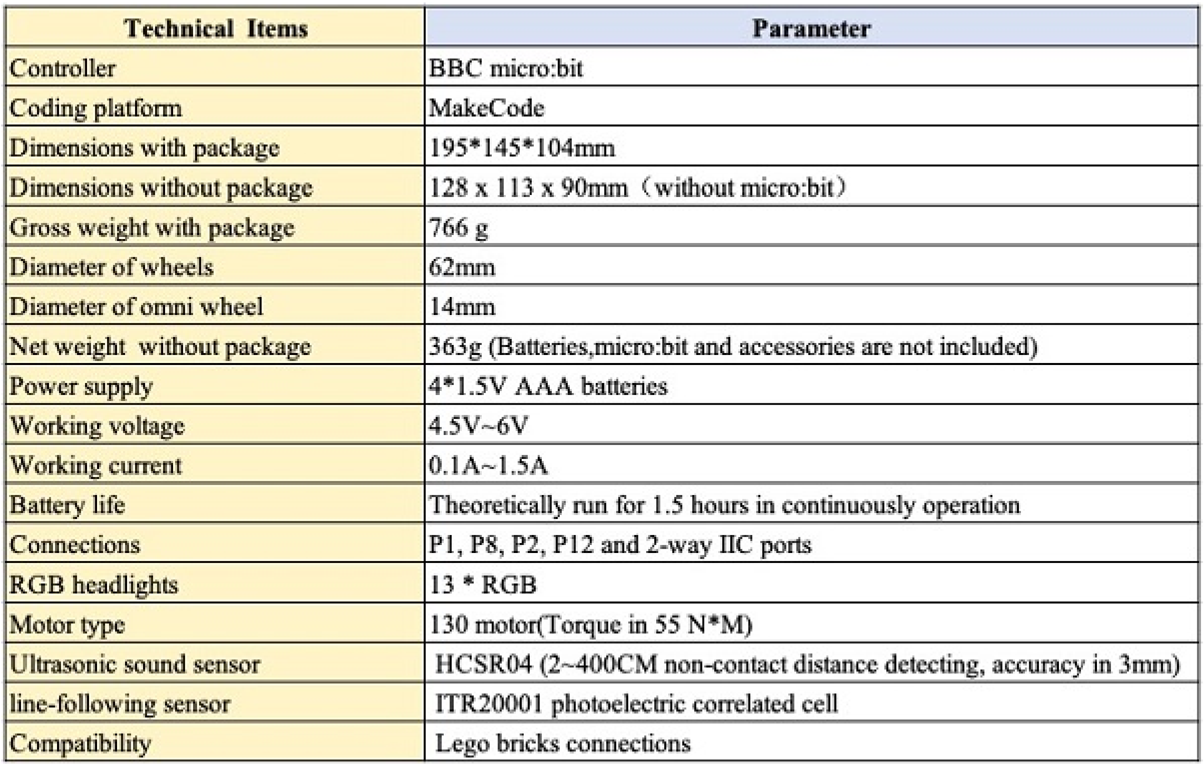
1. 1. TPBot Introduction

1.1. 1.1 Introduction

- TP Bot is a smart coding car for micro:bit. It can be regarded as a toy for its preset functions that do not need a micro:bit; it can also be used as a teaching aid at the same time, you can code it via the micro:bit or make extensions for the other modules and the Lego bricks to develop children's imagination and creativity.

1.2. 1.2 Picture

1.3. 1.3 Parameter

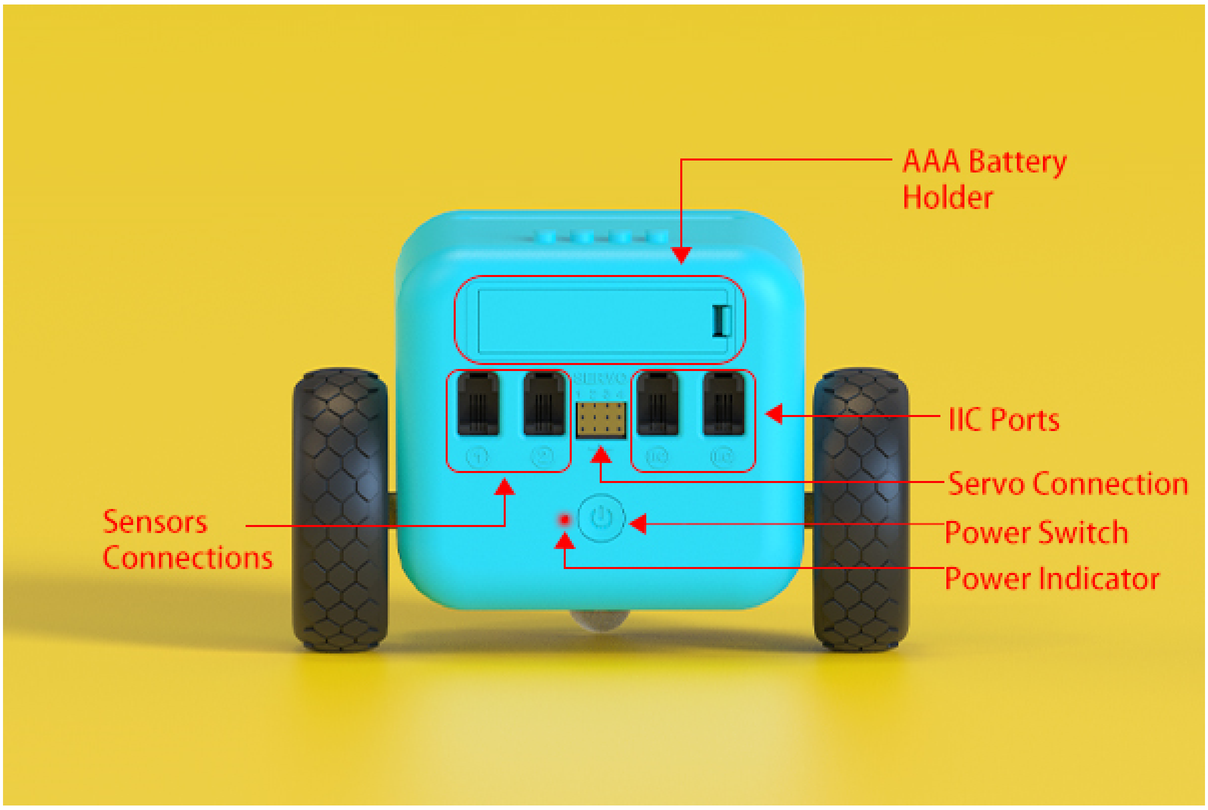


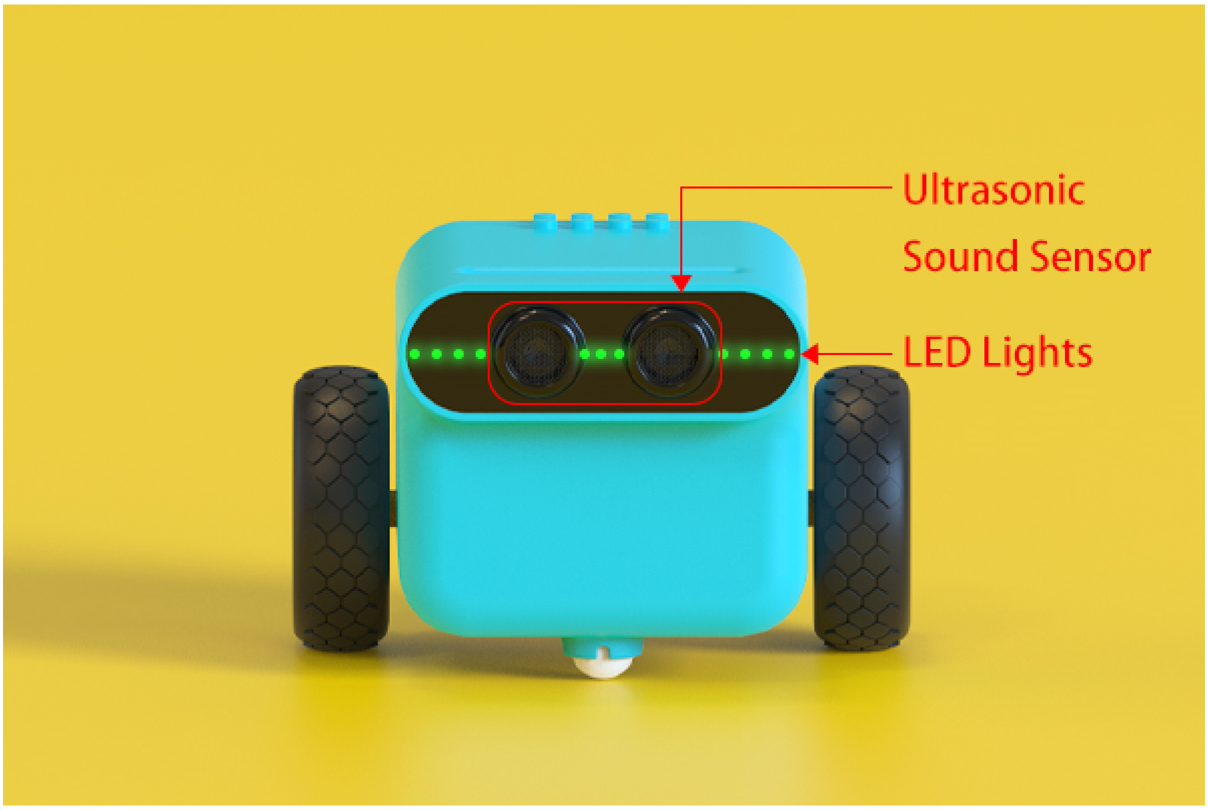
Technical Items	Parameter
Controller	BBC micro:bit
Coding platform	MakeCode
Dimensions with package	195*145*104mm
Dimensions without package	128 x 113 x 90mm（without micro:bit）
Gross weight with package	766 g
Diameter of wheels	62mm
Diameter of omni wheel	14mm
Net weight without package	363g (Batteries,micro:bit and accessories are not included)
Power supply	4*1.5V AAA batteries
Working voltage	4.5V~6V
Working current	0.1A~1.5A
Battery life	Theoretically run for 1.5 hours in continuously operation
Connections	P1, P8, P2, P12 and 2-way IIC ports
RGB headlights	13 * RGB
Motor type	130 motor(Torque in 55 N*M)
Ultrasonic sound sensor	HCSR04 (2~400CM non-contact distance detecting, accuracy in 3mm)
line-following sensor	ITR20001 photoelectric correlated cell
Compatibility	Lego bricks connections

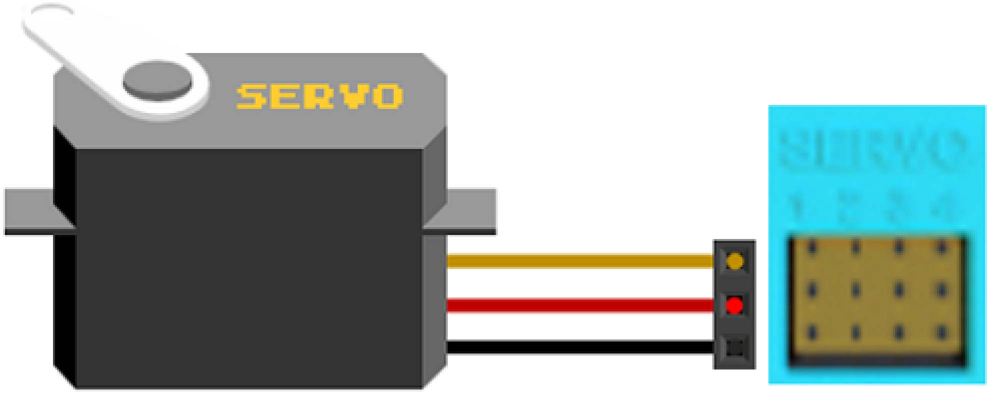
1.4. 1.4 Purchasing Link

- 1 x TPBot

1.5. Connections Diagram







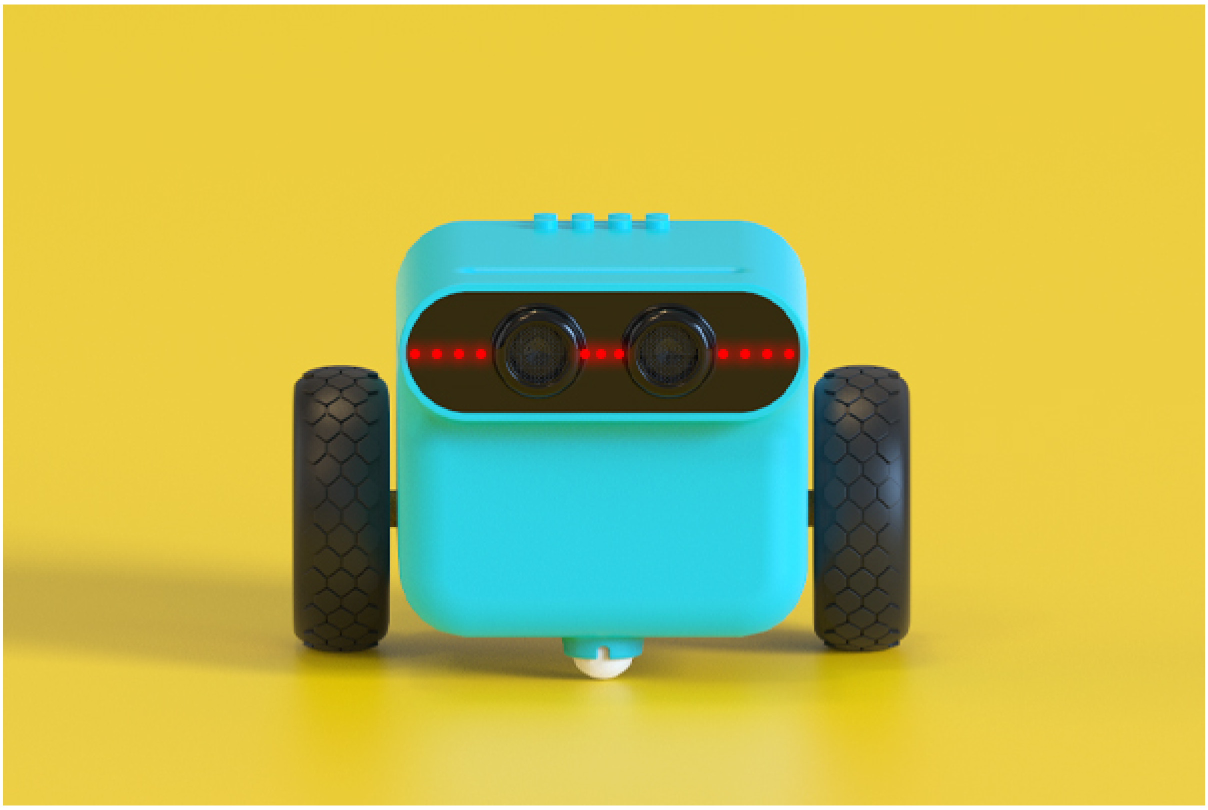
Note: The connection to servos shall be inserted vertically with the Ground wire in the bottom.

1.6. User Guide

- TPBot is available to operate even without the micro:bit, here are the instructions:
- Press the power button to enter into its standby mode, here lights on the power indicator and the LEDs in breathing green.

- While in its standby mode, press the power button to enter into the line-tracking & obstacles-avoidance mode, here lights on the LEDs in rainbow mode at the same time.

- While in its line-tracking & obstacles-avoidance mode, the headlights turn to red and it stops moving if an obstacle was detected.



- While in its line-tracking & obstacles-avoidance mode, press the power button to get back to the standby mode.
- No matter in its line-tracking & obstacles-avoidance mode or the standby mode, double click the power button to power off the TPBot.

1.7. Components

TPBot Smart Car * 1

Sticker(s) * 1

Map * 1

Manual book * 1

Batteries * 4

1.8. FAQ

1.9. Relevant File

2. Case 01: Running Control

2.1. Purpose

- Learn to control the movement of TPBot via programming.

2.2. Materials

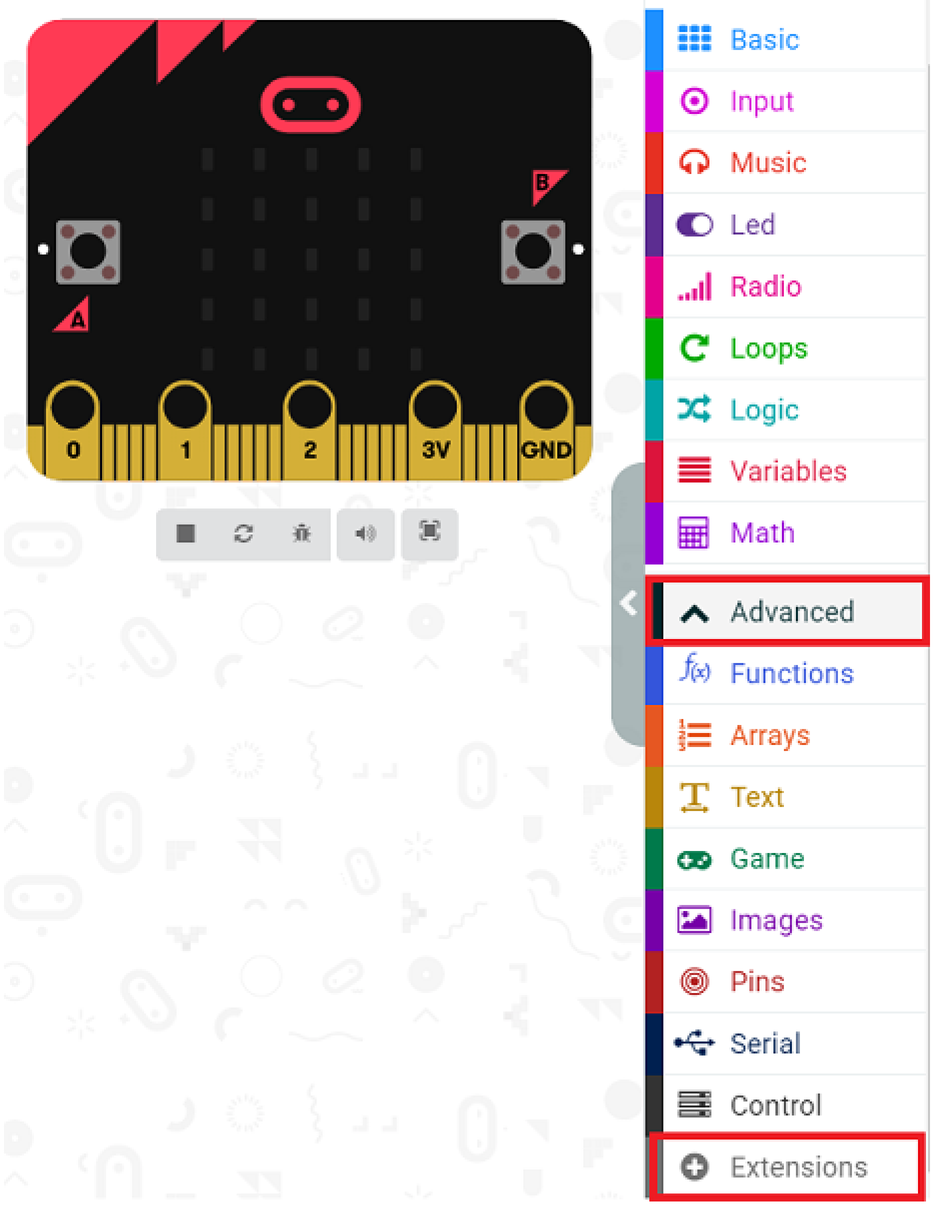
- 1 x TPBot

2.3. Software

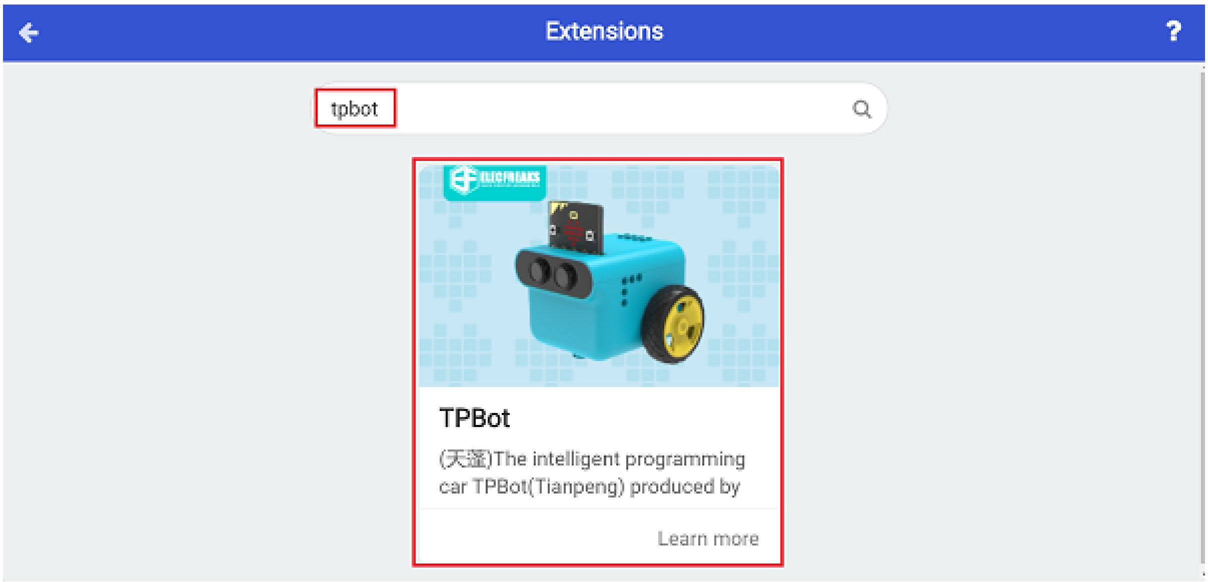
MicroSoftmakecode

2.4. Programming

- Click “Advanced” to see more choices in the MakeCode drawer.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.



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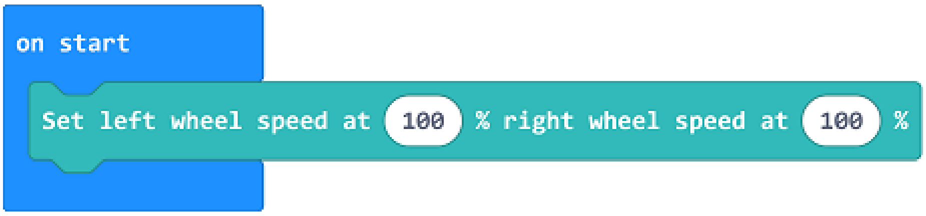
##Sample A

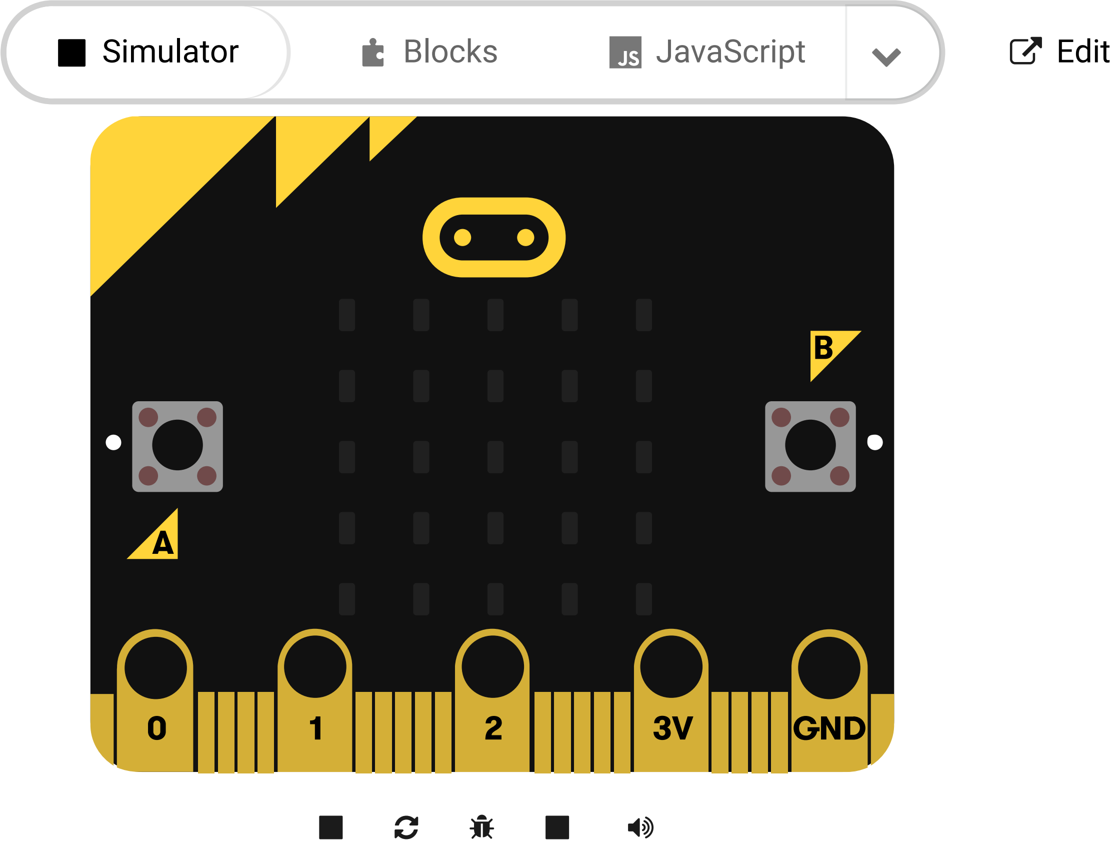
- Drag the brick of setting the speed in both 100 for both wheels of TPBot into the “On Start”.



```
on start
  Set left wheel speed at 100 % right wheel speed at 100 %
```

Link

- Link: https://makecode.microbit.org/_0r5C5L029L9m
- You may also download it directly below:

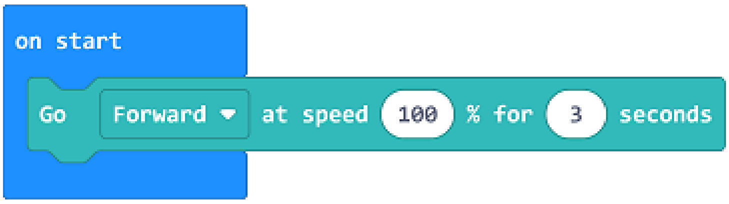


2.5. Conclusion

- TPBot keeps moving forward.

##Sample B

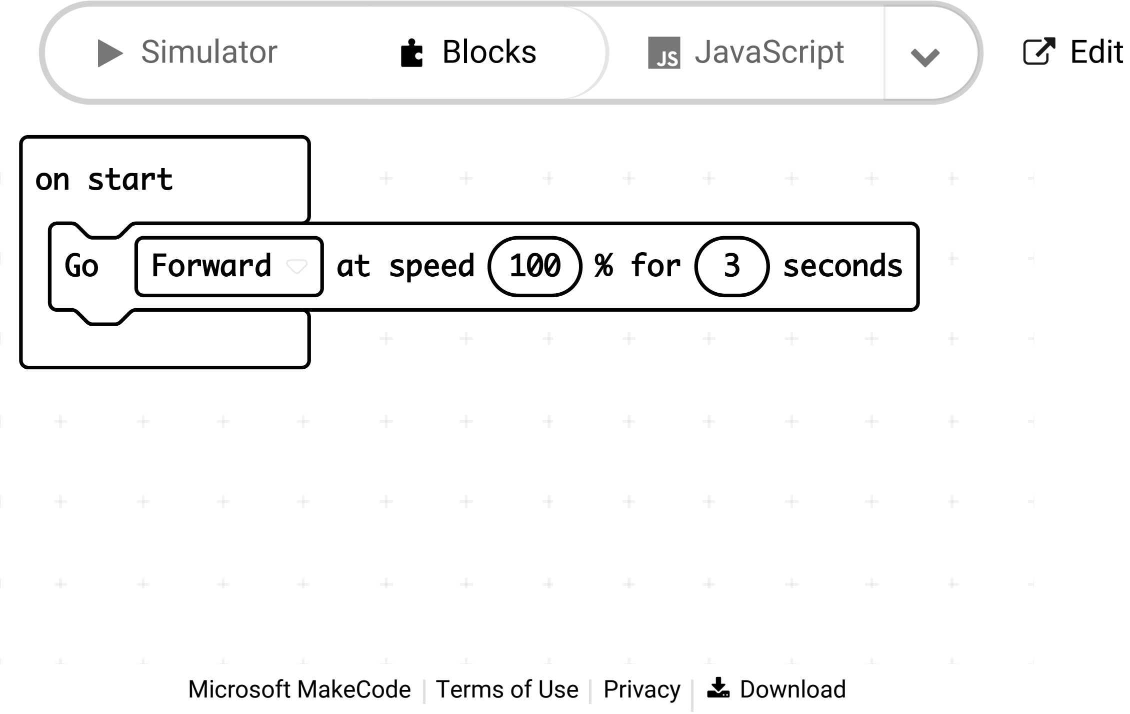
- Drag and set the brick of moving forward at the speed of 100 and lasting for 3 seconds into the “On Start”.



```
on start
  Go Forward ▾ at speed 100 % for 3 seconds
```

Link

- Link: https://makecode.microbit.org/_XXH3yP66oRRp
- You may also download it directly below:



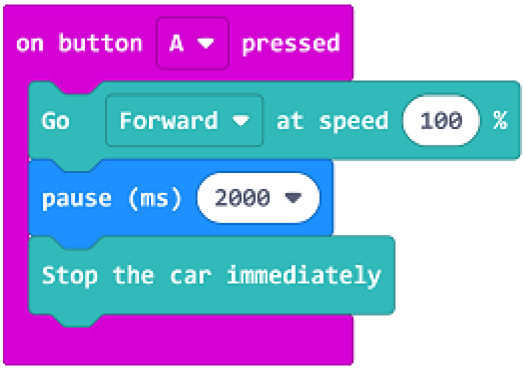
```
on start
  Go Forward at speed 100 % for 3 seconds
```

2.6. Conclusion

- TPBot moves forward at full speed for 3 seconds and then stops.

