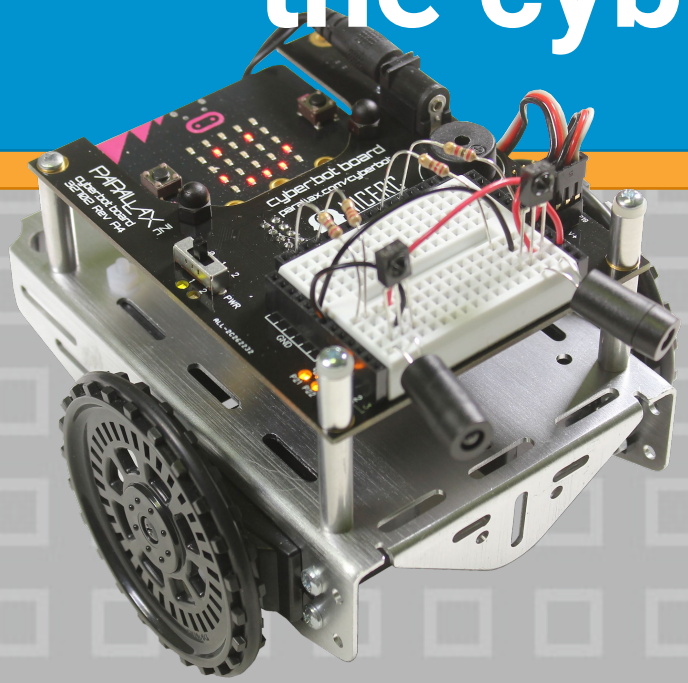
Getting started with Python and Microbit using the cyber:bot Webinar



Hosted by **Ken Gracey, Parallax CEO**
Co-host **Kevin Nolten, NICERC Director of Academic Outreach**

NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC
www.parallax.com

Ken Gracey, Parallax CEO

Started Parallax's educational program around microcontrollers, electronics and robotics in 1997. Rocklin, California. Preliminary CTE credential in California. Enjoys unicycling, mountains and robots!

E-mail: kgracey@parallax.com

Kevin Nolten, NICERC Director of Academic Outreach

Runs Department of Homeland Security cyber education grant and creates cyber education curriculum with district/state level education departments. Has two funny dogs, loves outdoors and and is taking up powered paragliding.
E-mail: kevin.nolten@cyber.org

NICERC™ AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX www.parallax.com

cyber:bot is a Joint Project of Parallax and NICERC

- https://www.parallax.com
- Established educational robotic company since 1992
- American manufacturer from Rocklin, California
- Staff of 20

- https://nicerc.org/
- Department of Homeland Security funded
- Create a cyber-ready workforce
- Produces a free curriculum for American educators
- Staff of 25

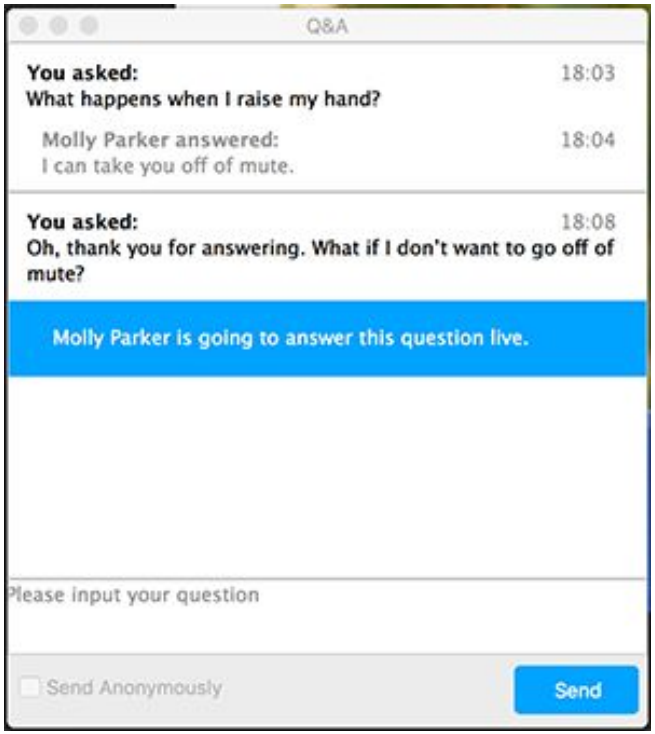
Webinars are interactive - we want your questions and comments!

NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

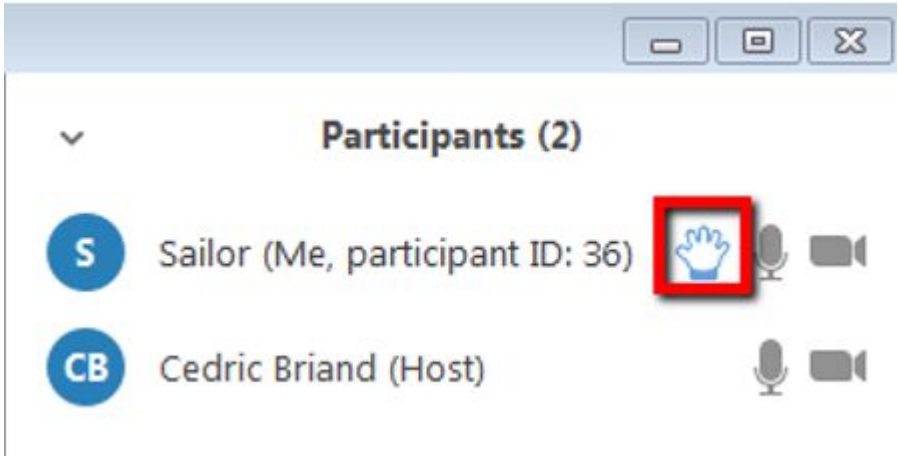
PARALLAX INC
www.parallax.com

How to use Zoom!

Use the Q&A to **TYPE** question, make a comment.



Raise your hand to **ASK** a question or make a comment. Your audio should be working to do this.



Lower your hand when you are done.

Agenda

- Microbit (5 min.)
  - Python language
  - Microbit from BBC in UK
  - Programming the Microbit
  - Educational resources
- cyber:bot (15 min.)
  - Adding Cyberbot module
  - Program the cyber:bot for turns
  - Curriculum
  - Educator's Resources
  - Cybersecurity - **new!**
- Demonstrations! (20 min.)
- Support and Products (5 min.)
- Q/A (15 min.)

Guest Goals

- Enjoy the webinar event
- Learn about the resources
- See some Python
- Identify setup challenges
- Understand the cyber:bot module and hardware interaction
- Gain confidence to use cyber:bots in classrooms
- See robots GO
- Get questions answered

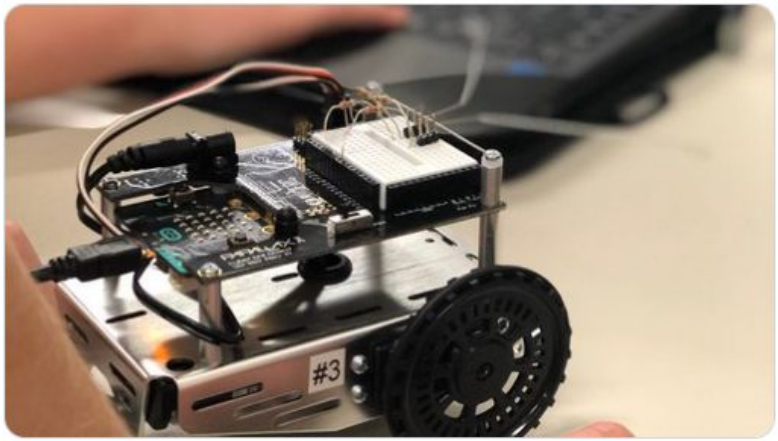
Parallax Manufactures in the USA

Cyber:bots Success One Year Anniversary

You Retweeted

Mitch Miller @MMiller_32 · Nov 8, 2019

Today my 7th grade class completed their #CyberBot challenges. We programmed these bots with Python script and guided them through floor obstacles. Thank you @ParallaxInc and @CIC_NICERC for supplying the robots for our students!

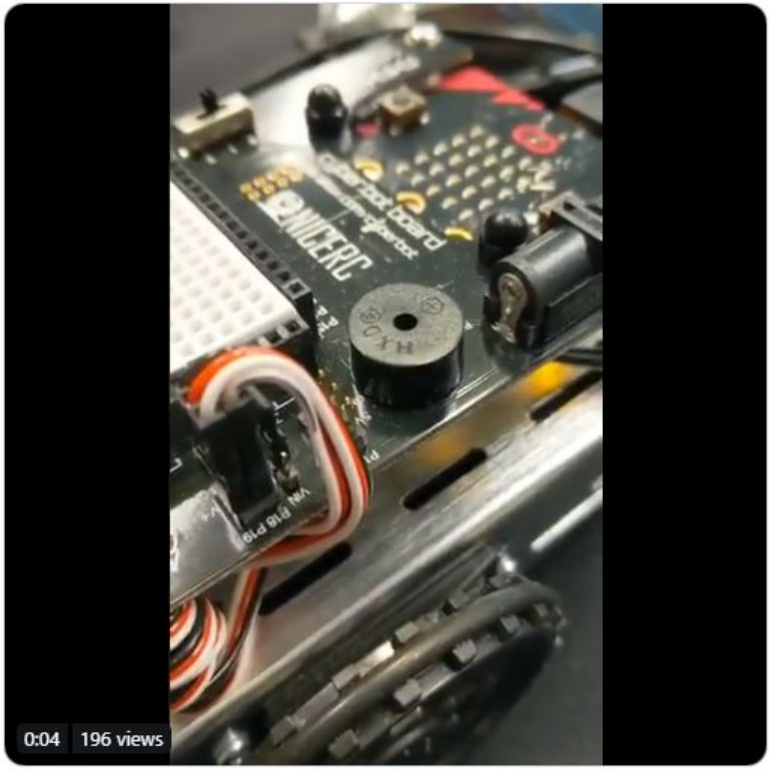


1 4 17

You Retweeted

Shaun Langevin @ShaunLangevin · Nov 14, 2019

I think I coded this cyber:bot with a sequence of appropriate tones. Great set of sessions at #vtfest2019. @mmuusdvt @ParallaxInc @CIC_NICERC #vted



1 5 9

NICERC™ AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC www.parallax.com

Ask a student what they think.

ZakUak (subscribe to his YouTube) spent two days at the Parallax booth at the USA Science and Engineering Festival. He says about cyber:bot in his video:

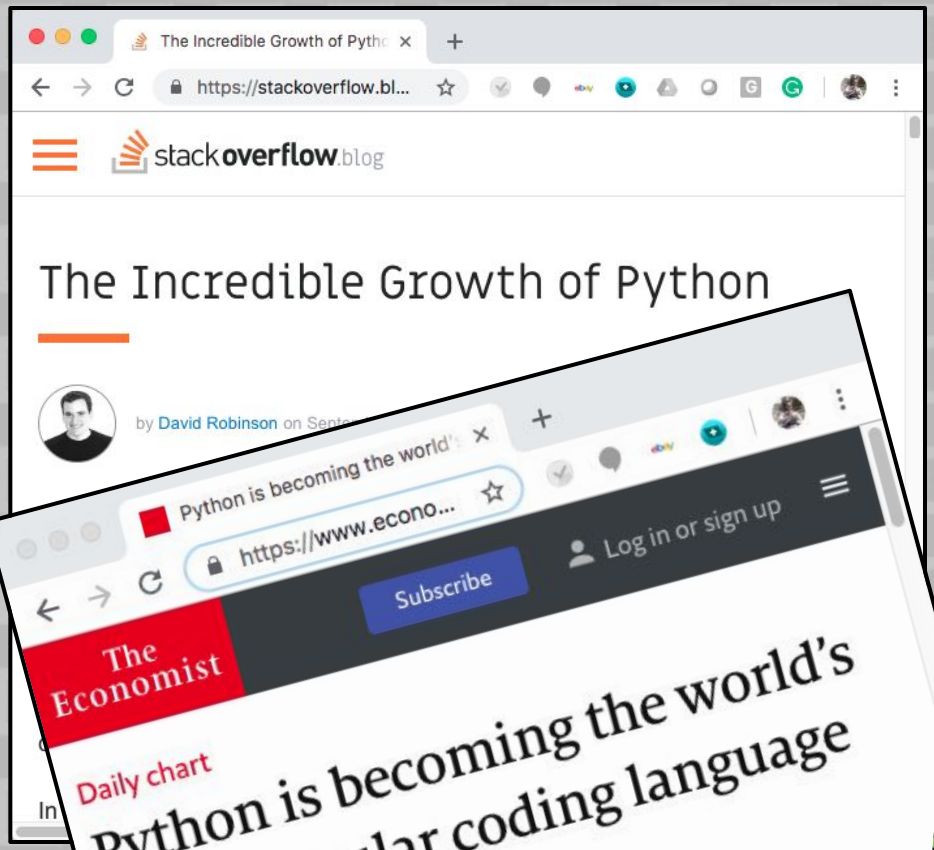
- “No black box - the real thing working with components!”
- “This makes coding interesting - Python is a fun programming language”

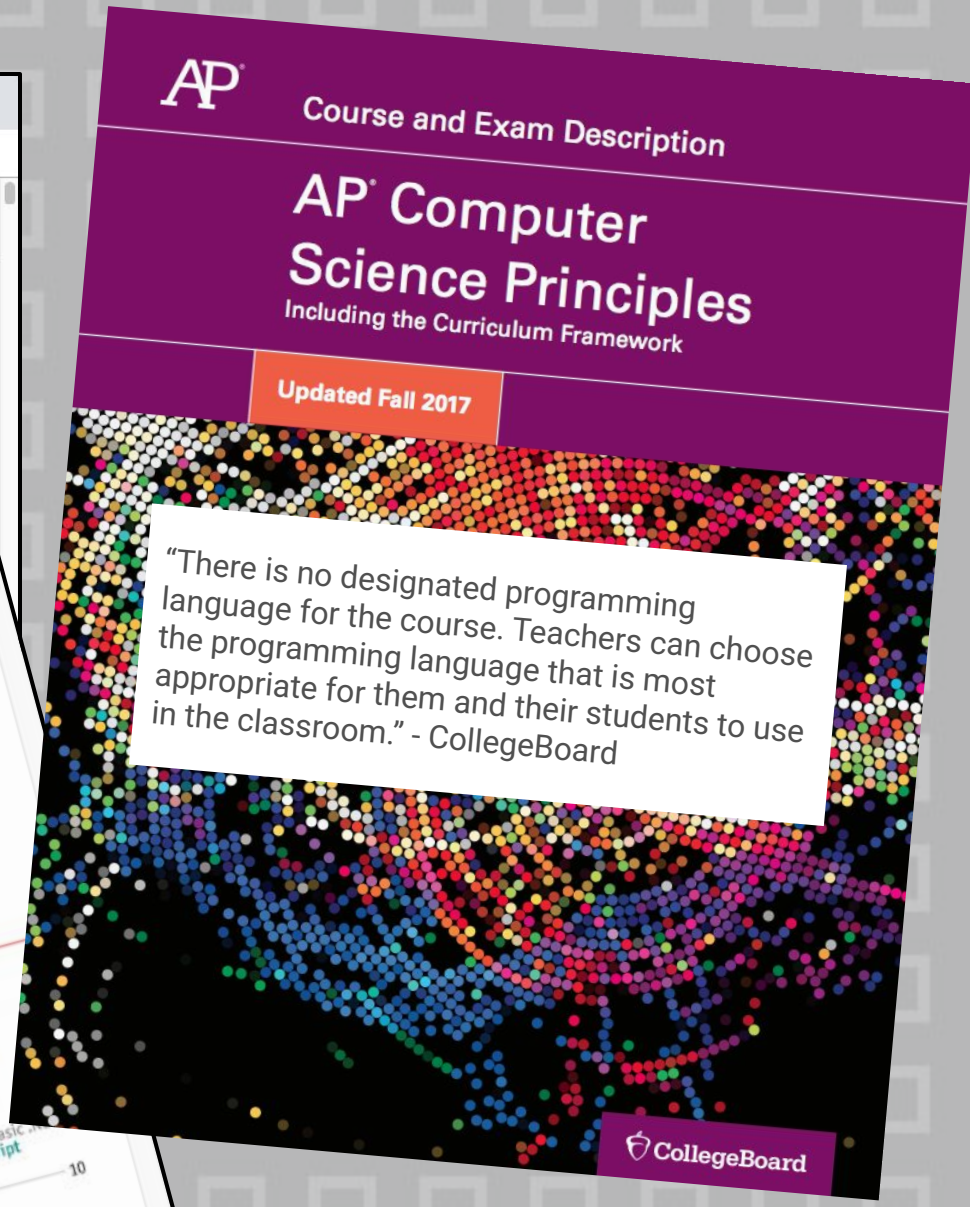
Exposure creates careers and drives the economy.

Python and micro:bit

NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC
www.parallax.com





PARALLAX INC
www.parallax.com

https://www.zdnet.com/article/python-is-eating-the-world-how-one-developers-side-...

EDITION: US

ZDNet

VIDEOS 5G WINDOWS 10 CLOUD AI INNOVATION SECURITY MORE NEWSLETTERS ALL WRITERS

MUST READ: Windows 10: Has Microsoft cleaned up its update mess? (Spoiler: no)

Python is eating the world: How one developer's side project became the hottest programming language on the planet

Frustrated by programming language shortcomings, Guido van Rossum created Python. With the language now used by millions, Nick Heath talks to van Rossum about Python's past and explores what's next.

By Nick Heath | July 11, 2019 -- 14:58 GMT (07:58 PDT) | Topic: Developer

MORE FROM NICK HEATH

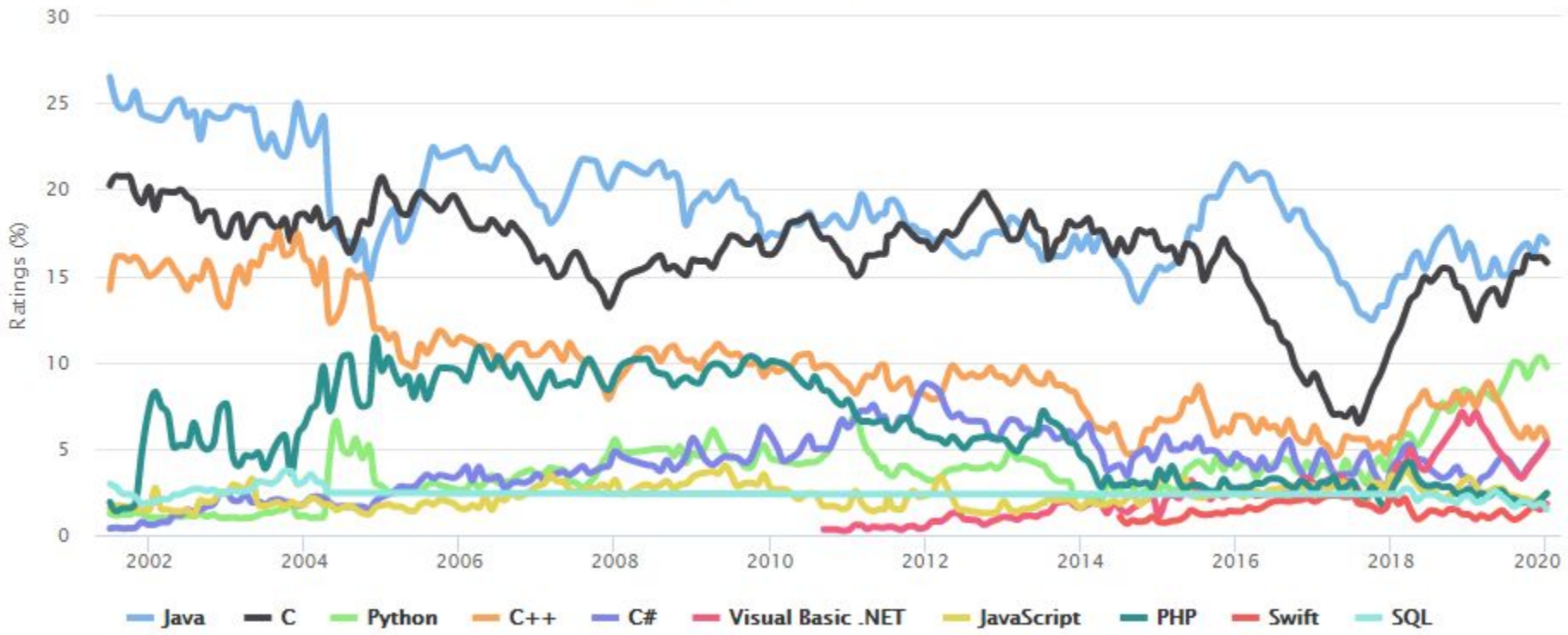
Windows 10
Microsoft blocks major Windows 10 update for Surface Book 2 after bug makes GPU vanish

NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX
www.parallax.com

TIOBE Programming Community Index

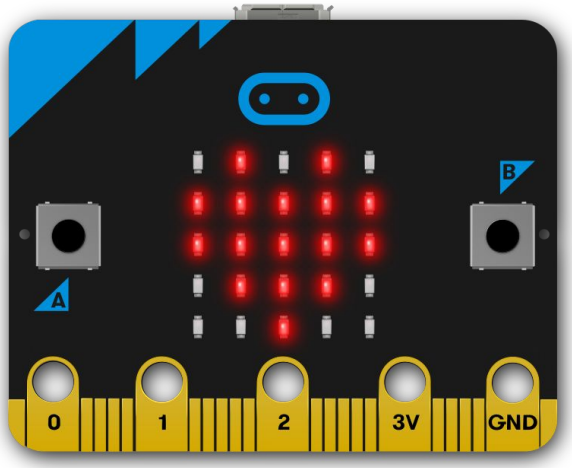
Source: www.tiobe.com



Jan 2020	Jan 2019	Change	Programming Language	Ratings	Change
1	1		Java	16.896%	-0.01%
2	2		C	15.773%	+2.44%
3	3		Python	9.704%	+1.41%

- Beginner-friendly (reads like English - looks BASIC)
- Object-oriented, structured language
- Runs on embedded, physical hardware (MicroPython)
- Tons of examples freely available
- Programming tool support (open source, all OSs, etc.)
- Forces new programmers to use alignment/indentation for legibility (good practice)
- Not overly verbose - easier to "get at the heart" of the concept you're teaching (no wading through a bunch of meaningless syntax rules that obscure the instructional intent)

