, doo, doo, doo, doo, doo

Mommy shark, doo, doo, doo, doo, doo, doo

Mommy shark

Daddy shark, doo, doo, doo, doo, doo, doo

Daddy shark, doo, doo, doo, doo, doo, doo

Daddy shark, doo, doo, doo, doo, doo, doo

Daddy shark

Functions

- ❖ Sometimes we need to pass additional information to our functions
- ❖ What might we pass to our “chorus” function for Baby Shark?

Parameter

Chorus(*name*):

<name> shark, doo, doo, doo, doo, doo, doo
<name> shark, doo, doo, doo, doo, doo, doo
<name> shark, doo, doo, doo, doo, doo, doo
<name> shark

Baby shark, doo, doo, doo, doo, doo, doo
Baby shark, doo, doo, doo, doo, doo, doo
Baby shark, doo, doo, doo, doo, doo, doo
Baby shark

Mommy shark, doo, doo, doo, doo, doo, doo
Mommy shark, doo, doo, doo, doo, doo, doo
Mommy shark, doo, doo, doo, doo, doo, doo
Mommy shark

Daddy shark, doo, doo, doo, doo, doo, doo
Daddy shark, doo, doo, doo, doo, doo, doo
Daddy shark, doo, doo, doo, doo, doo, doo
Daddy shark

Baby Shark Revisited

~~Baby shark, doo, doo, doo, doo, doo, doo
Baby shark, doo, doo, doo, doo, doo, doo
Baby shark, doo, doo, doo, doo, doo, doo
Baby shark~~

~~Mommy shark, doo, doo, doo, doo, doo, doo
Mommy shark, doo, doo, doo, doo, doo, doo
Mommy shark, doo, doo, doo, doo, doo, doo
Mommy shark~~

~~Daddy shark, doo, doo, doo, doo, doo, doo
Daddy shark, doo, doo, doo, doo, doo, doo
Daddy shark, doo, doo, doo, doo, doo, doo
Daddy shark~~

Chorus(name):

<name> shark , doo, doo, doo, doo, doo, doo

<name> shark, doo, doo, doo, doo, doo, doo

<name> shark, doo, doo, doo, doo, doo, doo

<name> shark

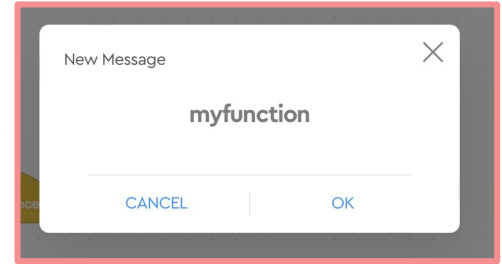
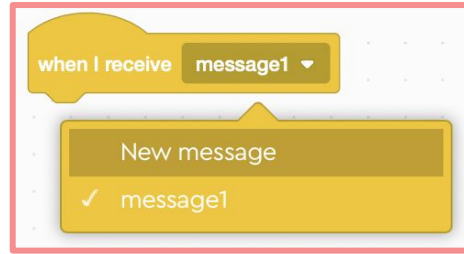
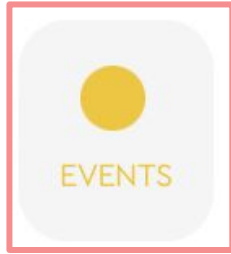
Chorus(baby)

Chorus(mommy)

Chorus(daddy)