##Sample C

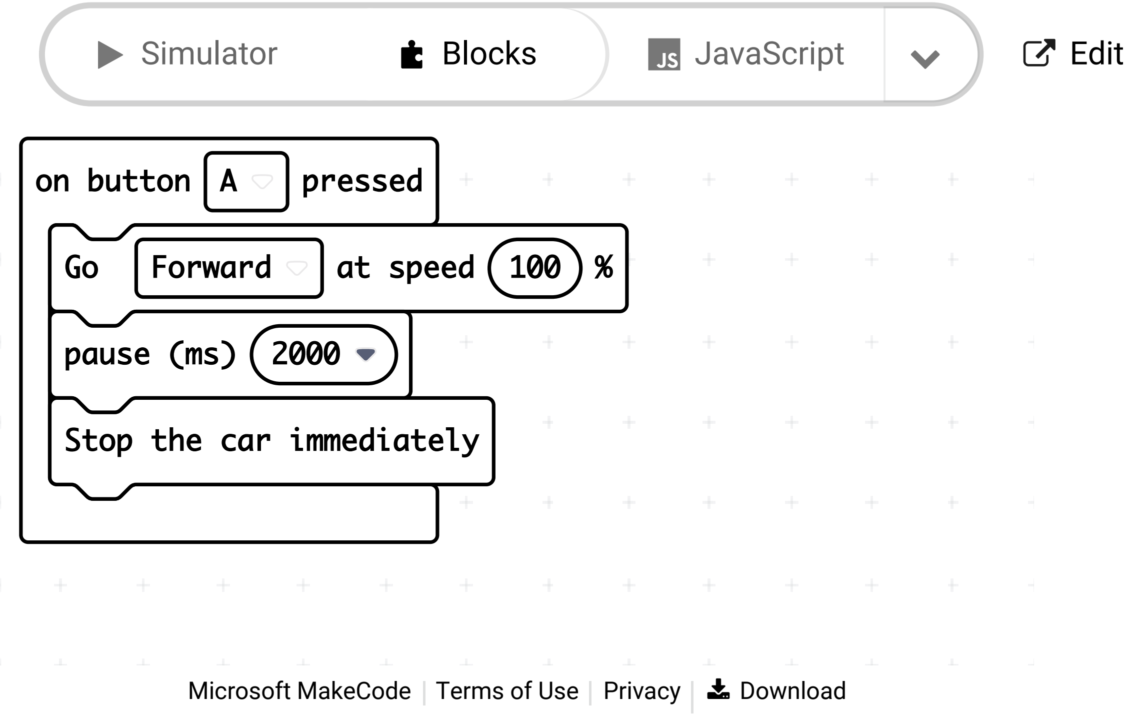
- Drag and set the brick of moving forward at the speed of 100 into the brick of “while button A being pressed”, then set to pause for 2000ms, and drag the stops immediately brick as the pic says.



```
on button A pressed
    Go Forward at speed 100 %
    pause (ms) 2000
    Stop the car immediately
```

Link

- Link: https://makecode.microbit.org/_6i4awR07MA7E
- You may also download it directly below:



```
on button A pressed
    Go Forward at speed 100 %
    pause (ms) 2000
    Stop the car immediately
```

2.7. Conclusion

- While button A being pressed, TPBot moves forward at the full speed for two seconds and then stops.

2.8. Exploration

2.9. FAQ

2.10. Relevant File

3. Case 02: Light Control

3.1. Purpose

- Programme to control the colour of the LED lights.

3.2. Material

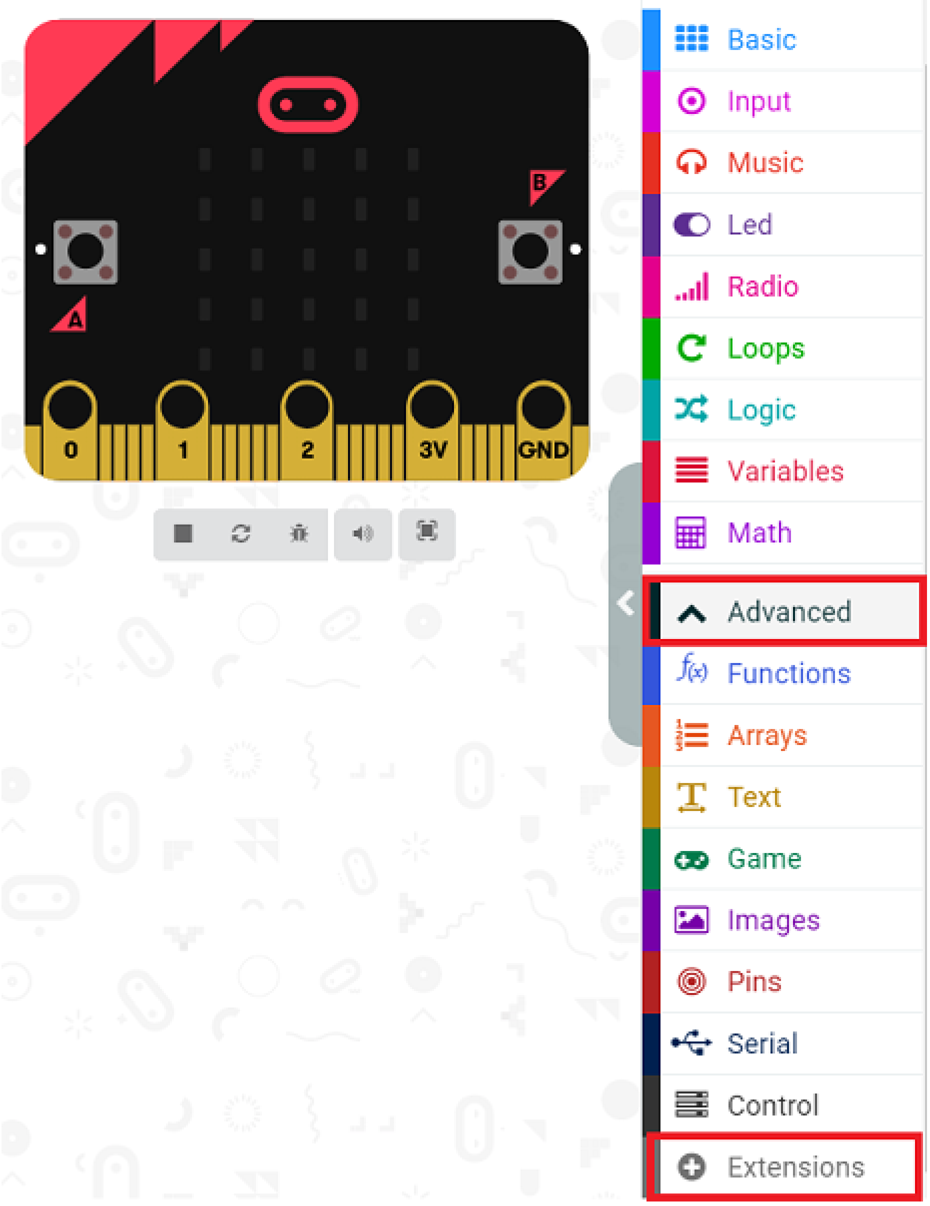
- 1 x TPBot

3.3. Software

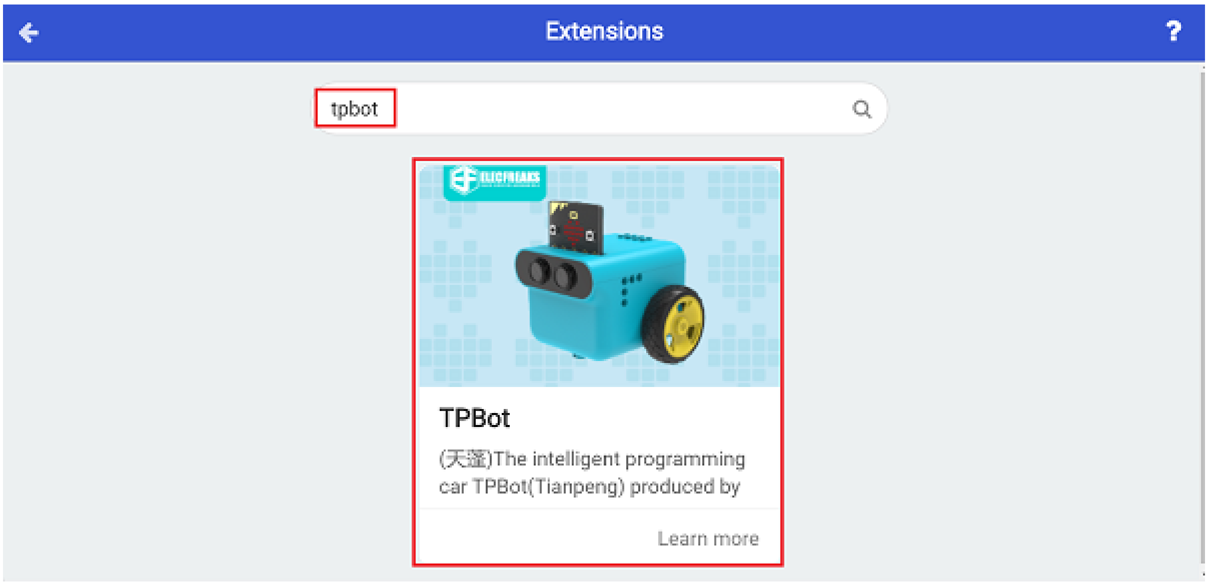
MicroSoftmakecode

3.4. Programming

- Click “Advanced” to see more choices in the MakeCode drawer.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.


Extensions
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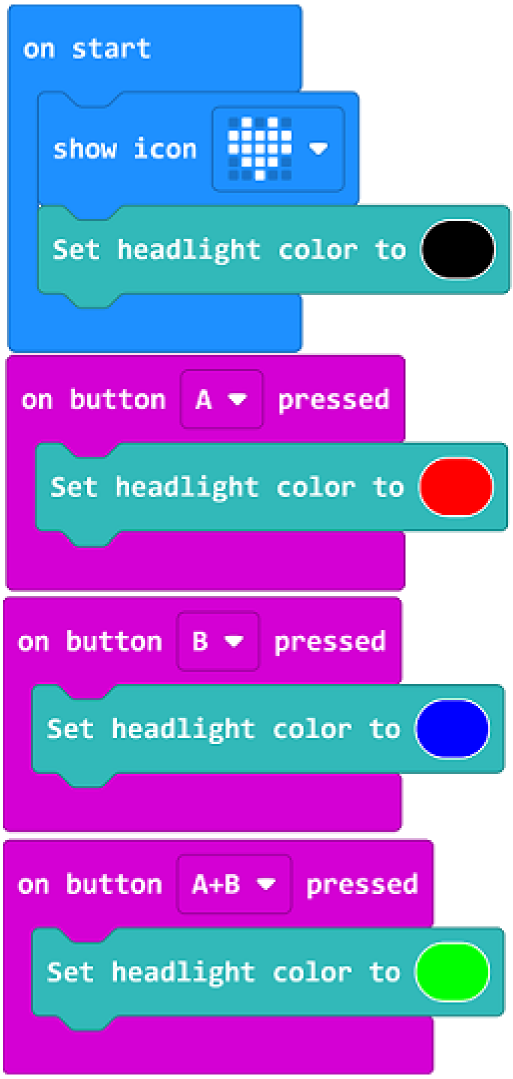
##Sample A

- The LED headlights are in black while on start, and the micro:bit shows an icon.

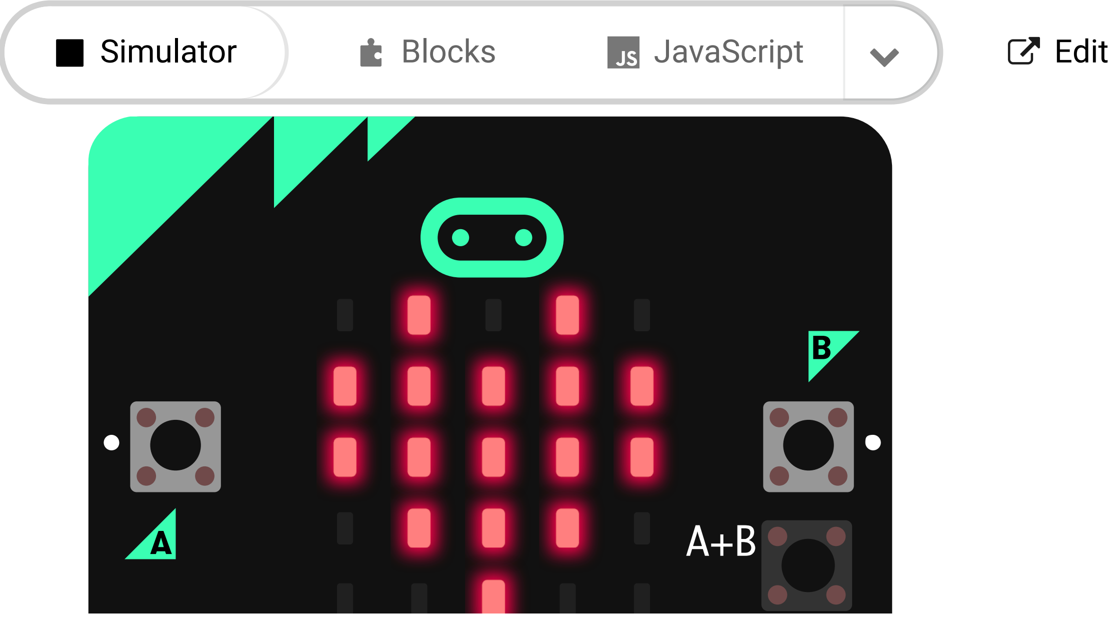
- Press button A to make the LED headlights show red.
- Press button B to make the LED headlights show blue.
- Press button A+B to make the LED headlights show green.

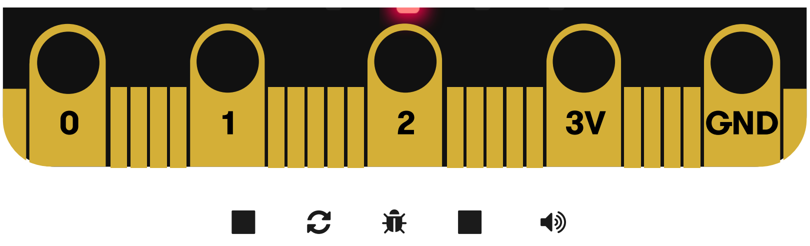


```
on start
    show icon ♥ ▾
    Set headlight color to ⚫
on button A ▾ pressed
    Set headlight color to 🔴
on button B ▾ pressed
    Set headlight color to 🔵
on button A+B ▾ pressed
    Set headlight color to 🟢
```

Link

- Link: https://makecode.microbit.org/_0RM5AJgos7C5
- You may also download it directly below:



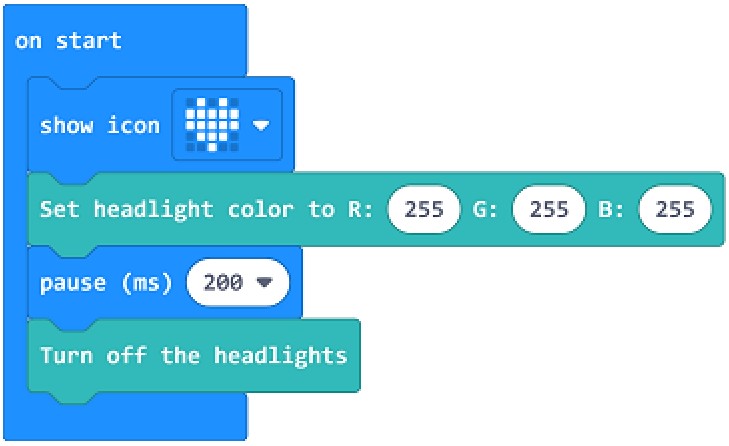


3.5. Conclusion

- Control the colour of the headlights with the buttons.
- Press button A to make the LED headlights show red.
- Press button B to make the LED headlights show blue.
- Press button A+B to make the LED headlights show green.

##Sample B

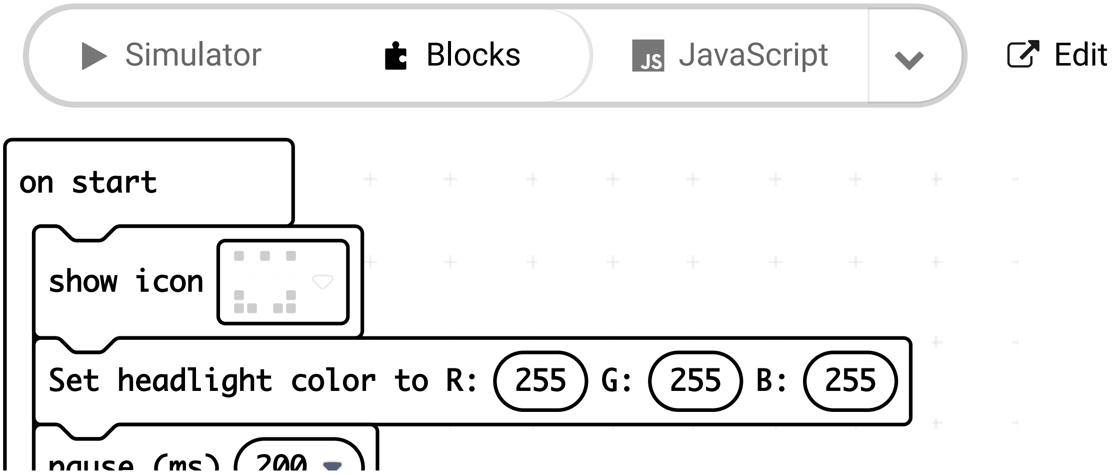
- While on start, set the micro:bit showing an icon and the LED headlights in red for 2 seconds and then turning off.



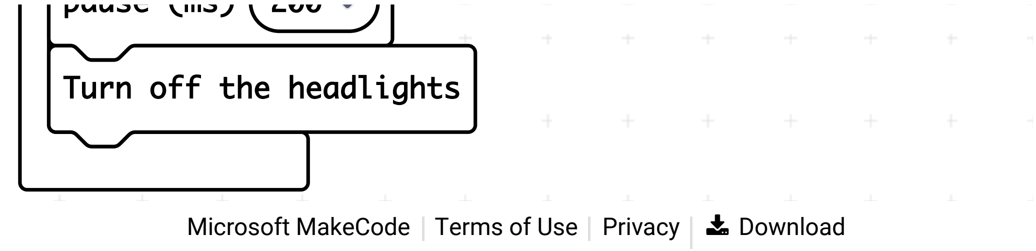
```
on start
  show icon
  Set headlight color to R: 255 G: 255 B: 255
  pause (ms) 200
  Turn off the headlights
```

Link

- Link: https://makecode.microbit.org/_P5cJ7oV1664J
- You may also download it directly below:



```
on start
  show icon
  Set headlight color to R: 255 G: 255 B: 255
  pause (ms) 200
```



```
pause (ms) 200
Turn off the headlights
```

3.6. Conclusion

- The micro:bit displays an icon while on start and the LED headlights of the TPBot show white for 2 seconds and then turn off.

3.7. Exploration

3.8. FAQ

3.9. Relevant File

4. Case 03: Line Tracking

4.1. Purpose

- Programme to set the TPBot driving along with the black line.

4.2. Material

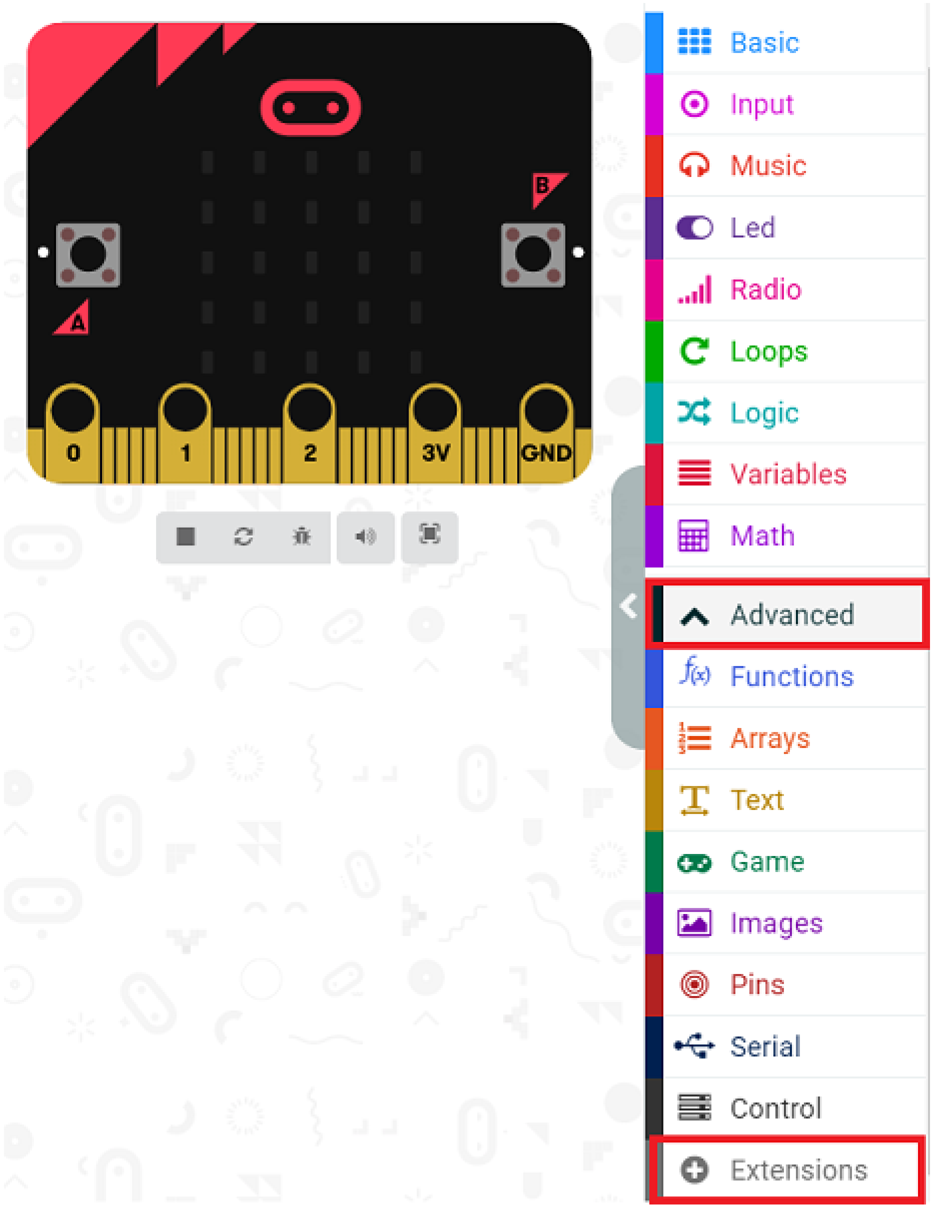
- 1 x TPBot

4.3. Software

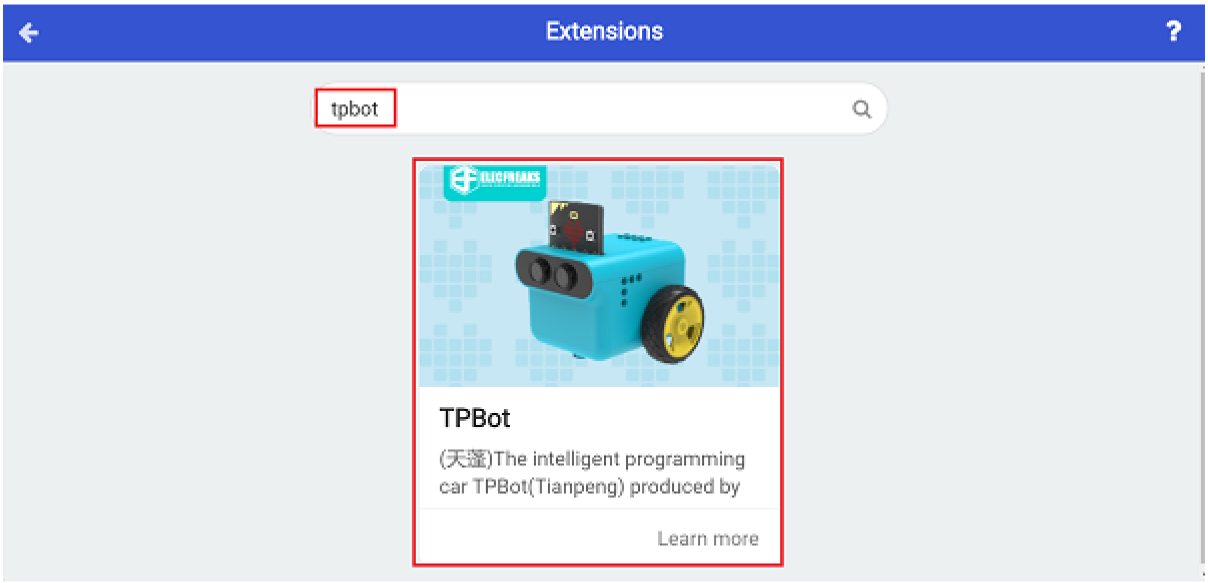
MicroSoftmakecode

4.4. Programming

- Click “Advanced” to see more choices in the MakeCode drawer.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.



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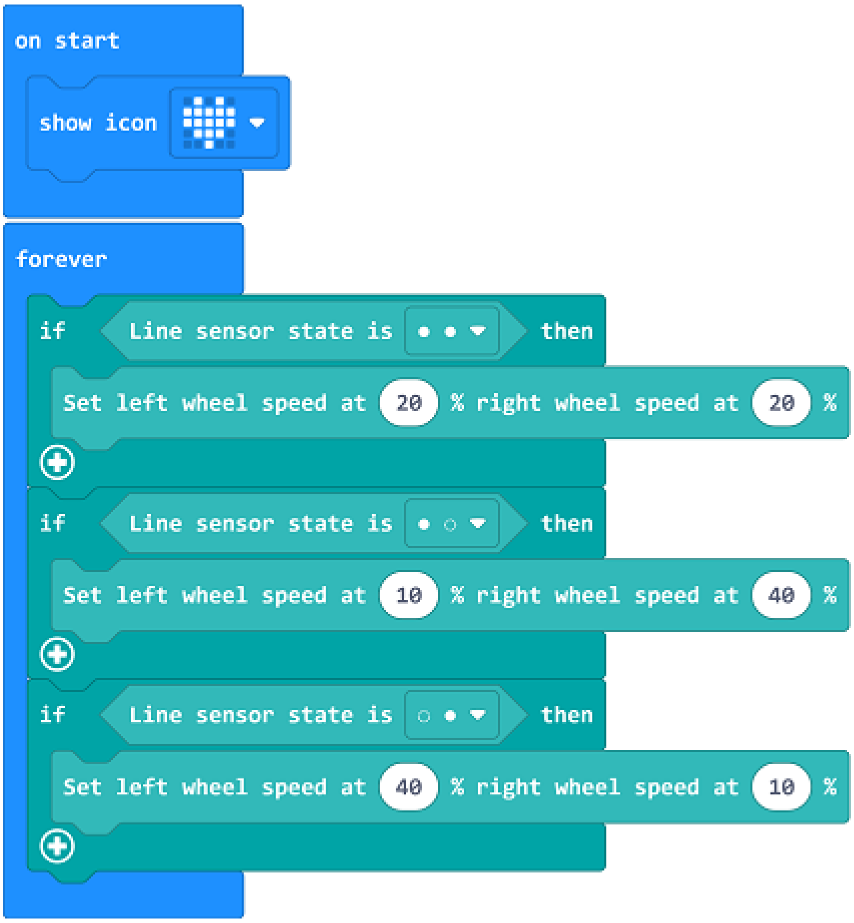
##Sample

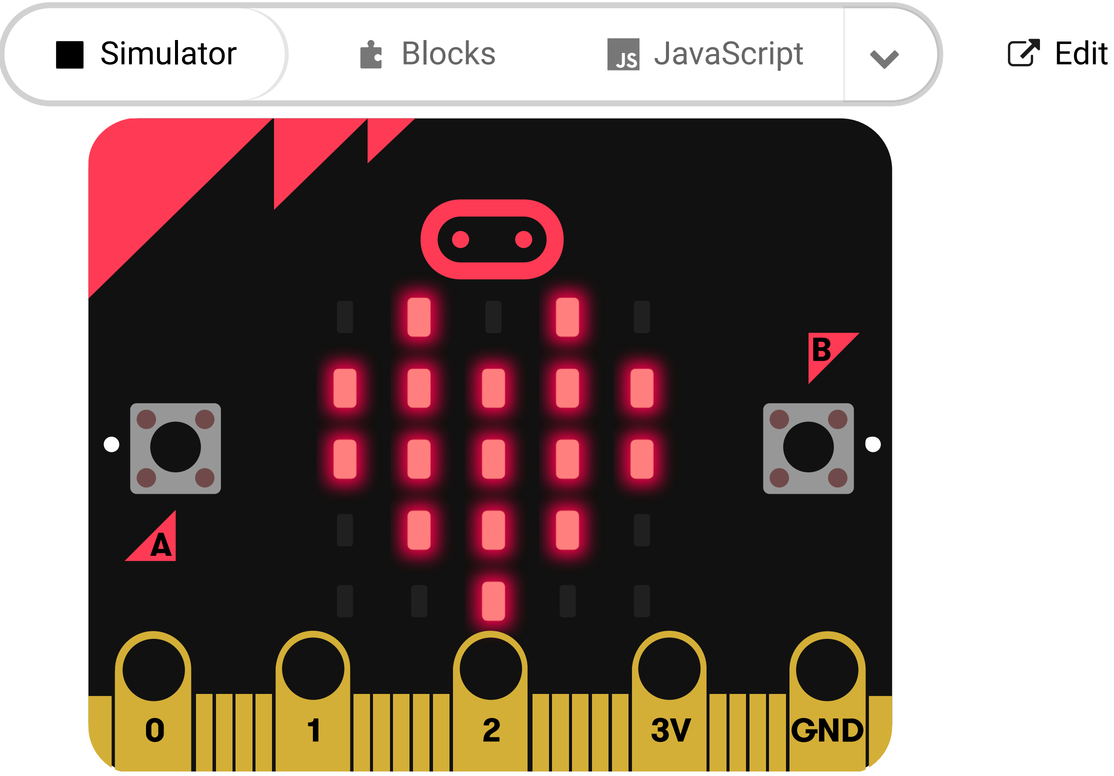
- Judge the status of the line-tracking sensors: if the black was detected on the left, set the speed of the left wheel in 0 and the right in 40; if the black was detected on the right, set the speed of the left wheel in 40 and the right in 0.