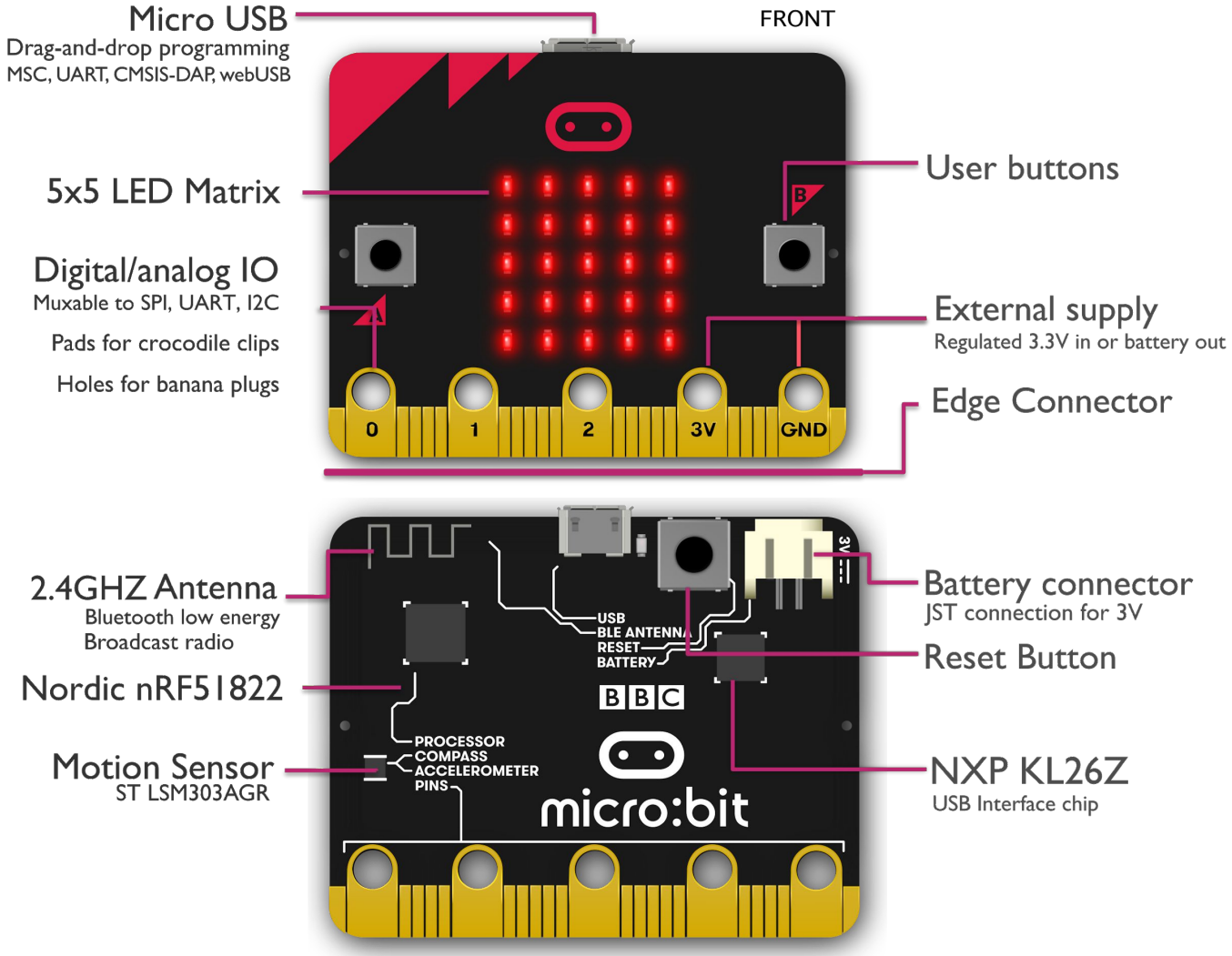
micro:bit

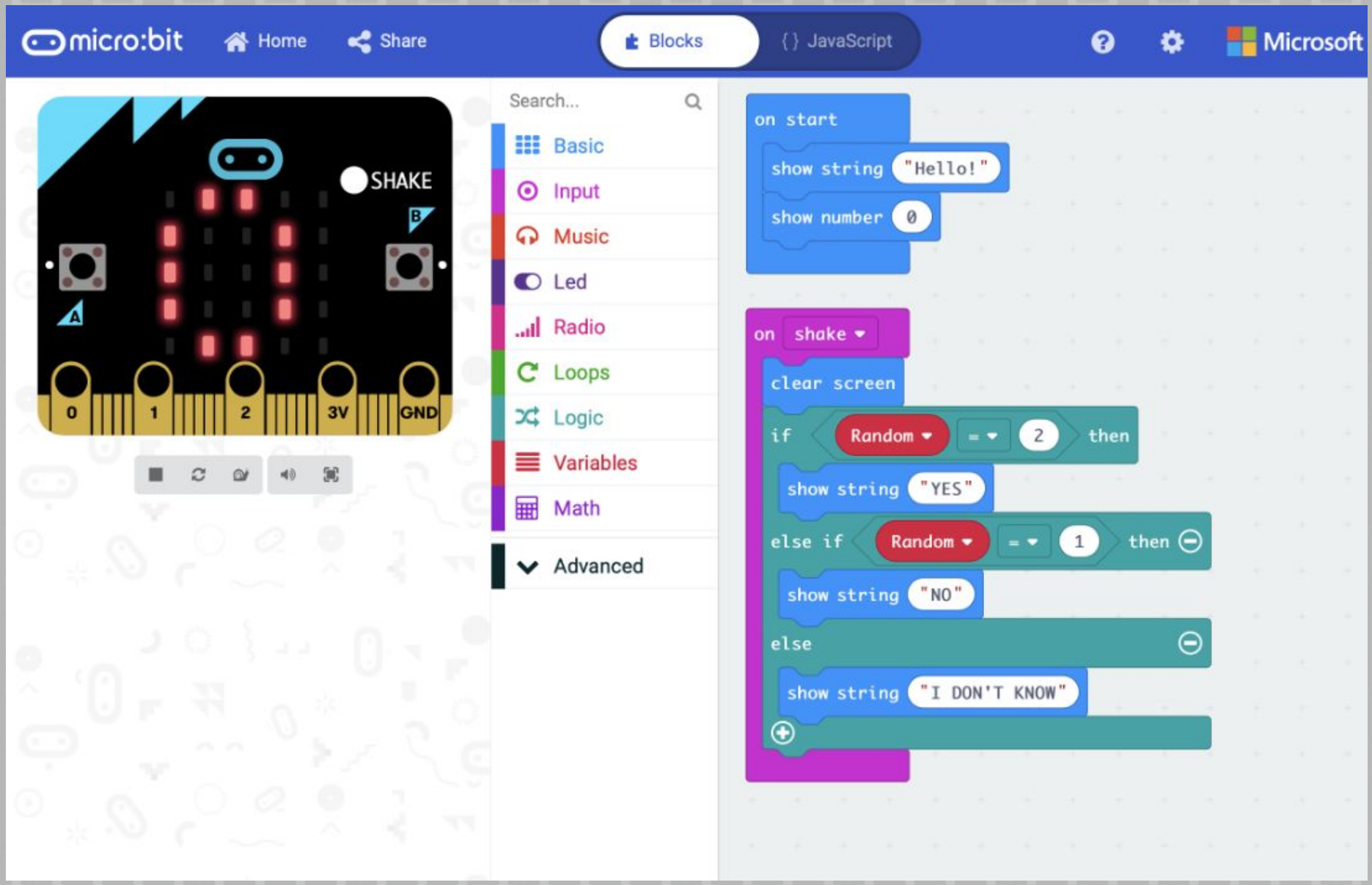


NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC
www.parallax.com

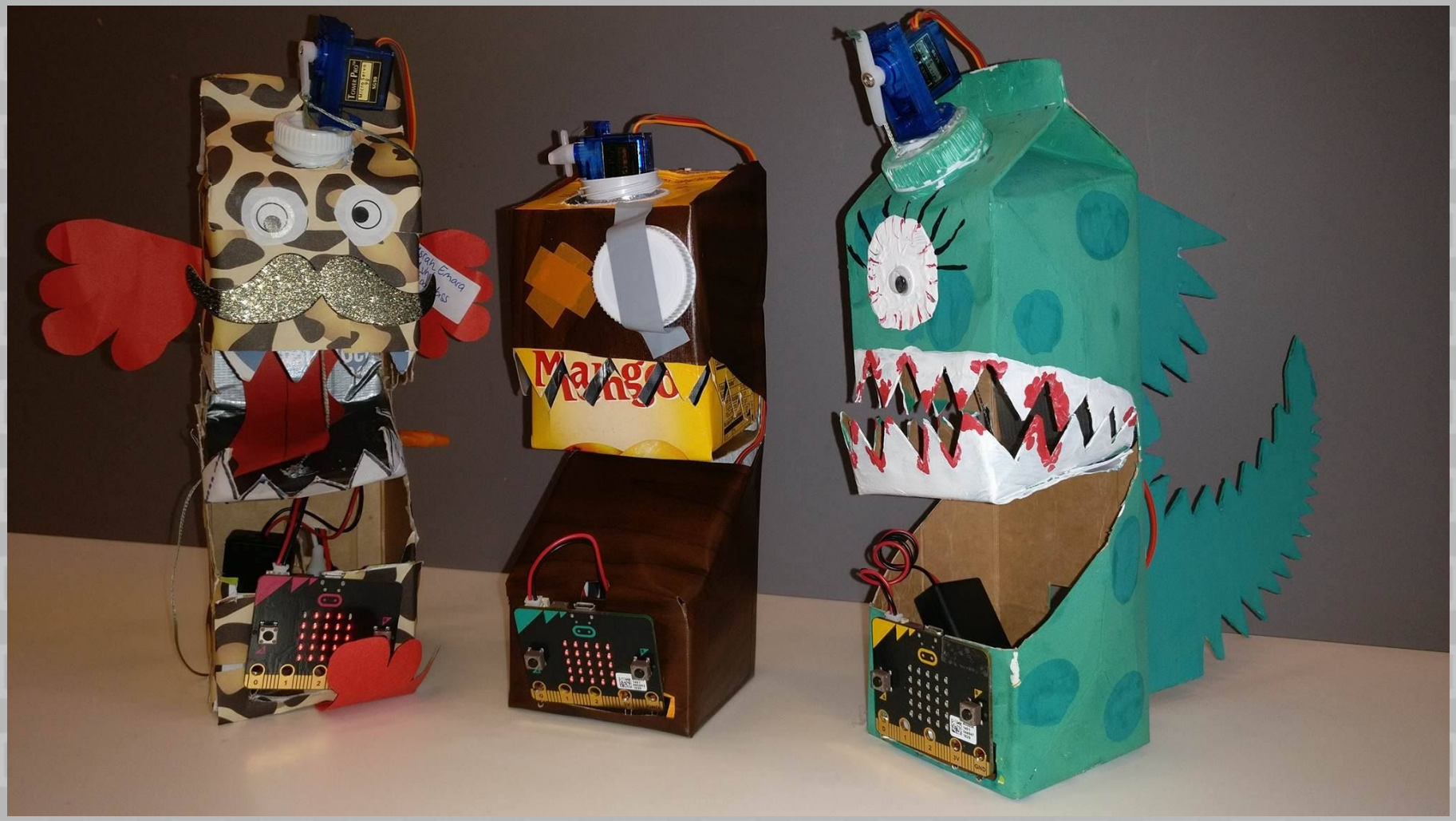
micro:bit: Hardware Features





NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

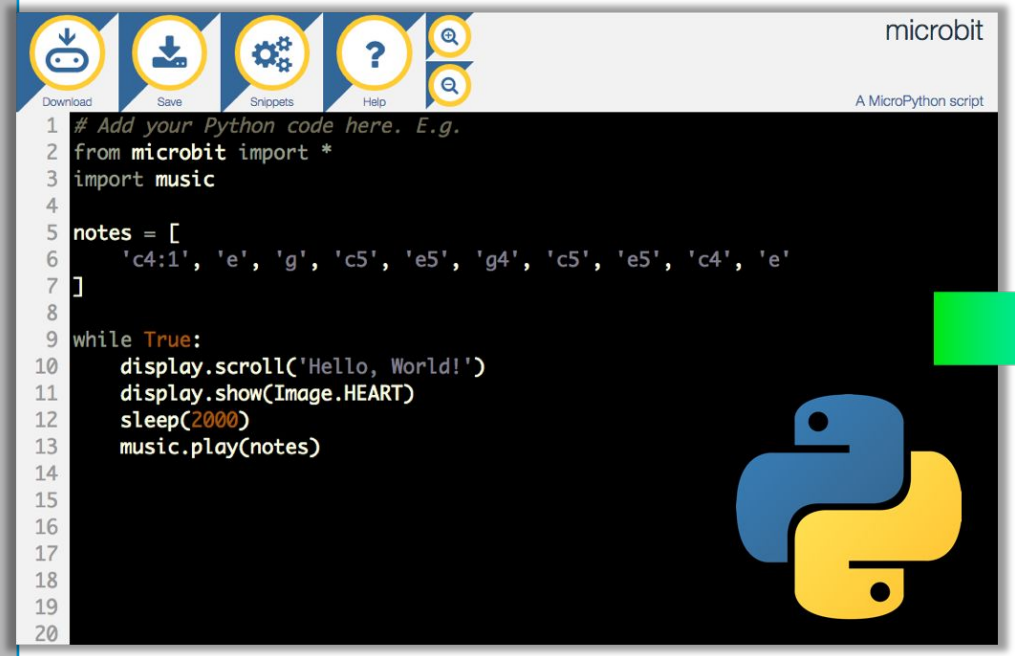
PARALLAX INC
www.parallax.com

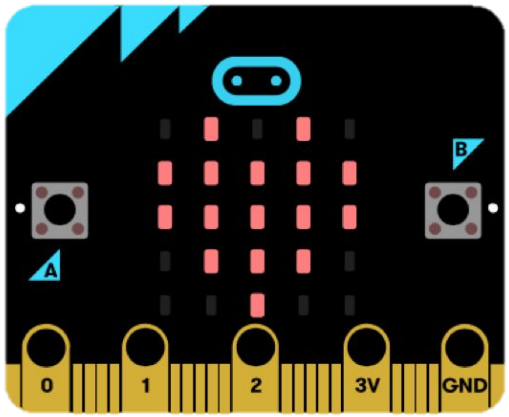


NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

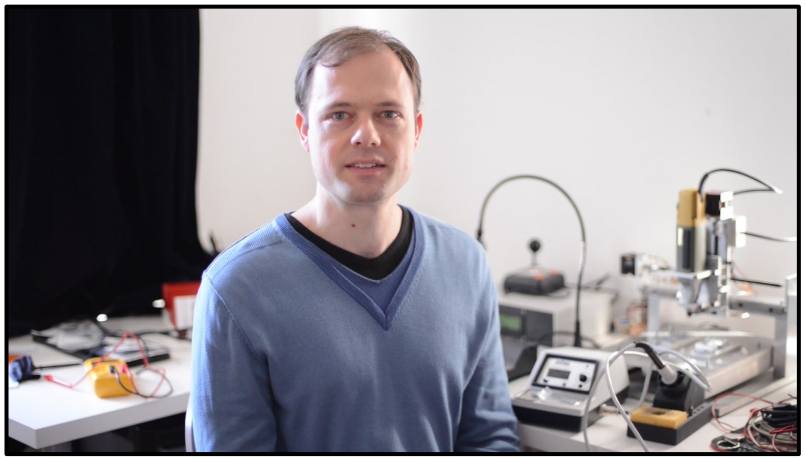
PARALLAX INC
www.parallax.com

MicroPython: Python for Microcontrollers



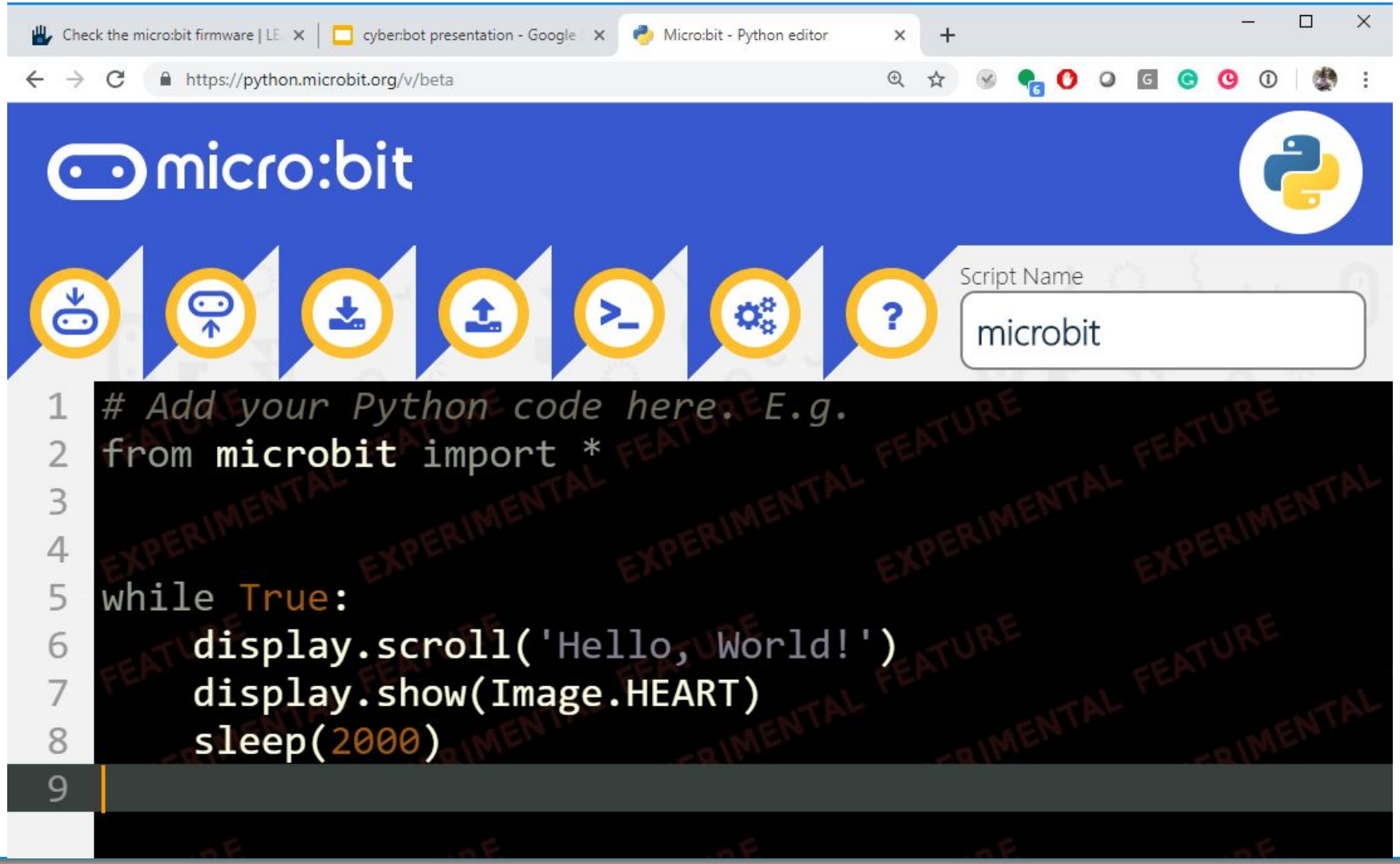


MicroPython is a creation of Damien George



Connect micro:bit to Computer

Go to python.microbit.org



LED Matrix - Premade Images

```
#beating_heart.py

from microbit import *

display.show(Image.HEART)
sleep (500)
display.show(Image.HEART_SMALL)
sleep (500)
```

- Press the “reset” button to see it again.
- Try your own - Google “micro:bit MicroPython Images”

LED Matrix - Scrolling

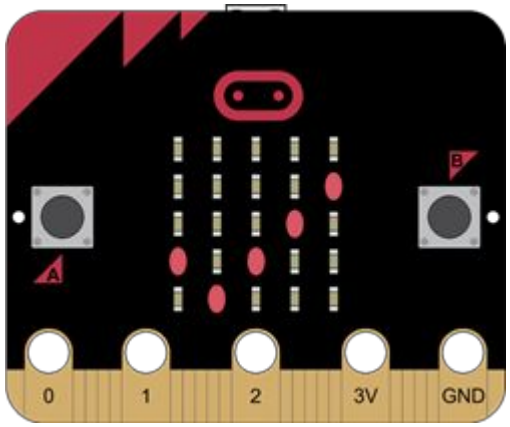
```
#hello_goodbye.py

from microbit import *

display.scroll('Hello', delay = 500)
display.scroll('Goodbye', delay = 150)
```

- Change the text with your own message.
- Change the delays.
- Add more lines of code and Flash!

Pushbuttons

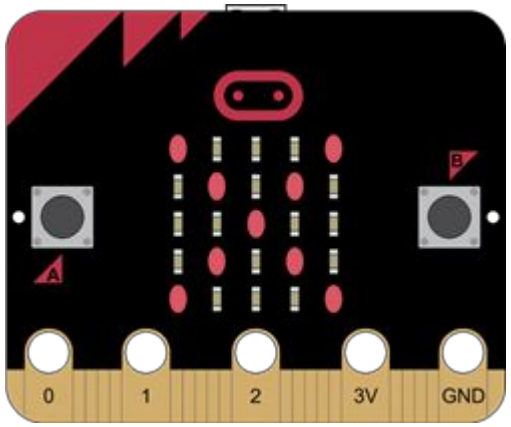
is_pressed()

```
#is_pressed.py
from microbit import *

while True:
    if button_a.is_pressed():
        display.show(Image.YES)
    else:
        display.show(Image.NO)
```



was_pressed()

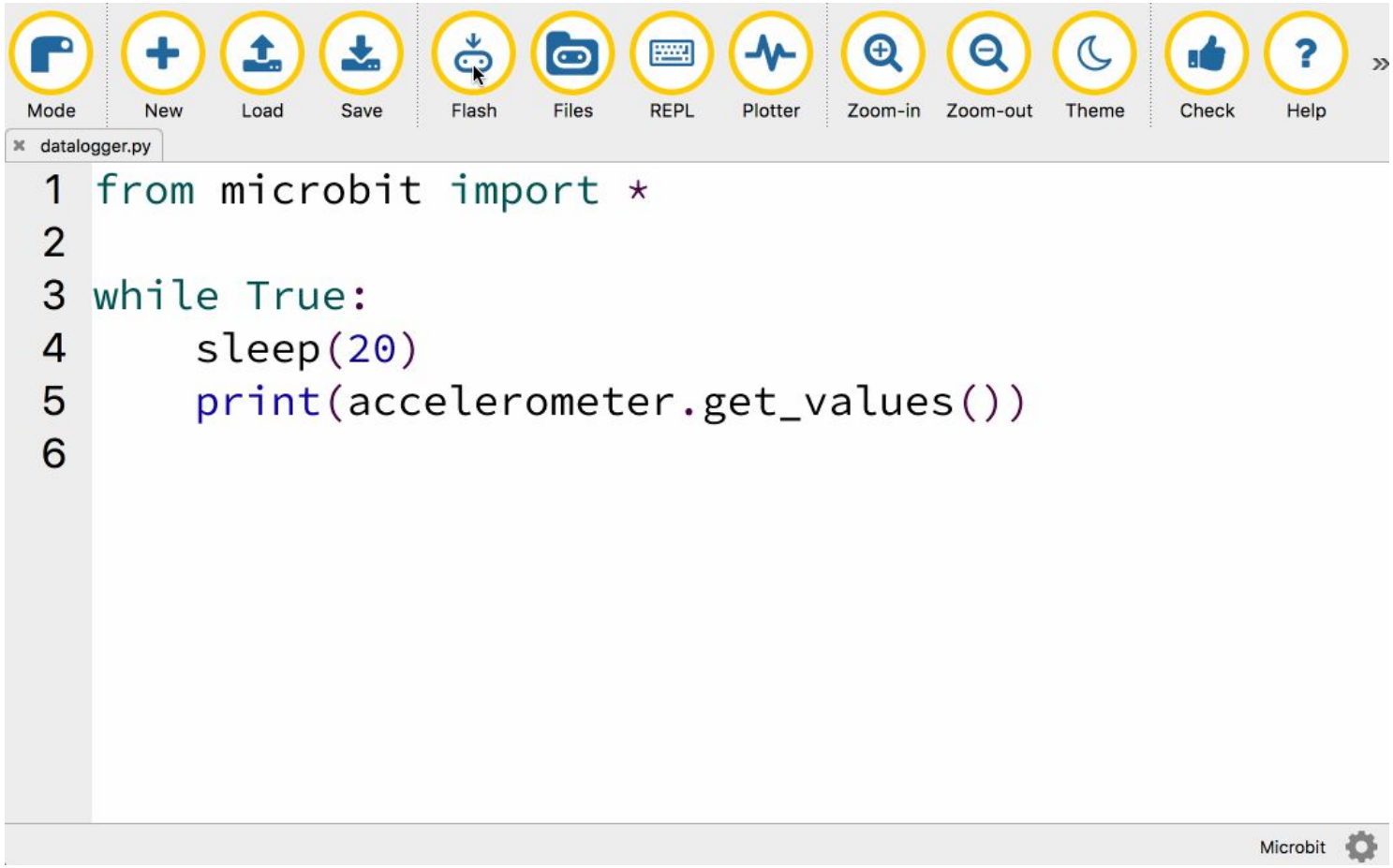
```
#was_pressed.py
from microbit import *

while True:
    sleep(5000)
    if button_a.was_pressed():
        display.show(Image.YES)
    else:
        display.show(Image.NO)
```

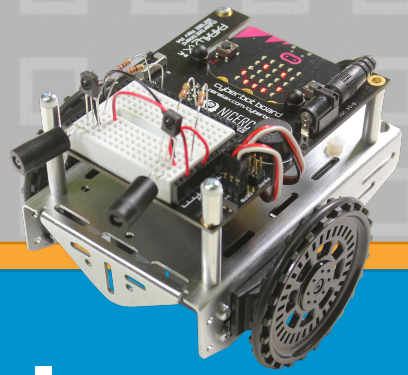


Modules, Methods, Functions, and Objects

- *Modules* are code libraries that include the *objects*
- *Methods* are *functions* that belong to a specific *object*
- *Functions* are defined by a def statement. Functions can pass parameters (arguments) - like robot speed, sensor states.

