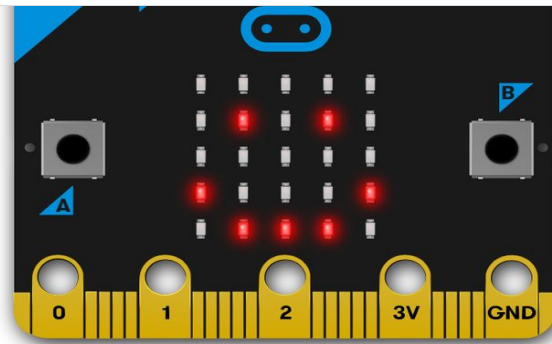
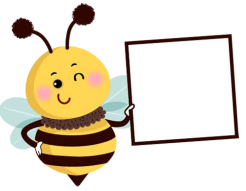


STEM education LLC



What are “Radio Signals”? (Reminder)

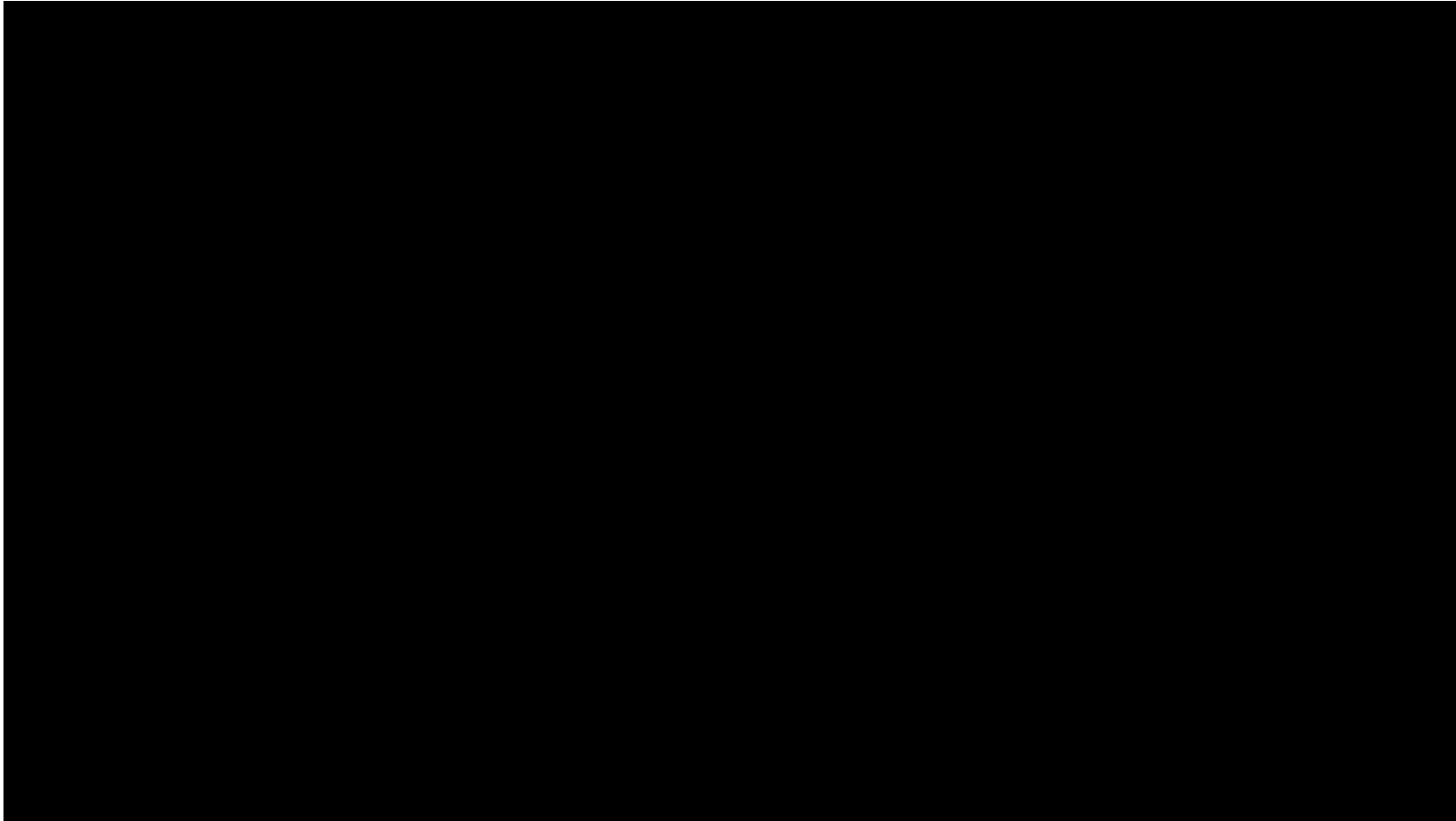
Radio signals are information signals sent using radio waves*. We can use radio waves to transmit information over long distances.