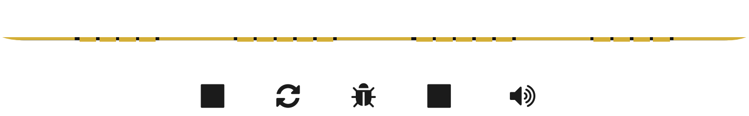


```
on start
    show icon [icon]
forever
    if Line sensor state is ● ● then
        Set left wheel speed at 20 % right wheel speed at 20 %
    if Line sensor state is ● ○ then
        Set left wheel speed at 10 % right wheel speed at 40 %
    if Line sensor state is ○ ● then
        Set left wheel speed at 40 % right wheel speed at 10 %
```

Link

- Link: https://makecode.microbit.org/_4WML7wLL5DDJ
- You may also download it directly below:





4.5. Conclusion

- TPBot drives along with the balck line.

4.6. Exploration

4.7. FAQ

Q: The car does not work with the code in the wiki.
A: It should be the batteries that are lack of power, please try to fix it by adding the value of the speed in the code.

4.8. Relevant File

5. Case 04: Obstacle-avoidance Driving

5.1. Purpose

- Programme to set the TPBot avoiding an obstacle automatically.

5.2. Material

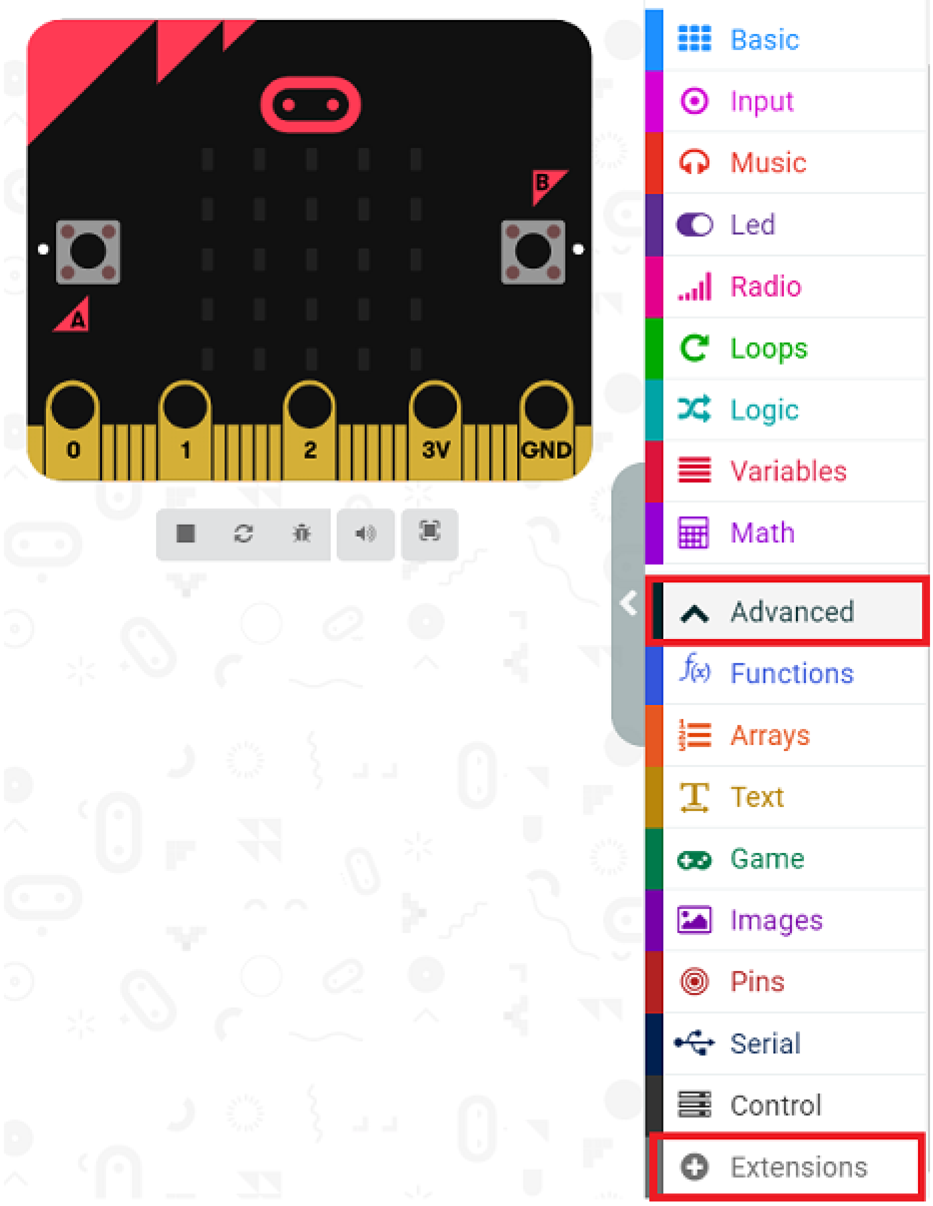
- 1 x TPBot

5.3. Software

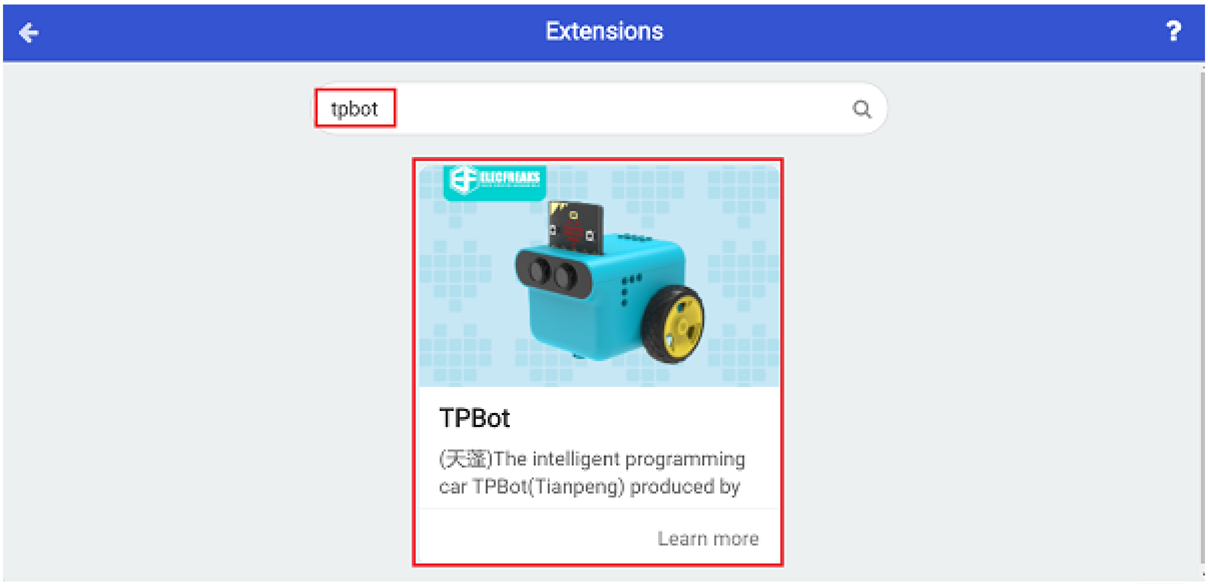
MicroSoftmakecode

5.4. Programming

- Click “Advanced” to see more choices in the MakeCode drawer.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.



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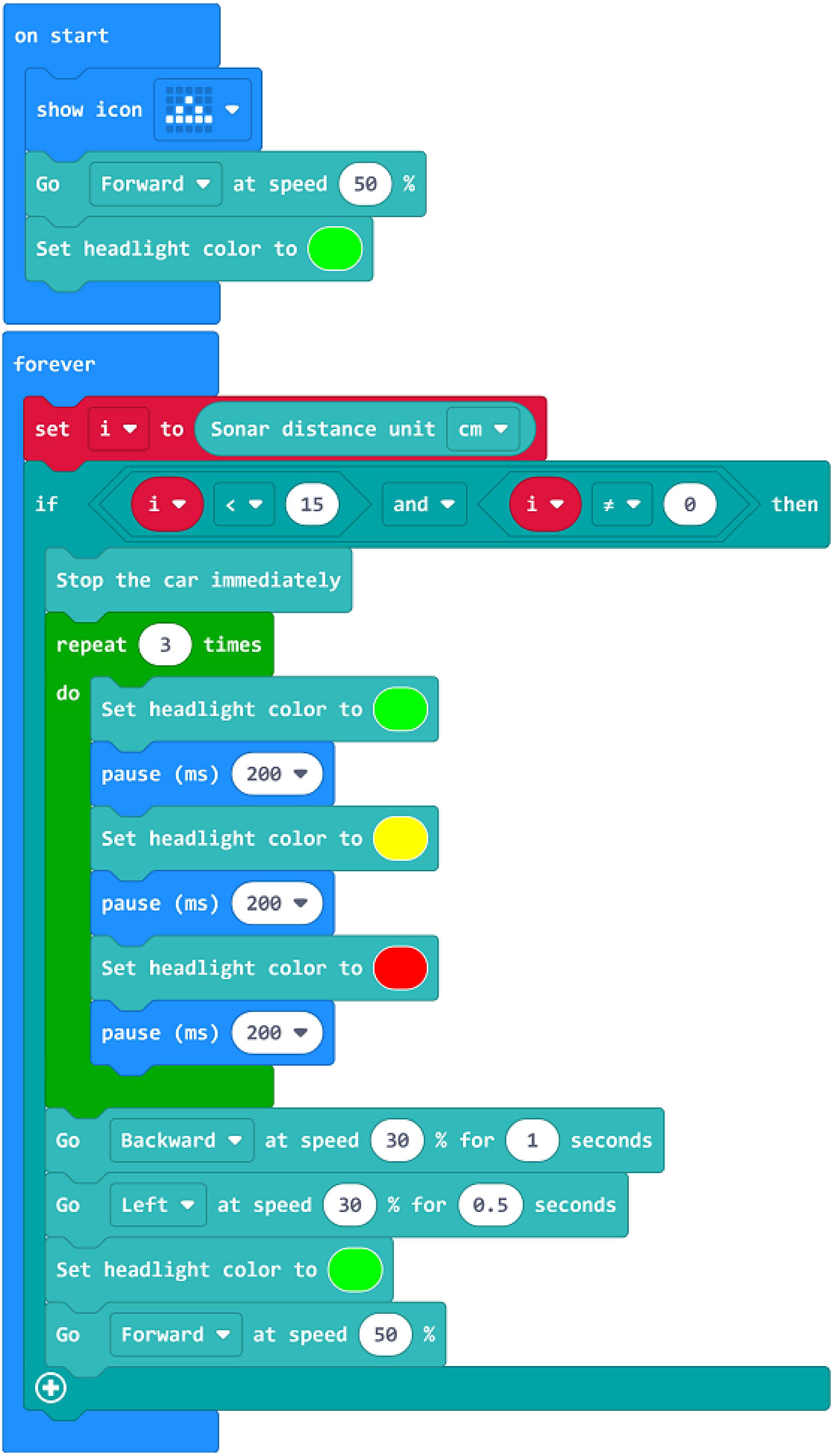
##Sample

- Set a triangle in the micro:bit and the TPBot moving forward at the speed of 50%; Set the LED headlights in green.
- Save the variable of the distance from the TPBot to the obstacle in the forever brick, judge if the items of `i<15` and `i≠0` are both true, if yes, set TPBot stopping immediately and the headlights flashing three times; set it reversing for 1 second at the speed of 30% and then turning left for 0.5 second at the speed of 30%; finally set the headlights showing green and the TPBot moving forward at the speed of 50%.



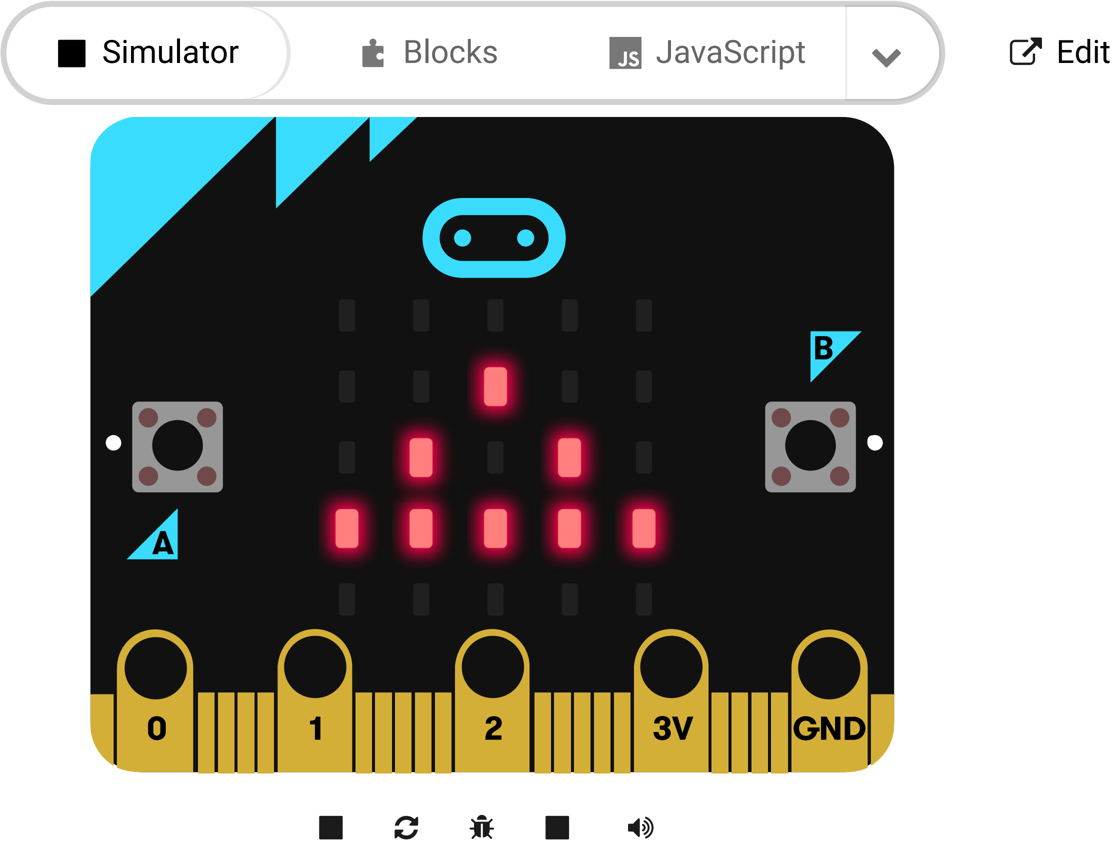
```
on start
    show icon
    Go Forward at speed 50 %
    Set headlight color to 🟩

forever
    set i to Sonar distance unit cm
    if i < 15 and i ≠ 0 then
        Stop the car immediately
        repeat 3 times
        do
            Set headlight color to 🟩
            pause (ms) 200
            Set headlight color to 🟨
            pause (ms) 200
            Set headlight color to 🟥
            pause (ms) 200
        Go Backward at speed 30 % for 1 seconds
        Go Left at speed 30 % for 0.5 seconds
        Set headlight color to 🟩
        Go Forward at speed 50 %
    ⊕
```

Link

- Link: https://makecode.microbit.org/_9A0XzETTzA54

- You may also download it directly below:



5.5. Conclusion

- Power up the TPBot to move forward and it stops immediately with the headlights flashing three times if an obstacle was detected, then it reverses and turns left to keep moving forward with the headlights in green.

5.6. Exploration

5.7. FAQ

Q: The car does not work with the code in the wiki.
A: It should be the batteries that are lack of power, please try to fix it by adding the value of the speed in the code.

5.8. Relevant File

6. Case 05: Automatic Lamp

6.1. Purpose

- Programme to turn on the lights automatically in the darkness.

6.2. Material

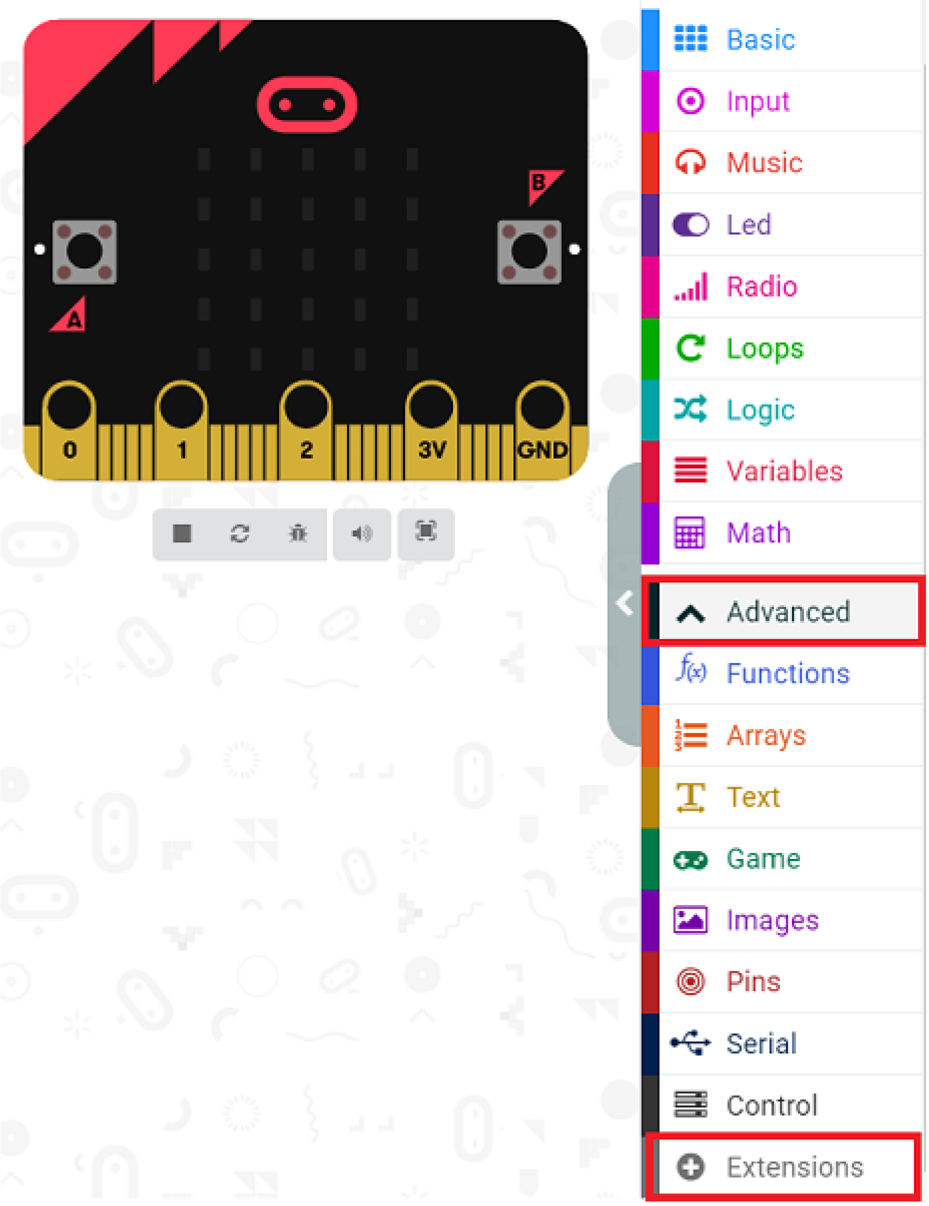
- 1 x TPBot

6.3. Software

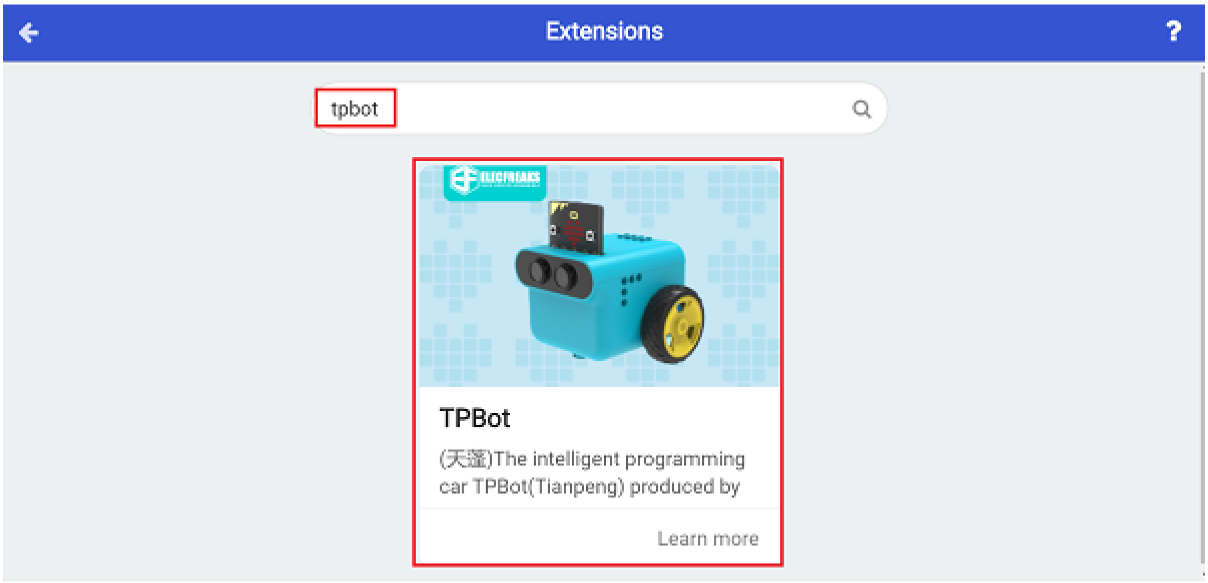
MicroSoftmakecode

6.4. Programming

- Click “Advanced” to see more choices in the MakeCode drawer.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.


Extensions
?
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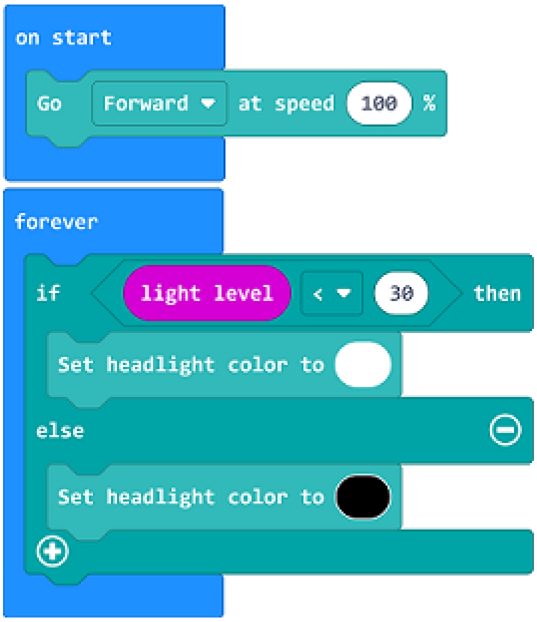
##Sample

- Set to move forward at the speed of 100%.

- Judge if the current light intensity is below the set point, if yes, set the headlights in white; or in black.

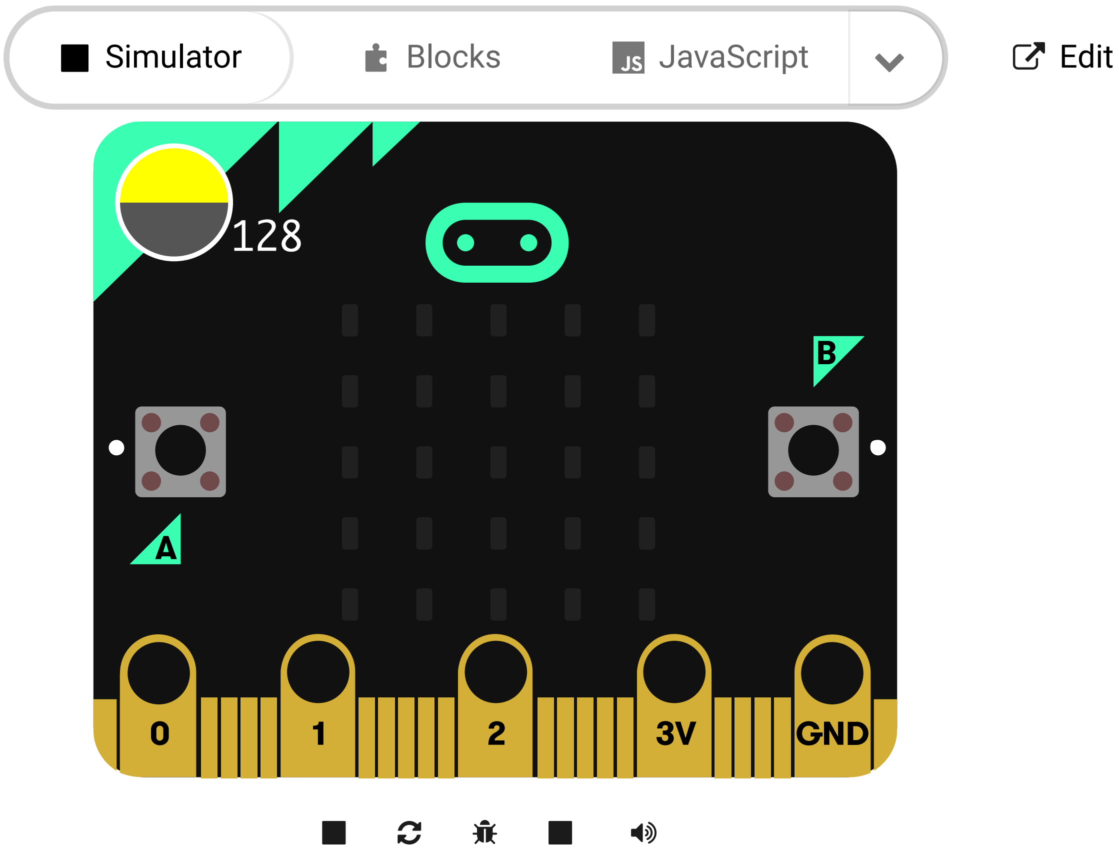


```
on start
    Go Forward ▾ at speed 100 %

forever
    if light level < ▾ 30 then
        Set headlight color to ○
    else
        Set headlight color to ●
```

Link

- Link: https://makecode.microbit.org/_4Wm85b3K4ikU
- You may also download it directly below:



6.5. Conclusion

- Power up to set the TPBot driving forward and turning on/off the headlights automatically while it goes into the dark/bright area.

6.6. Exploration

6.7. FAQ

6.8. Relevant File

7. Case 06: Drive at Random

7.1. Purpose

- Programme to set the TPBot driving at random.