Alternative editor: Code with Mu
https://codewith.mu/





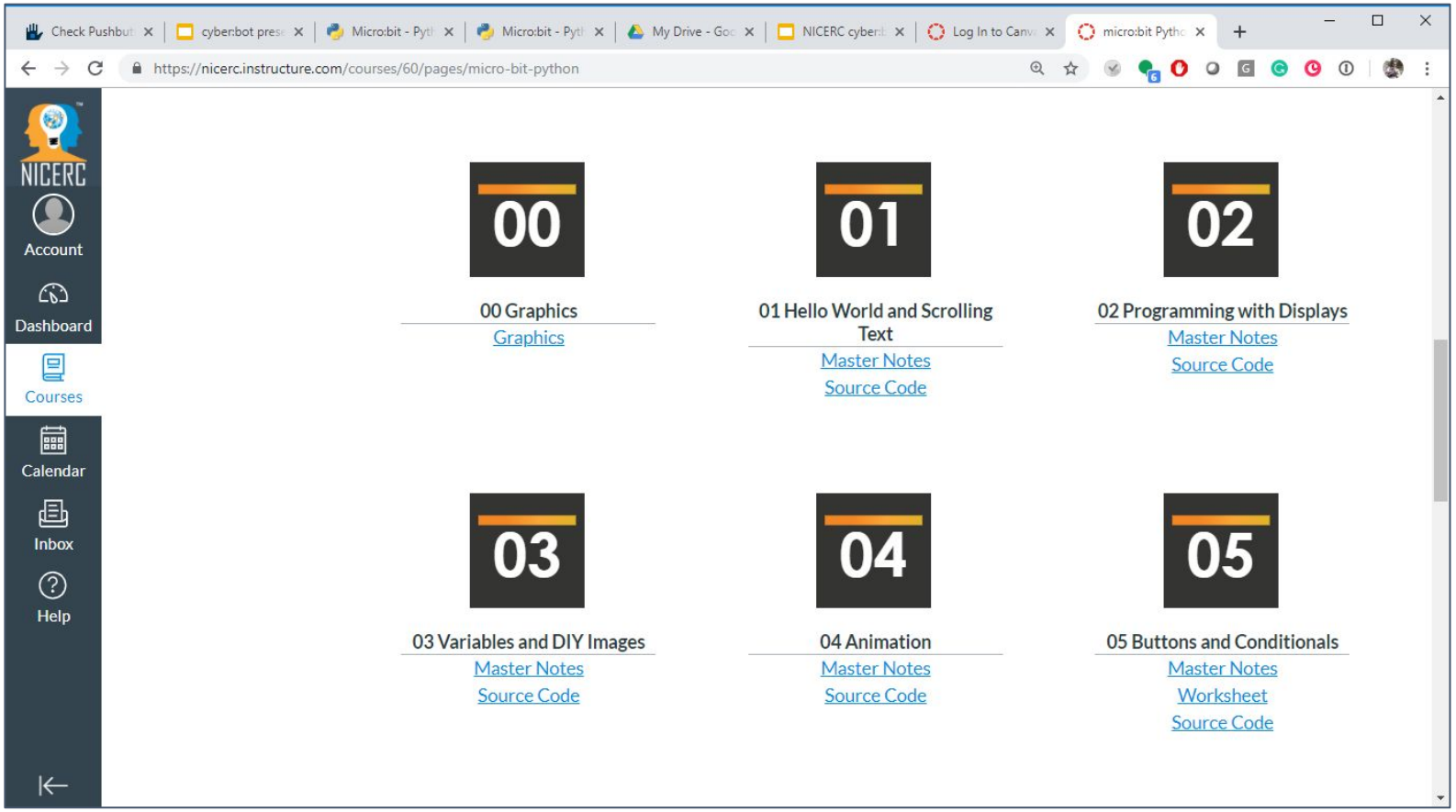
Micro:bit Educational Resources

NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC
www.parallax.com

NICERC.org Cyber Fundamentals

Educators may request access at nicerc.org

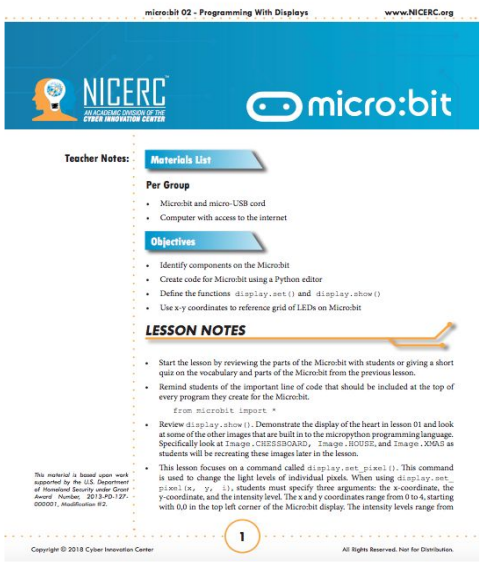


NICERC™ AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC. www.parallax.com

NICERC.org Cyber Fundamentals

Lesson	Title
00	Graphics
01	Hello World and Scrolling Text
02	Programming with Displays
03	Variables and DIY Images
04	Animation
05	Buttons and Conditionals
06	Compass and Comparisons
07	Binary and Visual Counter
08	Tug-o-War
09	Communications
10	Student Response System
11	Passwords and Security
12	Voltage Measurement
13	Temperature Sensor


micro:bit 02 - Programming With Displays www.NICERC.org

NICERC AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER micro:bit

Teacher Notes:

Materials List

Per Group

- Microbit and micro-USB cord
- Computer with access to the internet

Objectives

- Identify components on the Microbit
- Create code for Microbit using a Python editor
- Define the functions `display.set()` and `display.show()`
- Use x-y coordinates to reference grid of LEDs on Microbit

LESSON NOTES

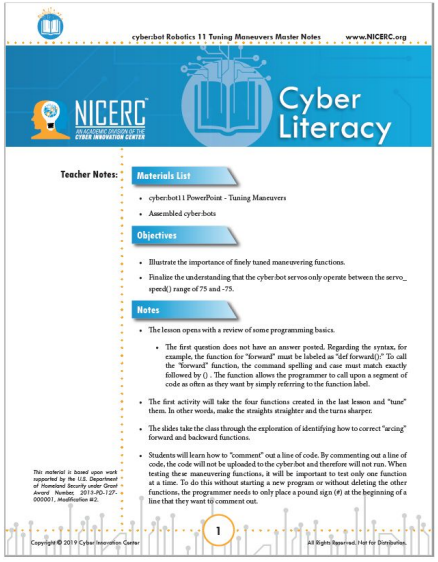
- Start the lesson by reviewing the parts of the Microbit with students or giving a short quiz on the vocabulary and parts of the Microbit from the previous lesson.
- Remind students of the important line of code that should be included at the top of every program they create for the Microbit.

```
from microbit import *
```

- Review `display.show()`. Demonstrate the display of the heart in lesson 01 and look at some of the other images that are built in to the micropython programming language. Specifically look at `Image.CHESSBOARD`, `Image.HOUSE`, and `Image.XMAS` as students will be recreating these images later in the lesson.
- This lesson focuses on a command called `display.set_pixel()`. This command is used to change the light levels of individual pixels. When using `display.set_pixel(x, y, i)`, students must specify three arguments: the x-coordinate, the y-coordinate, and the intensity level. The x and y coordinates range from 0 to 4, starting with 0,0 in the top left corner of the Microbit display. The intensity levels range from

This material is based upon work supported by the U.S. Department of Homeland Security under Grant Award Number, 2013-PD-127-000001, Modification #2.

Copyright © 2018 Cyber Innovation Center 1 All Rights Reserved. Not for Distribution.


cyberbot Robotics 11 Tuning Maneuvers Master Notes www.NICERC.org

NICERC AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER Cyber Literacy

Teacher Notes:

Materials List

- cyberbot11 PowerPoint - Tuning Maneuvers
- Assembled cyberbots

Objectives

- Illustrate the importance of finely tuned maneuvering functions.
- Finalize the understanding that the cyberbot servos only operate between the servo_speed() range of 75 and -75.

Notes

- The lesson opens with a review of some programming basics.
  - The first question does not have an answer posted. Regarding the syntax, for example, the function for "forward" must be labeled as "def forward():" To call the "forward" function, the command spelling and case must match exactly followed by (). The function allows the programmer to call upon a segment of code as often as they want by simply referring to the function label.
- The first activity will take the four functions created in the last lesson and "tune" them. In other words, make the straights straighter and the turns sharper.
- The slides take the class through the exploration of identifying how to correct "arcing" forward and backward functions.
- Students will learn how to "comment" out a line of code. By commenting out a line of code, the code will not be uploaded to the cyberbot and therefore will not run. When testing these maneuvering functions, it will be important to test only one function at a time. To do this without starting a new program or without deleting the other functions, the programmer needs to only place a pound sign (#) at the beginning of a line that they want tji comment out.

This material is based upon work supported by the U.S. Department of Homeland Security under Grant Award Number, 2013-PD-127-000001, Modification #2.

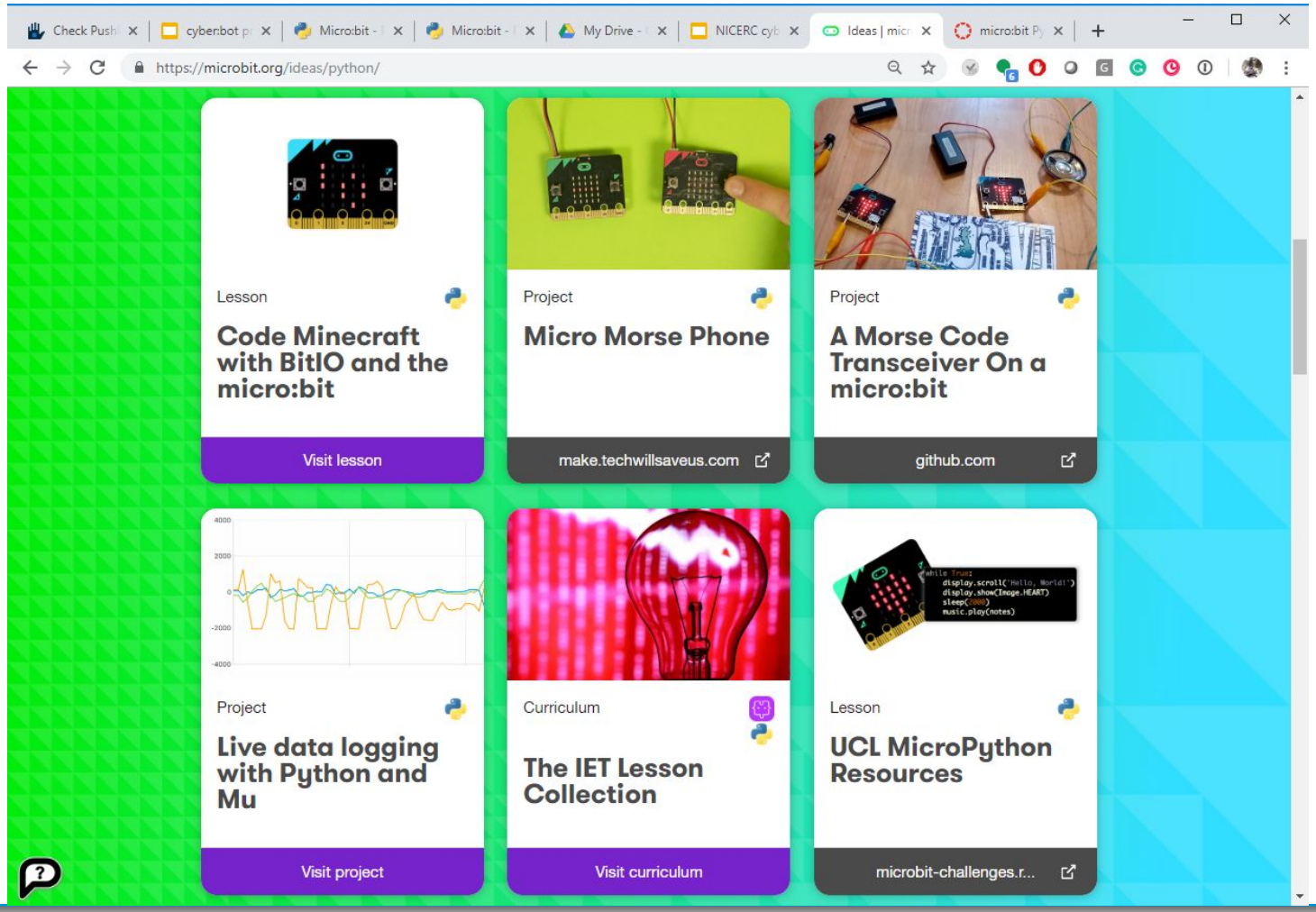
Copyright © 2019 Cyber Innovation Center 1 All Rights Reserved. Not for Distribution.

NICERC™ AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC. www.parallax.com

micro:bit “Ideas”

https://microbit.org/ideas/python/

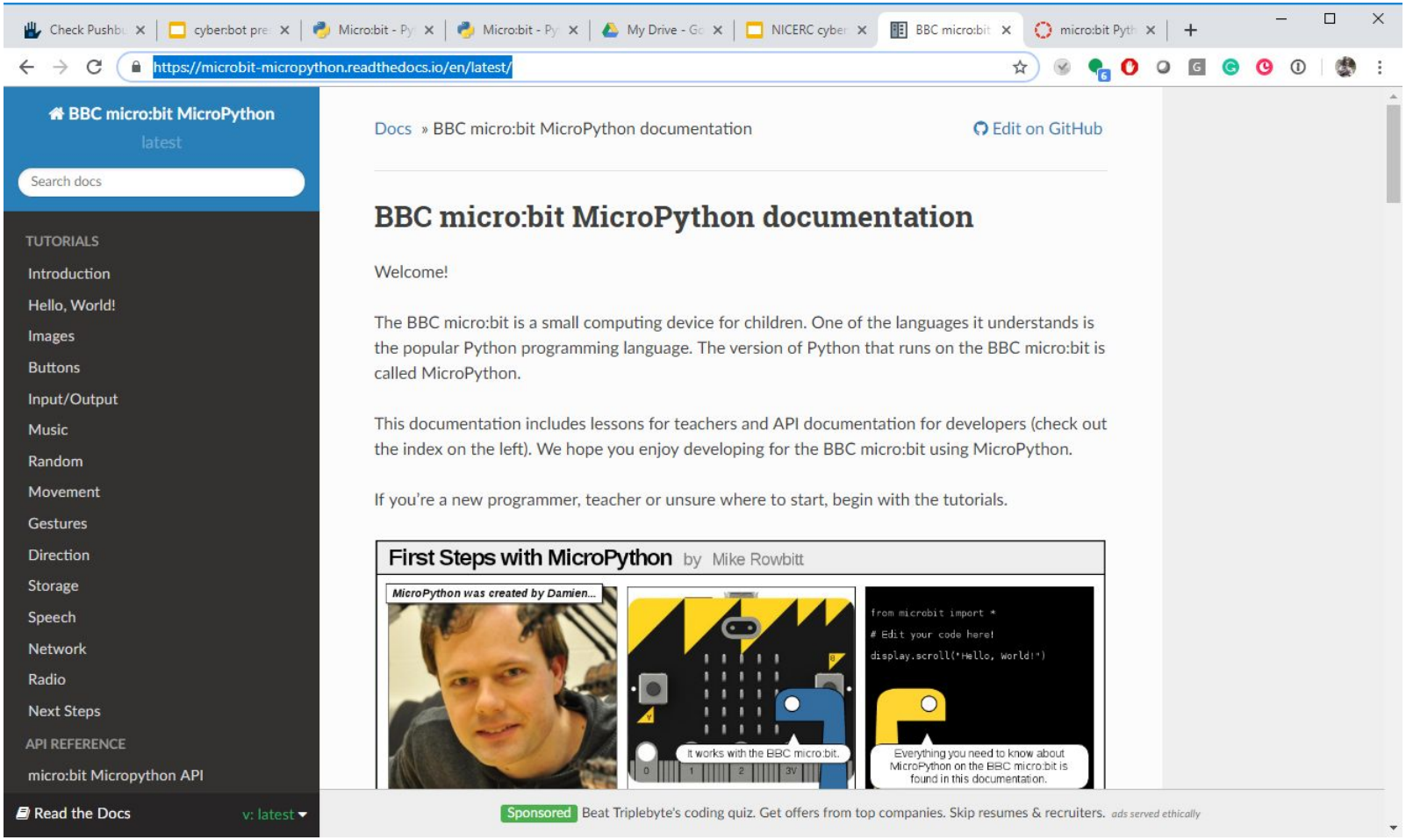


NICERC™ AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC. www.parallax.com

BBC micro:bit Python Documentation

https://microbit-micropython.readthedocs.io/en/latest/



NICERC™ AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC. www.parallax.com

Hackster.io Educator Resources

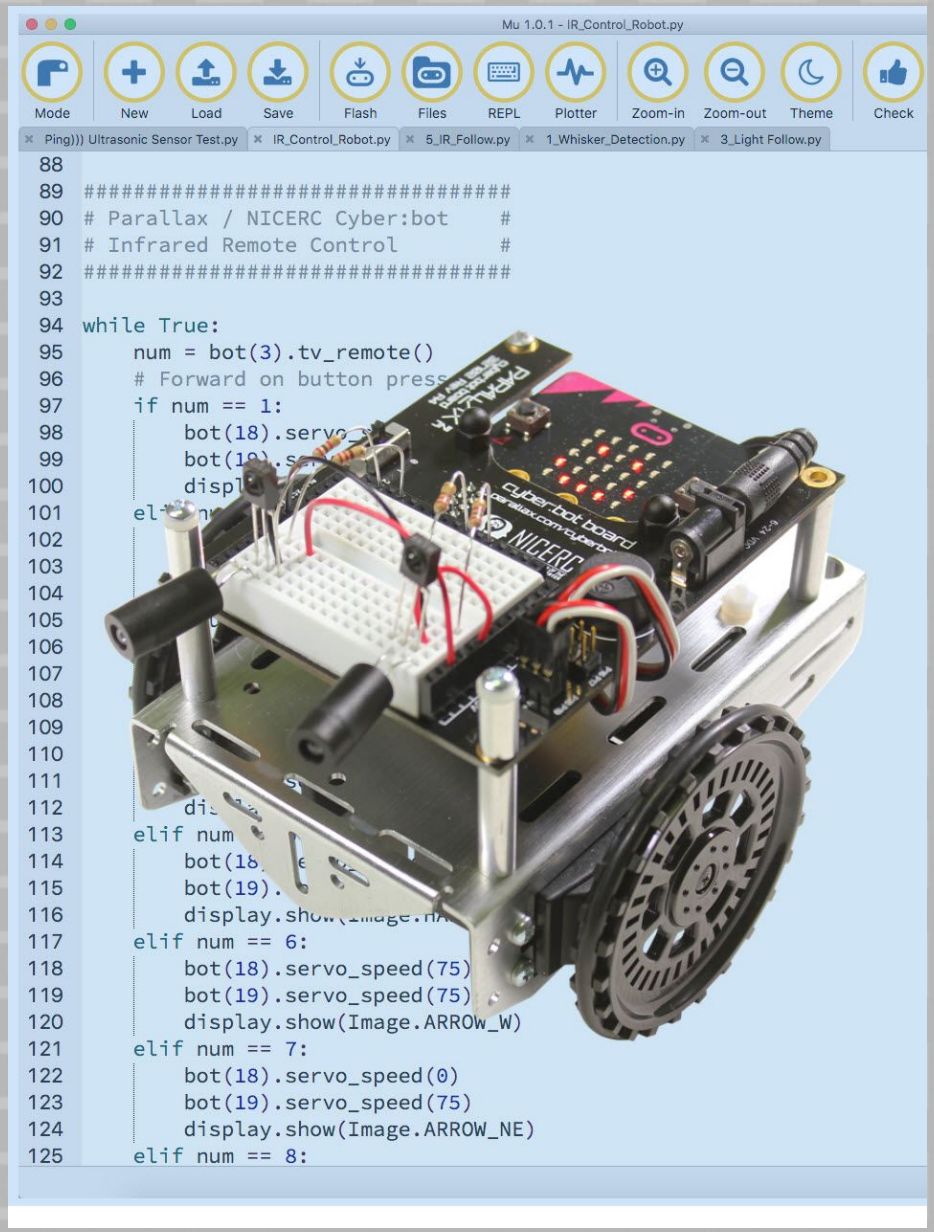
The Hardware (1), JavaScript (2) and Python (3)

NICERC™ AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC. www.parallax.com

Python + Robotics = cyber:bot

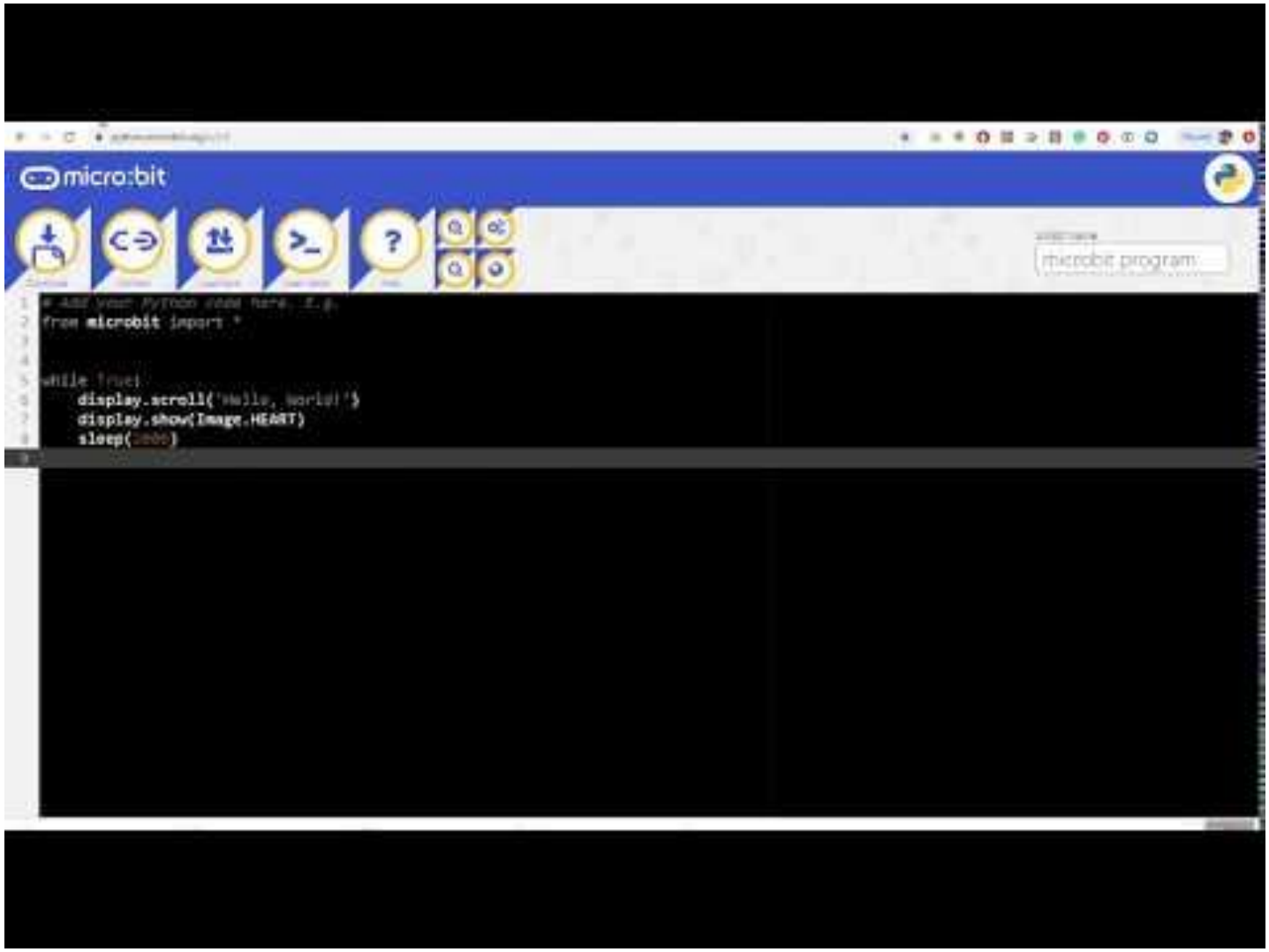
- Students learn more when they can “see” their programs run
- Competition-based challenges make it fun
- Basis for learning product development, robotics, and mechanical
- Understanding about “how it works” vs. consumer-level experience