*Radio waves are electromagnetic waves with a frequency of about 3 Hz to 300 GHz



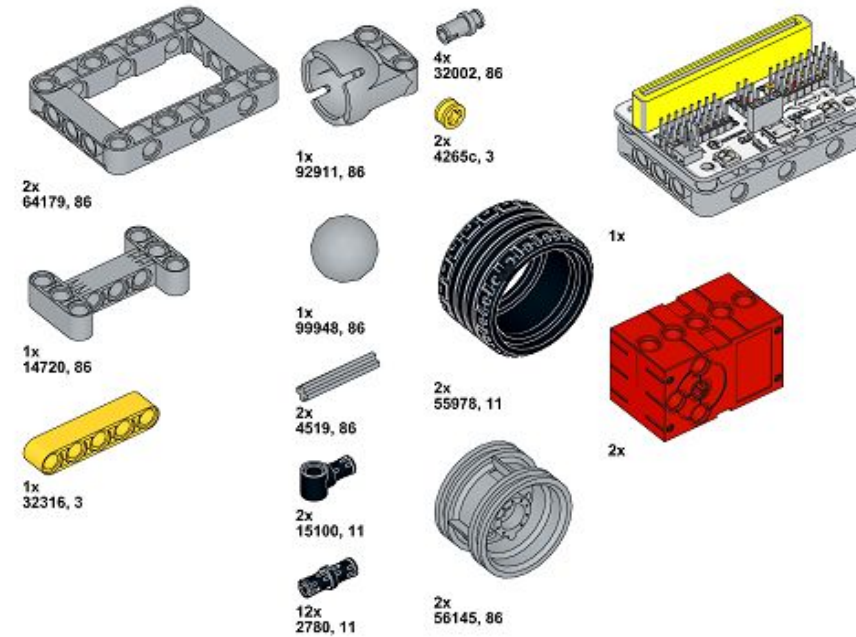
Remote Control (RC) Vehicles :



How do these kinds of vehicles work? Could we, with what we know so far, build our own drone?



Of course! We can use the radio!



Let's think about , what do we need to make our vehicle Radio - Controlled?





We will need a microbit for the role of the transmitter (remote control) and a microbit for the role of the receiver that will be in the vehicle!

The logic of the system is as follows : Whenever the microbit transmitter has a tilt in one of the four basic directions (up , down , right , left) it will send a corresponding letter to the receiver (F , B , R , L) . By reading each letter the receiver, will transmit , and the corresponding command to the vehicle to move (forward , backward , right , left)

Transmitter code:

```
import Wukong
from microbit import *
import radio

radio.on()
radio.config(channel = 1)
```

```
while True:
    if accelerometer.is_gesture("left"):
        radio.send("L")
    elif accelerometer.is_gesture("right"):
        radio.send("R")
    elif accelerometer.is_gesture("up"):
        radio.send("B")
    elif accelerometer.is_gesture("down"):
        radio.send("F")
    elif accelerometer.is_gesture("face up"):
        radio.send("S")
    sleep(100)
```

Receiver Code:

```
import Wukong
from microbit import *
import radio

wk = Wukong.WUKONG()

radio.on()
radio.config(channel = 1)

def forward(speed):
    wk.set_motors(1, speed)
    wk.set_motors(2, speed)

def backward(speed):
    wk.set_motors(1,-speed)
    wk.set_motors(2,-speed)
```