7.2. Material

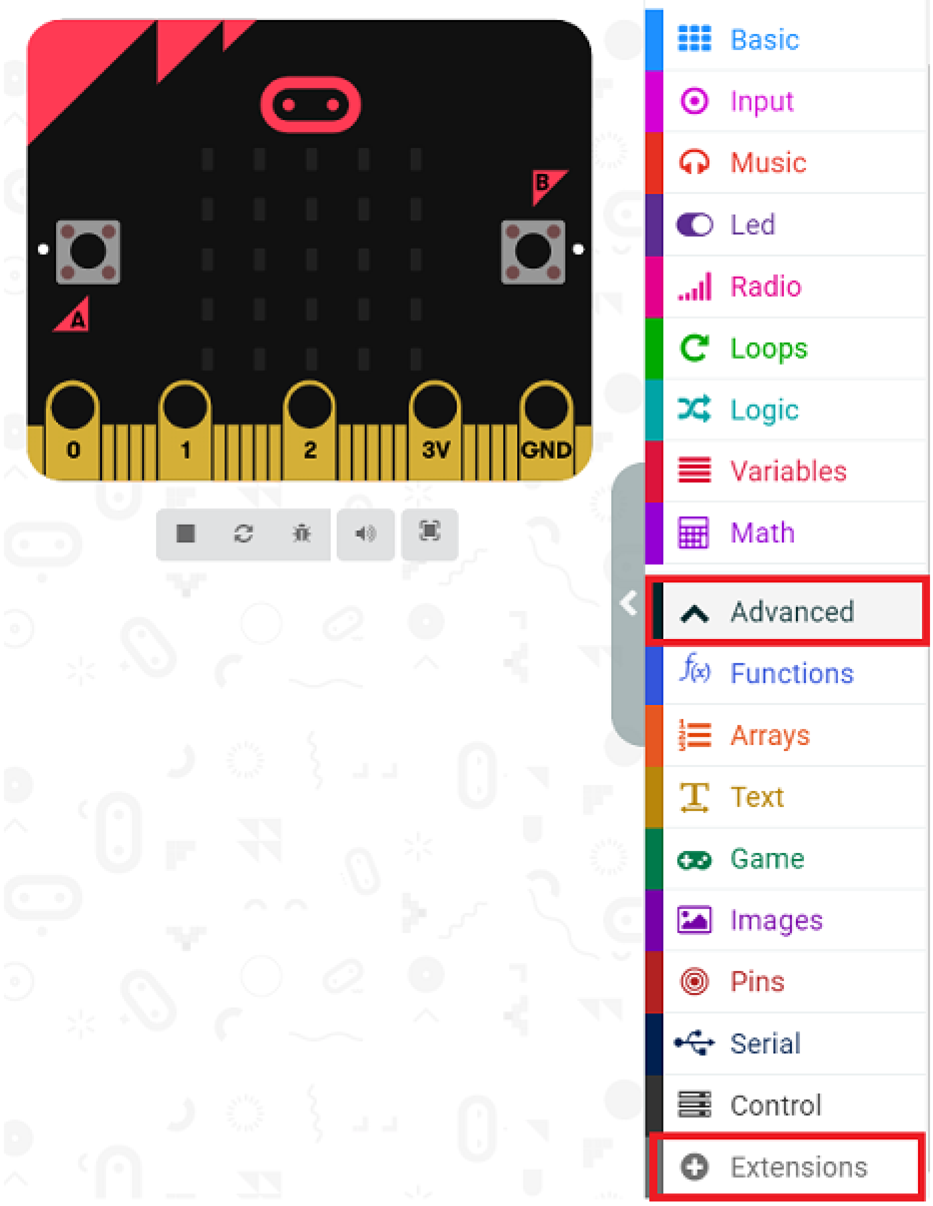
- 1 x TPBot

7.3. Software

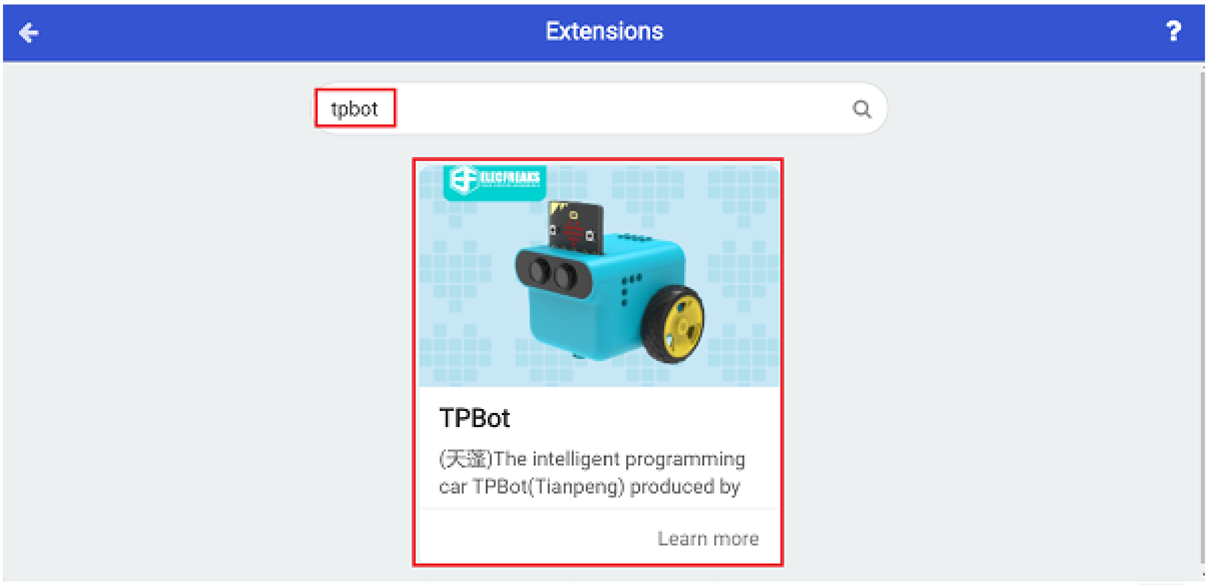
MicroSoftmakecode

7.4. Programming

- Click “Advanced” to see more choices in the MakeCode drawer.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.



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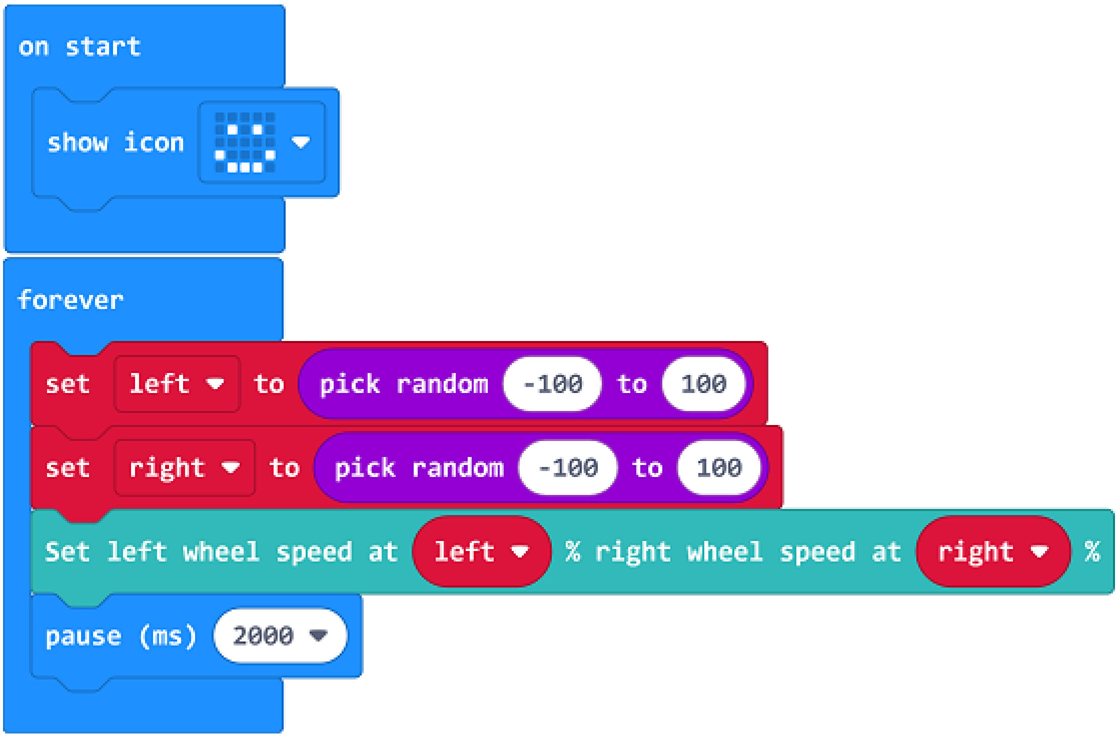
##Sample

- Set a smile face on the micro:bit.

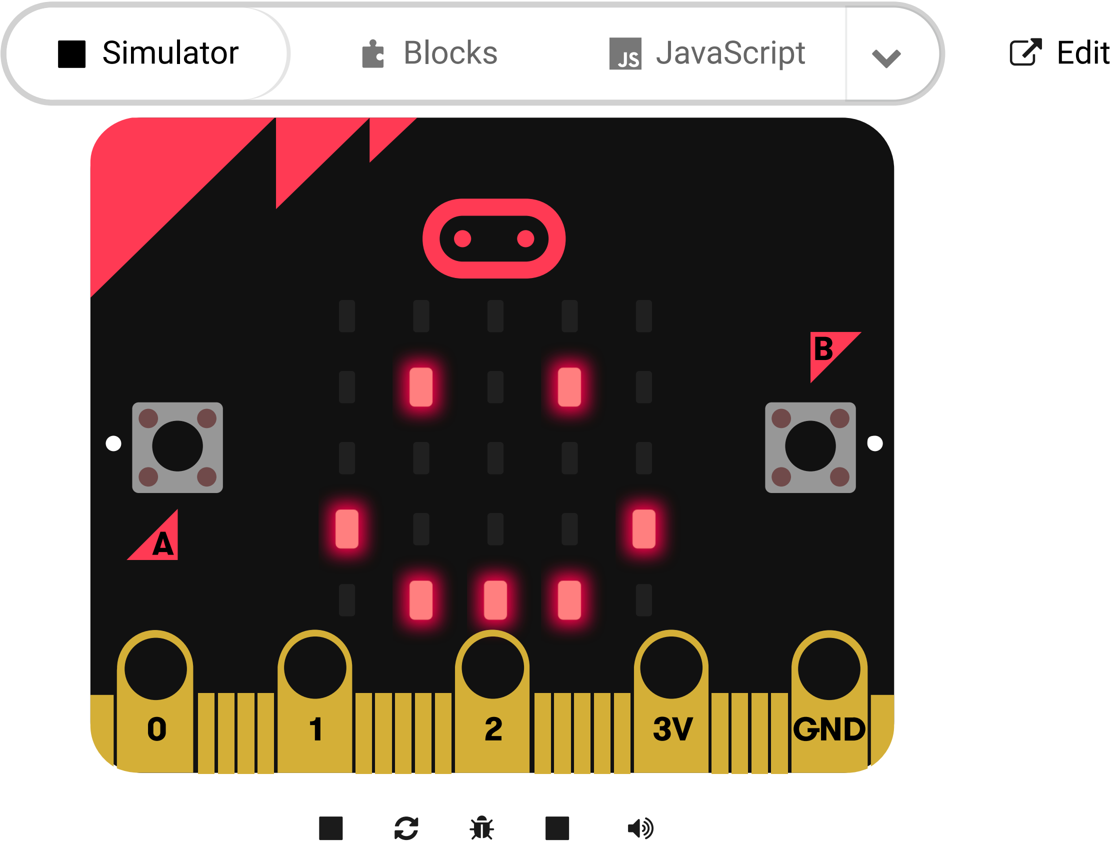
- Set the speed of the left and the right wheel at a random value between -100~100 and pause 2 seconds.



```
on start
    show icon
forever
    set left to pick random -100 to 100
    set right to pick random -100 to 100
    Set left wheel speed at left % right wheel speed at right %
    pause (ms) 2000
```

Link

- Link: https://makecode.microbit.org/_PHzL9LUCL4cv
- You may also download it directly below:



7.5. Conclusion

- The micro:bit shows a smile face and the speed of both wheels changes every two seconds at random.

7.6. Exploration

7.7. FAQ

7.8. Relevant File

8. Case 07: Here Comes the Police

8.1. Purpose

- Programme to let the TPBot be a “police car”.

8.2. Material

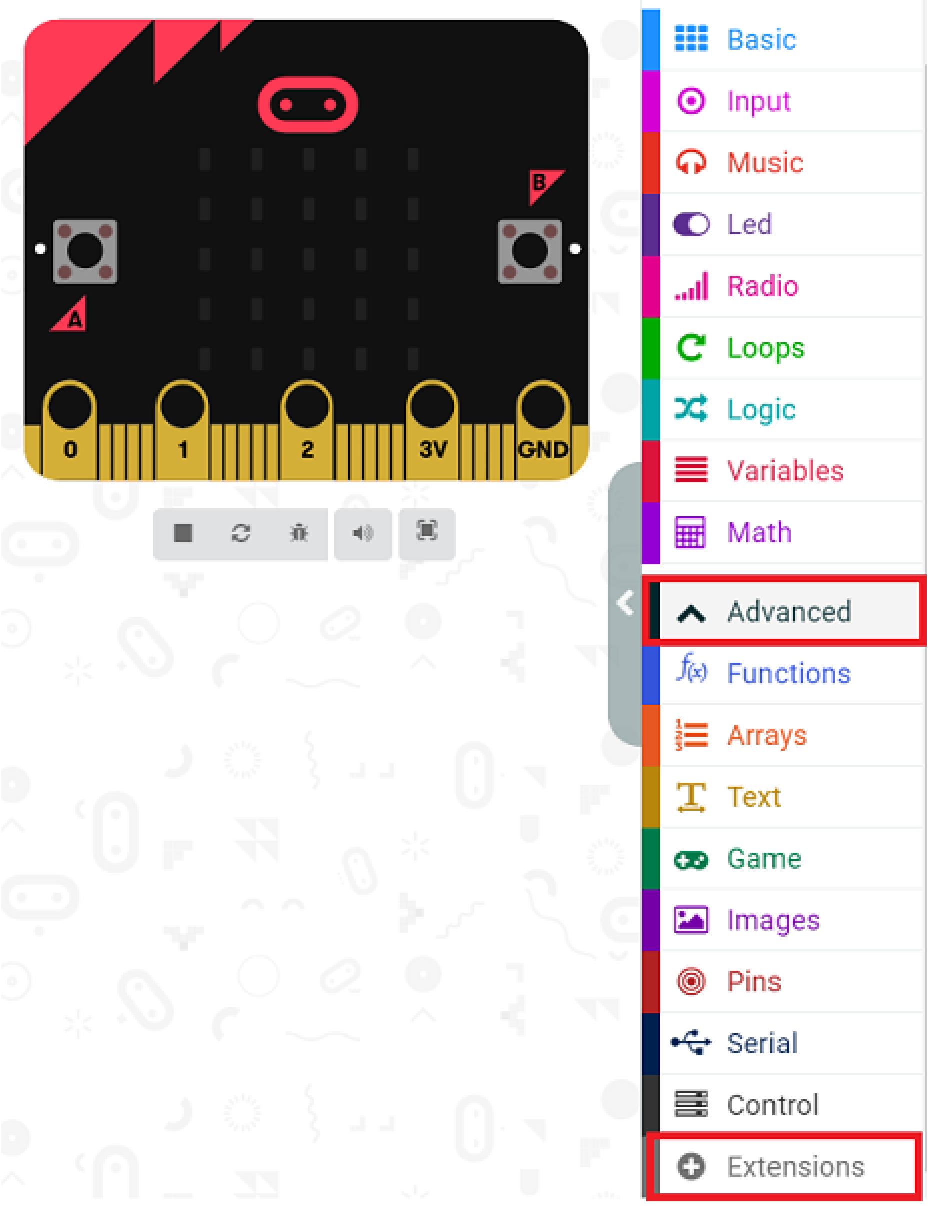
- 1 x TPBot

8.3. Software

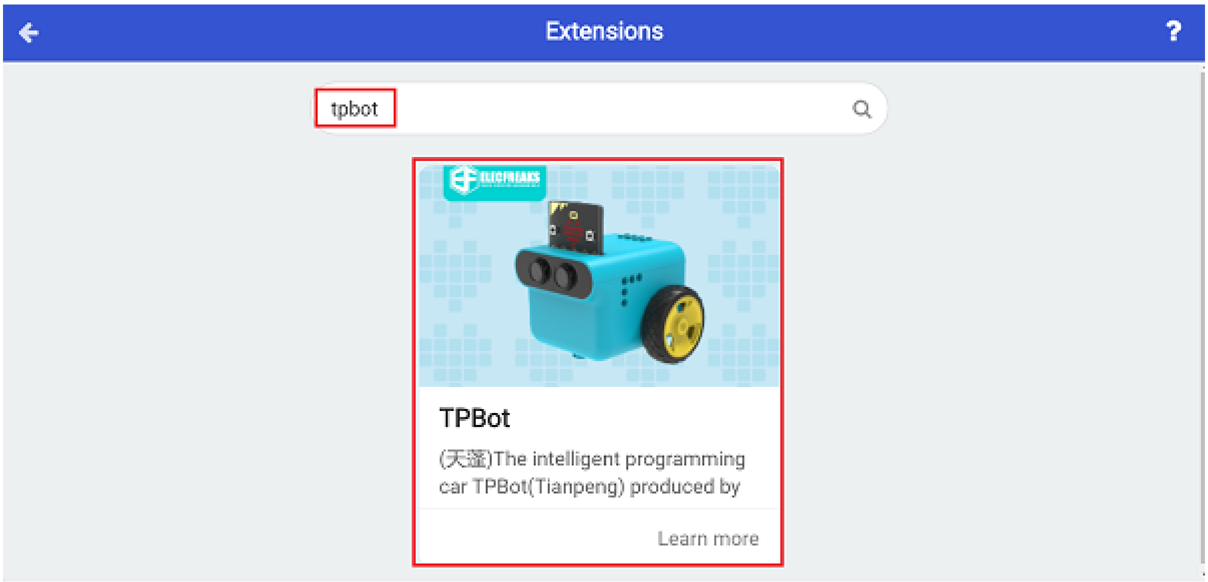
MicroSoftmakecode

8.4. Programming

- Click “Advanced” to see more choices in the MakeCode drawer.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.



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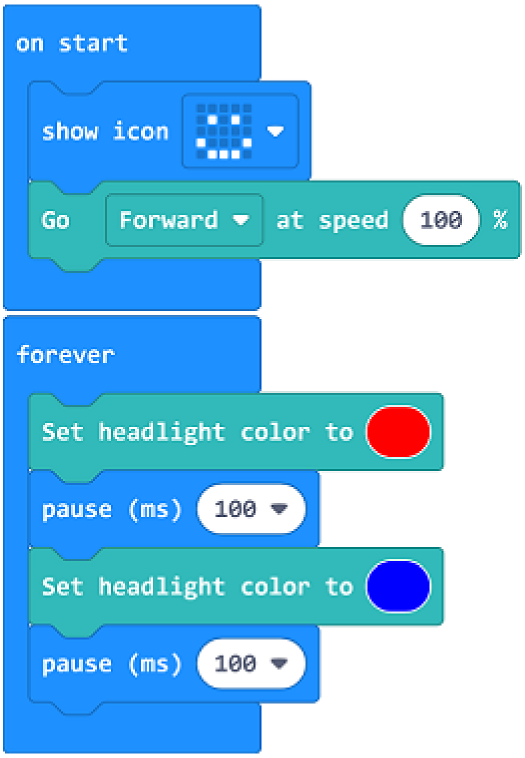
##Sample

- Set a smile face on the micro:bit and set it moving forward at the speed of 100%.

- Set the headlights in red and pause for 100ms in the forever brick; then set them in blue and pause for 100ms.

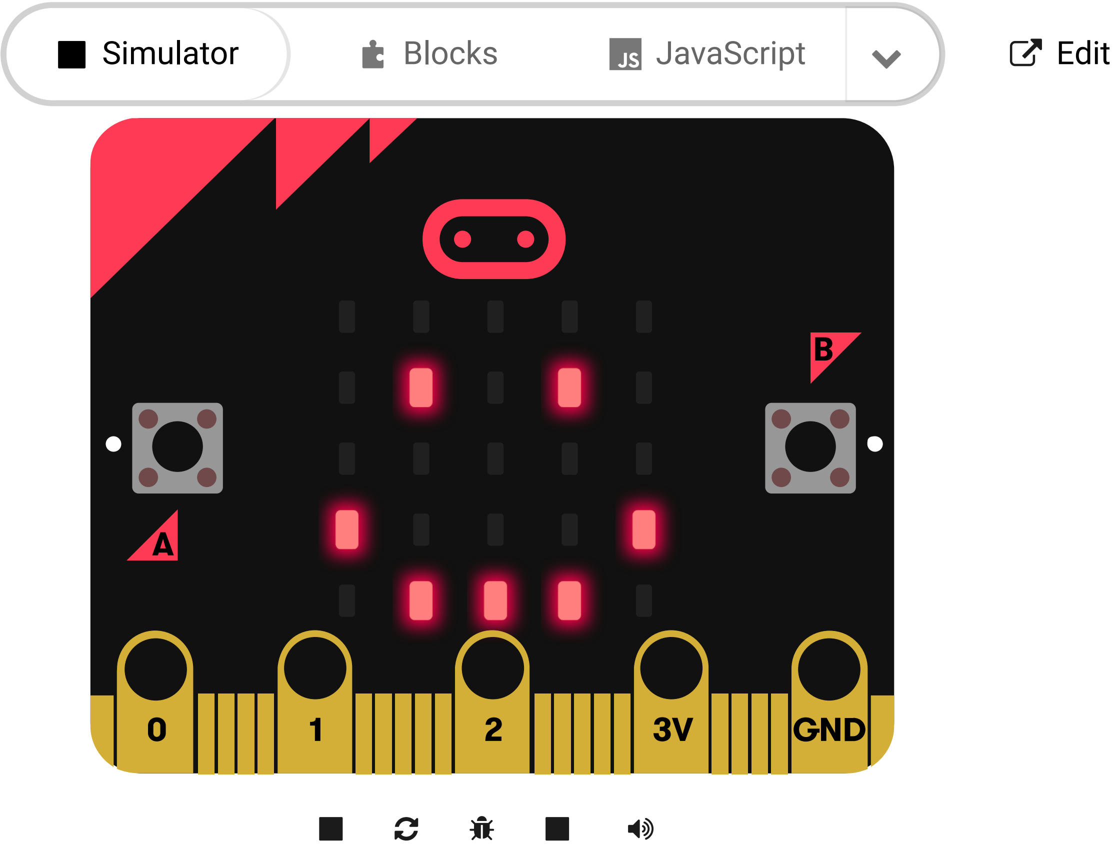


```
on start
  show icon [▼]
  Go Forward ▼ at speed 100 %

forever
  Set headlight color to 🟥
  pause (ms) 100 ▼
  Set headlight color to 🟦
  pause (ms) 100 ▼
```

Link

- Link: https://makecode.microbit.org/_6AT0J1Yx99rm
- You may also download it directly below:



8.5. Conclusion

- Power up to set the TPBot driving forward with the headlights alternating showing red and bule.

8.6. Exploration

8.7. FAQ

8.8. Relevant File

9. Case 08: Parking at A Set Point

9.1. Purpose

- Programme to set the TPBot parking at a set point.

9.2. Material

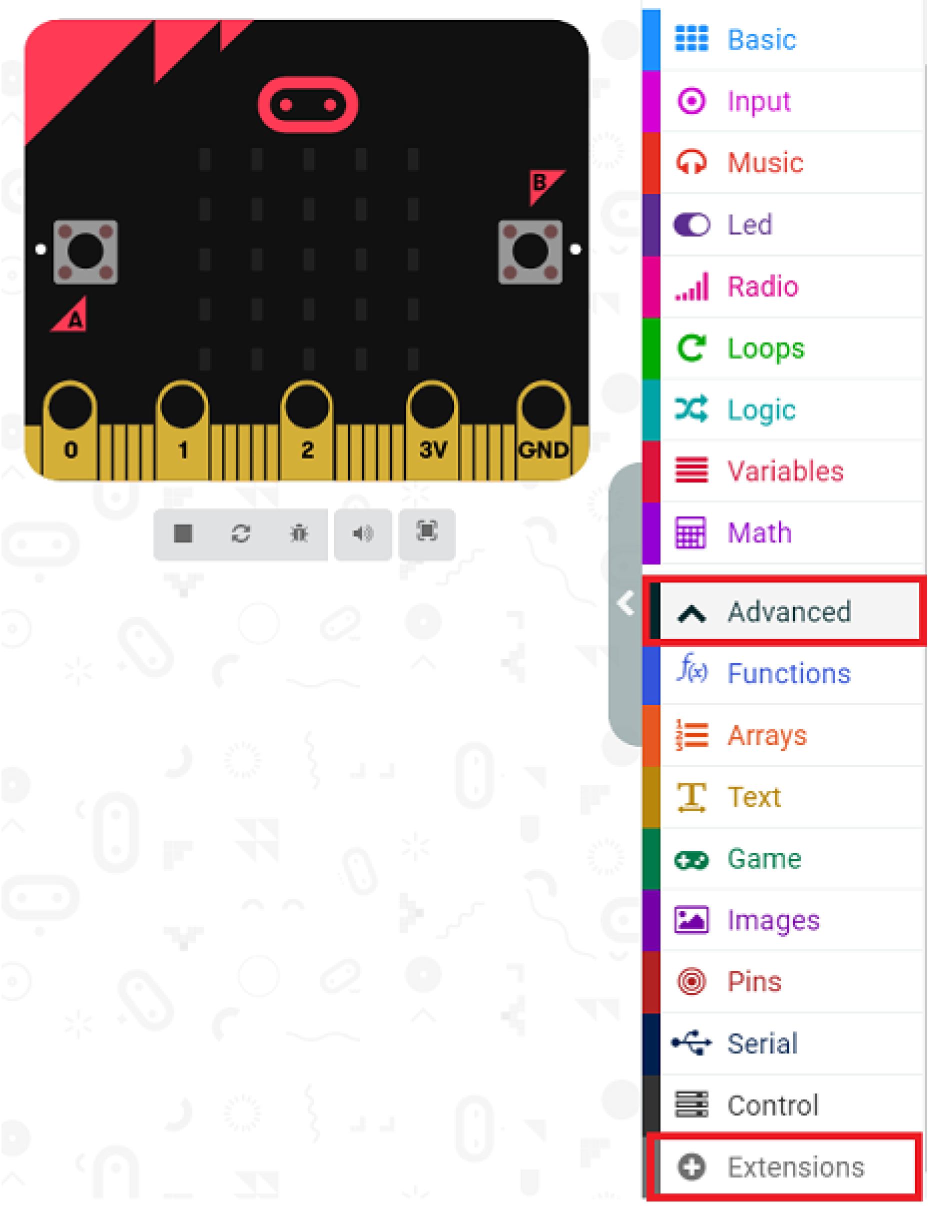
- 1 x TPBot

9.3. Software

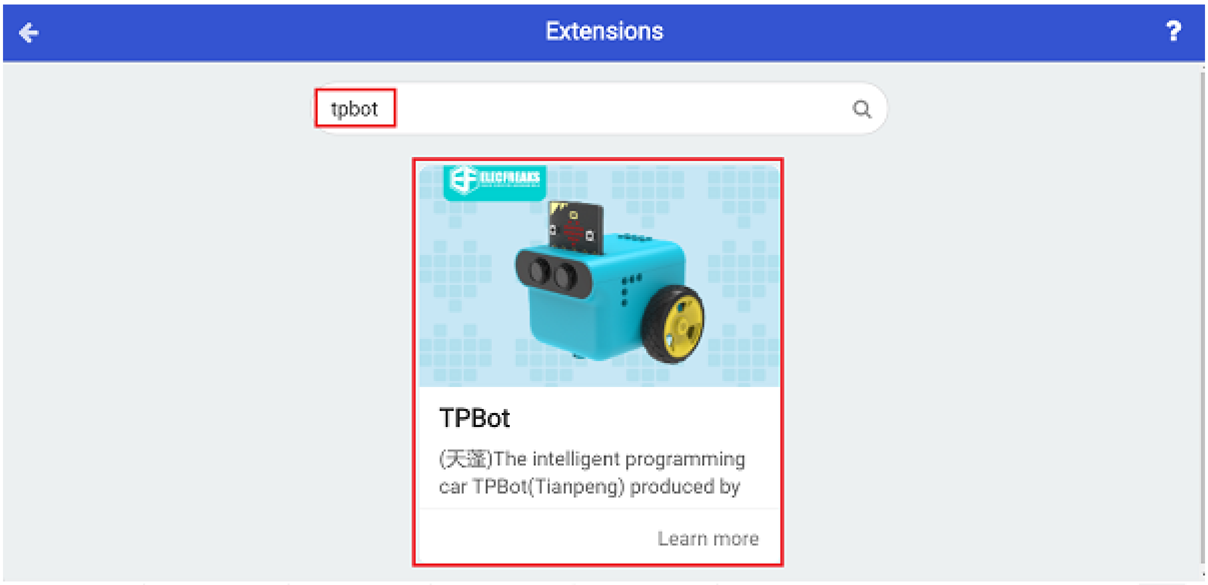
MicroSoftmakecode

9.4. Programming

- Click “Advanced” to see more choices in the MakeCode drawer.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.



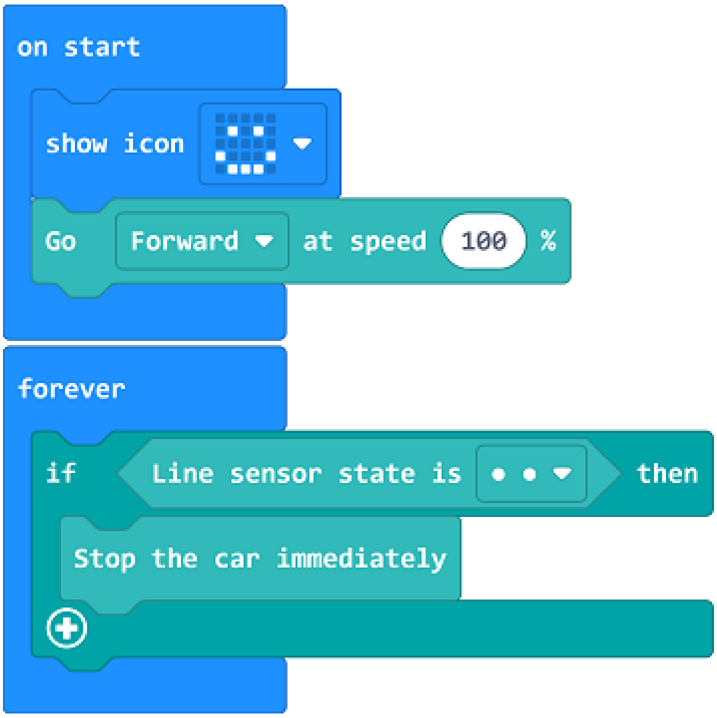
TPBot

(天蓬)The intelligent programming car TPBot(Tianpeng) produced by

##Sample

- Set the icon on the micro:bit display and set it moving forward at the speed of 50%.