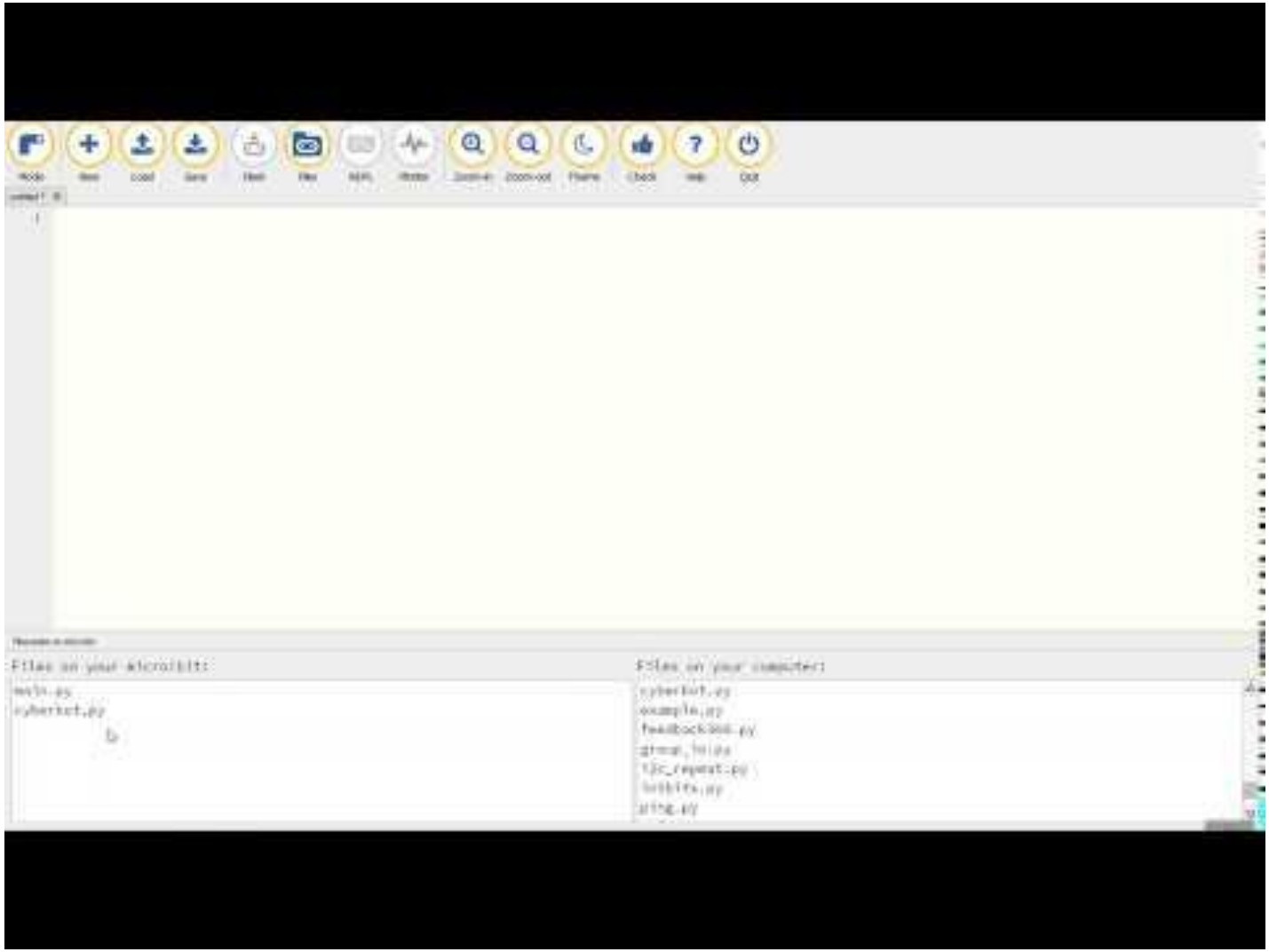
NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

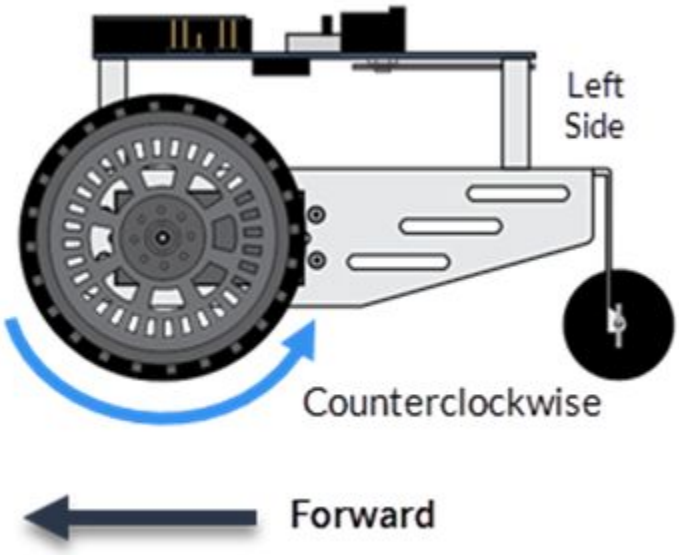
PARALLAX INC
www.parallax.com

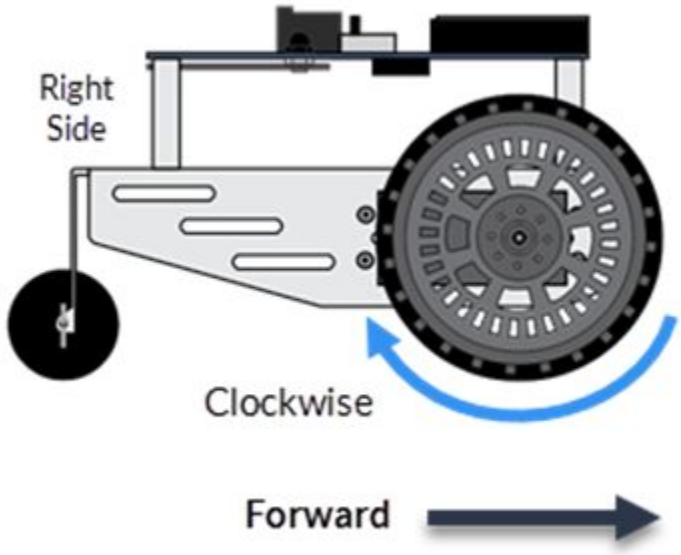
Add cyberbot.py module to Microbit using **Python editor**



Add cyberbot.py module to Microbit **using Mu**

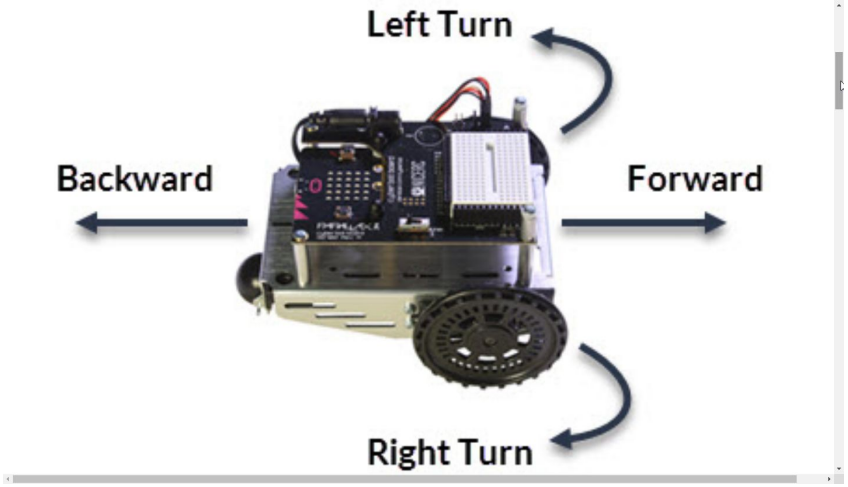






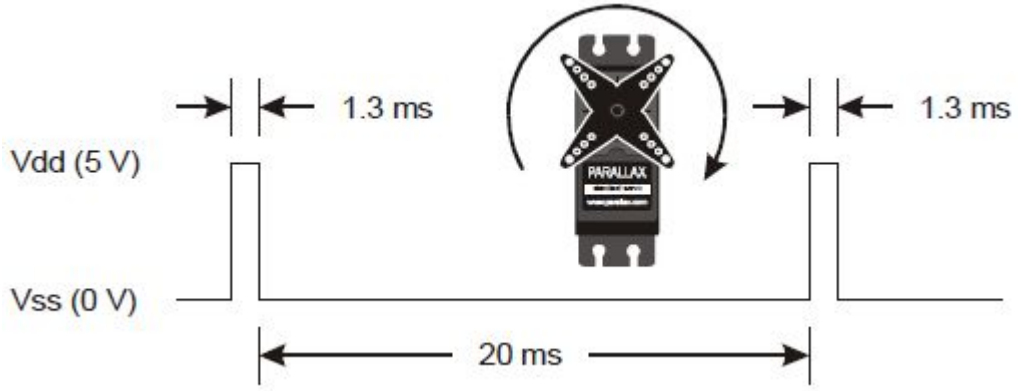
Forward Motion

Opposite directions for forward motion



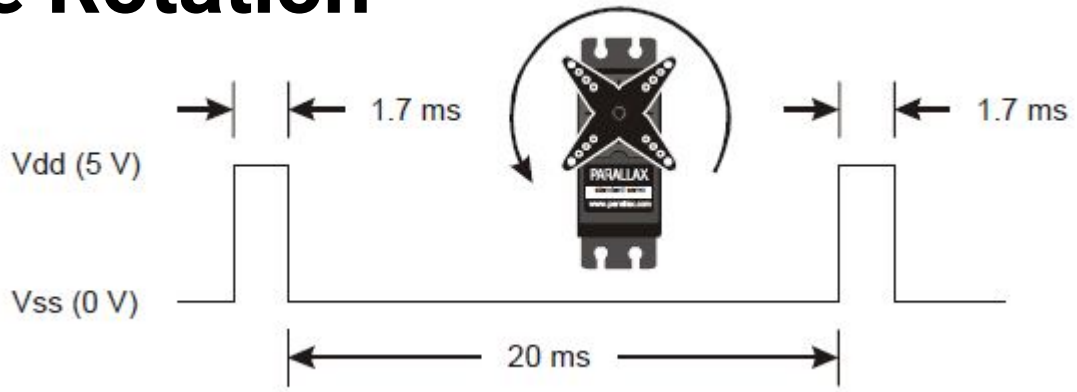
Clockwise Rotation

```
# left_servo_CW.py
from cyberbot import *

bot(18).servo_speed(-75)
```

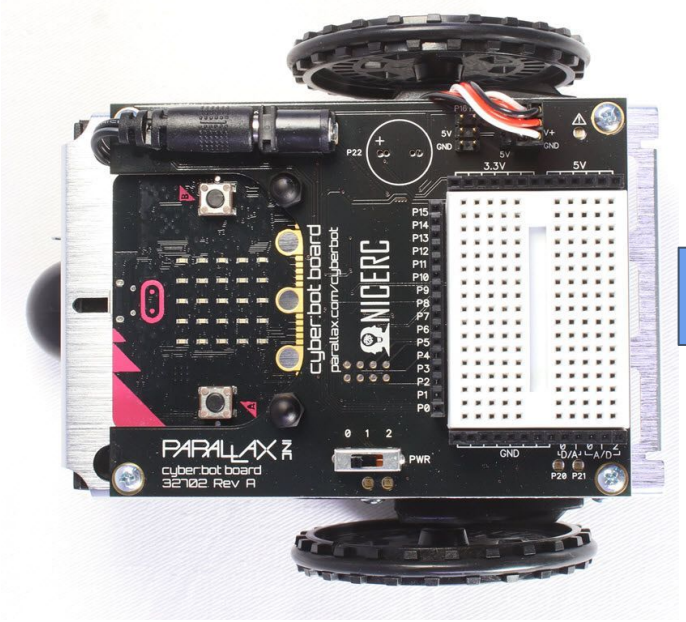


Counter-clockwise Rotation

```
# left_servo_CCW.py
from cyberbot import *

bot(18).servo_speed(75)
```

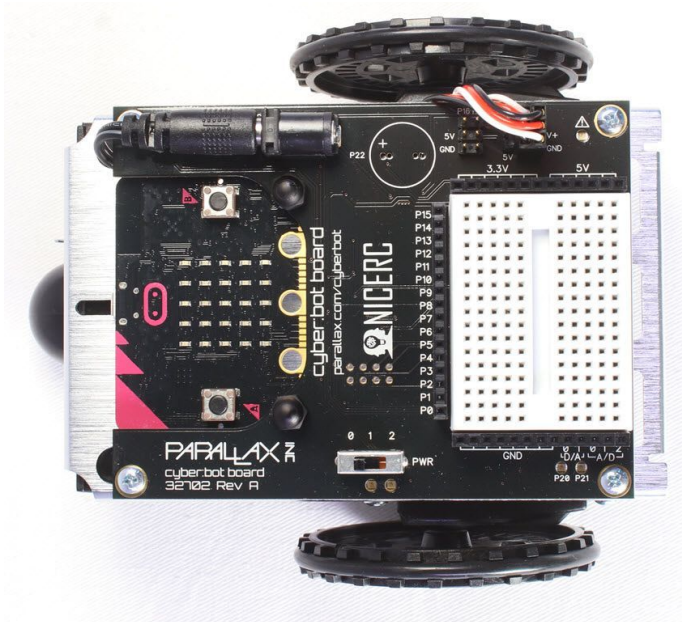


Forward



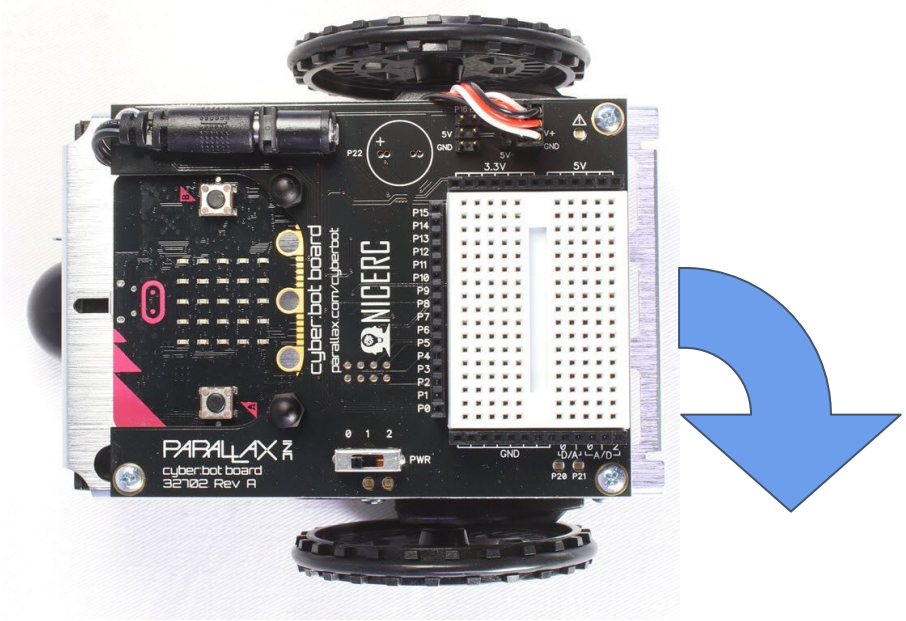

```
from cyberbot import *

# forward_three_seconds.py

bot(18).servo_speed(75)
bot(19).servo_speed(-75)
sleep (3000)

# stop
bot(18).servo_speed(0)
bot(19).servo_speed(0)
```

Backward



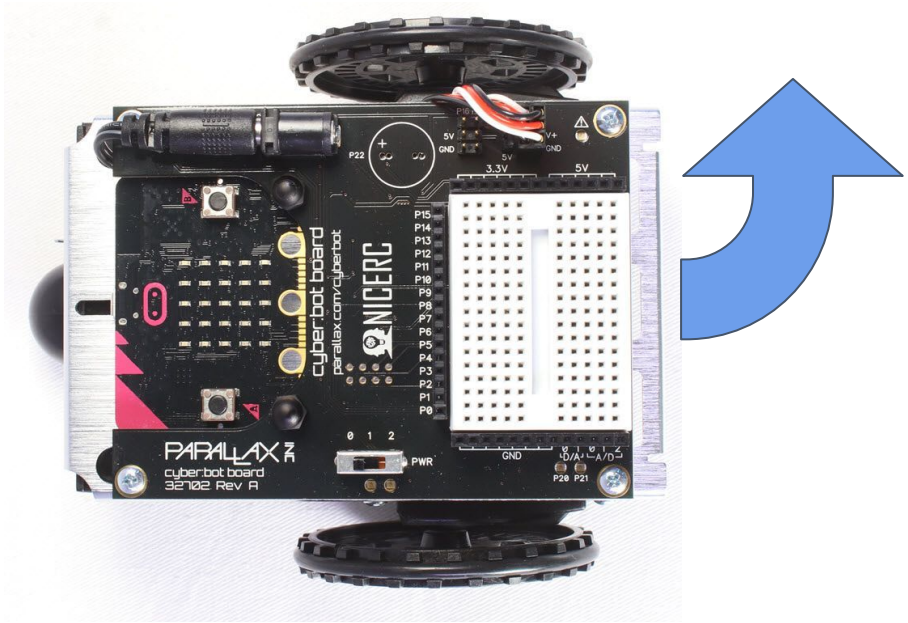

```
from cyberbot import *

# backward_three_seconds.py

bot(18).servo_speed(-75)
bot(19).servo_speed(75)
sleep (3000)

# stop
bot(18).servo_speed(0)
bot(19).servo_speed(0)
```

Right



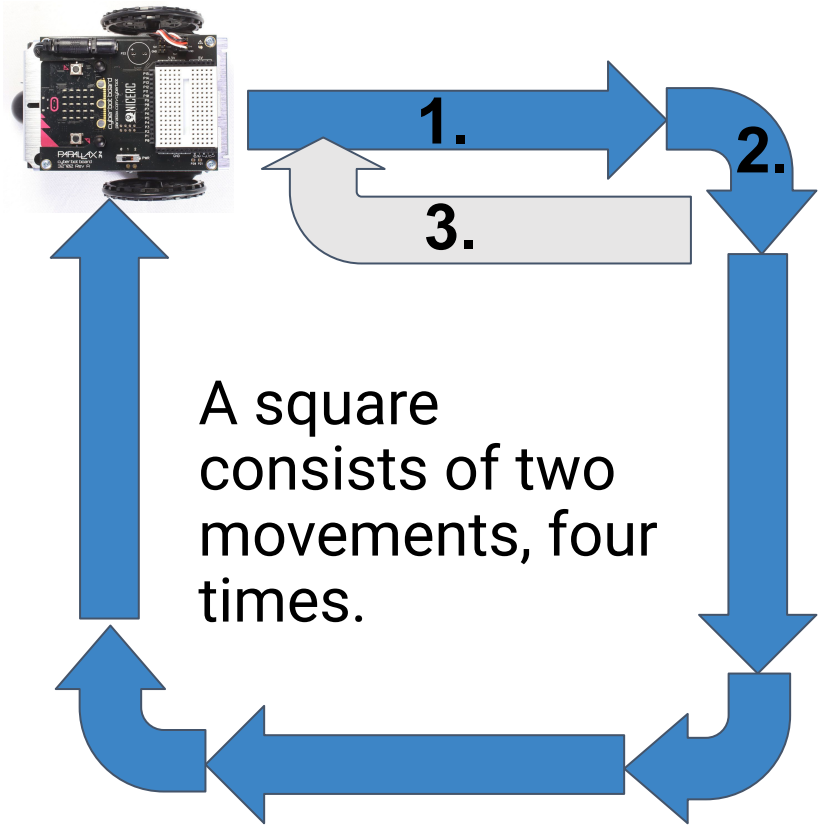

```
from cyberbot import *

# right_three_seconds.py

bot(18).servo_speed(75)
bot(19).servo_speed(0)
sleep (3000)

# stop
bot(18).servo_speed(0)
bot(19).servo_speed(0)
```

Left




```
from cyberbot import *

# left_three_seconds.py

bot(18).servo_speed(0)
bot(19).servo_speed(-75)
sleep (3000)

# stop
bot(18).servo_speed(0)
bot(19).servo_speed(0)
```

Repeat Loops



A square consists of two movements, four times.

```
from cyberbot import *
# square_with_repeat

for y in range (0, 3):
    # straight
    bot(18).servo_speed(75)
    bot(19).servo_speed(-75)
    sleep (3000)

    # right
    bot(18).servo_speed(75)
    bot(19).servo_speed(0)
    sleep (2000)
```

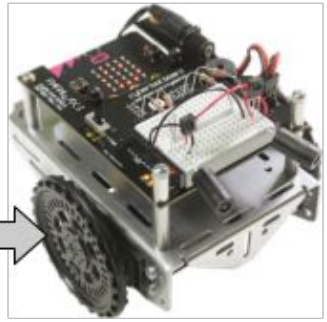
Functions Without Arguments

- Simplified the drive commands
- Why not pass the duration?

```
from cyberbot import *
# functions with arguments

def straight():
    bot(18).servo_speed(75)
    bot(19).servo_speed(-75)
    sleep (3000)

def right():
    bot(18).servo_speed(75)
    bot(19).servo_speed(0)
    sleep (1100)

def stop():
    bot(18).servo_speed(0)
    bot(19).servo_speed(0)

straight()
right()
straight()
right()
stop()
```