Functions in Spike

First define a function by naming it and programming content



Then use the function in the main program

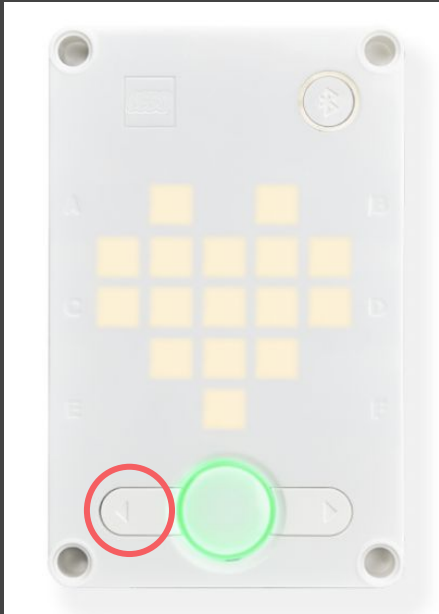


Include this block

at the end of every function definition to tell the main program to stop waiting

Pre-Lab

Come up with a program that uses functions (broadcast messages) to react to the hub being pressed and tapped in different ways.



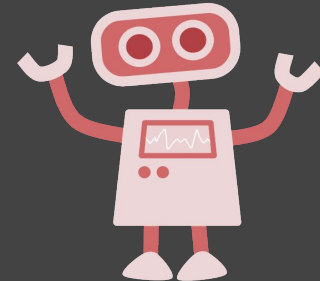
Sensors

- > shaken
- > tapped
- > left key
- > right key

Reactions

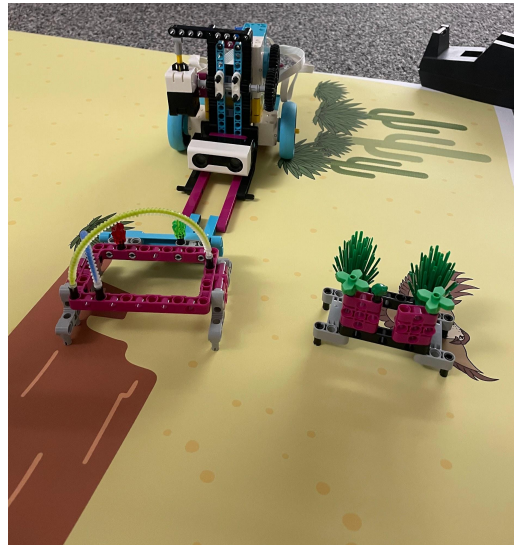
- > sound
- > light display
- > motors, etc.

For example, I could make a lockbox that would only open after a correct input combination of keys



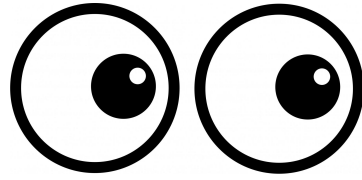
Lab

Today you will be building **forkie** to traverse through different maps and, using function calls, you will lift and retrieve as many objects on the map as possible in 2 minutes.



You will use two new sensors, an ultrasonic sensor and a touch sensor.

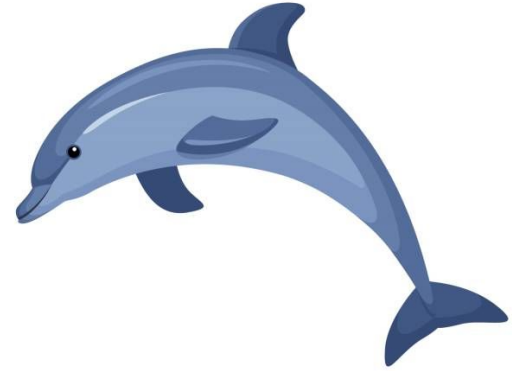
Ultrasonic Sensor



Almost like echolocation!



The ultrasonic sensor generates sound waves to measure how far an object is



Helpful block!!

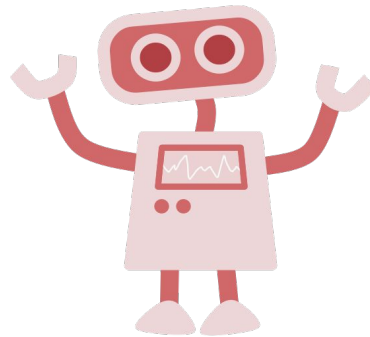
Bump Sensor



Helpful block!!