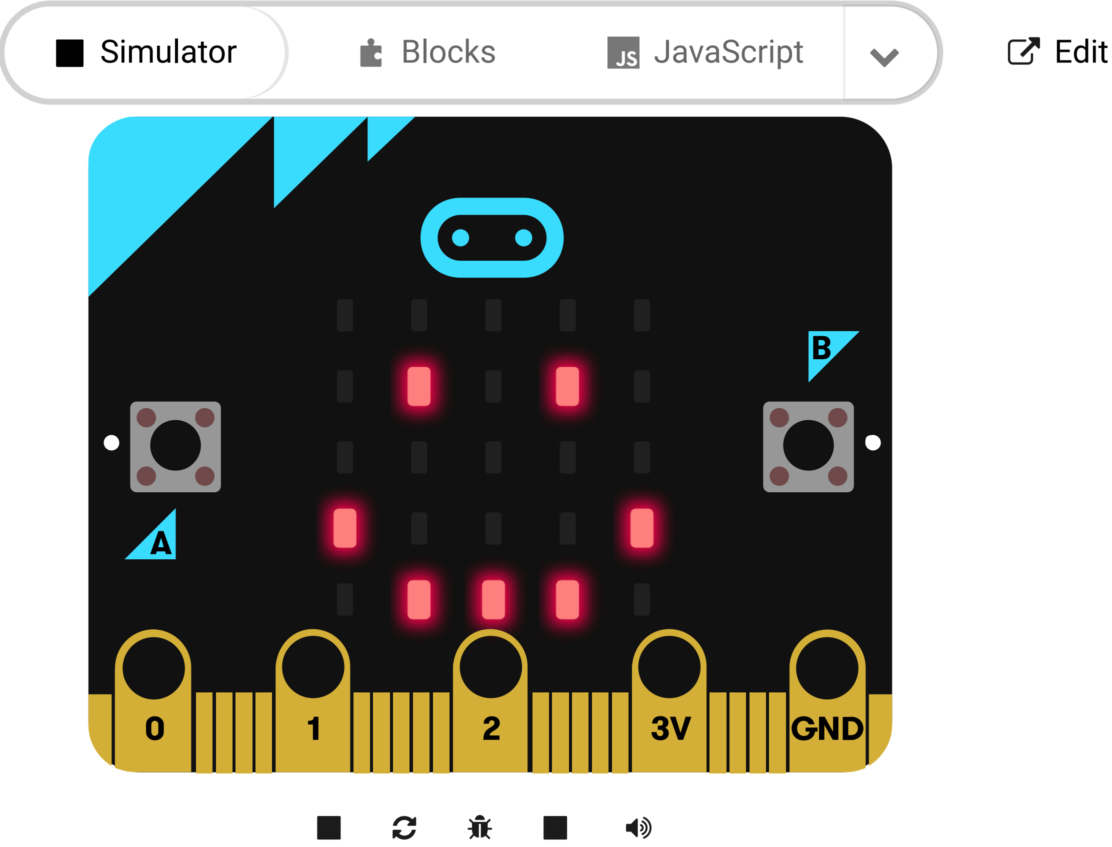
- Judge the status of the line-tracking sensors in the forever brick, if both of them detect the black line, set the car to stop immediately.



```
on start
    show icon
    Go Forward at speed 100 %
forever
    if Line sensor state is ● ● then
        Stop the car immediately
```

Link

- Link: https://makecode.microbit.org/_Jda4MkM8gCsf
- You may also download it directly below:



9.5. Conclusion

- Power up to show a set icon on the micro:bit and the TPBot moves forward and doesn't stop until the black line is detected by both sensors.

9.6. Exploration

9.7. FAQ

9.8. Relevant File

10. Case 09: Seeking light

10.1. Purpose

- Programme to set the TPBot heading to the light.

10.2. Material

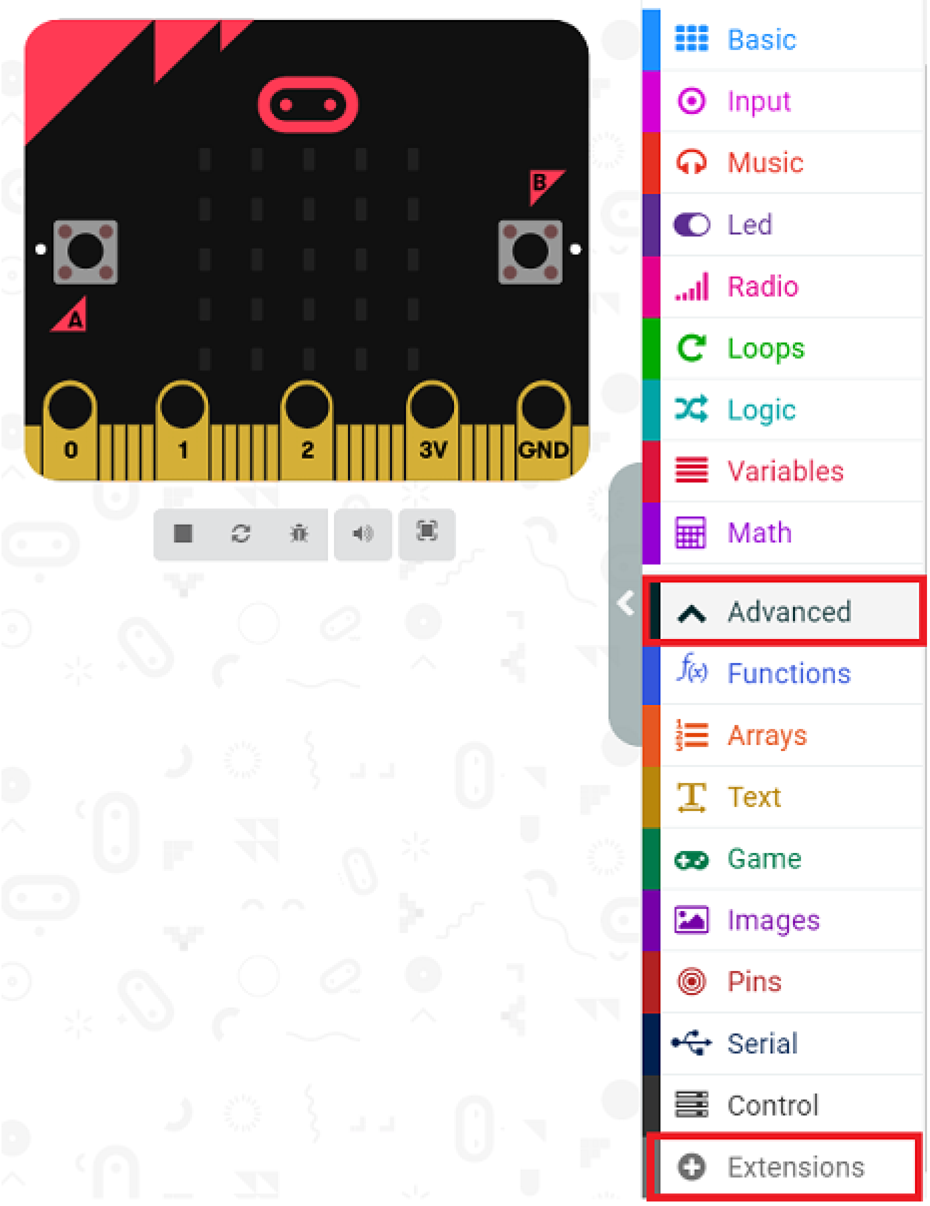
- 1 x TPBot

10.3. Software

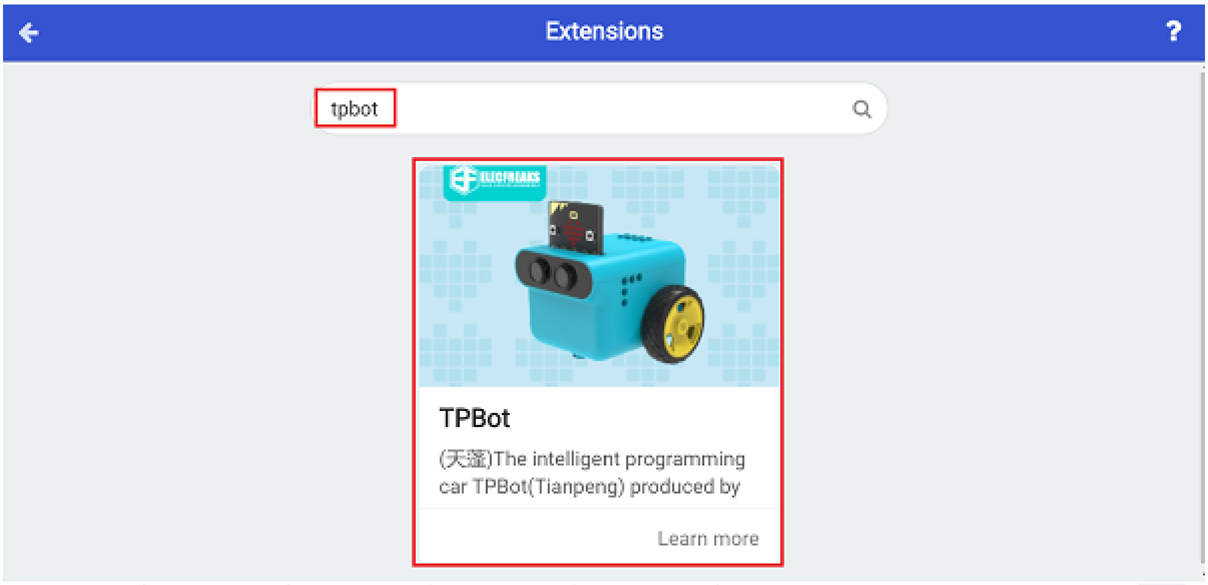
MicroSoftmakecode

10.4. Programming

- Click “Advanced” to see more choices in the MakeCode drawer.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.

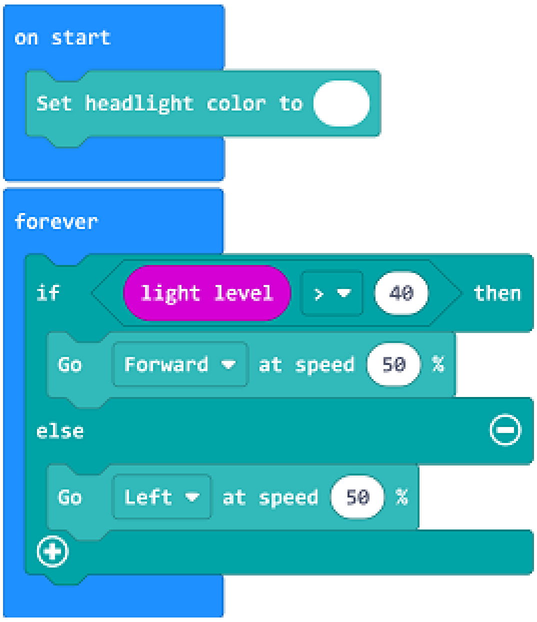


(天蓬)The intelligent programming car TPBot(Tianpeng) produced by

##Sample

- Set the headlights in white in the on start brick.

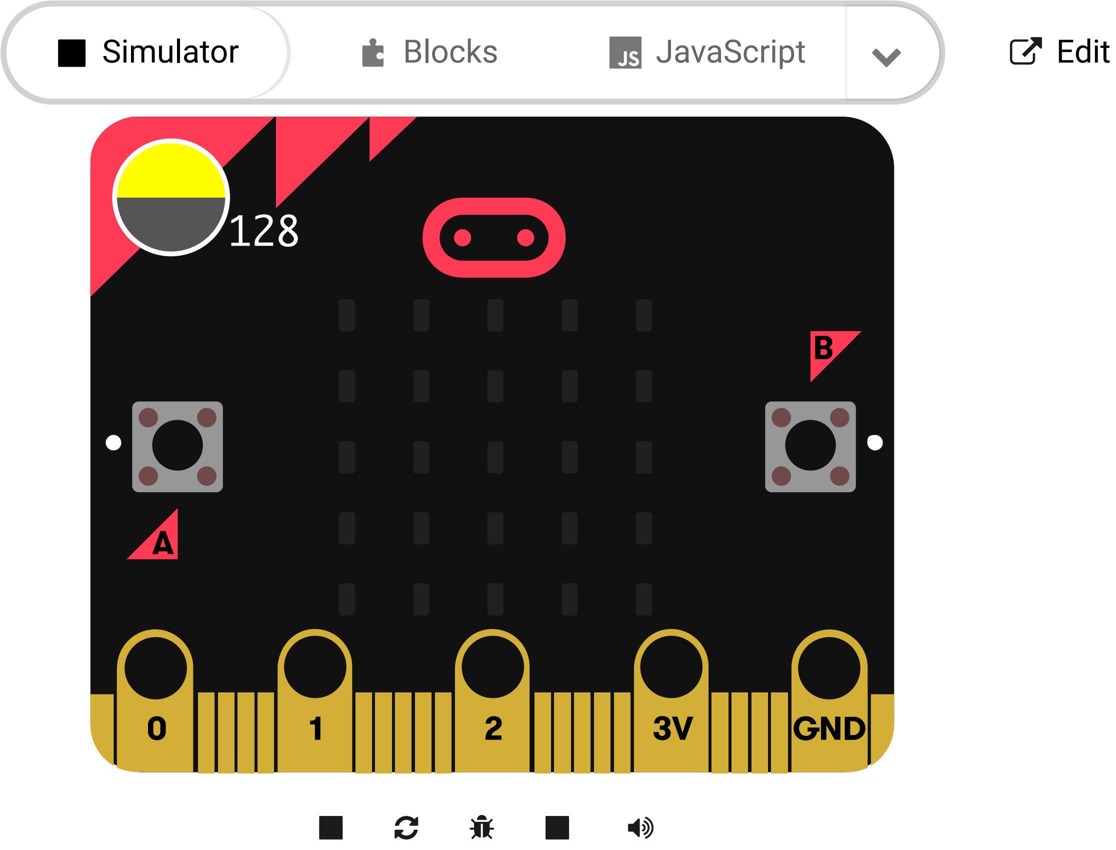
- Judge if the light intensity is over the set point in the forever brick, if yes, set the TPBot moving forward; or it goes around in circles.



```
on start
    Set headlight color to ○
forever
    if light level > 40 then
        Go Forward at speed 50 %
    else
        Go Left at speed 50 %
```

Link

- Link: https://makecode.microbit.org/_by81v67kf8Ef
- You may also download it directly below:



10.5. Conclusion

- Power up to set the TPBot going around in circles or moving forward if the detected light intensity is over the set point.

10.6. Exploration

10.7. FAQ

Q: The car does not work with the code in the wiki.
A: It should be the batteries that are lack of power, please try to fix it by adding the value of the speed in the code.

10.8. Relevant File

11. Case 10: Fall-arrest TPBot

11.1. Purpose

- Stick a black gummed paper to the edges of the table, programme to set the TPBot reversing if the black was detected and then it keeps moving forward.

11.2. Material

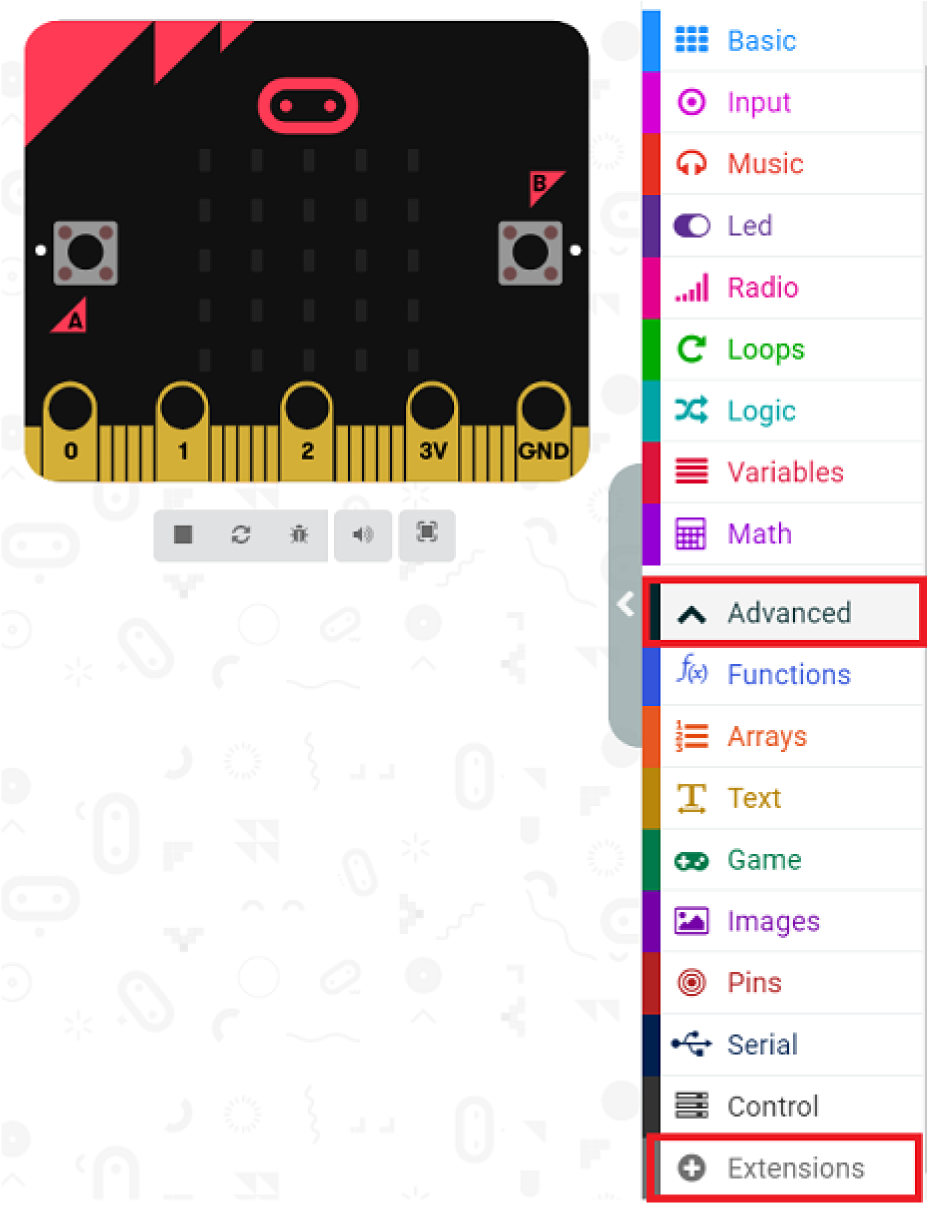
- 1 x TPBot

11.3. Software

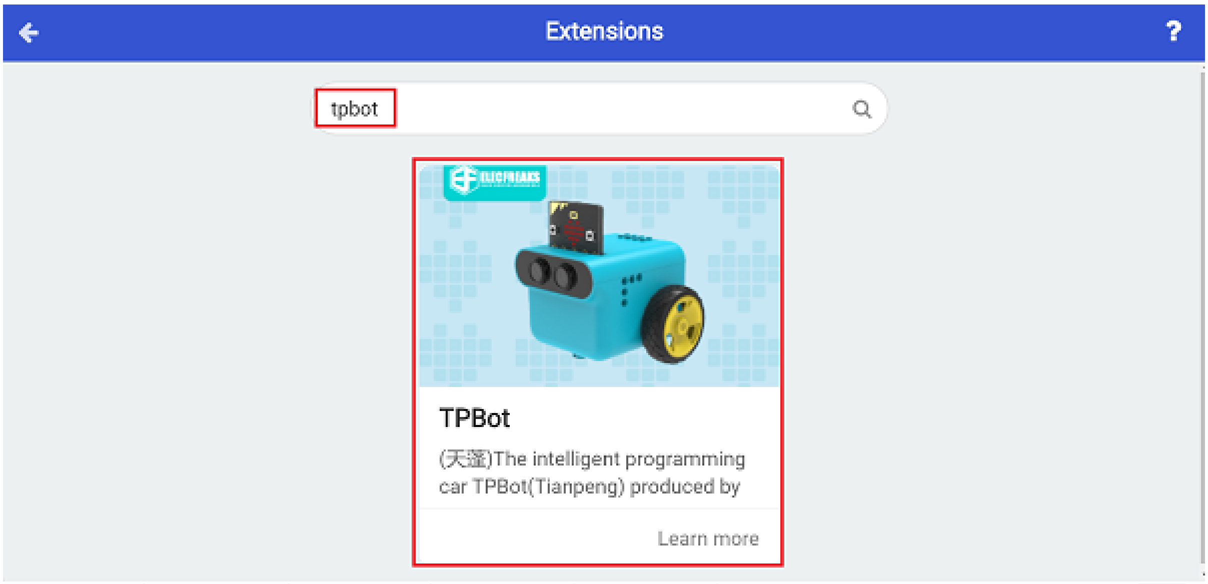
MicroSoftmakecode

11.4. Programming

- Click “Advanced” to see more choices in the MakeCode drawer.



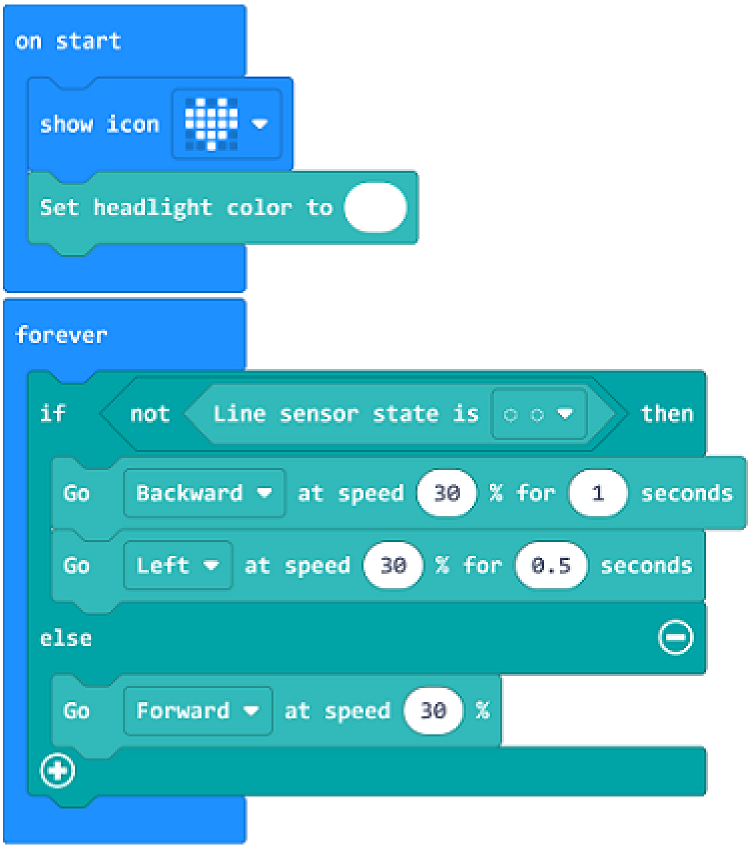
- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.



(天蓬)The intelligent programming car TPBot(Tianpeng) produced by

##Sample

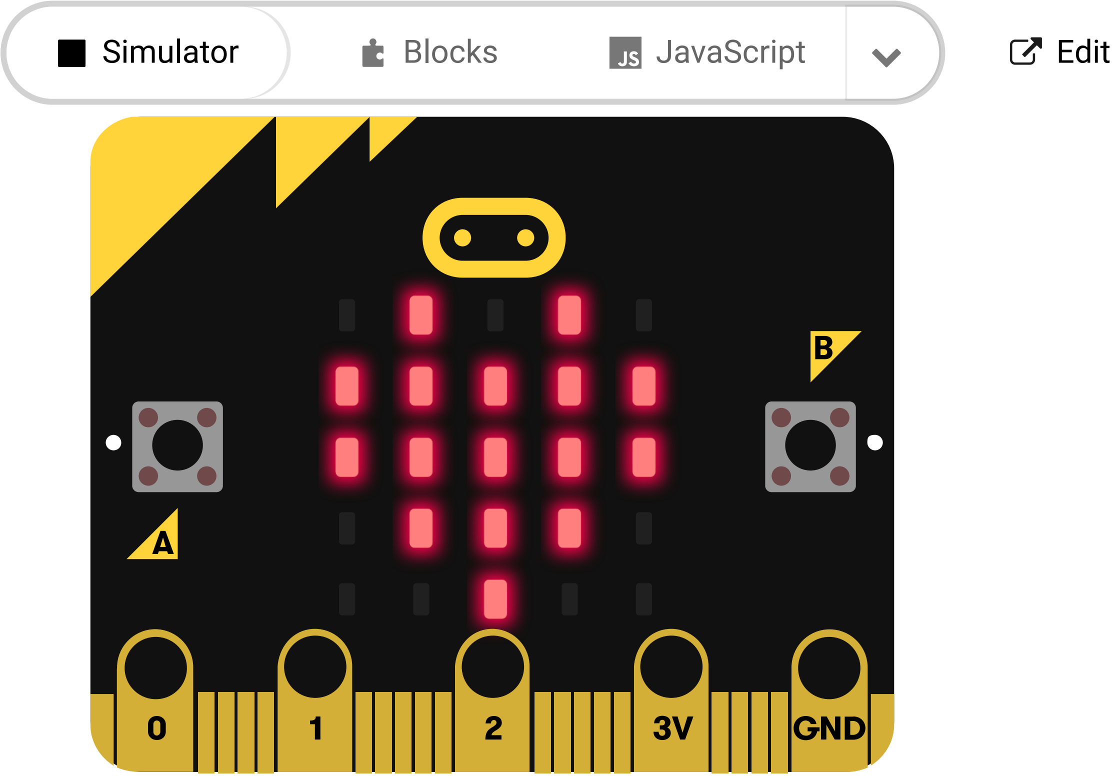
- Set an icon on the micro:bit display and the headlights in white.
- Judge if the black line was detected in the forever brick, if yes, set the TPBot reversing for one second at the speed of 30% and then turning left for 0.5 second at the same speed; or it moves forward at the speed of 30%.



```
on start
    show icon
    Set headlight color to
forever
    if not Line sensor state is ○ ○ then
        Go Backward at speed 30 % for 1 seconds
        Go Left at speed 30 % for 0.5 seconds
    else
        Go Forward at speed 30 %
```

Link

- Link: https://makecode.microbit.org/_dtPhXL3XxTJC
- You may also download it directly below:



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11.5. Conclusion

- Power up to show an icon on the micro:bit display and set the TPBot moving forward with headlights in white. If the black line was detected, it reverses and then turns left to keep moving.

11.6. Exploration

11.7. FAQ

Q: The car does not work with the code in the wiki.
A: It should be the batteries that are lack of power, please try to fix it by adding the value of the speed in the code.

11.8. Relevant File

12. Case 11: Following with A Fixed Distance

12.1. Purpose

- Programme to set the TPBot following another car with a fixed distance.

12.2. Material

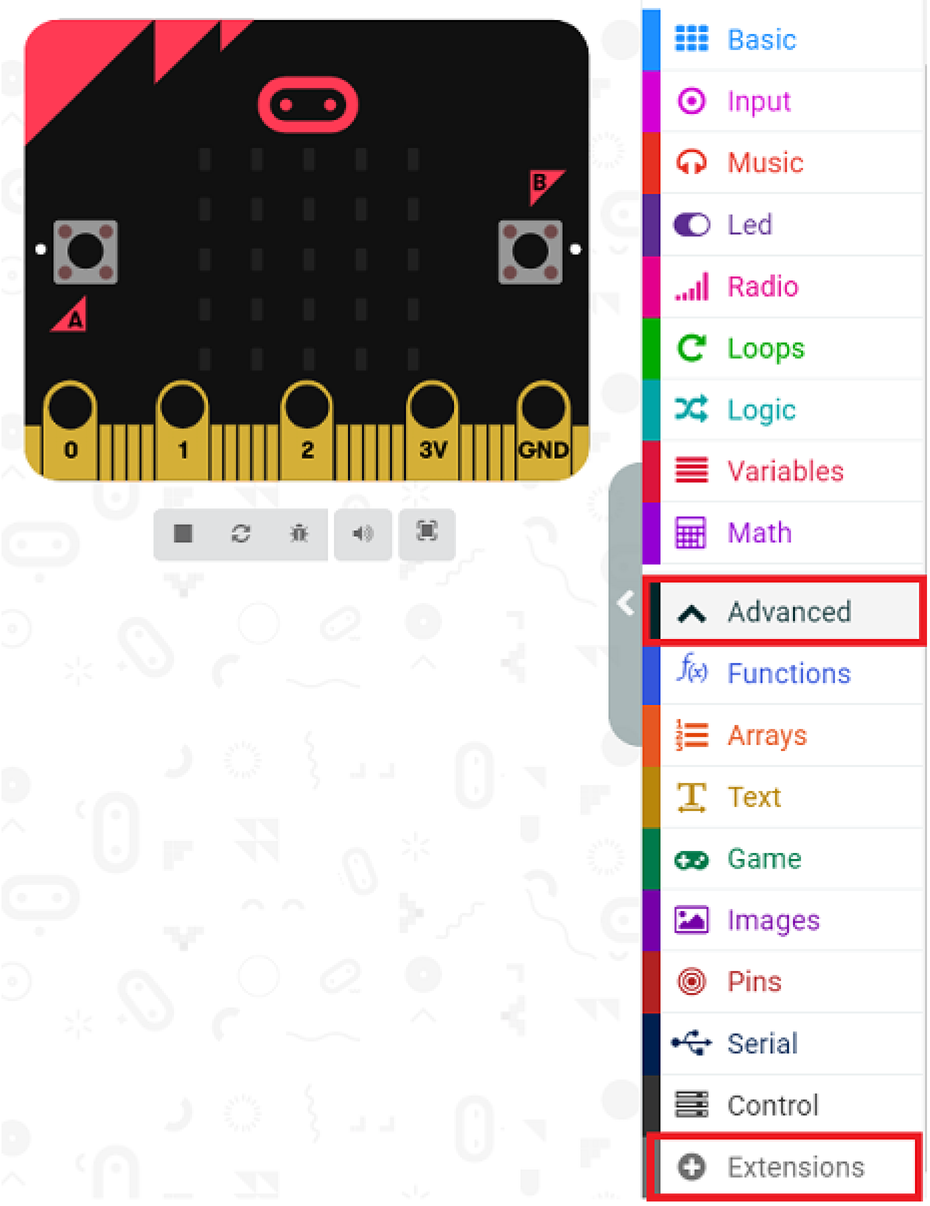
- 1 x TPBot

12.3. Software

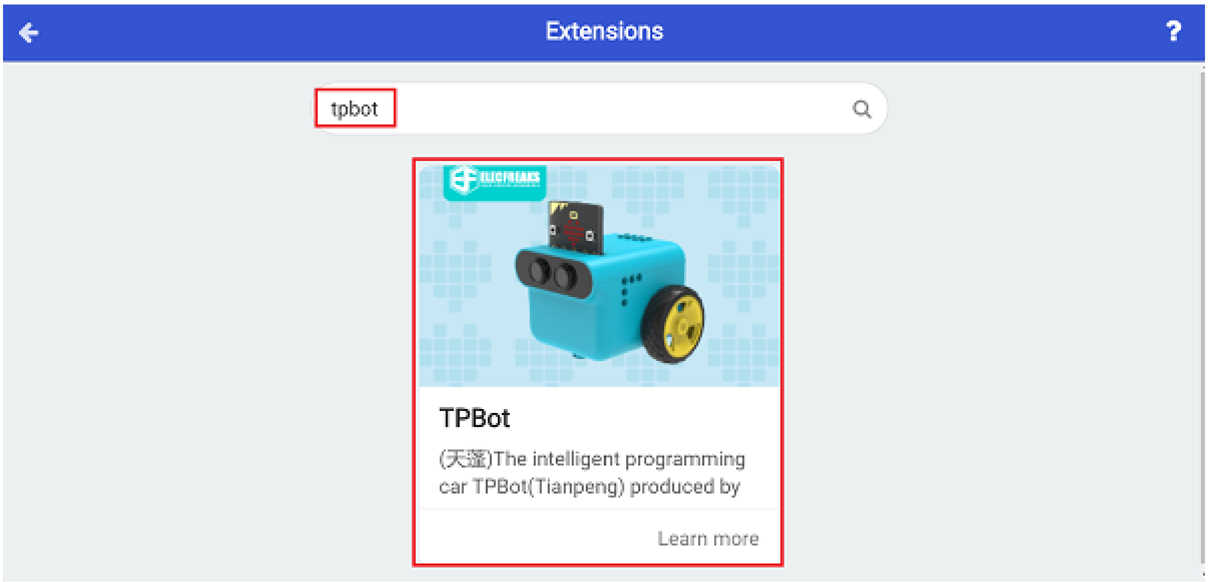
MicroSoftmakecode

12.4. Programming

- Click "Advanced" to see more choices in the MakeCode drawer.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.