Cyberbot.py library contents

```
bot(pin).read_r(data)                # retrieve returned value via I2C
bot(pin).digital_write(state)        # set I/O pins high or low
bot(pin).analog_write(PWM)           # set duty cycle to four available PWM channels
bot(pin).digital_read(state)         # get I/O pin state high or low
bot(pin).states(states)              # set binary pin states to multiple I/Os
bot(pin).directions(directions)      # set I/O pin directions
bot(pin).qti(QTI values)             # set and read four line follower sensors
bot(pin).pulse_out(pulsewidth)       # set and maintain a pulse
bot(pin).pulse_in(pulsewidth)        # measure pulse on I/O pin (accelerometers)
bot(pin).pulse_count(counts)         # count pulses over duration of time
bot(pin).rc_time(time)               # pseudo-analog R/C charge/discharge time on I/O pin
bot(pin).tone(sound)                 # set frequency, duration to I/O pin
bot(pin).ir_detect(frequency)        # generate IR pulse and get receiver value
bot(pin).servo_angle(angle)          # set and hold servo in an angle (up to 14 servos)
bot(pin).servo_speed(speed)          # set and hold servo speed (-100 to 100)
bot(pin).servo_disable(disable)      # disable a servo
bot(pin).ping_distance(distance)     # configure Ultrasonic or Laser Ping, receive distance
bot(pin).tv_remote(button)           # decode pulses from Sony TV remote and return button number
```



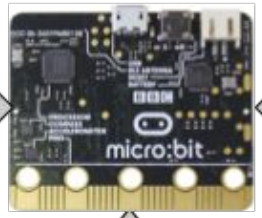
Propeller microcontroller I/O pins interact with student's breadboard circuits, piezo speaker, and servo motors

16 17

18 19

Student writes microPython code in Mu editor for the micro:bit

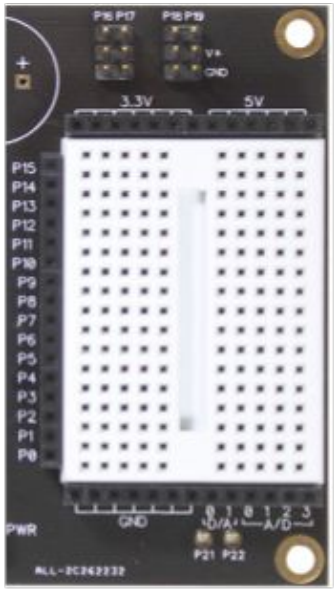
USB cable



I2C bus

Propeller carries out requests made by micro:bit code, can reply with data

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

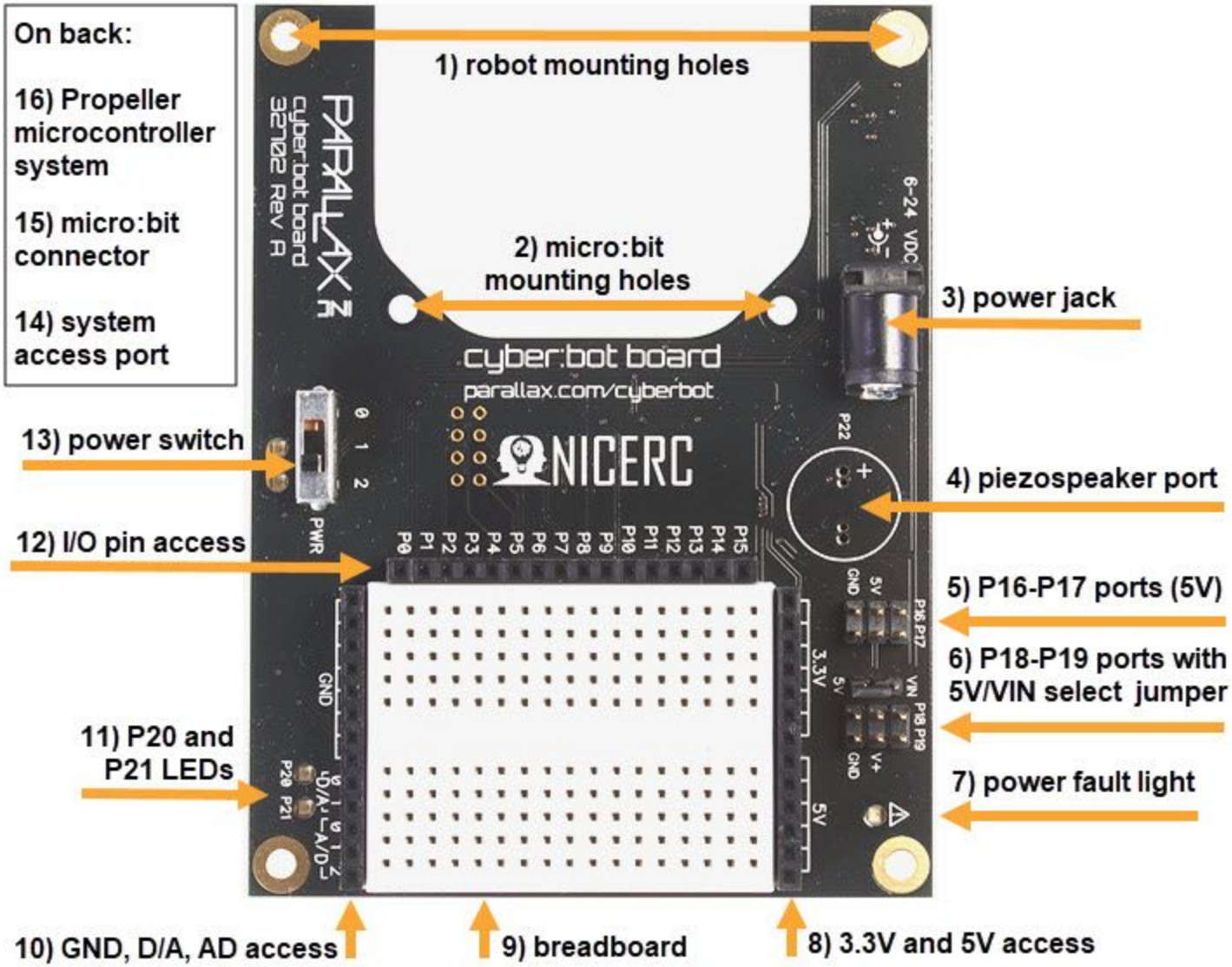


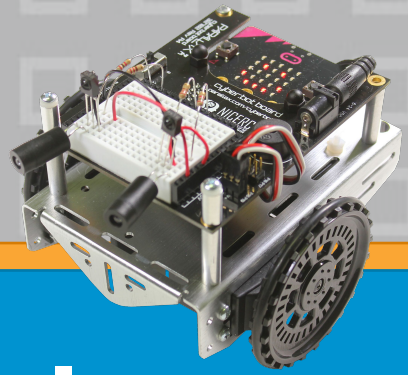
Propeller sends voltage to D/A output sockets

0 1 D/A

0 1 2 A/D

A/D input sockets send variable voltage input to the micro:bit


On back:
16) Propeller microcontroller system
15) micro:bit connector
14) system access port
1) robot mounting holes
2) micro:bit mounting holes
3) power jack
4) piezospeaker port
5) P16-P17 ports (5V)
6) P18-P19 ports with 5V/VIN select jumper
7) power fault light
8) 3.3V and 5V access
9) breadboard
10) GND, D/A, AD access
11) P20 and P21 LEDs
12) I/O pin access
13) power switch
cyber:bot board
parallax.com/cyberbot
NICERC
6-24 VDC
PWR

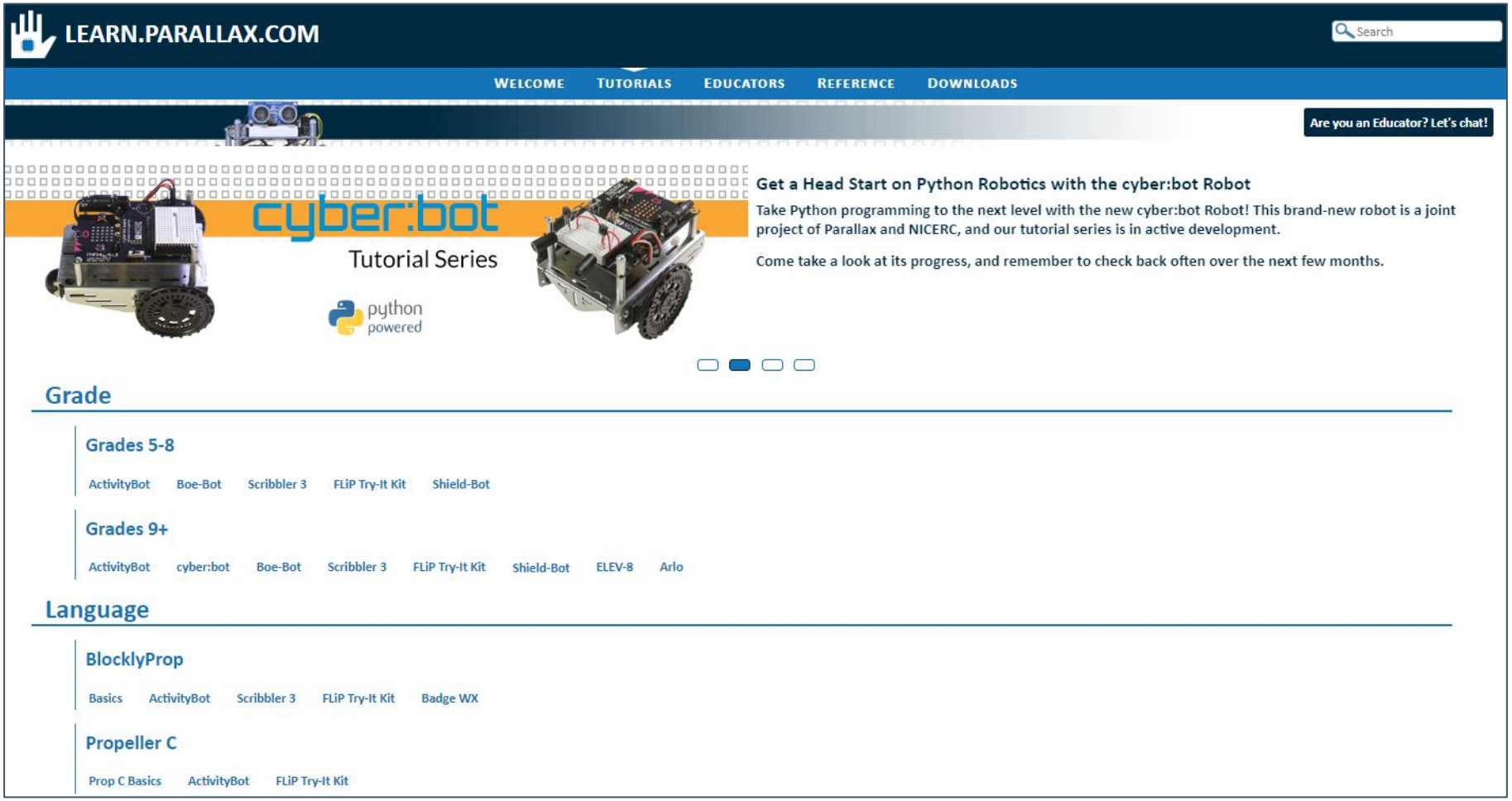


Cyber:bot Educational Resources

NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC
www.parallax.com

Learn.parallax.com

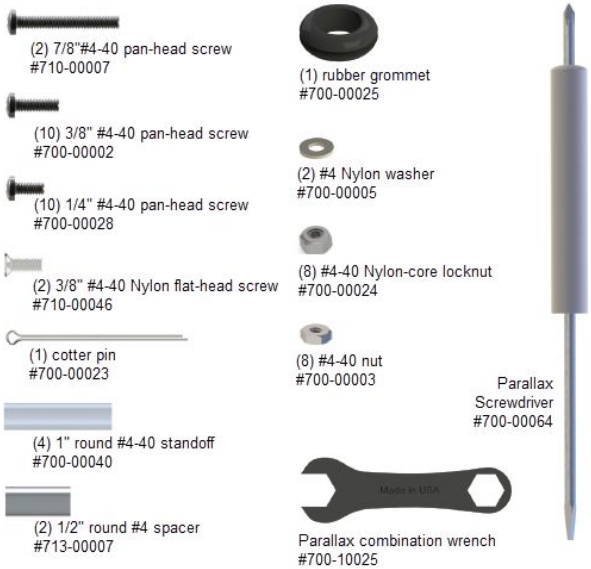


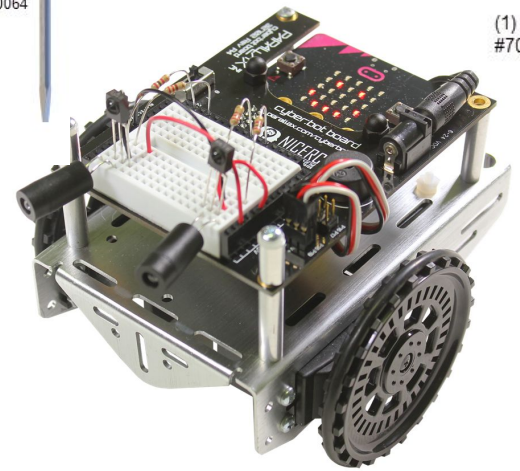
NICERC™ AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC www.parallax.com

Assemble your cyber:bot

https://learn.parallax.com






(2) wheels
#721-00021


(2) o-ring tires
#710-00200


(1) tail wheel ball
#700-00099


(1) small robot chassis
#700-00022

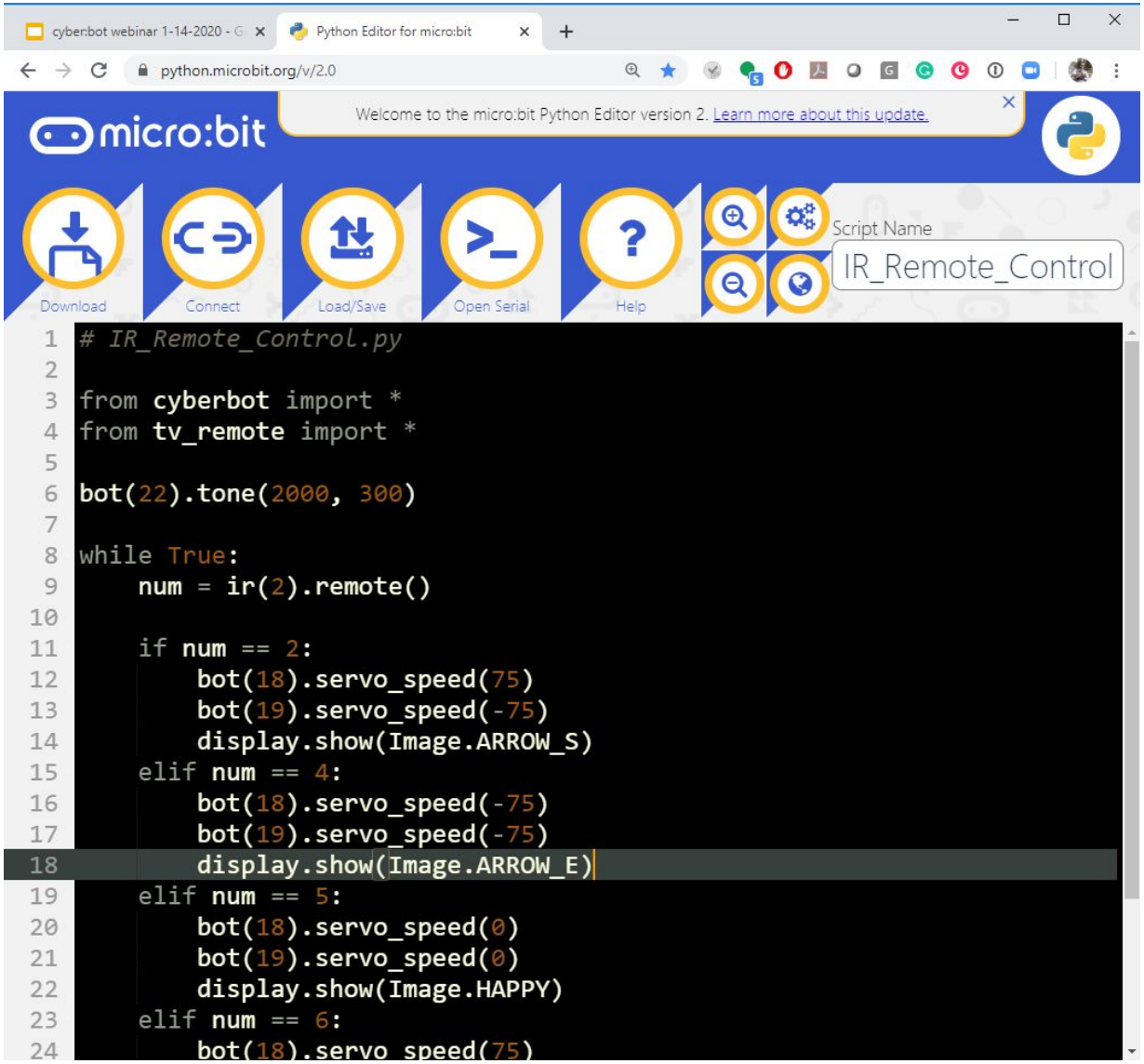

(1) 5 AA battery holder
#753-00007

(2) continuous
rotation servos
#900-00008

Python scripting: learn* data types, logic, interaction between hardware and software

*student experience,

not instructed!

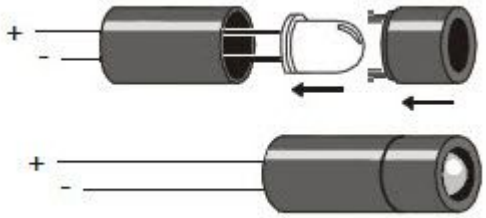


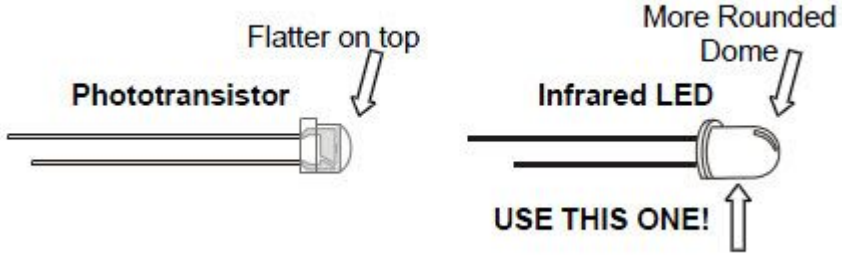
NICERC AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC www.parallax.com

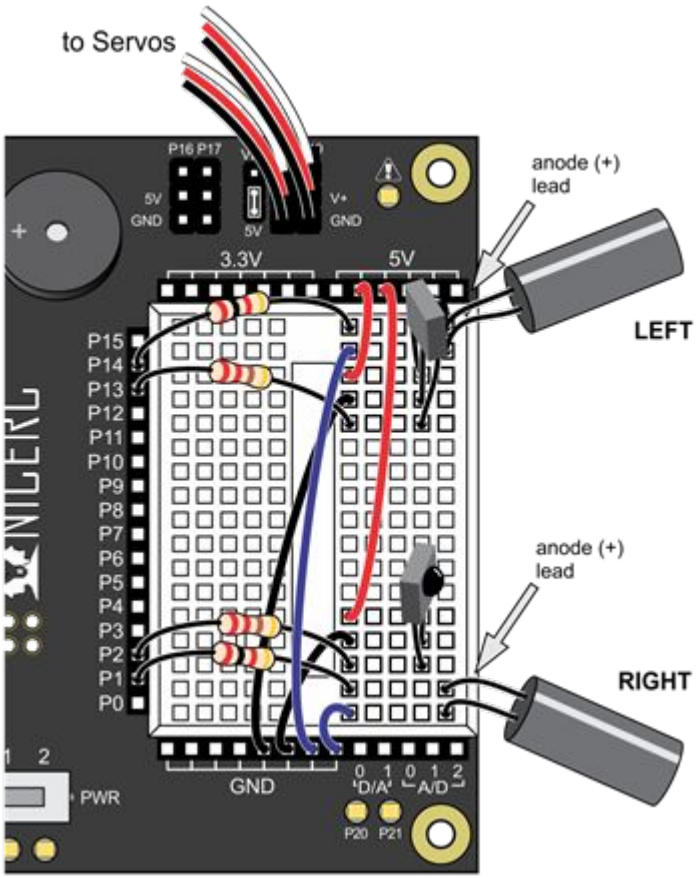
Components: identification, function and use of real electronic sensors and parts

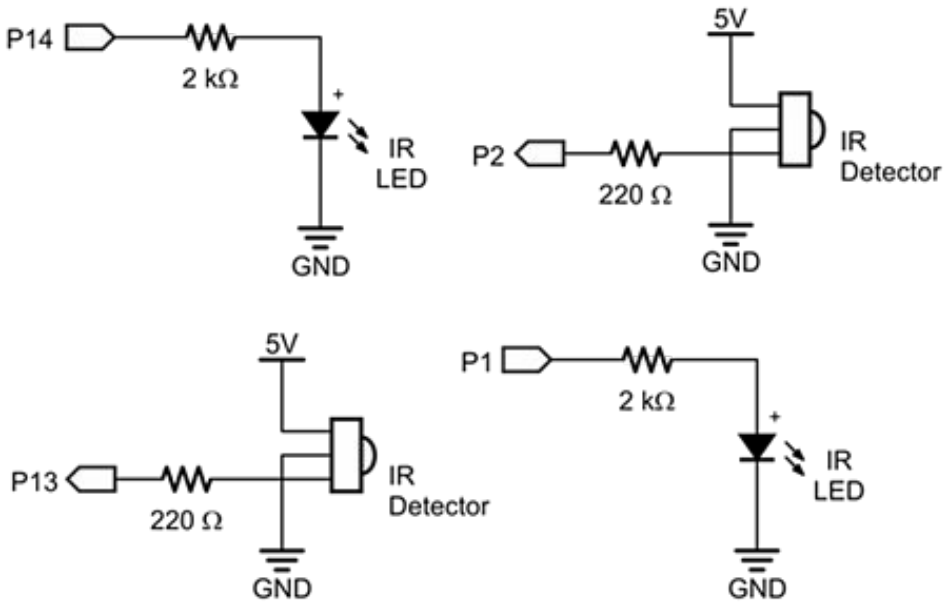
(2) IR receivers
(2) IR LEDs (clear case)
(2) IR LED shield assemblies
(2) Resistors, 220 Ω (red-red-brown)
(2) Resistors, 2 kΩ (red-black-red)
(misc) Jumper wires





Electronic circuit building by pictorial and schematic





Content exclusively available to educators:
e-mail learn@parallax.com for access

- Google Presentation Slides
- Scope and sequence
- Standards alignment
- Assessment material

Standards Alignment:

Common Core (ELA, Math), NGSS, K-12 Computer Science Framework, CTE and 21st Century Competencies

Concepts Vocabulary	Common Core State Standards (ELA)[2]	Common Core State Standards (Math)[2]	Next Generation Science Standards (NGSS)[4]	K-12 Computer Science Framework[1]	Career Technical Education Standards (CTE)[3]	21st Century Competencies
• Active-low • Active-high • Anode • Cathode • Circuit • Diode • Jumper wire • LED • Ohms • Prototyping • Pushbutton • Pull-down resistor • Pull-up resistor • Resistor • Socket	CCSS.ELA-LITERACY.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. CCSS.ELA-LITERACY.CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. CCSS.ELA-LITERACY.CCRA.R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. CCSS.ELA-LITERACY.CCRA.R.10 Read and comprehend complex literary and informational texts independently and proficiently.			*Practices* P4: Developing and Using Abstractions. 1 *Extract common features from a set of interrelated processes or complex phenomena.* P4: Developing and Using Abstractions. 2 *Evaluate existing technological functionalities and incorporate them into new designs.* P4. Developing and Using Abstractions. 3 *Create modules and develop points of interaction that can apply to multiple situations and reduce complexity.* P5. Creating Computational Artifacts. 1 *Plan the development of a computational artifact using an iterative process that includes reflection on and modification of the plan, taking into account key features, time and resource constraints, and user expectations.* P5. Creating Computational Artifacts. 2 *Create a computational artifact for practical intent, personal expression, or to address a societal issue.* P5. Creating Computational Artifacts. 3 *Modify an existing artifact to improve or customize it.* P6. Testing and Refining Computational Artifacts. 1 *Systematically test computational artifacts*	(CRP) Career Ready Practices 2. Apply appropriate academic skills 11. Use technology to enhance productivity (ST) Stem Careers 2. Use technology to acquire, manipulate, analyze and report data. 6. Demonstrate technical skills needed in a chosen STEM field. (ST-ET) Engineering & Technology 1. Use STEM concepts and processes to solve problems involving design and/or production. 3. Apply processes and concepts for the use of technological tools in STEM. 5. Apply the elements of the design process. 6. Apply the knowledge learned in STEM to solve problems. (ST-SM) Science & Math 2. Apply science and mathematics concepts to the development of plans.	Self-direction Technology Use Innovation Critical-thinking Reflection Revision Design-thinking

Assessment material:

editable (RTF) and PDF formats available for download

Python Programming with the cyber:bot **Visible Light Navigation**

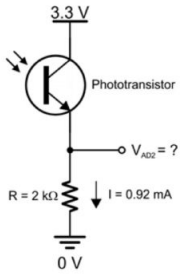
Name: _____ **Class:** _____
Date: _____

11.) Capacitor decay time is based on _____ .
- a. resistor size
- b. voltage
- c. brightness of light
- d. the number of capacitors used

12.) When roaming with visible light, the key variable is the _____ the measurements of two sensors.
- a. sum of
- b. difference between
- c. average of
- d. median of

13.) Using the Propeller microcontroller, decay time is _____ .
- a. the time it takes for the capacitor to register 0 V.
- b. the voltage value after 1 ms.
- c. the difference between the initial voltage and the ending voltage.
- d. the time it takes for the capacitor to reach 1.6 V.