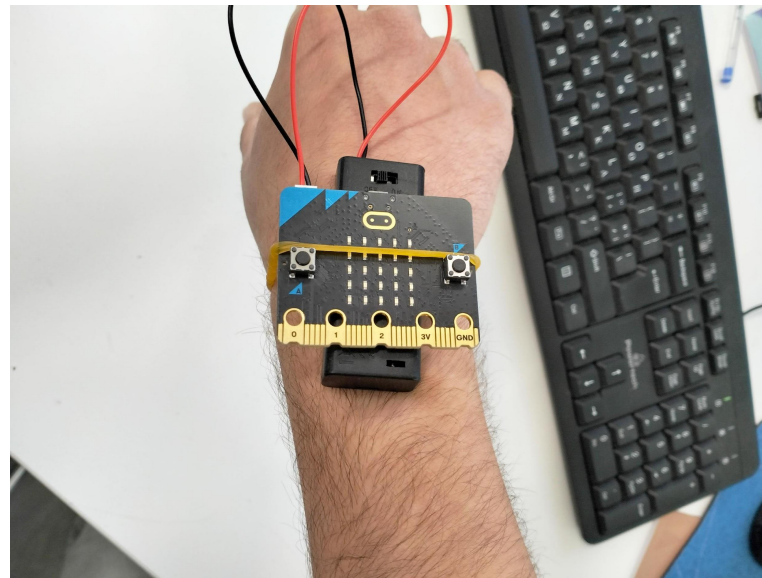
```
def turn_left(speed):
    wk.set_motors(1, 0)
    wk.set_motors(2, speed)

def turn_right(speed):
    wk.set_motors(1, speed)
    wk.set_motors(2, 0)

def stop():
    wk.set_motors(1,0)
    wk.set_motors(2,0)
```

```
while True:
    command = radio.receive()
    if command == "F" :
        forward(40)
    elif command == "B" :
        backward(40)
    elif command == "L" :
        turn_left(40)
    elif command == "R" :
        turn_right(40)
    else:
        stop()
        sleep(100)
```

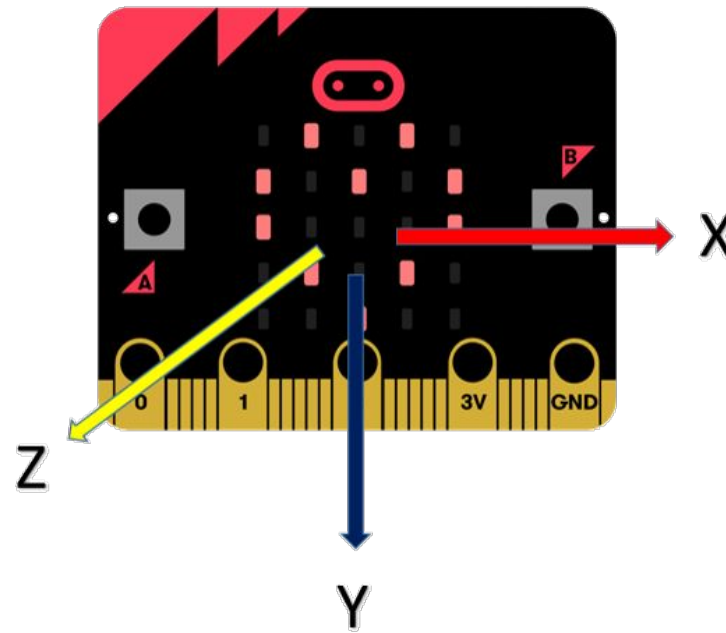
Add a battery case to the microbit transmitter, and mount with Wukong's rubber bands , on your hand:



Try racing with your classmates on a track set by your teacher. How quickly were you able to get off the track?



The accelerometer of the microbit has the ability to give its slope in the x, y, z axes with values from -1023 to 1023. Which means we can make our transmitter more sensitive!



Receiver Code:

```
import Wukong
from microbit import *
import radio

radio.on()
radio.config(channel = 1)
```



```
while True:
    x = accelerometer.get_x()
    y = accelerometer.get_y()
    if x < -512 :
        radio.send("L")
    elif x > 512 :
        radio.send("R")
    elif y < -512 :
        radio.send("B")
    elif y > 512 :
        radio.send("F")
    else:
        radio.send("S")
    sleep(100)
```

Make any customization you want on your vehicle, and with your Teacher as referee, play robot soccer!