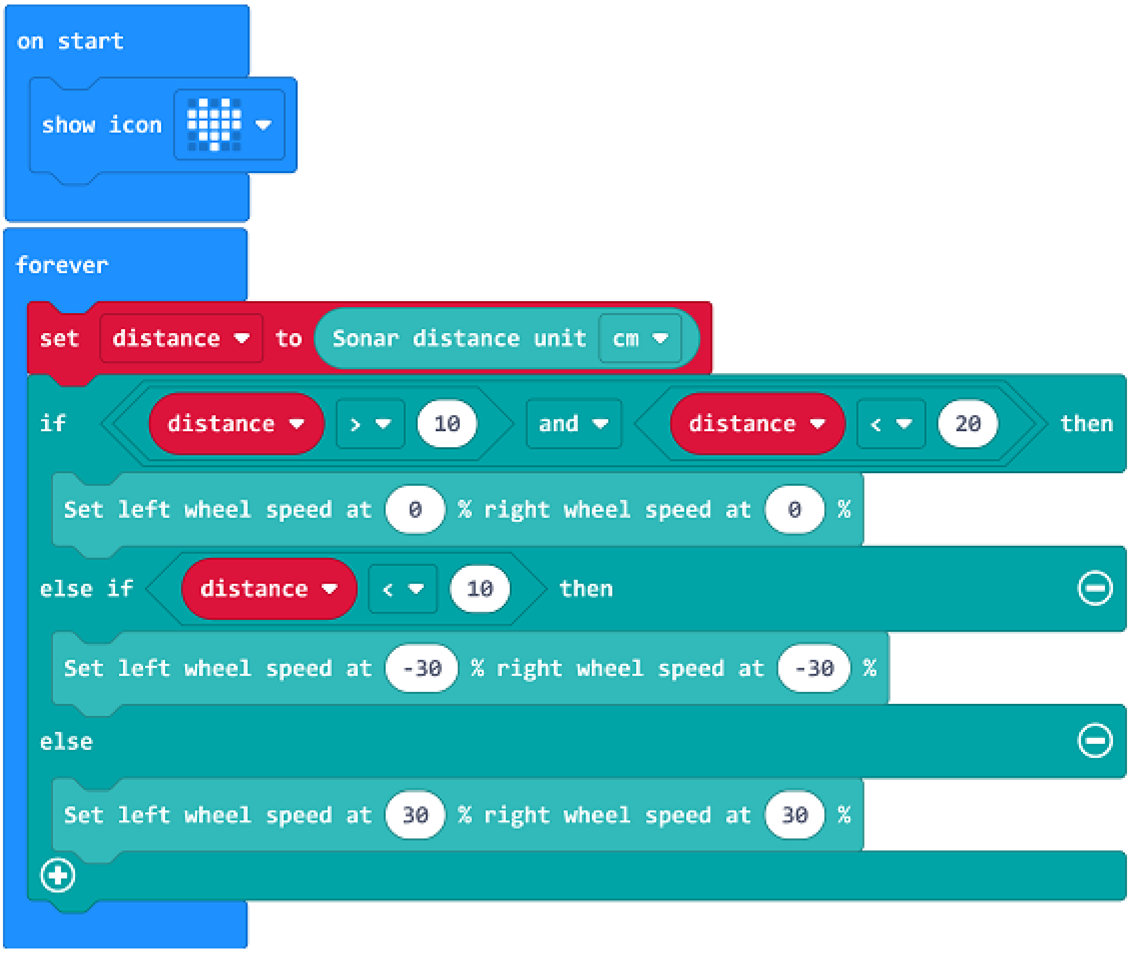
TPBot

(天蓬)The intelligent programming car TPBot(Tianpeng) produced by

##Sample

- Set an icon on the micro:bit display.

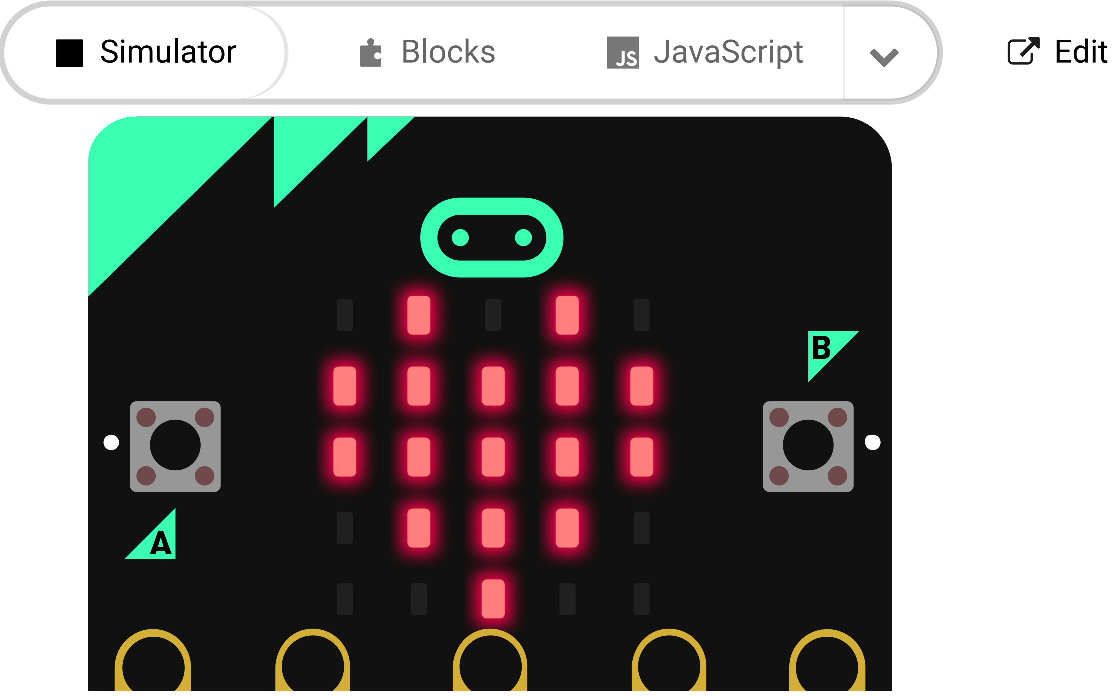
- Save the variable as the distance detected from the TPBot to its front car in the forever brick, judge if the the distance is between 10 and 20(exl. 10&20), if yes, set the speed of both wheels in 0; if the distance is below 10, set the speed of both wheels in -30%; or set the speed both in 30%.

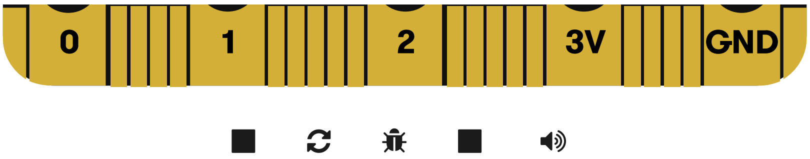


```
on start
    show icon
forever
    set distance to Sonar distance unit cm
    if distance > 10 and distance < 20 then
        Set left wheel speed at 0 % right wheel speed at 0 %
    else if distance < 10 then
        Set left wheel speed at -30 % right wheel speed at -30 %
    else
        Set left wheel speed at 30 % right wheel speed at 30 %
```

Link

- Link: https://makecode.microbit.org/_9ugK1pVyPE8M
- You may also download it directly below:





12.5. Conclusion

Power up to show an icon on the micro:bit display and the TPBot keeps a distance to its front car. It goes slower if the distance detected was close or it goes forward if the distance detected was far; and it stops if the distance detected was between the set interval value.

12.6. Exploration

12.7. FAQ

Q: The car does not work with the code in the wiki.
A: It should be the batteries that are lack of power, please try to fix it by adding the value of the speed in the code.

12.8. Relevant File

13. Case 12: micro:bit Remote Control

13.1. Purpose

- Programme to use the mciro:bit to control the TPBot.

13.2. Material

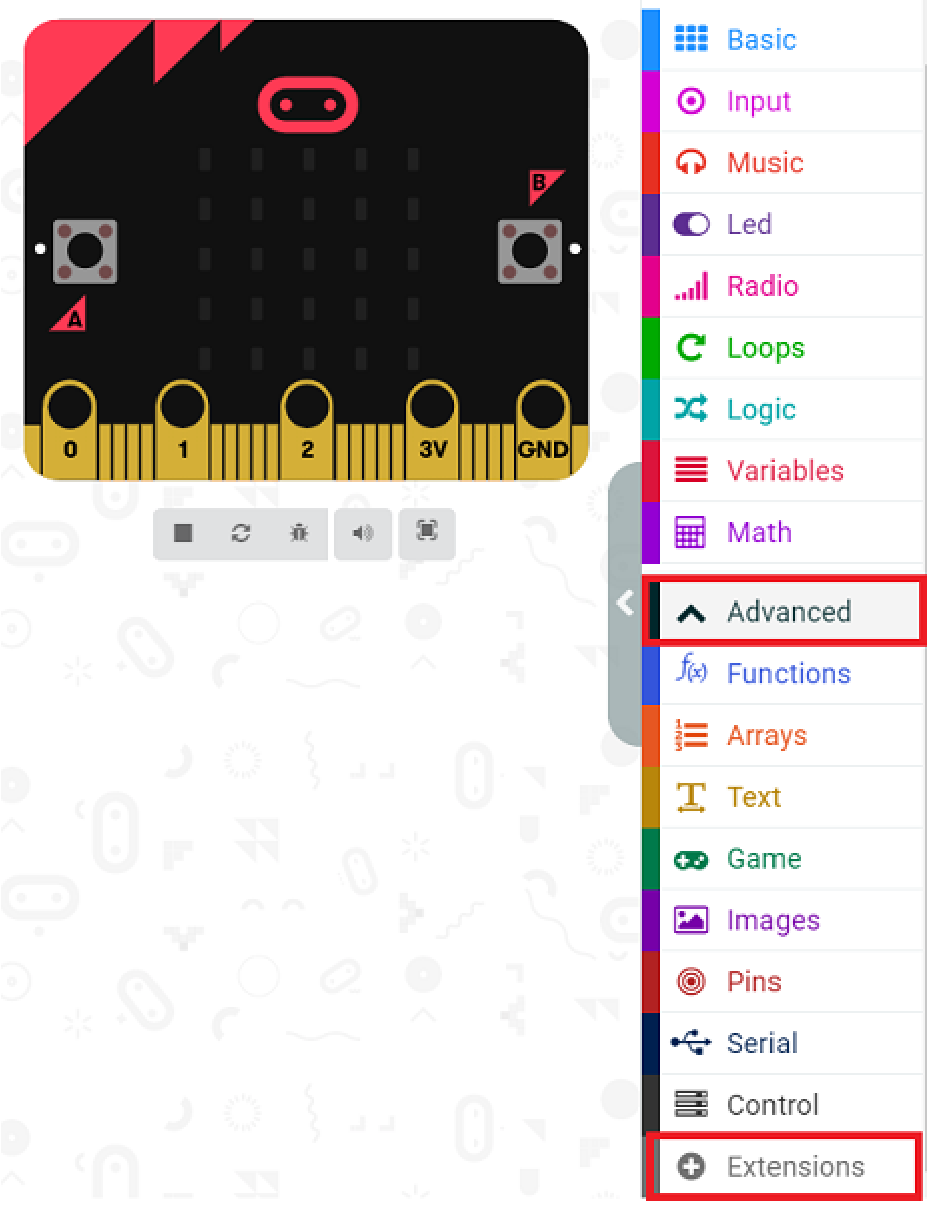
- 1 x TPBot

13.3. Software

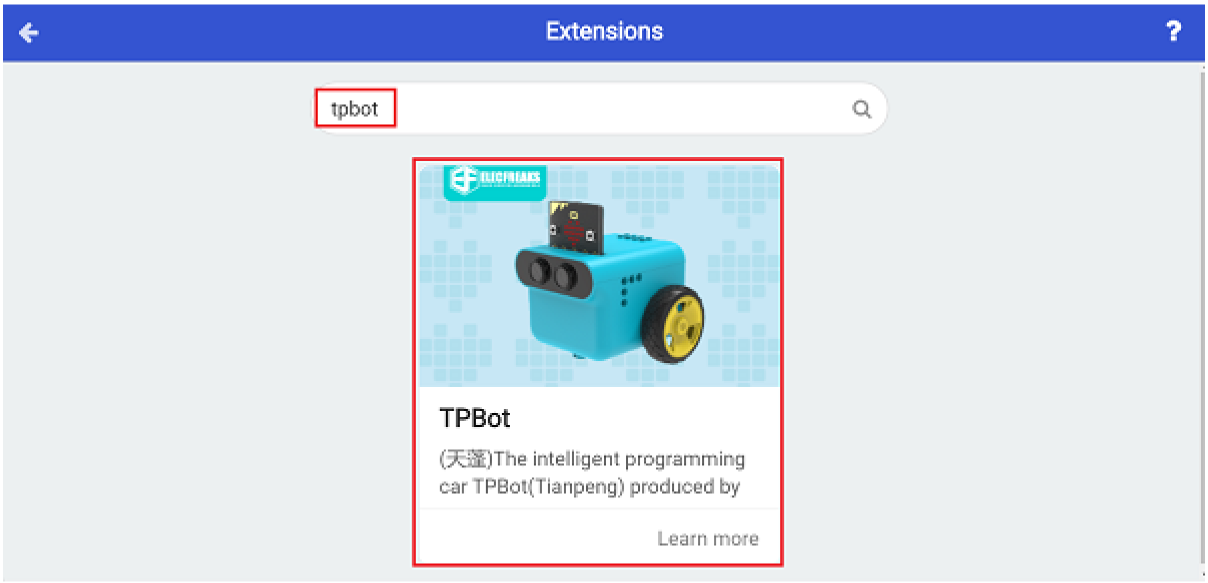
MicroSoftmakecode

13.4. Programming

- Click “Advanced” to see more choices in the MakeCode drawer.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.



tpbot

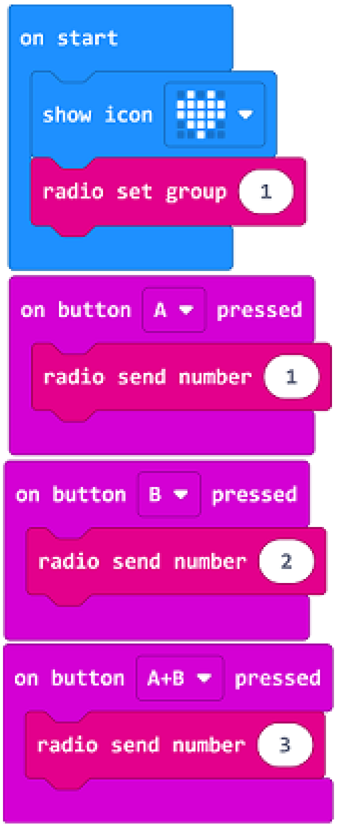
TPBot

(天蓬)The intelligent programming car TPBot(Tianpeng) produced by

##Sample

Remote Control Part

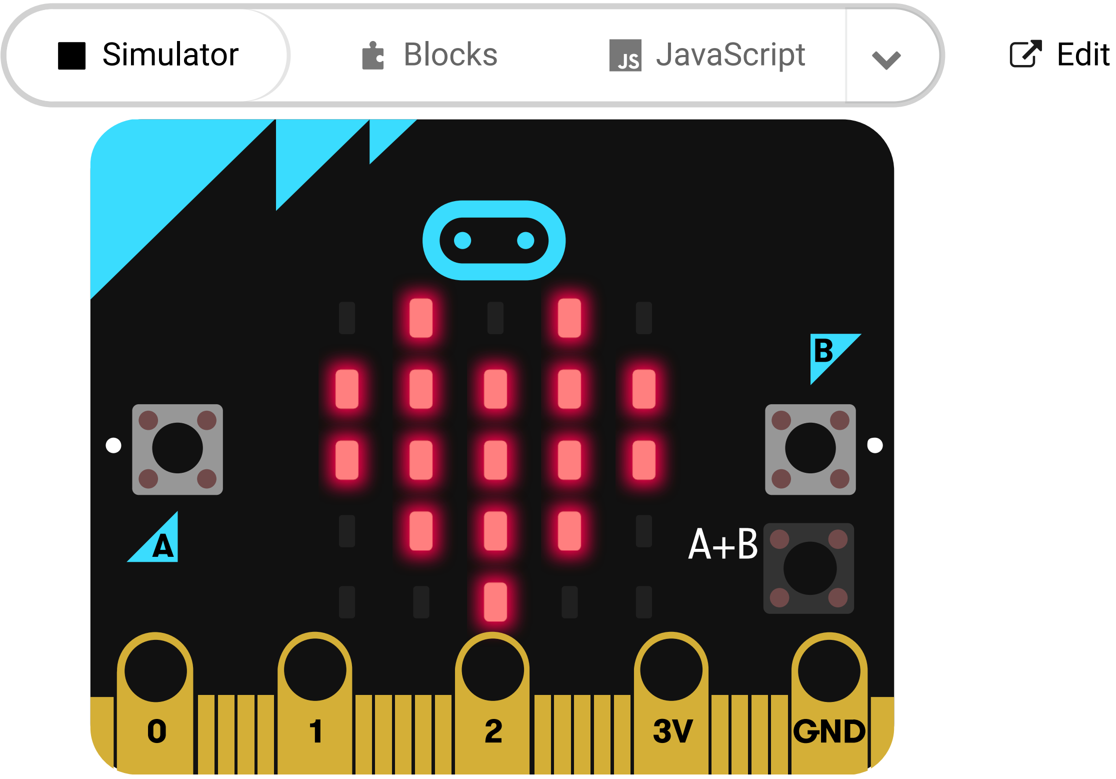
- Set the micro:bit showing a set icon and the radio group as 1.
- After pressing button A, radio send number 1; after pressing button B, radio send number 2; after pressing button A+B, radio send number 3.

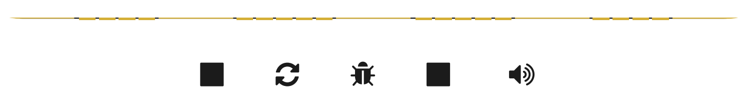


```
on start
    show icon
    radio set group 1
on button A pressed
    radio send number 1
on button B pressed
    radio send number 2
on button A+B pressed
    radio send number 3
```

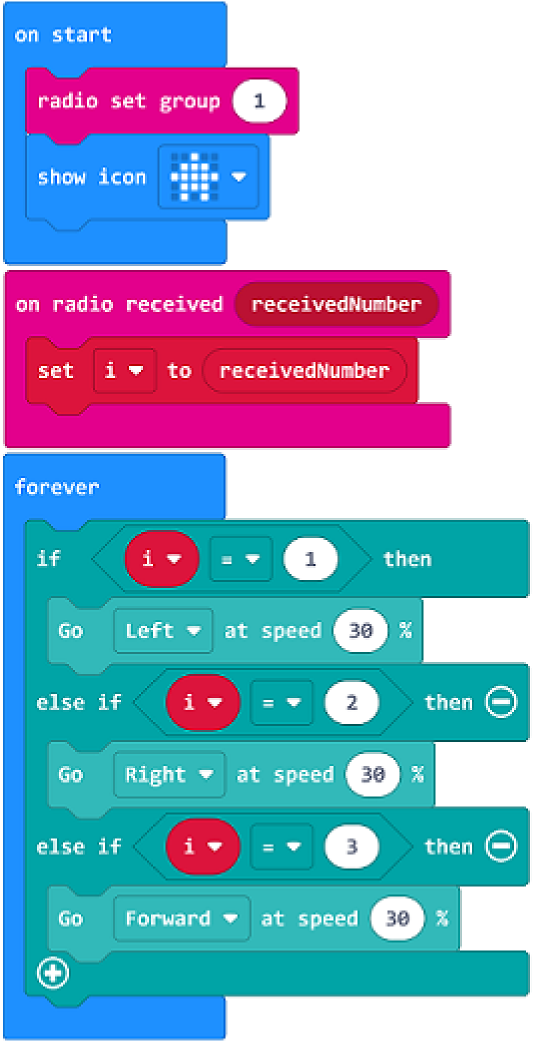
Link

- Link: https://makecode.microbit.org/_DYDT9ibh9V1E
- You may also download it directly below:





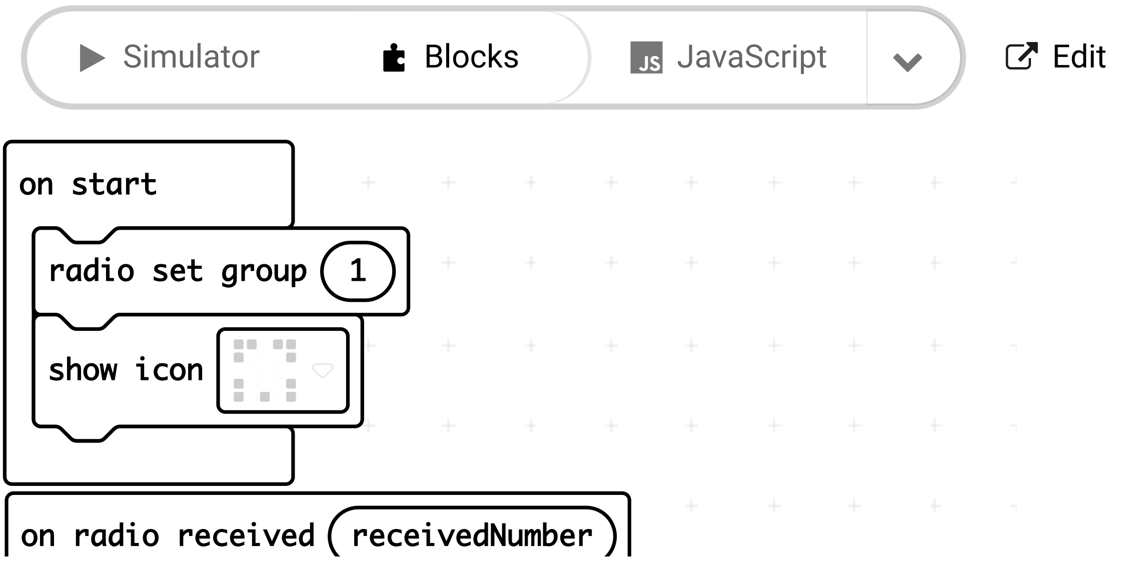
--- ### Receiving Part - Set the micro:bit showing a set icon and the radio group as 1. - Save the received number as the variable. - Judge if the variable is 1, if yes, set the TPBot turning left at the speed of 30%; if the variable is 2, set the TPBot turning right at the speed of 30%; if the variable is 3, set the TPBot moving forward at the speed of 30%.



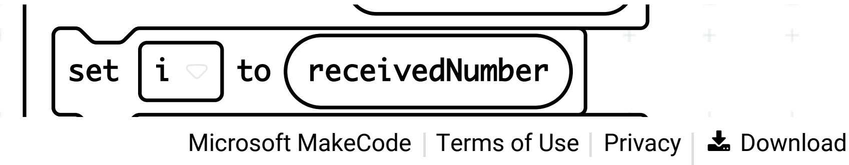
```
on start
    radio set group 1
    show icon
on radio received receivedNumber
    set i to receivedNumber
forever
    if i = 1 then
        Go Left at speed 30 %
    else if i = 2 then
        Go Right at speed 30 %
    else if i = 3 then
        Go Forward at speed 30 %
```

Link

- Link: https://makecode.microbit.org/_CAMF0t8rYT0j
- You may also download it directly below:



```
on start
    radio set group 1
    show icon
on radio received receivedNumber
```



```
set i to receivedNumber
```

--- ## Conclusion ---

- Power up to show a set icon on the micro:bit, after pressing button A, it turns left; after pressing button B, it turns right; after pressing button A+B, it moves forward.

13.5. Exploration

13.6. FAQ

Q: The car does not work with the code in the wiki.
A: It should be the batteries that are lack of power, please try to fix it by adding the value of the speed in the code.

13.7. Relevant File

14. Case 13: Remote Control with micro:bit Accelerometer

14.1. Purpose

- Programme to control the TPBot with the accelerometer.

14.2. Material

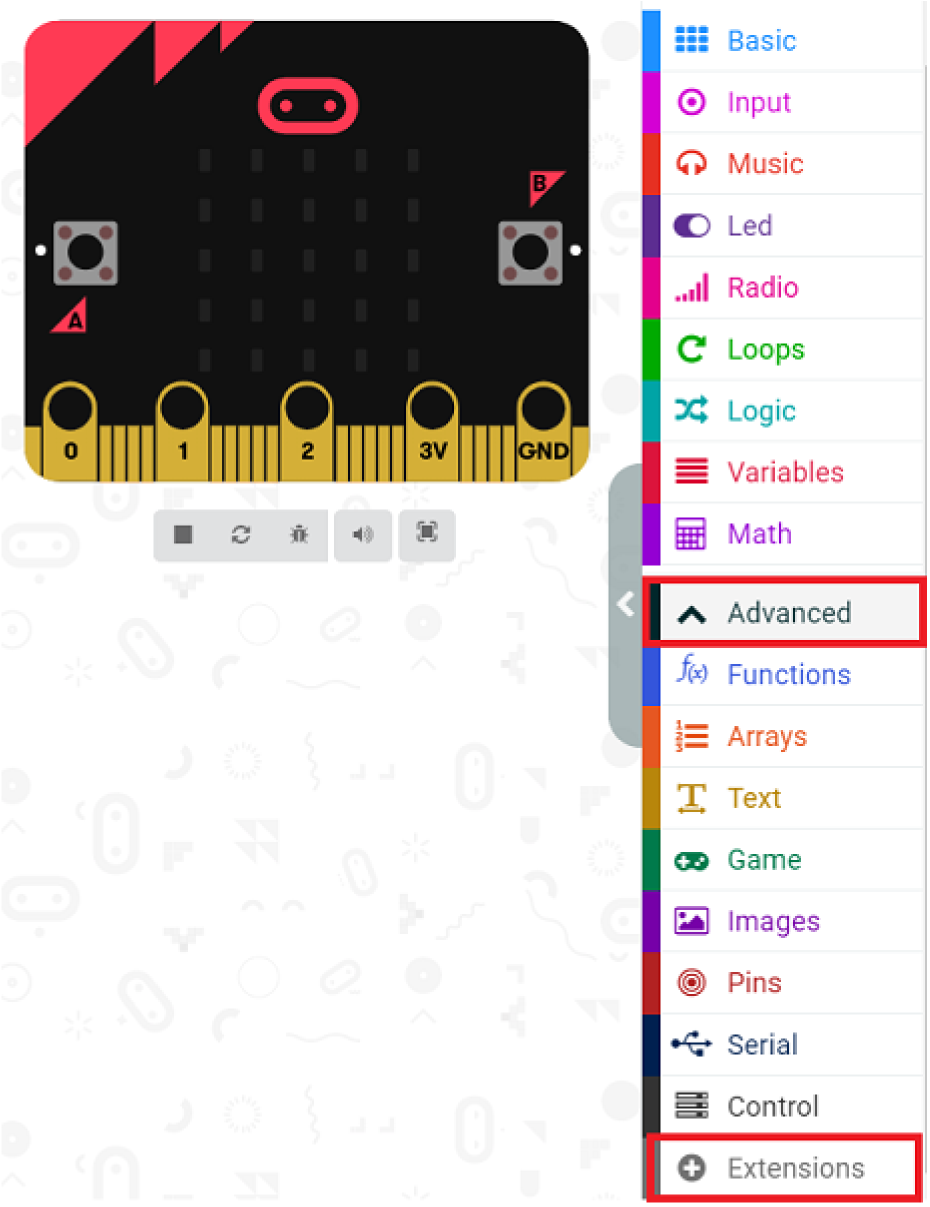
- 1 x TPBot

14.3. Software

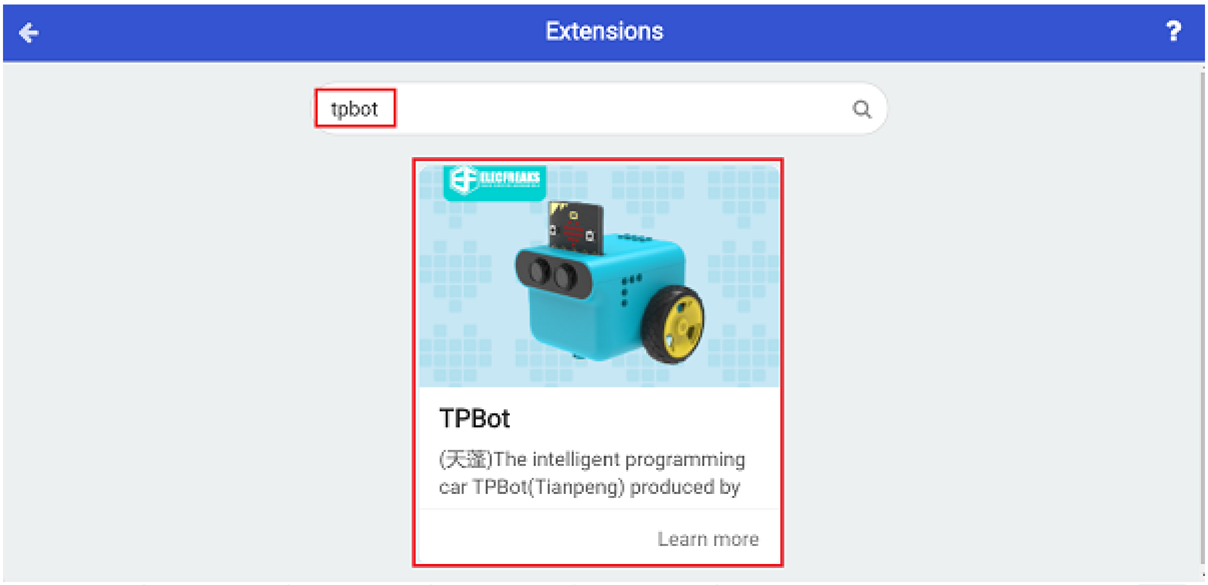
MicroSoftmakecode

14.4. Programming

- Click “Advanced” to see more choices in the MakeCode drawer.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.