14.) Use Ohm's Law to calculate the volts at AD2. _____



Answer true or false to questions 15 - 19.

15.) _____ Brighter light results in less current.

16.) _____ Zero-justified normalized differential measurement centers the data around zero.

17.) _____ Current flows through the phototransistor in two directions.

18.) _____ A smaller resistor in series with a phototransistor makes the circuit less sensitive to light than when a larger resistor is used.

19.) _____ In bright light the capacitor drains more quickly resulting in a low reading.

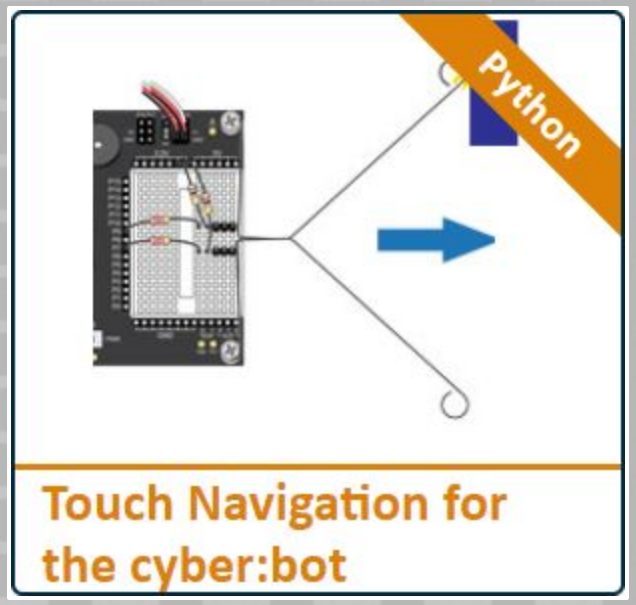
20.) List 3 actions of the `rc_time` function.

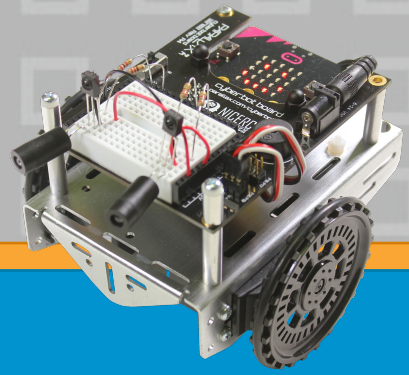
_____

- Developed from cyber:bot tutorial content
- One assessment per cyber:bot "chapter"
- Answer key is included
- Use as provided or modify on your own

Scope and Sequence:

- Google Drive - look for tab
- Download PDF & zipped Excel





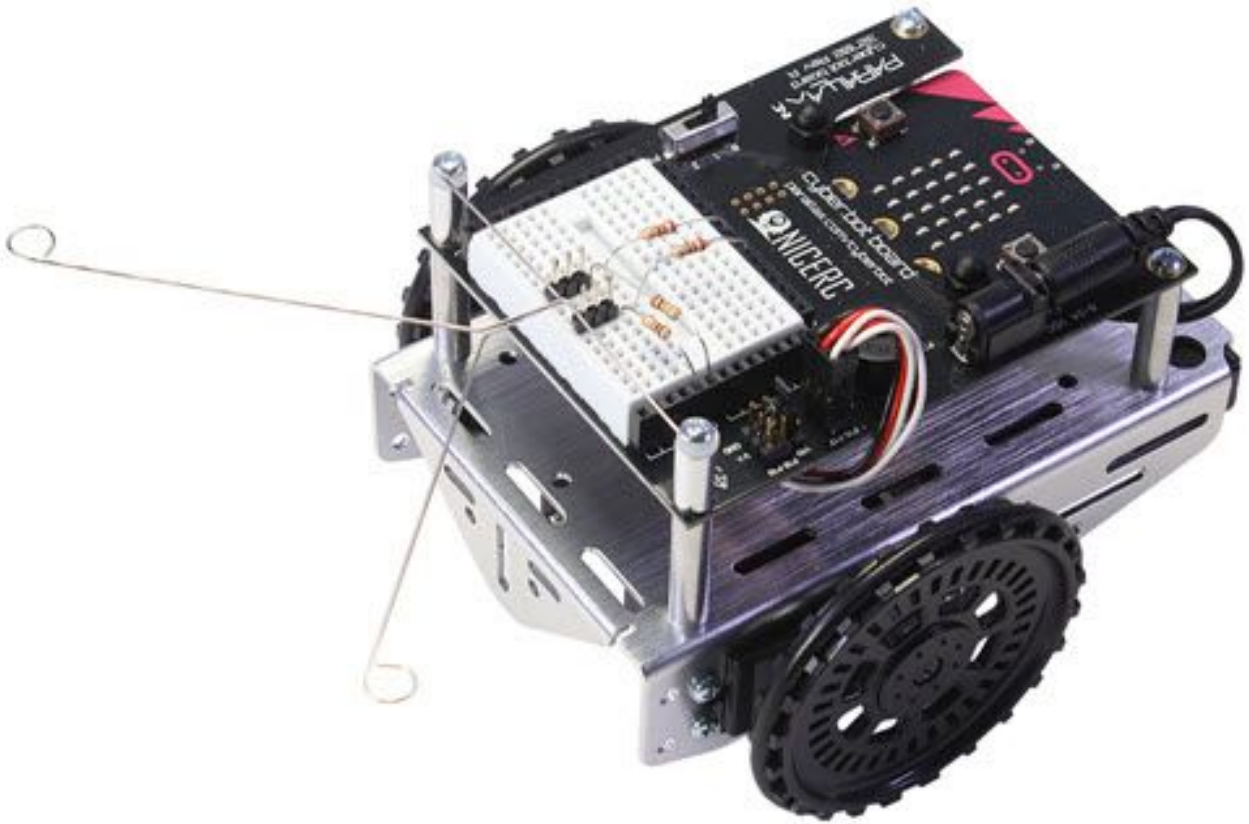
Touch Navigation

https://learn.parallax.com/tutorials/robot/cyberbot/touch-navigation-cyberbot

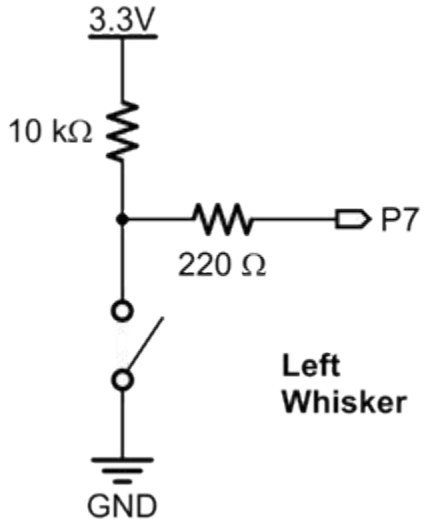
NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

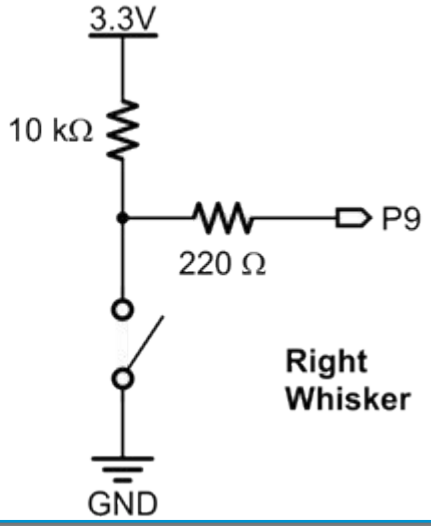
PARALLAX INC
www.parallax.com

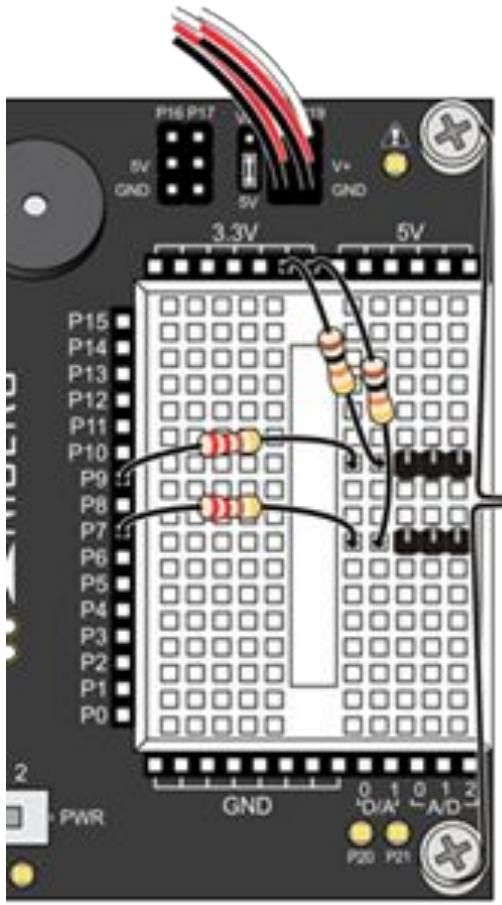
Touch Navigation: Assembled Circuit

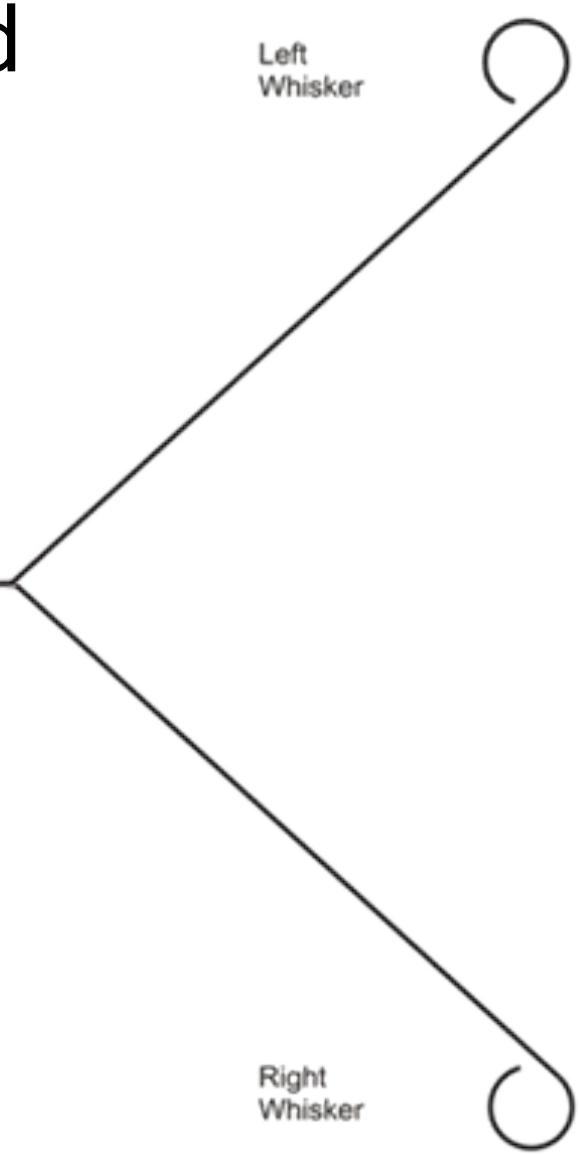


Touch Navigation: Circuit Build

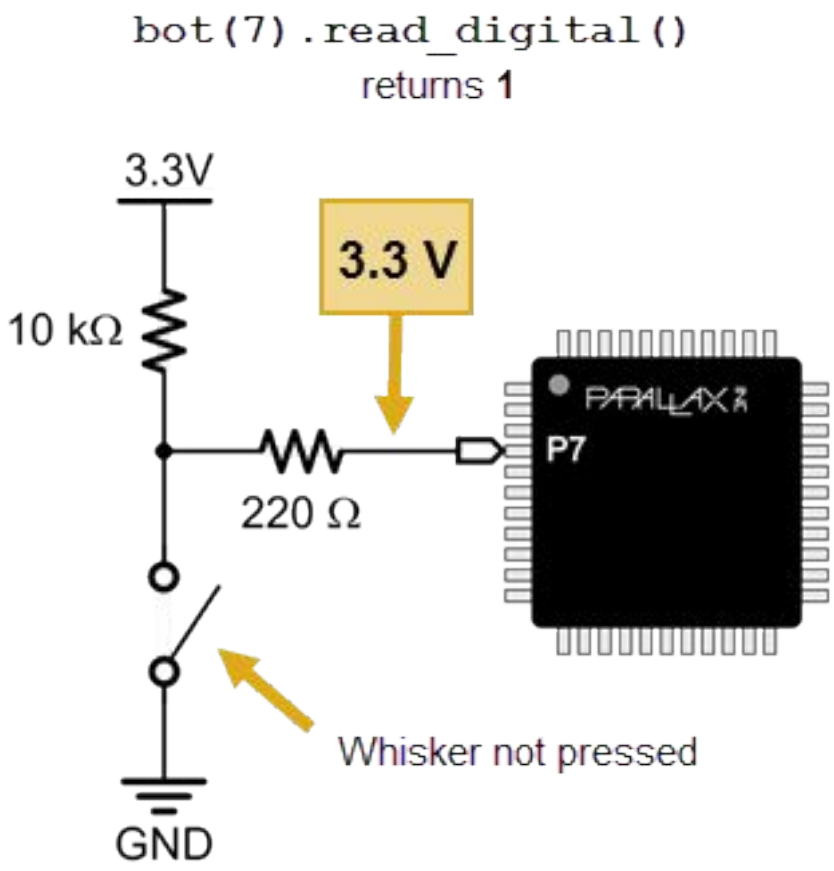


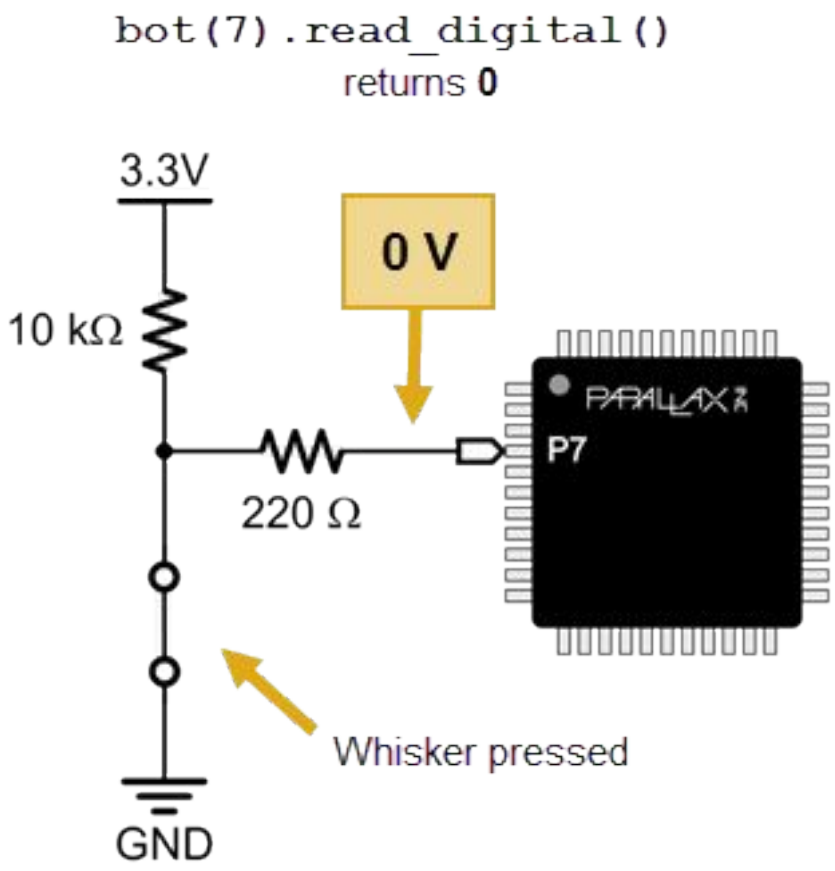


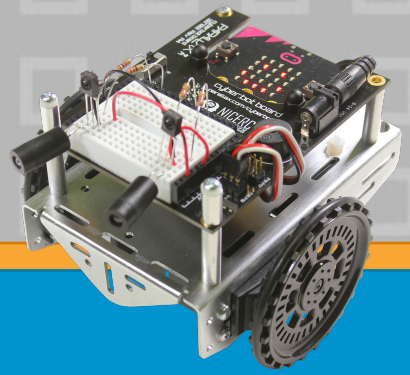




Touch Navigation: Pressed / Not Pressed







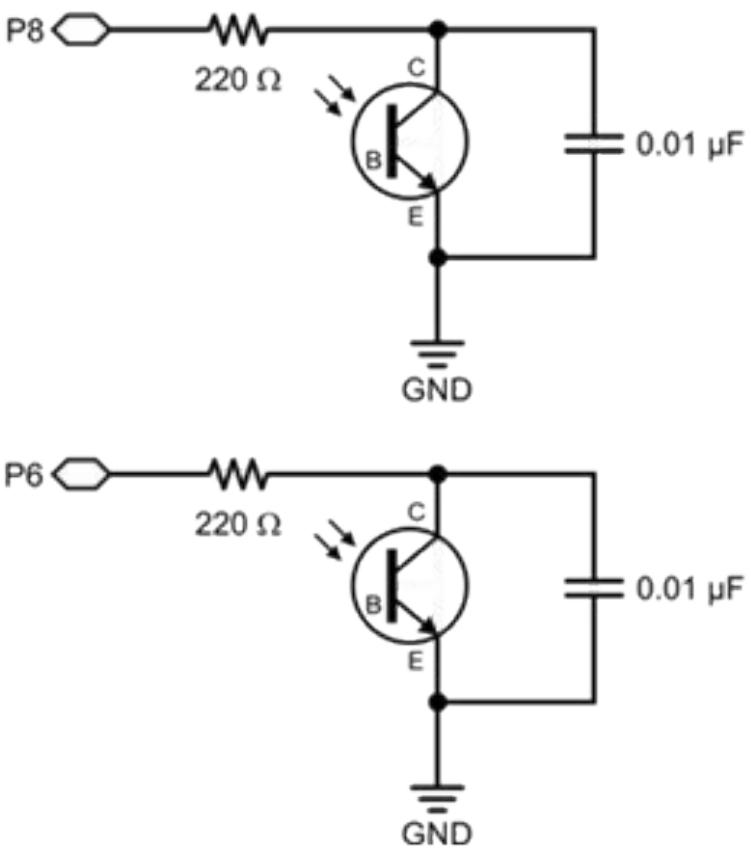
Visible Light

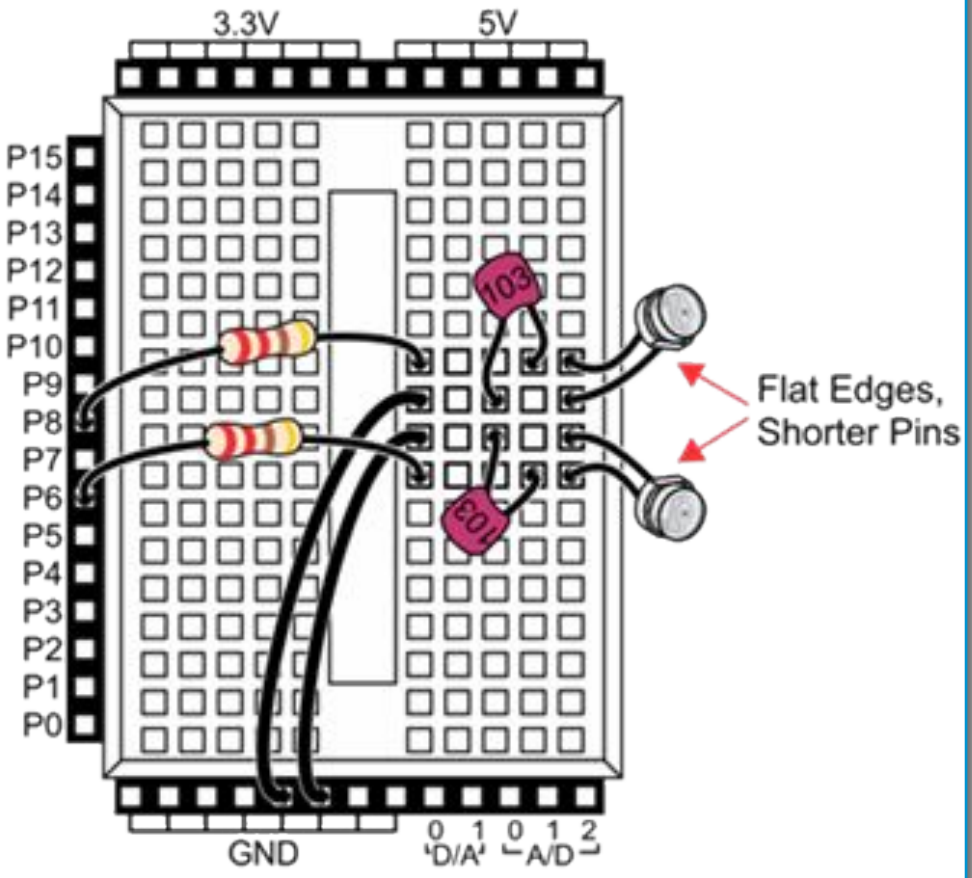
https://learn.parallax.com/tutorials/robot/cyberbot/visible-light-navigation-cyberbot

NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

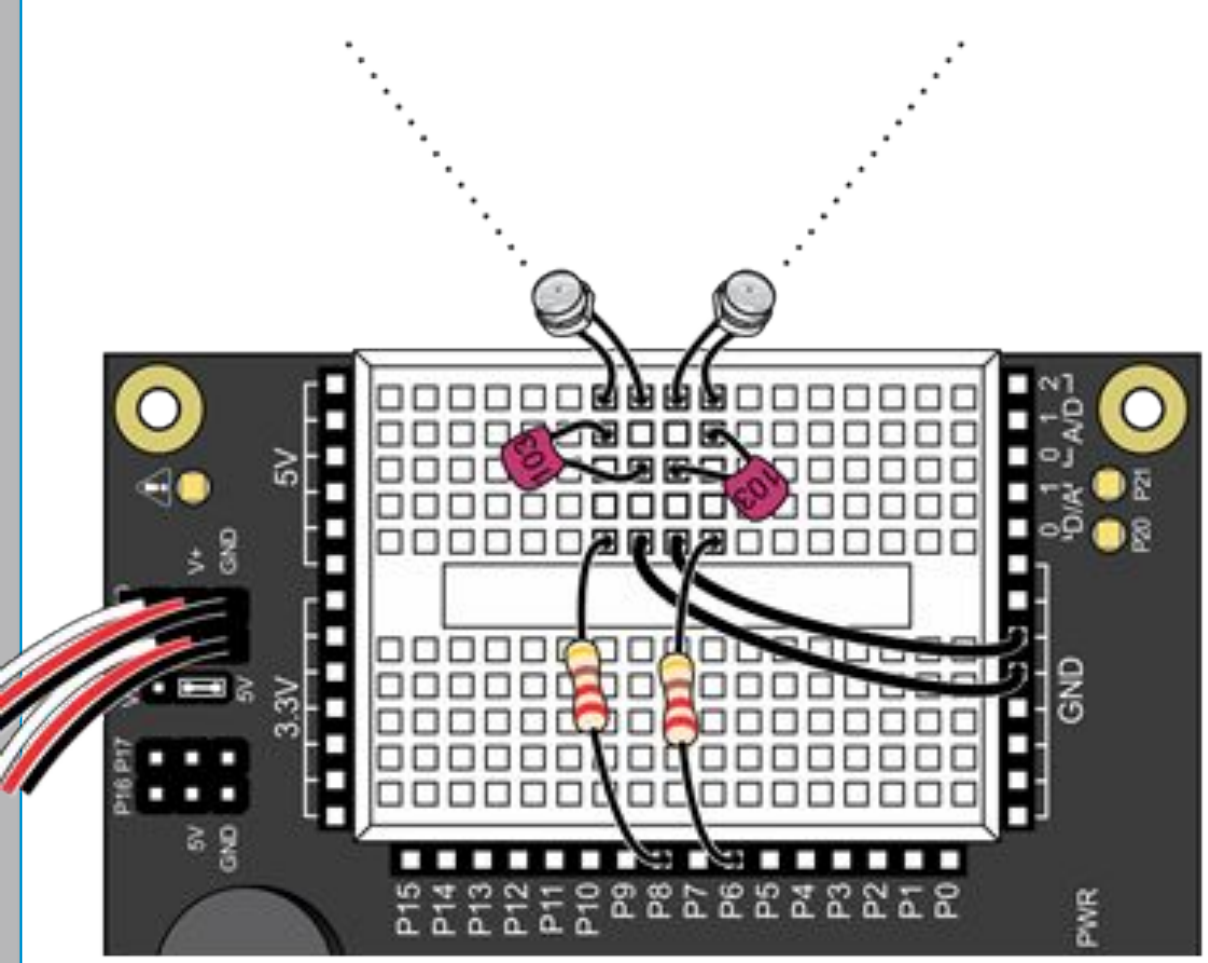
PARALLAX INC
www.parallax.com

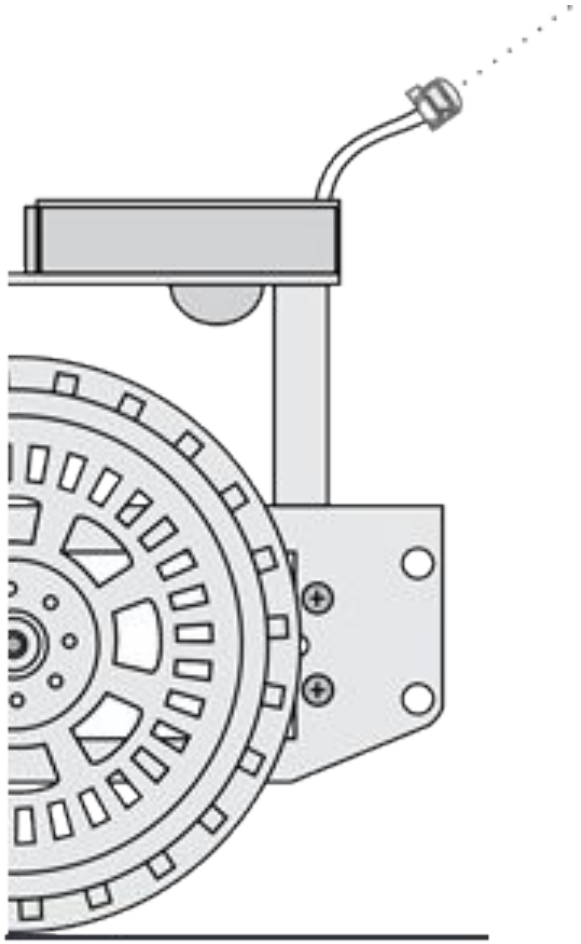
Visible Light Following: Circuit Build

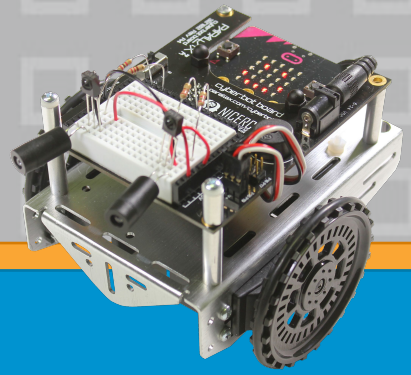




Visible Light Following: Circuit Build







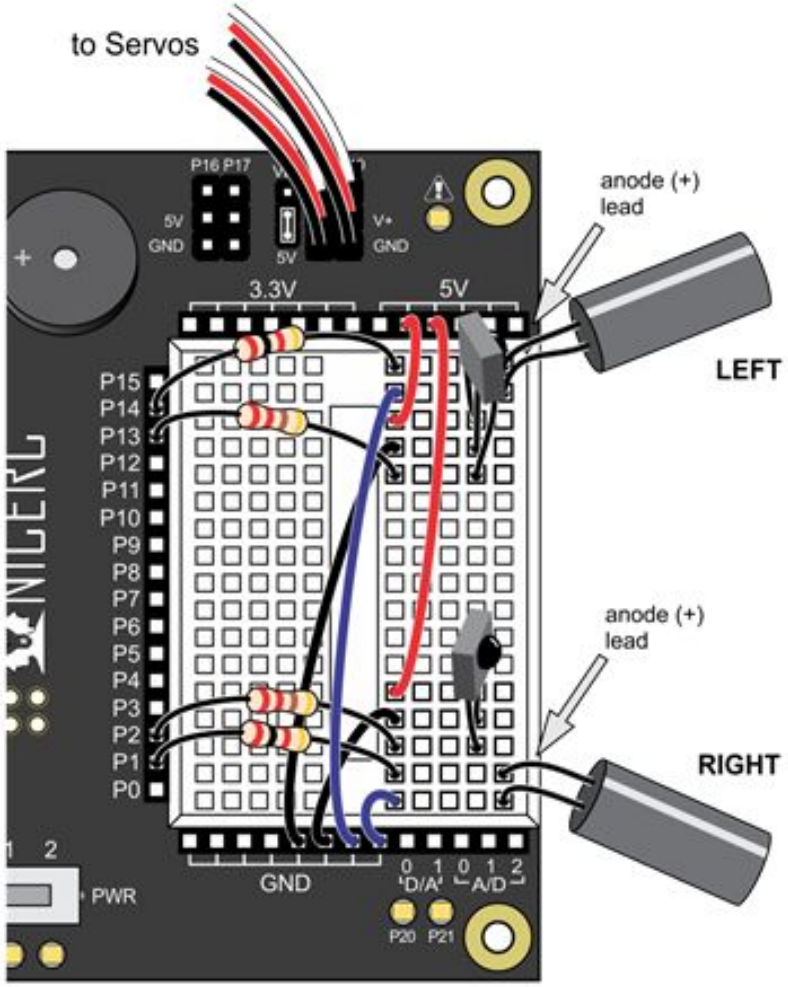
Infrared Light

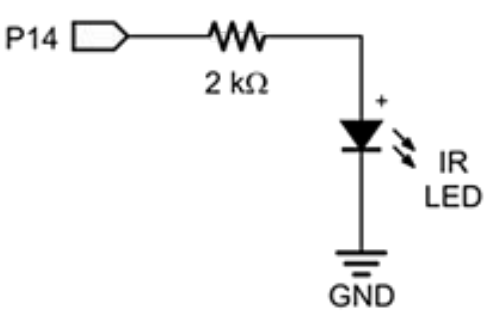
https://learn.parallax.com/tutorials/robot/cyberbot/infrared-light-navigation-cyberbot

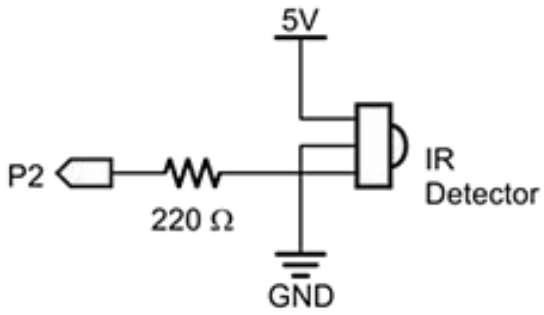
NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

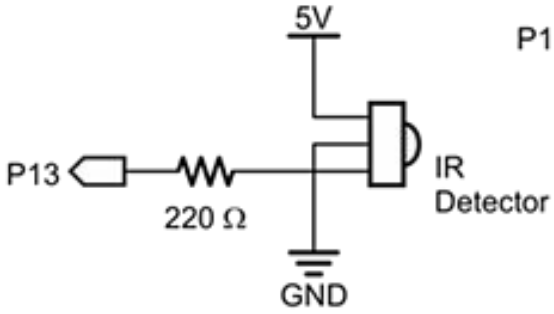
PARALLAX INC
www.parallax.com

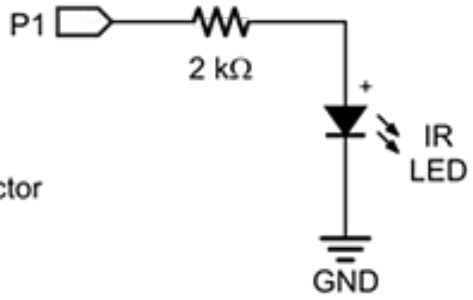
Infrared Emitter / Receivers for Object Detection and Following

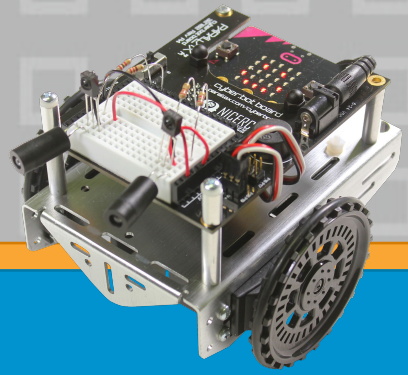










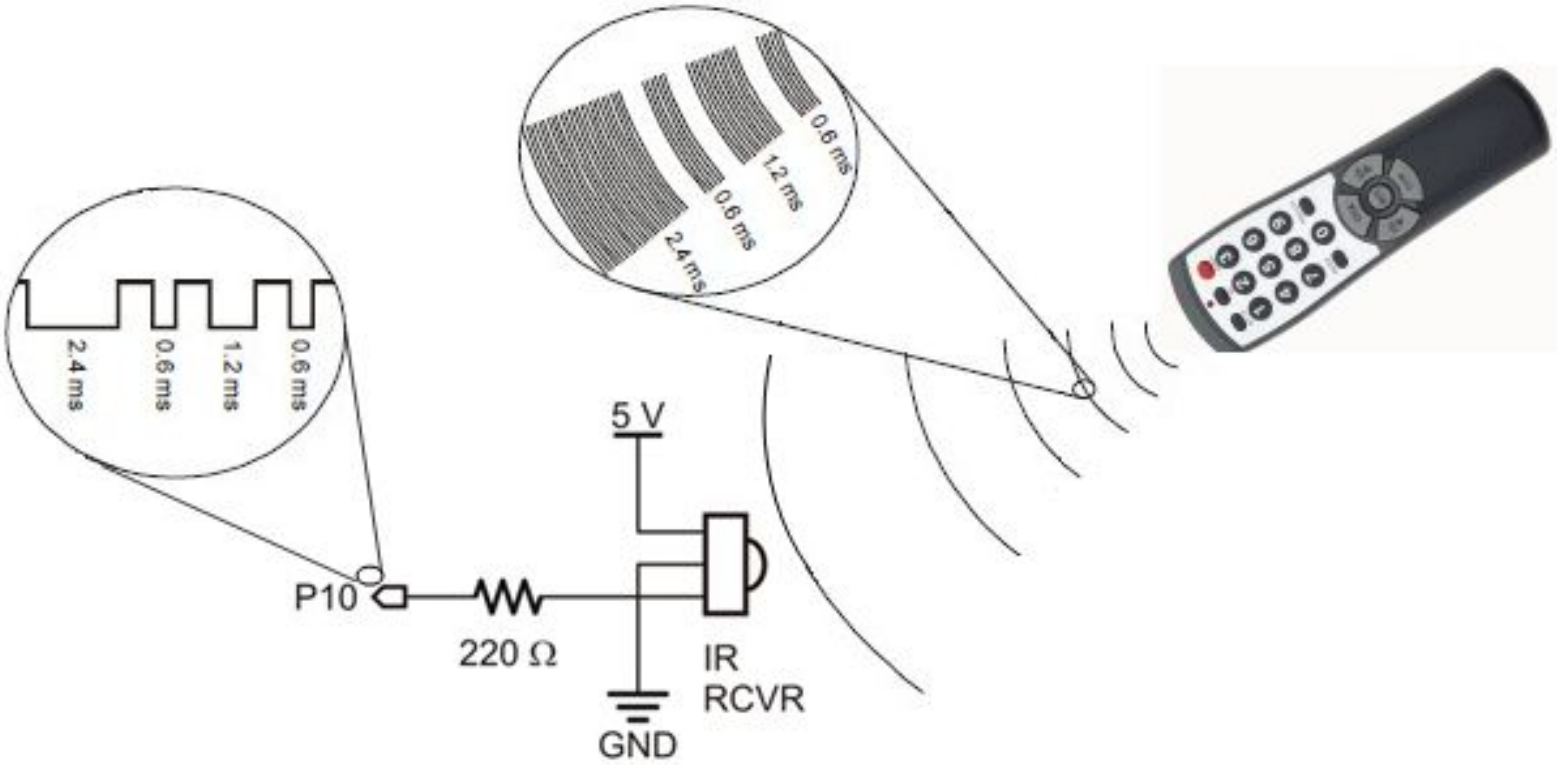


Projects

NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

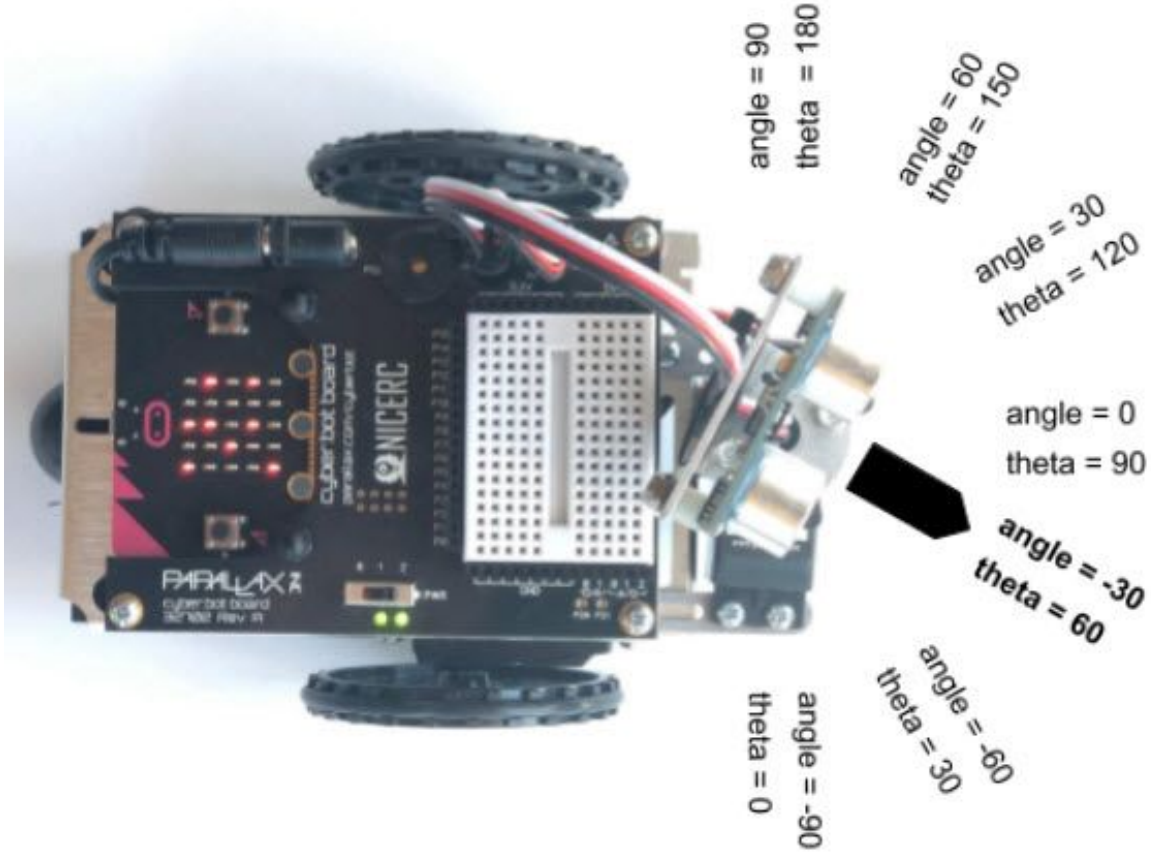
PARALLAX INC
www.parallax.com

Infrared Remote Control



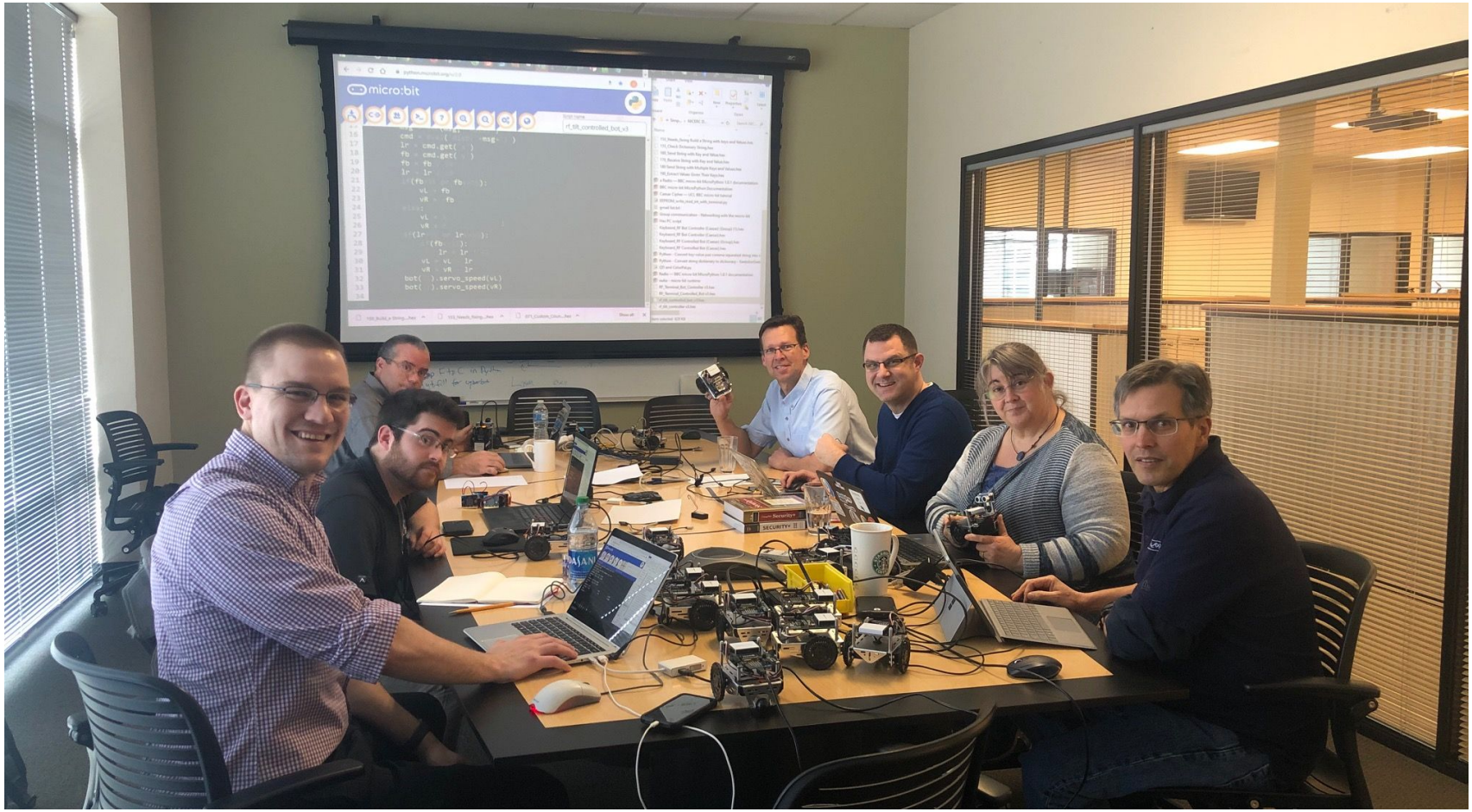
http://learn.parallax.com/tutorials/robot/cyberbot/control-your-cyberbot-infrared-tv-remote

Roaming with the Ping))) Ultrasonic Sensor



http://learn.parallax.com/tutorials/robot/cyberbot/cyberbot-roaming-ping

Happening Now: NICERC & Parallax Cybersecurity Curriculum Jam Session



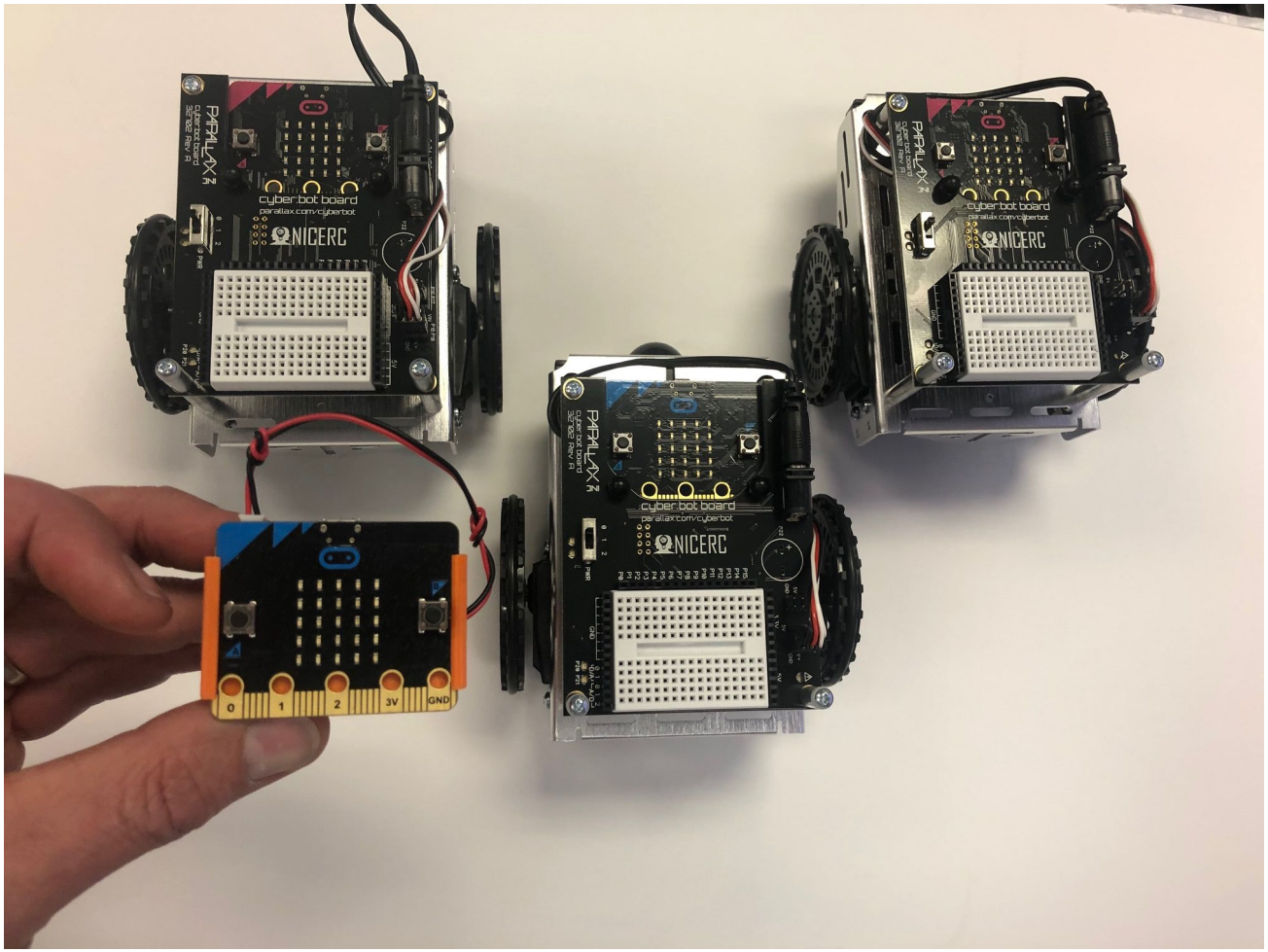
NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC
www.parallax.com