Just like a
button to push

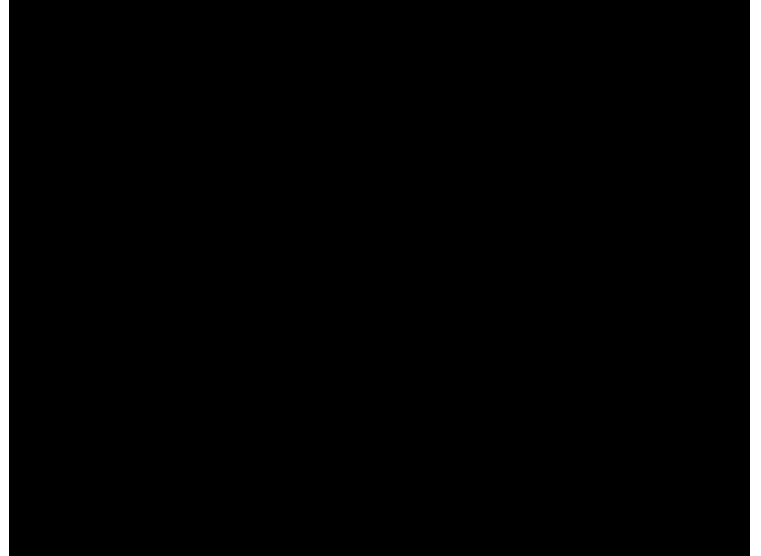


Lab Hints

forkie will frequently need to raise and lower its lift, so begin by creating functions to move the lift.

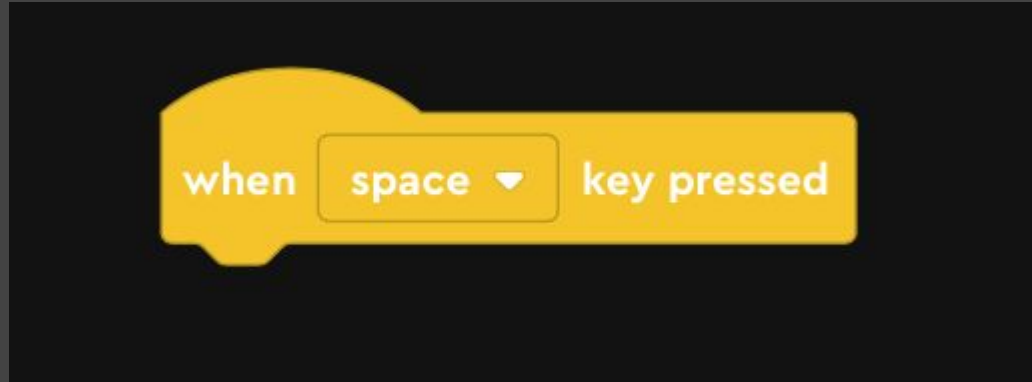
forkie can work in the mountains, the desert, and even space, only when it can “see” an obstacle, so be sure to align the vision of the ultrasonic sensor with the obstacle to lift. There are two boxes to build and decorate for **forkie** to move!

forkie needs to search for an obstacle to retrieve, so we will be using arrow keys to lead **forkie**, but you need to still use the ultrasonic sensor to detect when an obstacle is close enough to lift it. Wiggle around and when **forkie** is facing the direction of the obstacle, call the function to go lift it!

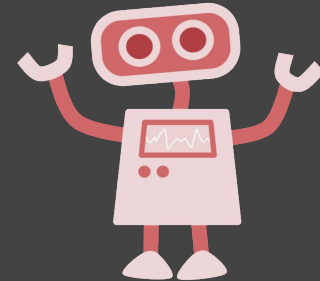


MindStorm App

The same blocks are available to you as in the SPIKE app, but there is one special block!



This block can let you control forkie from your keyboard!



Remote Control

Try to move forkie with
your arrow keys but
keep the same functions
for picking up obstacles!