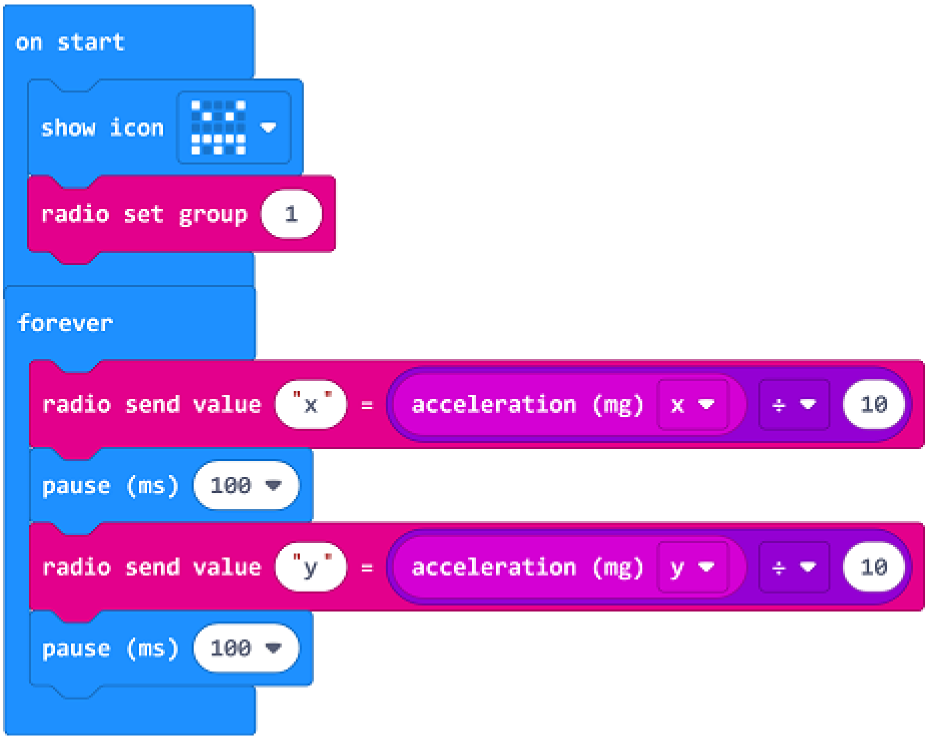


(天蓬)The intelligent programming car TPBot(Tianpeng) produced by

##Sample

Remote Control Part

- Set the micro:bit showing a set icon and the radio group as 1.
- Radio send x which is given by its acceleration dividing 10 in the forever brick.
- Radio send y which is given by its acceleration dividing 10 in the forever brick.
-

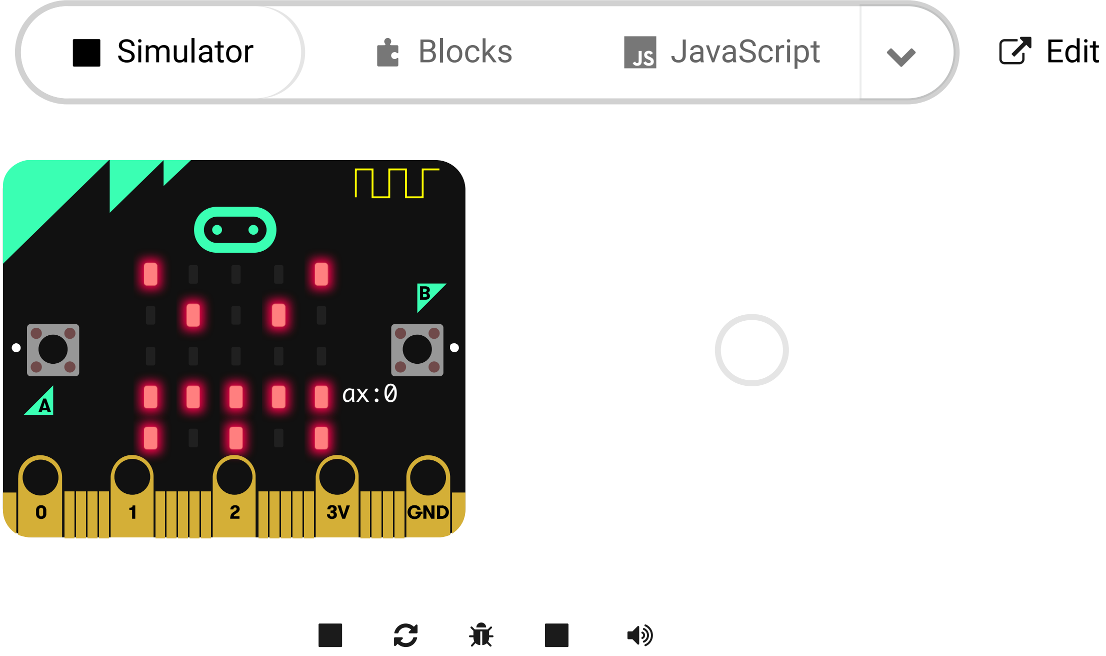


```
on start
    show icon
    radio set group 1

forever
    radio send value "x" = acceleration (mg) x ÷ 10
    pause (ms) 100
    radio send value "y" = acceleration (mg) y ÷ 10
    pause (ms) 100
```

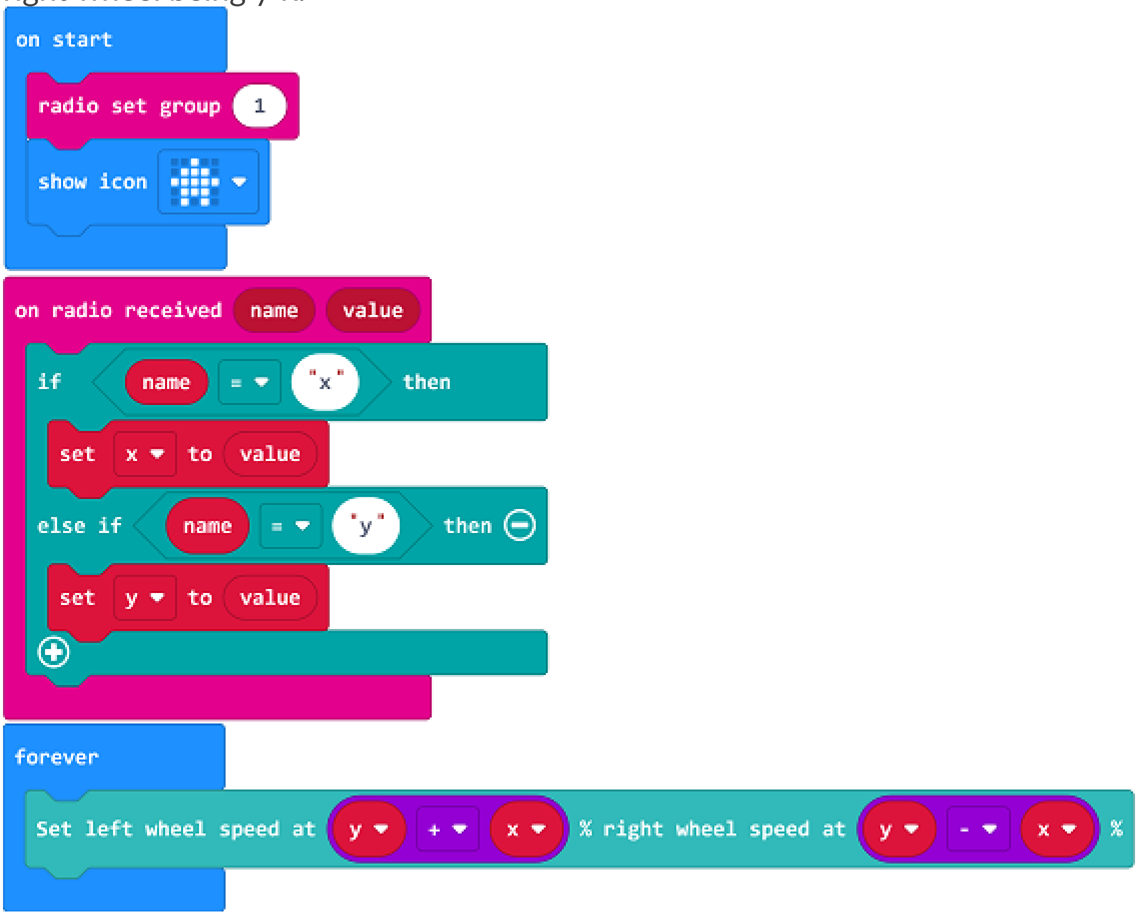
Link

- Link: https://makecode.microbit.org/_11kPTbbxM9Mf
- You may also download it directly below:



⊖ ⊕

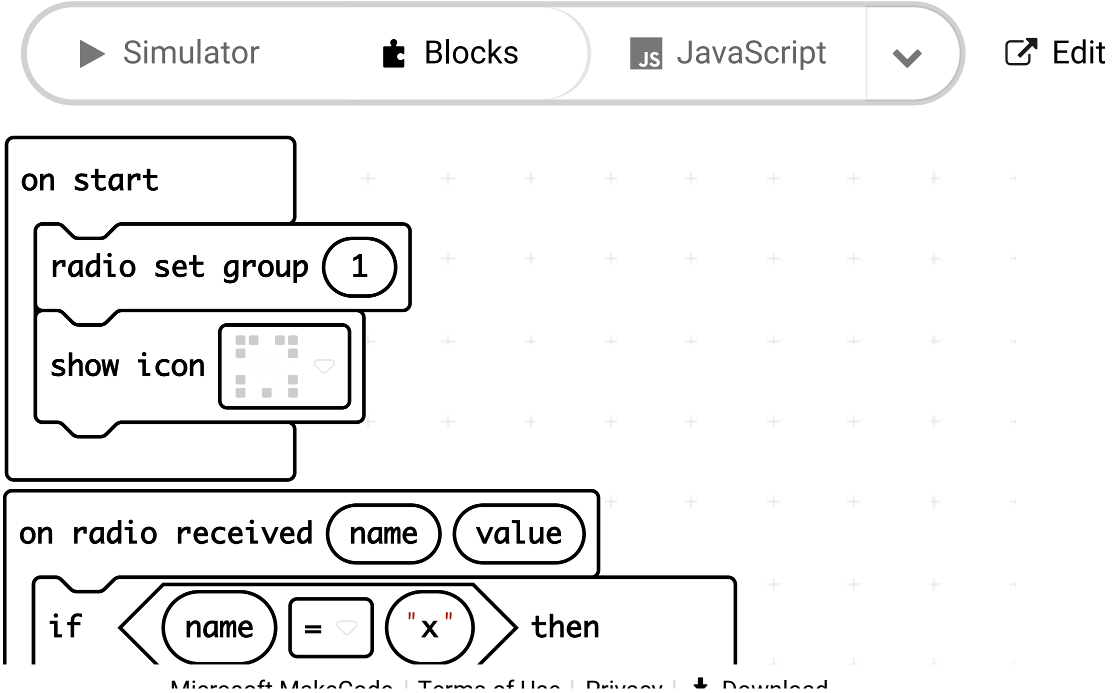
--- ### Receiving Part - Set the micro:bit showing a set icon and the radio group as 1. - Drag two" if...else..." sentences to the "on radio received..." block, judge if the received name is x or y. - If it's x, save it as the variable as the accelaration from the x. - If it's y, save it as the variable as the accelaration from the y. - Set the speed of the left wheel being y+x and the right wheel being y-x.



```
on start
    radio set group 1
    show icon
on radio received name value
    if name = "x" then
        set x to value
    else if name = "y" then ⊖
        set y to value
    ⊕
forever
    Set left wheel speed at y + x % right wheel speed at y - x %
```

Link

- Link: https://makecode.microbit.org/_a6LLFsMfDT7K
- You may also download it directly below:



```
on start
    radio set group 1
    show icon
on radio received name value
    if name = "x" then
```

Microsoft MakeCode | Terms of Use | Privacy | Download

--- ## Conclusion ---

- Power up to show the set icon on the micro:bit display, and the movement of TPBot is controlled by the changing angel from the micro:bit.

14.5. Exploration

14.6. FAQ

14.7. Relevant File

15. Case 14: Remote Control with Joystick:bit

15.1. Purpose

- Programme to control the TPBot with the Joystick:bit.

15.2. Material

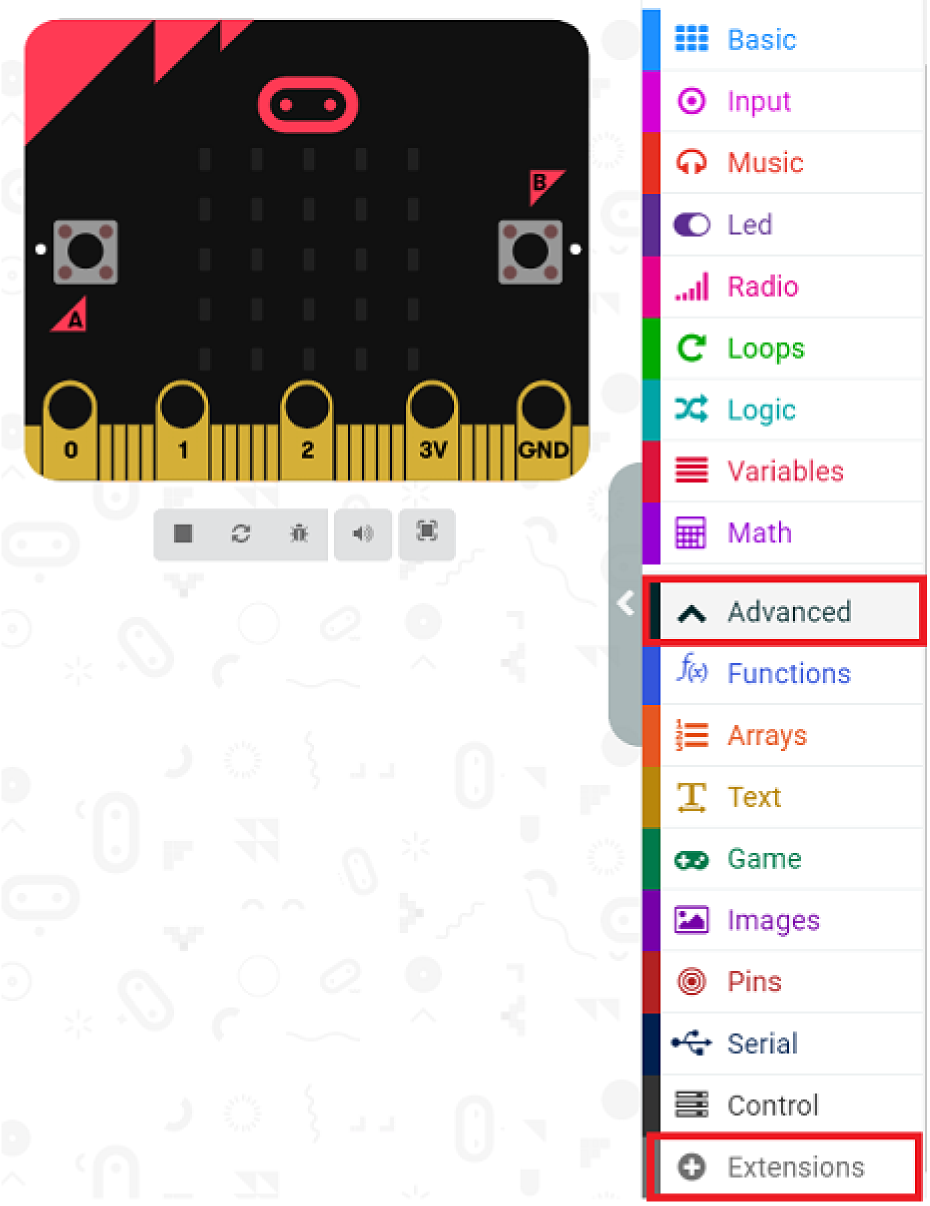
- 1 x TPBot

15.3. Software

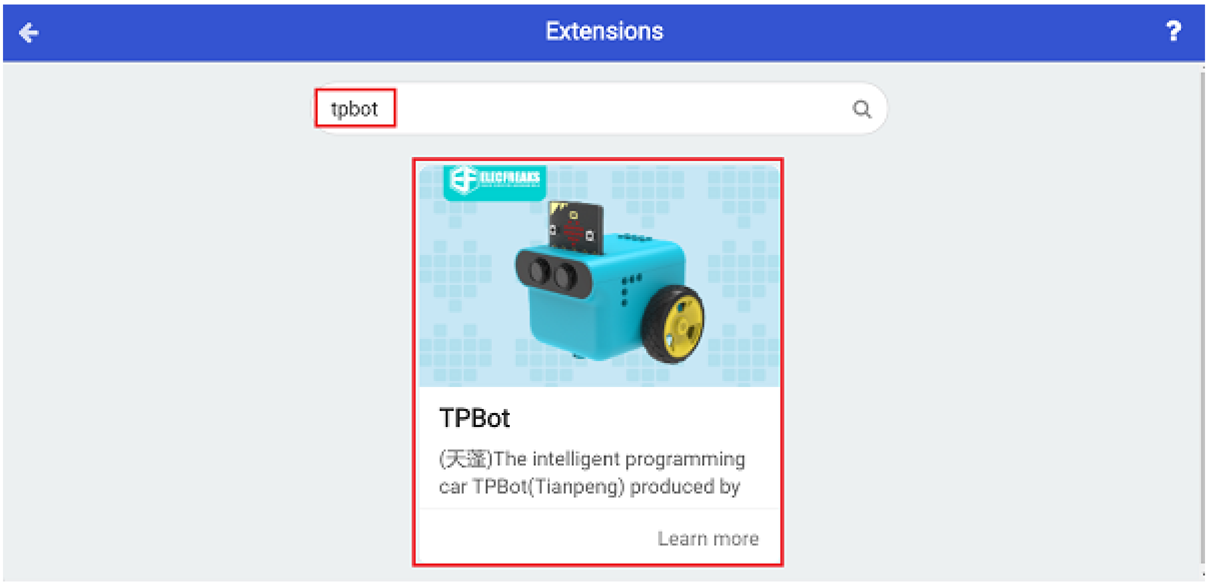
MicroSoftmakecode

15.4. Programming

- Click “Advanced” to see more choices in the MakeCode drawer.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.



TPBot

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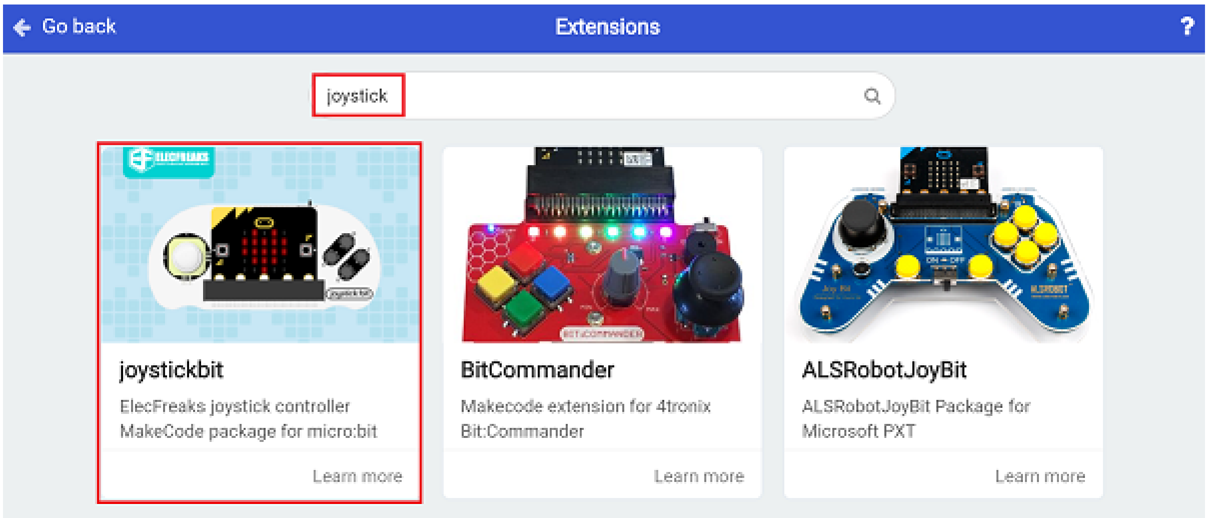
- We need to add a package for programming the Joystick also. Click “Extensions” in the bottom of the drawer and seach with “joystick” in the dialogue box to download it.



joystickbit

ElecFreaks joystick controller MakeCode package for micro:bit

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BitCommander

Makecode extension for 4tronix Bit:Commander

Learn more

ALSRobotJoyBit

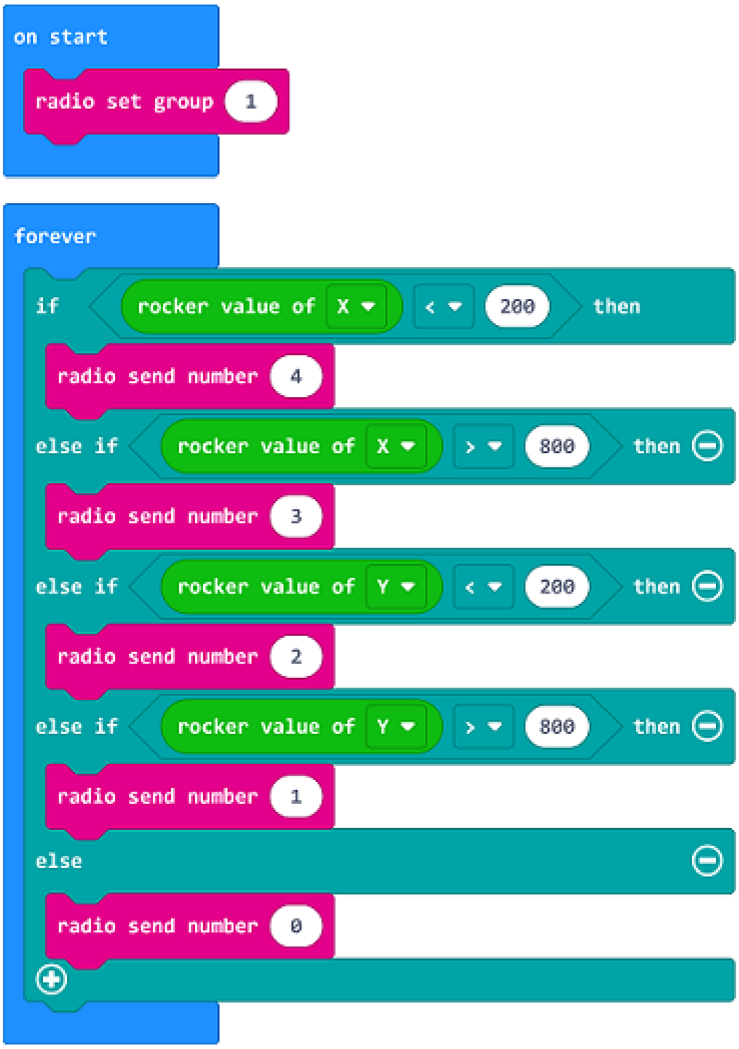
ALSRobotJoyBit Package for Microsoft PXT

Learn more

##Sample

Remote Control Part

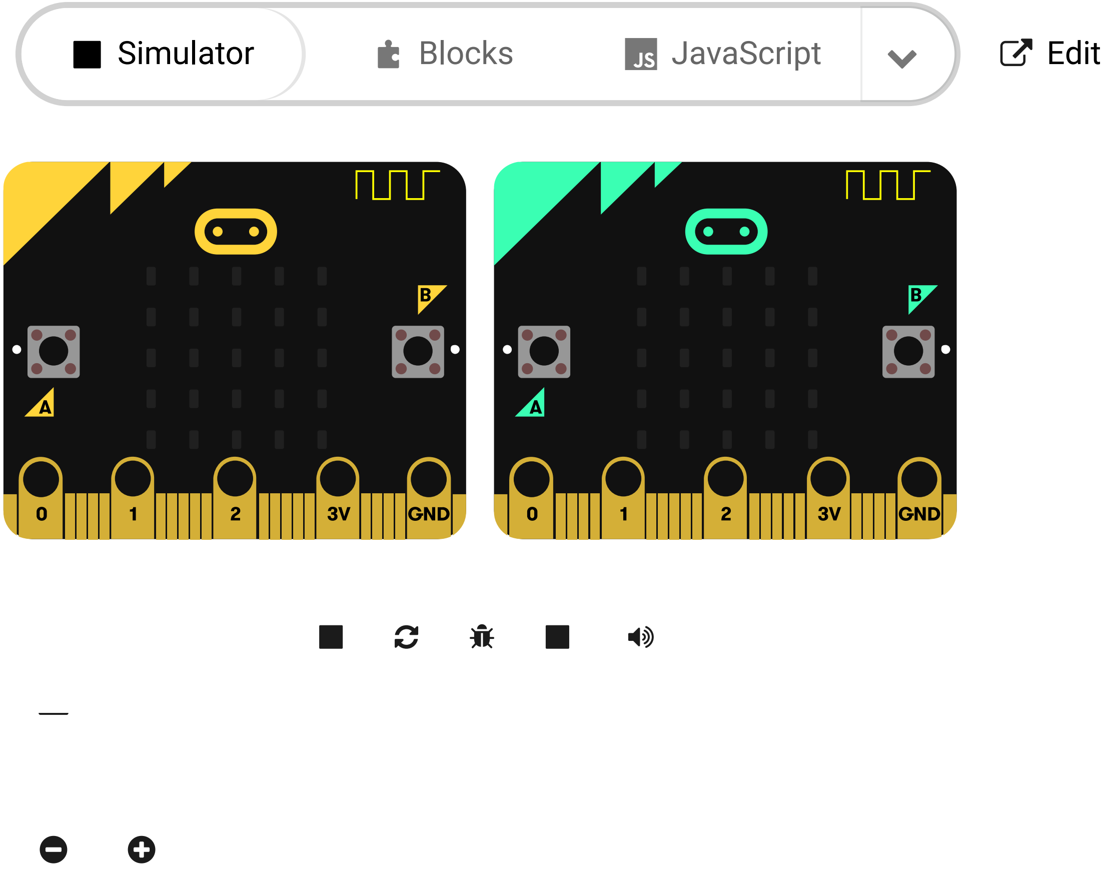
- Set the radio group as 1.
- Judge the value of x&y of the Joystick in the forever brick, if the value of the x is below 200, radio send number 4; if the value of the x is over 800, radio send number 3; if the value of the y is below 200, radio send number 2; if the value of the y over 800, radio send number 1; or radio send number 0.