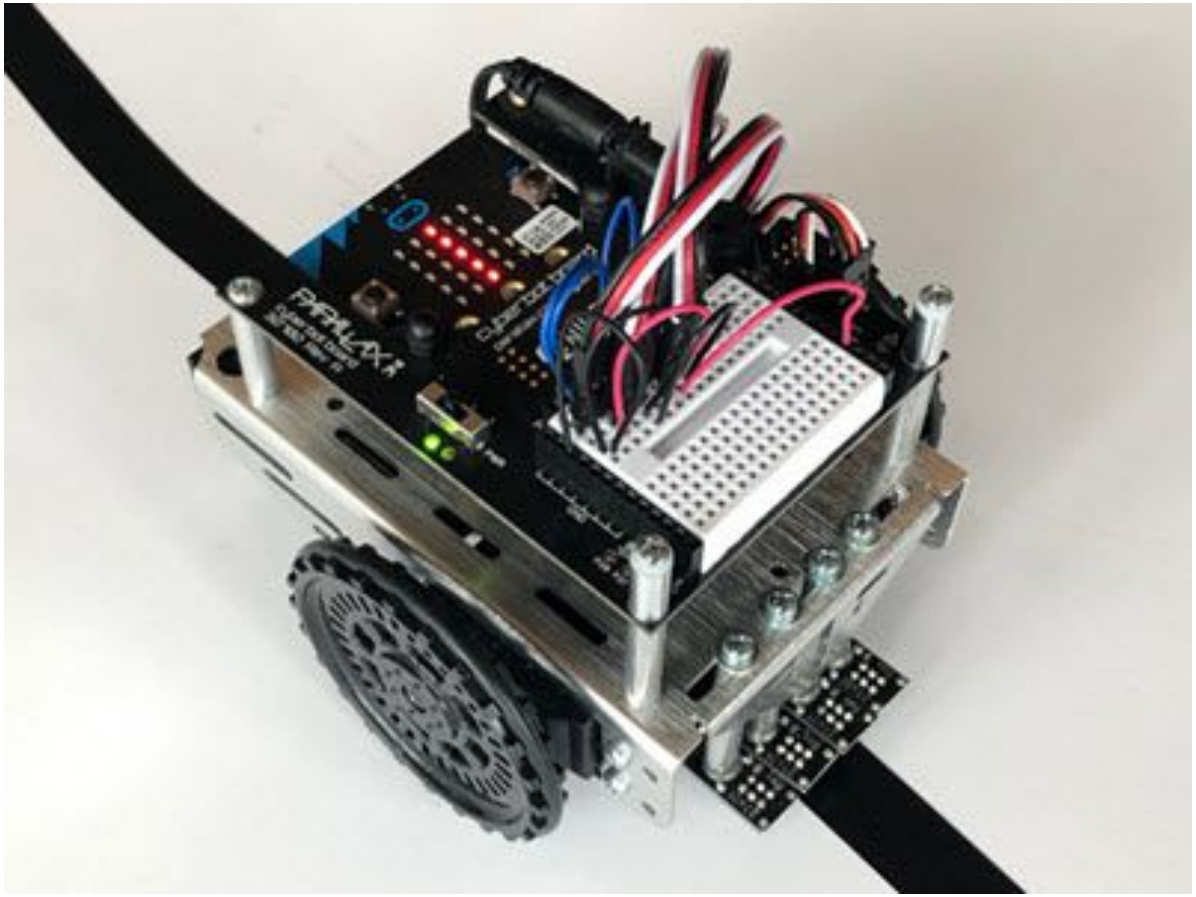
Cybersecurity Tutorial Topics

- Computer — micro:bit Talk
- Strings, Dictionaries, and Error Handling
- Radio Basics
- Radio Navigation Control
- Simple Attacks and Detections
- Denial of Service
- Authentication and Encryption
- Brute Force
- Key Exchange
- Replay Attack & Defense

In Development: Bluetooth RF Control

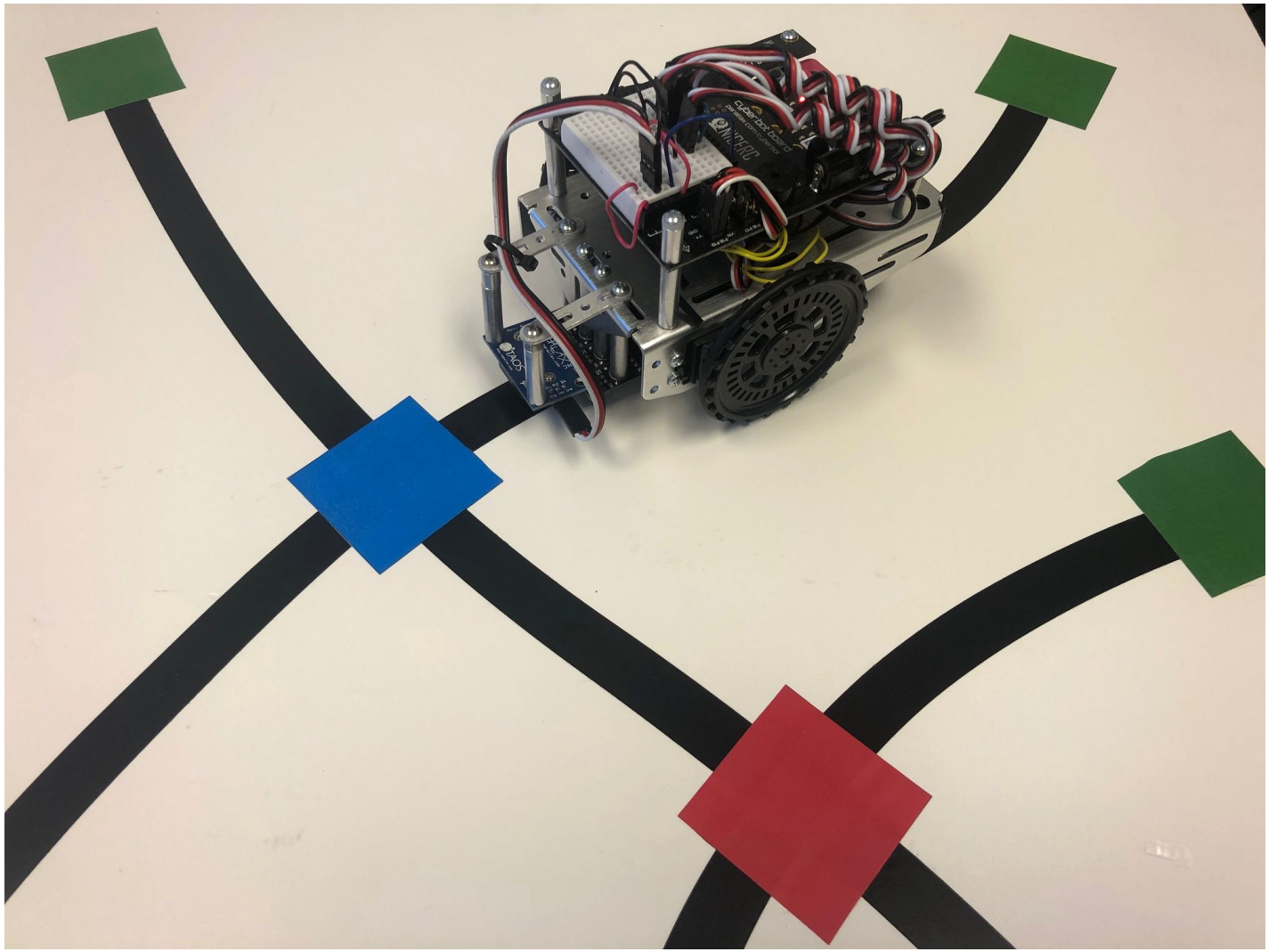


Line Follower

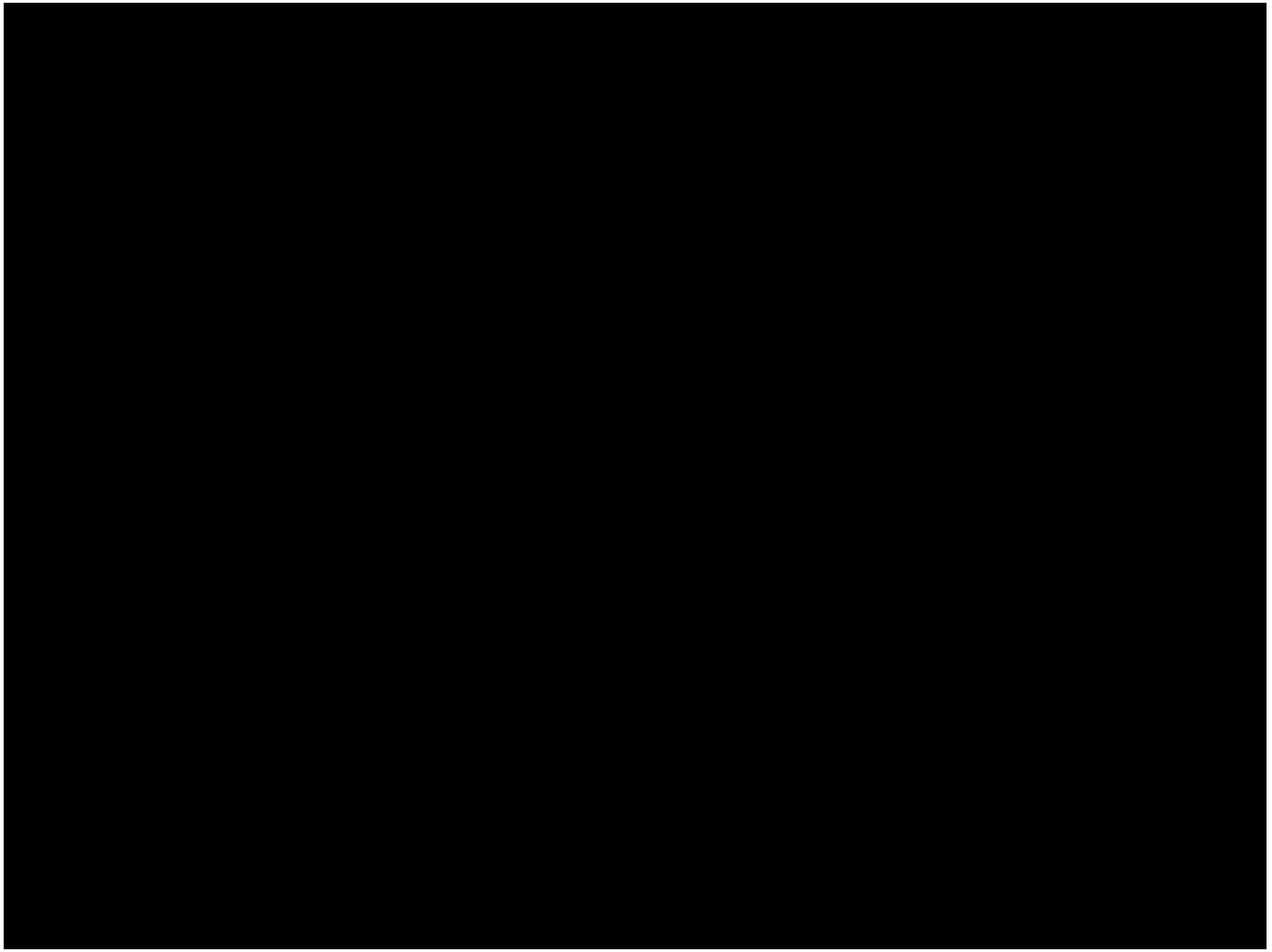


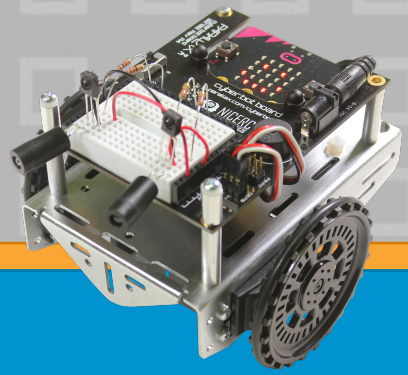
http://learn.parallax.com/tutorials/robot/cyberbot/qti-line-follower-cyberbot

In Development: Line Following with Color Codes



In Development: Gripper





Purchasing and Support

NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

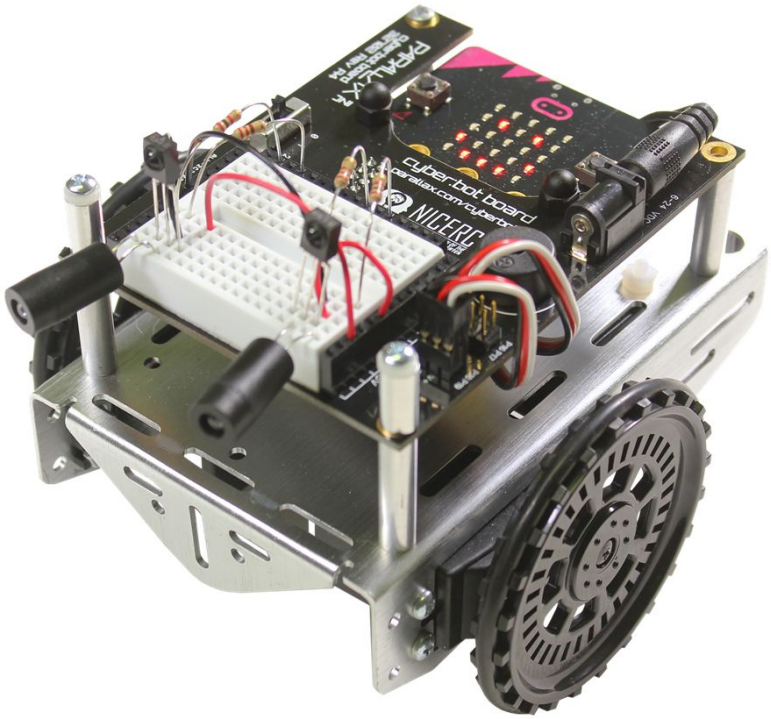
PARALLAX INC
www.parallax.com

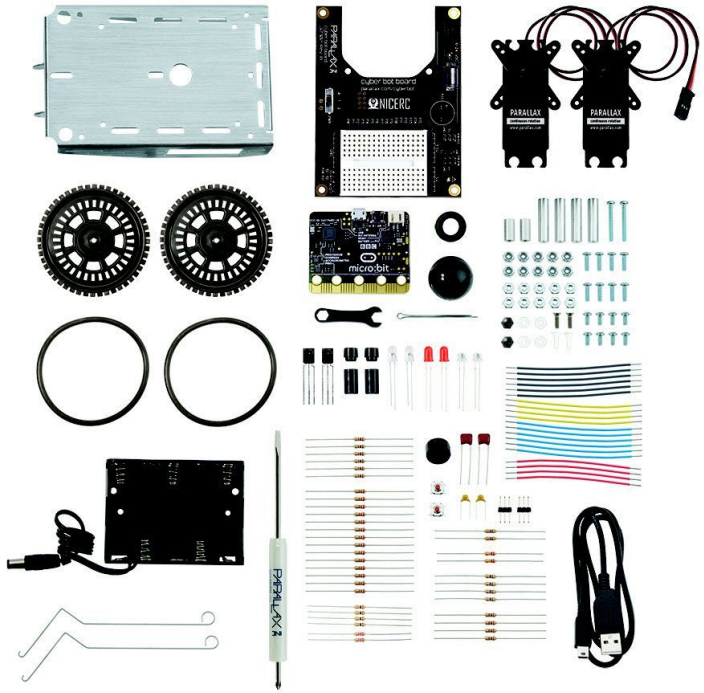
Cyber:bot with micro:bit #32700

$219 ea. (qty 1-9)

$208.05 ea. (qty 10-19)

$179.10 ea. (qty 20+)





Also available at www.mouser.com #619-32700

MOUSER ELECTRONICS

NICERC™ AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC. www.parallax.com

Cyber:bot 12-Pack Plus #32712

$3,595 (regular $4,330)

- (12) cyber:bot kits
- (12) micro:bit modules
- (12) QTI Line Followers
- (12) Ping))) Ultrasonic sensors and servo mounting brackets
- (12) Infrared remote controls
- (5) battery chargers
- (120) NiMH batteries
- 2’x6’ class banner

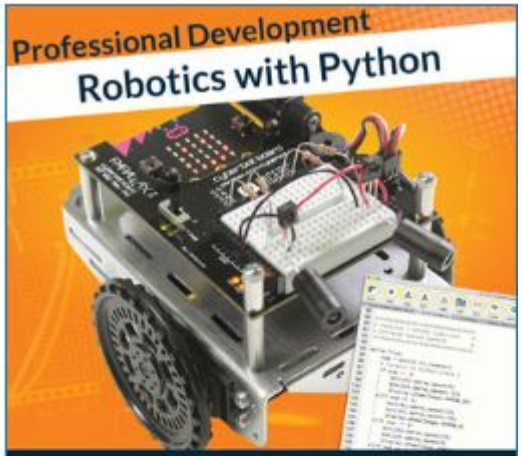
NICERC™
AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC
www.parallax.com

- Educator Hotline open 12 hrs/day (916) 701-8625
- E-mail learn@parallax.com
- Sales (916) 624-8333
- Forums http://forums.parallax.com/
- Facebook
  - Parallax https://www.facebook.com/ParallaxInc/
  - Micro:bit https://www.facebook.com/groups/1756471244599979/

Cyber:bot Workshop for Educators in Rocklin, CA: Thursday February 13

- Full day of training
- No cost (free!)
- Includes cyber:bot
- Limit 25 educators
- Register at parallax.com/events

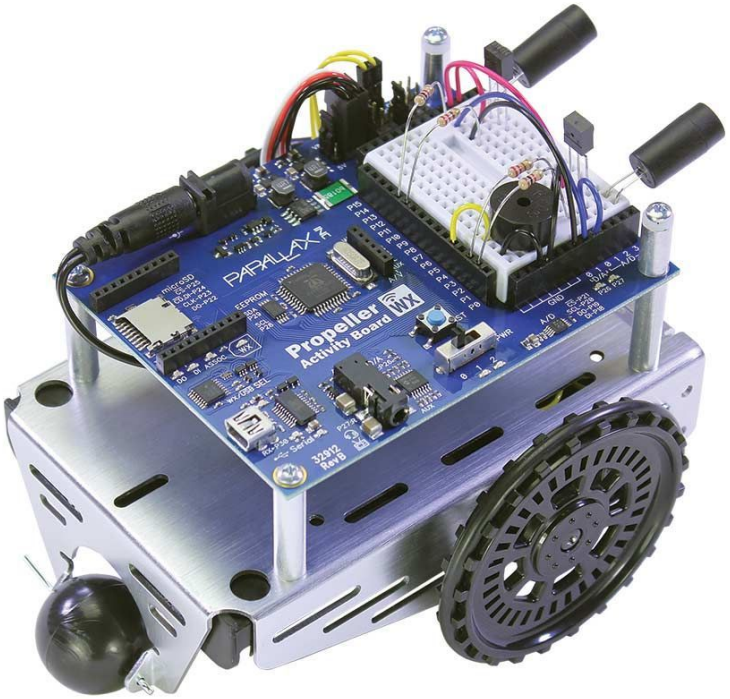


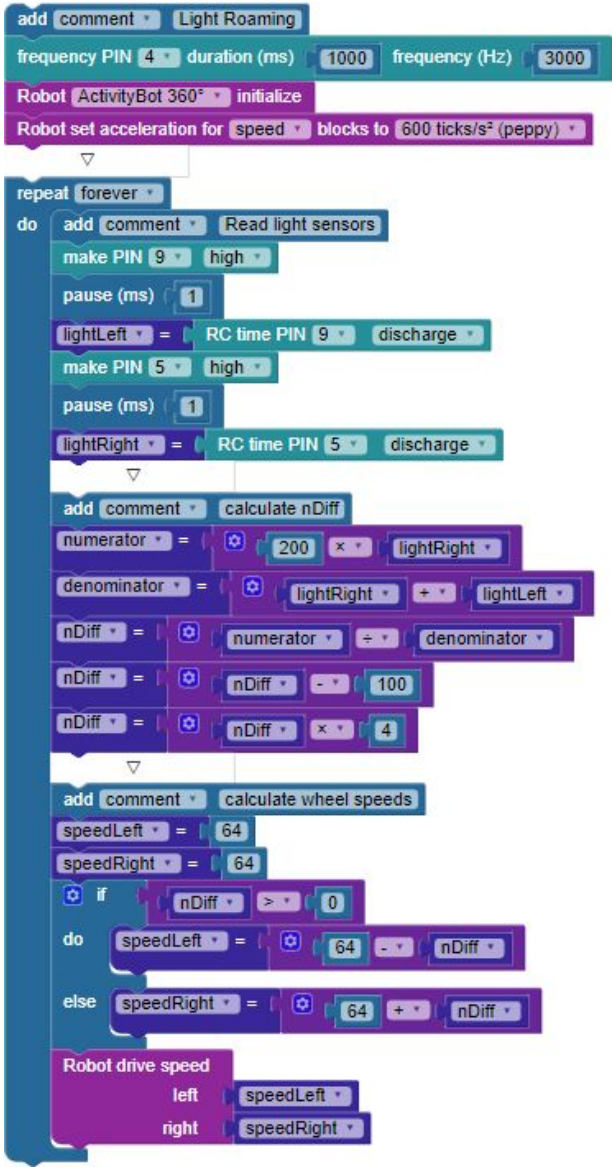
NICERC™ AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC. www.parallax.com

BlocklyProp and the ActivityBot 360 Webinar: Tuesday, January 21st 1:00 pm (Pacific)

- Register at parallax.com/events





NICERC™ AN ACADEMIC DIVISION OF THE CYBER INNOVATION CENTER

PARALLAX INC www.parallax.com

Parallax Inc.
599 Menlo Drive, Ste 100
Rocklin, CA 95765

www.parallax.com
Learn.parallax.com
Main: (916) 624-8333
Educator Hotline: (916) 701-8625

National Integrated Cyber Education Research Center, NICERC
6300 East Texas Street
Bossier City, LA 71111

www.nicerc.org
Main: (318) 759-1600