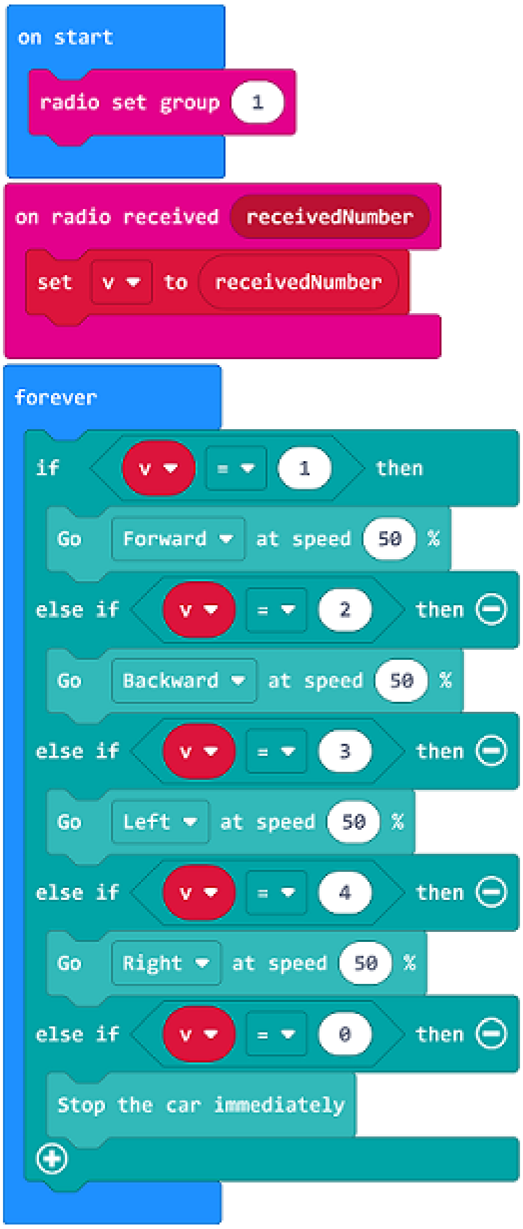
```
on start
    radio set group 1

forever
    if rocker value of X < 200 then
        radio send number 4
    else if rocker value of X > 800 then
        radio send number 3
    else if rocker value of Y < 200 then
        radio send number 2
    else if rocker value of Y > 800 then
        radio send number 1
    else
        radio send number 0
```

Link

- Link: https://makecode.microbit.org/_7rzb5TEfrbu7
- You may also download it directly below:



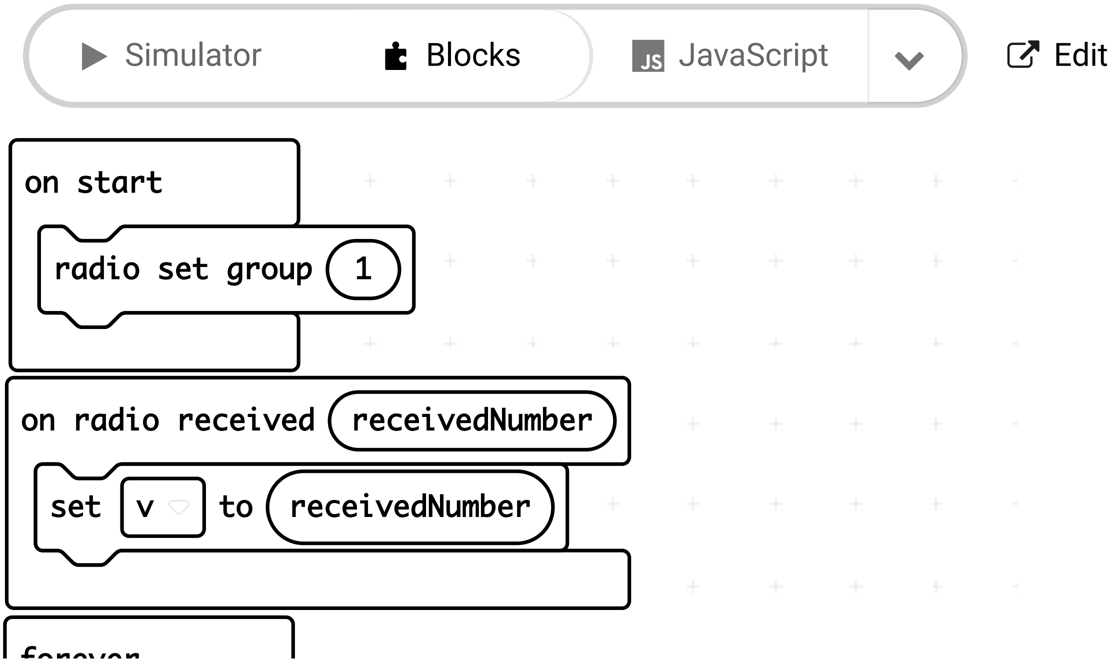
--- ### Receiving Part - Set the radio group as 1. - Save the received number as the variable in "on radio received..."block. - Judge if the value is 1, if yes, set the TPBot moving forward at the speed of 100%; if it's 2, set the TPBot reversing at the speed of 50%; if it's 3, set the TPBot turning left at the speed of 50%; if it's 4, set the TPBot turning right at the speed of 50%; If it's 0, set the TPBot to stop.



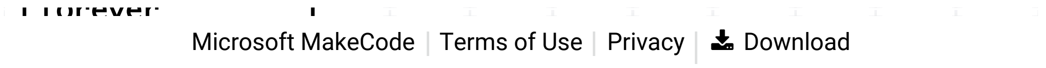
```
on start
    radio set group 1

on radio received receivedNumber
    set v to receivedNumber

forever
    if v = 1 then
        Go Forward at speed 50 %
    else if v = 2 then
        Go Backward at speed 50 %
    else if v = 3 then
        Go Left at speed 50 %
    else if v = 4 then
        Go Right at speed 50 %
    else if v = 0 then
        Stop the car immediately
```

Link

- Link: https://makecode.microbit.org/_HPVCEx29zTPx
- You may also download it dorectly below:



```
on start
    radio set group 1

on radio received receivedNumber
    set v to receivedNumber

forever
```



--- ## Conclusion ---

- The movement of the TPBot is controlled via the Joystick:bit.

15.5. Exploration

15.6. FAQ

Q: The car does not work with the code in the wiki.
A: It should be the batteries that are lack of power, please try to fix it by adding the value of the speed in the code.

15.7. Relevant File

16. Case15: Speed Adjustable TPBot

16.1. Purpose

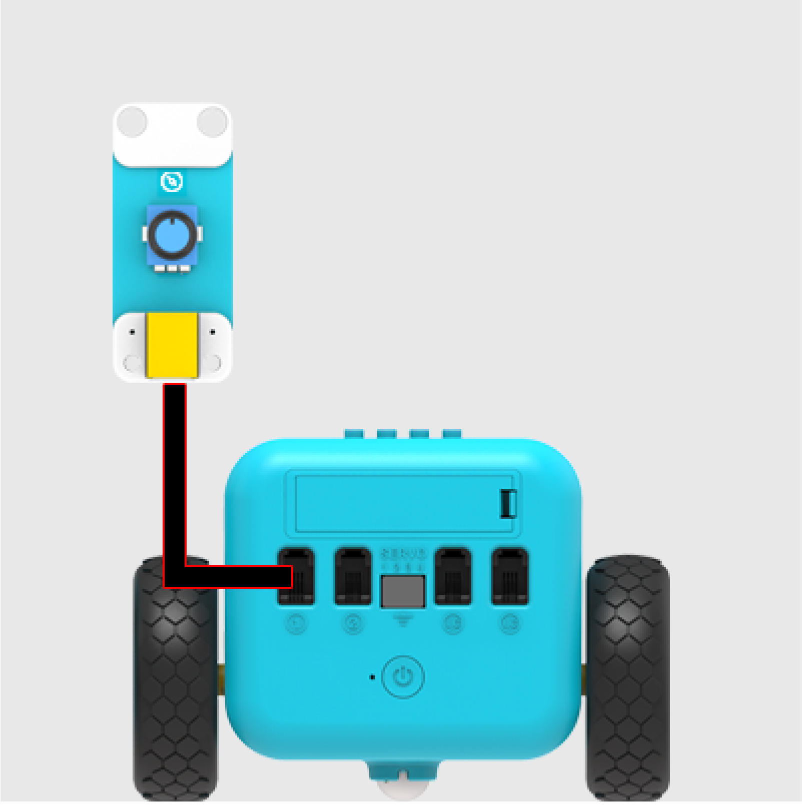
- Adjust the speed of the TPBot with the potentiometer.

16.2. Material

- 1 x TPBot

16.3. Hardware connection

Connect potentiometer to port 1 on TPBot.

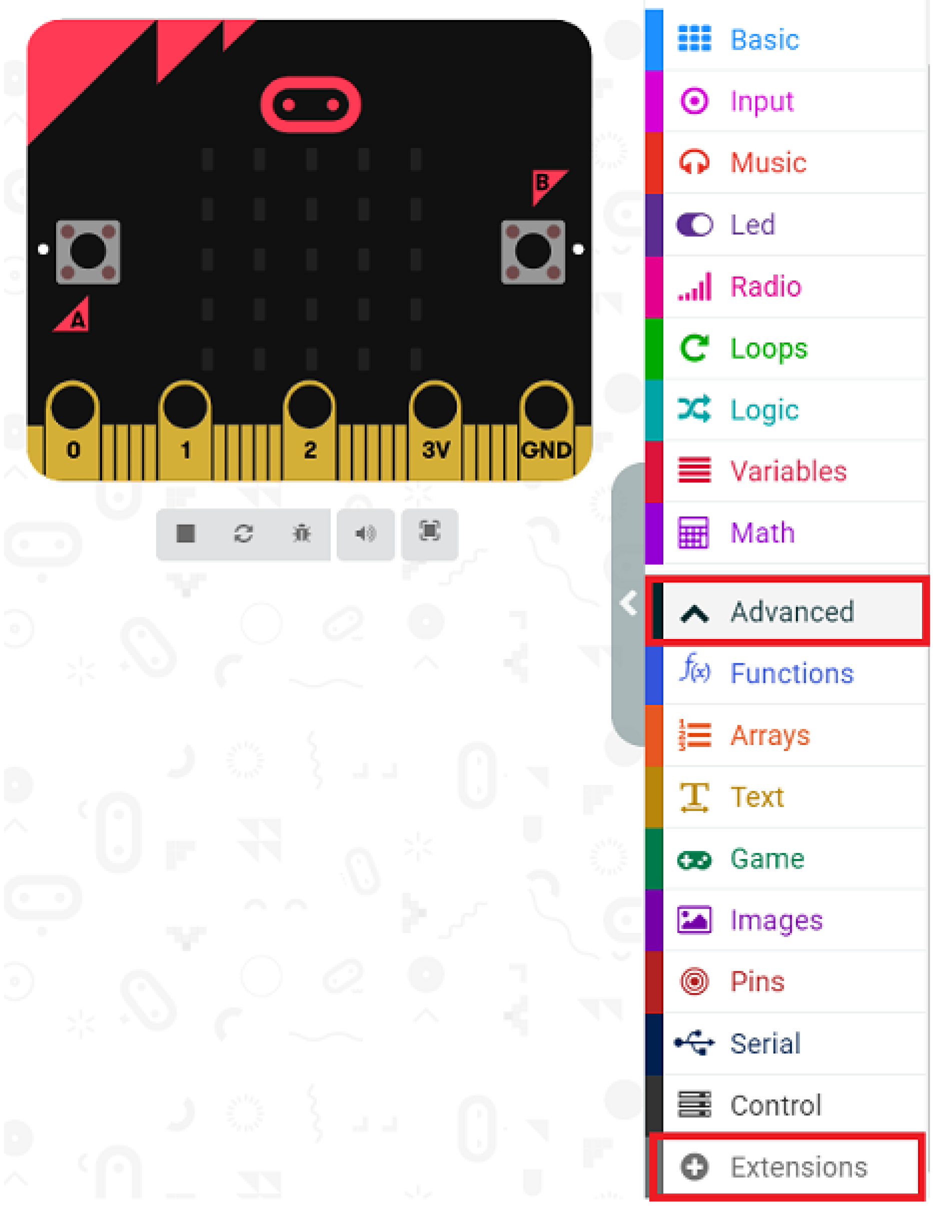


16.4. Software

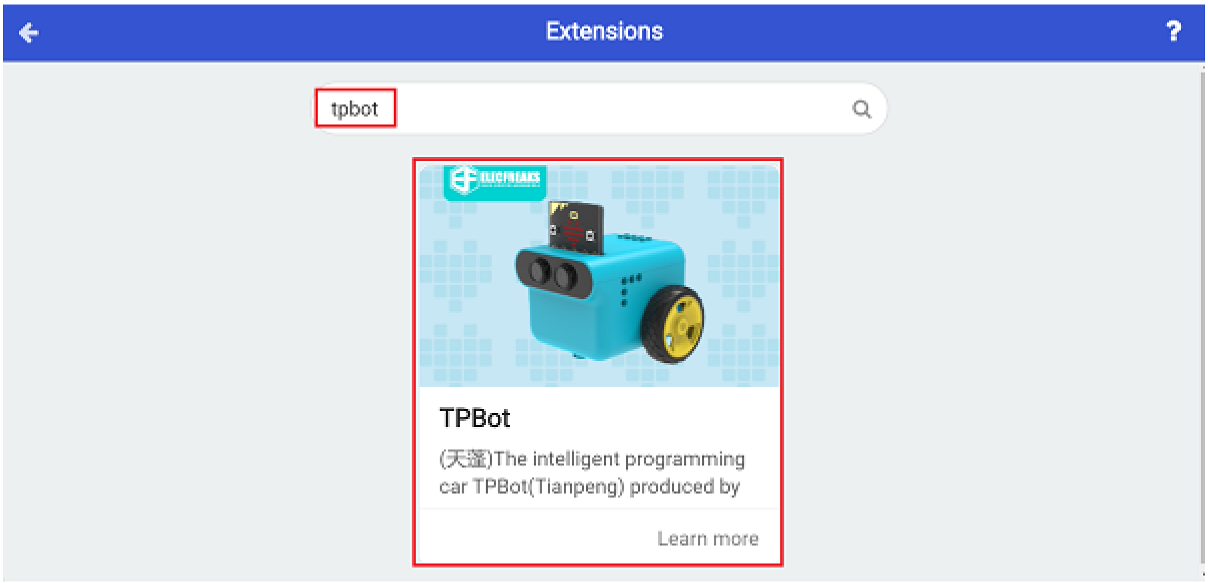
MicroSoftmakecode

16.5. Programming

Click “Advanced” to see more choices in the MakeCode drawer.



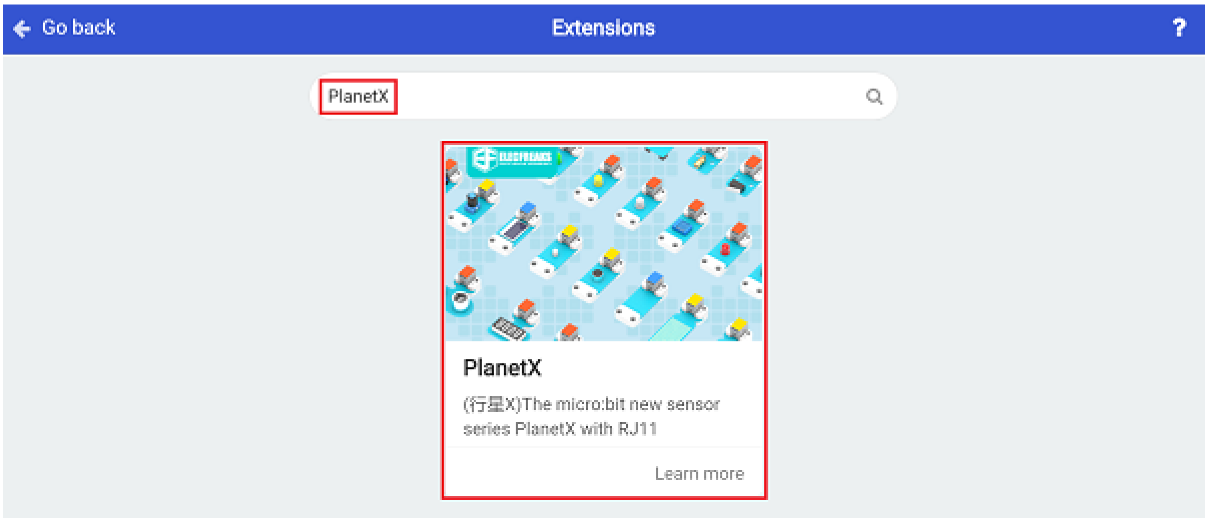
- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.



TPBot

(天蓬)The intelligent programming car TPBot(Tianpeng) produced by

- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and seach with “PlanetX” in the dialogue box to download it.



PlanetX

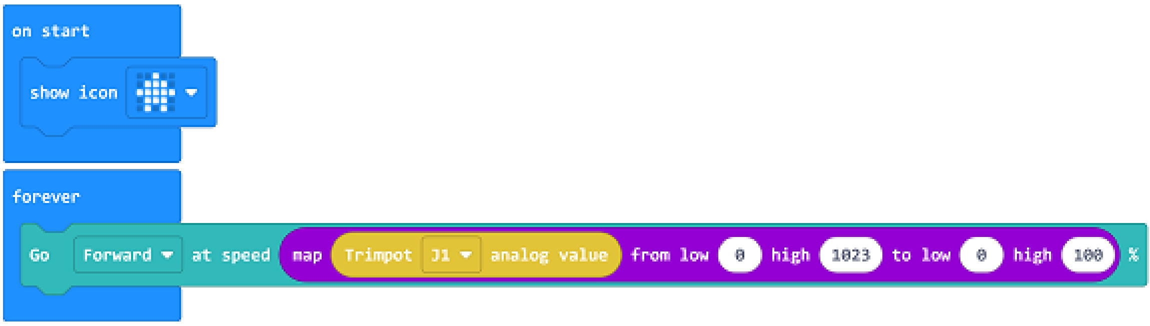
PlanetX

(行星X)The micro:bit new sensor series PlanetX with RJ11

Learn more

##Sample

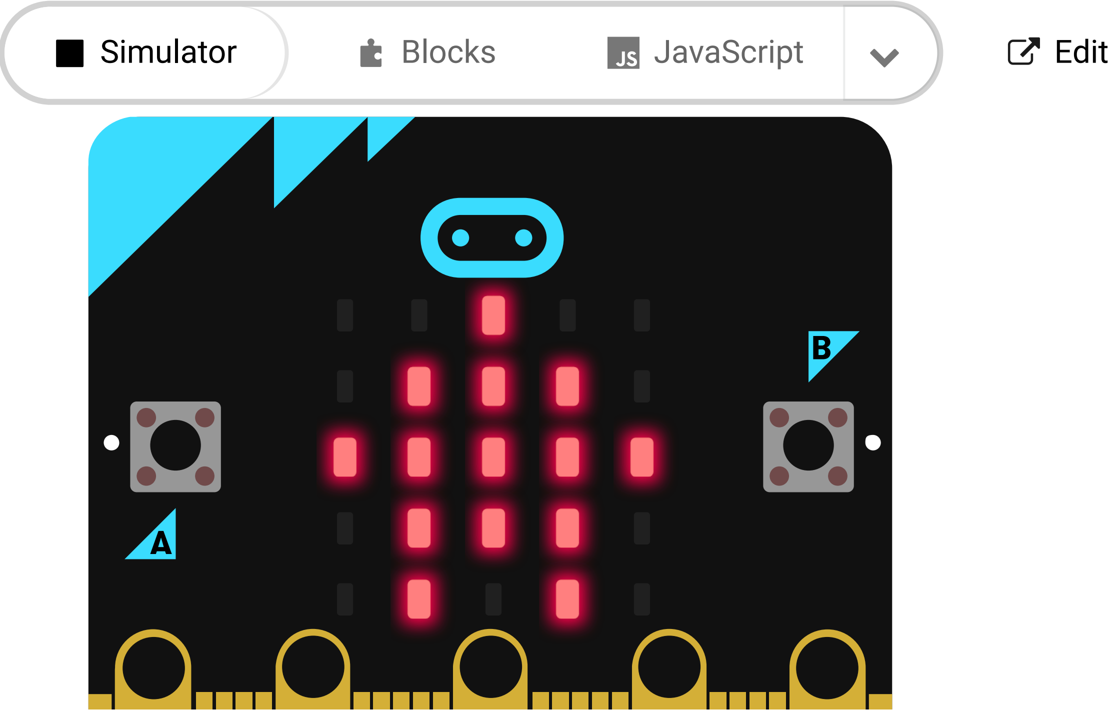
- Drag the show icon brick into on start.
- In forever brick, map the returned value of the potentiometer from 0~1023 to 0~100, and set the mapping value as the speed for the car to move forward.

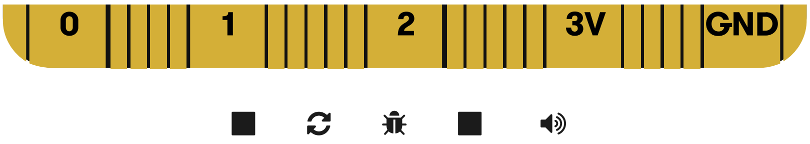


```
on start
    show icon
forever
    Go Forward at speed map Trimpot J1 analog value from low 0 high 1023 to low 0 high 100 %
```

Link

- Link：https://makecode.microbit.org/_ArRM71PD6de0
- You may also download it directly below:





16.6. Conclusion

- After powering on, the speed of the TPBot could be adjusted by the potentioneter.

16.7. Exploration

16.8. FAQ

Q: While operating this case, why the car might not work properly?

A: It might be the low power of the batteries, please try adding the value of TPBot's speed and test again.

16.9. Relevant File

17. Case16: The Dazzling Lights

17.1. Purpose

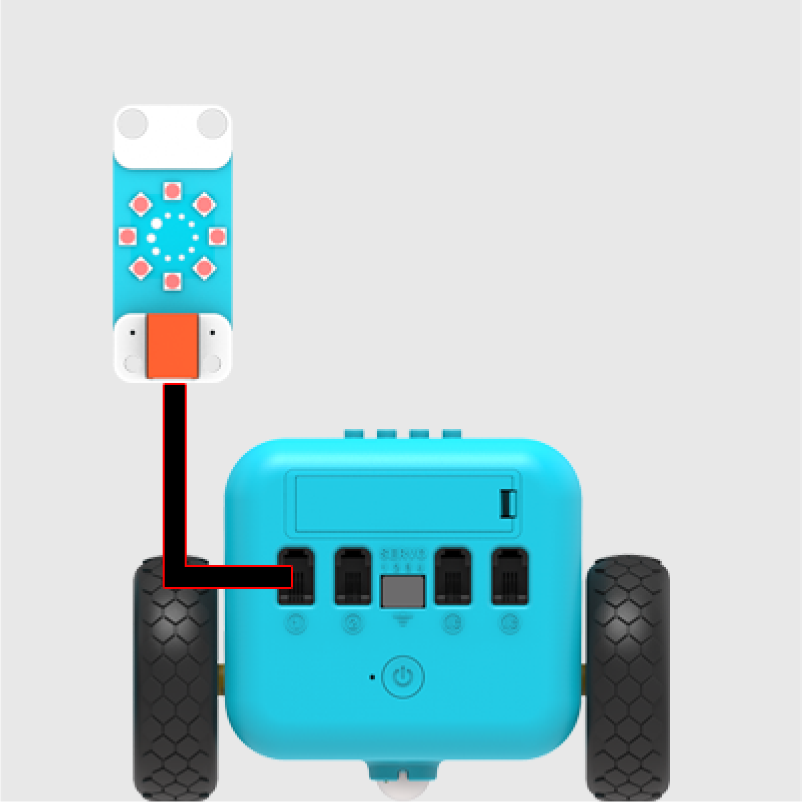
- Simulate the lights of the police car.

17.2. Material

1 x TPBot

17.3. Hardware connection

Connect rainbow led to port 1 on TPBot.

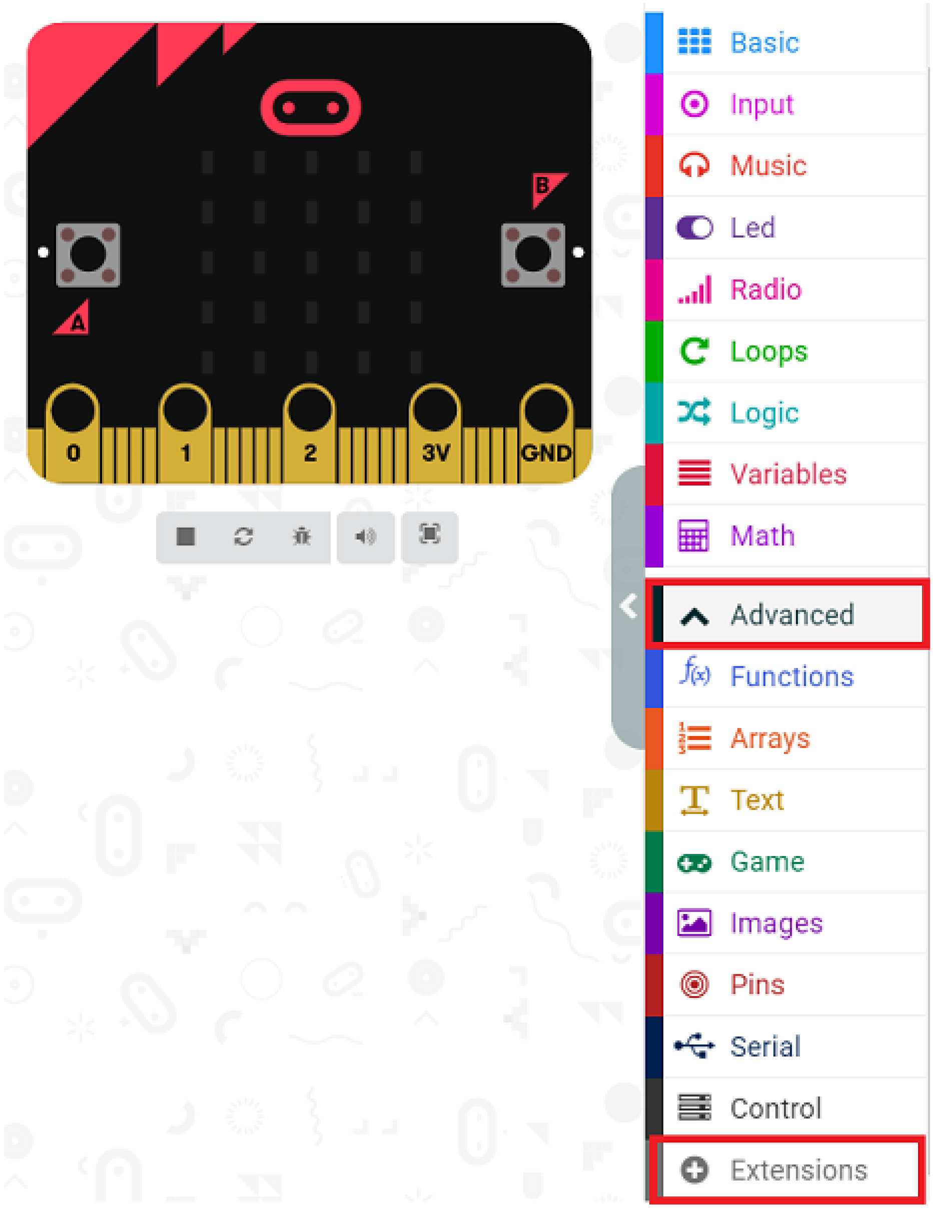


17.4. Software

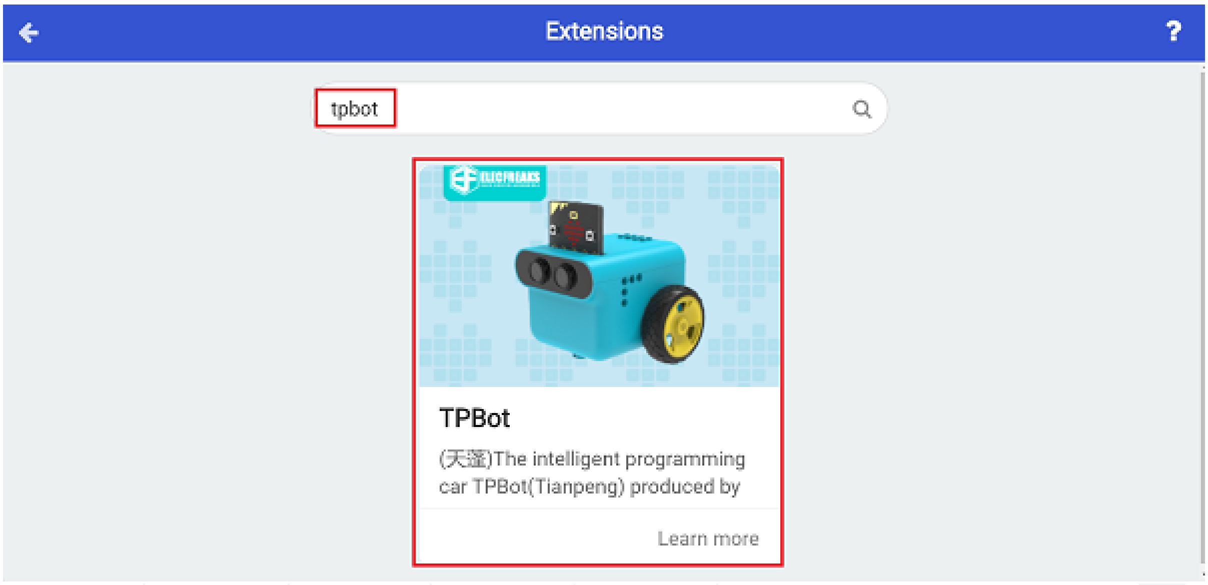
MicroSoftmakecode

17.5. Programming

Click “Advanced” to see more choices in the MakeCode drawer.



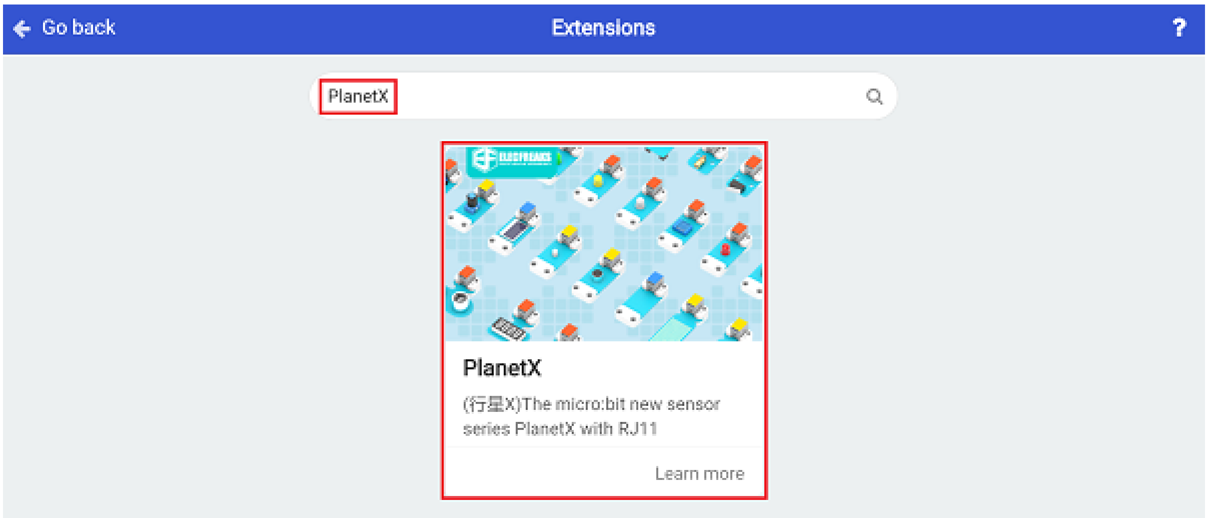
- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.



TPBot

(天蓬)The intelligent programming car TPBot(Tianpeng) produced by

- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and seach with “PlanetX” in the dialogue box to download it.

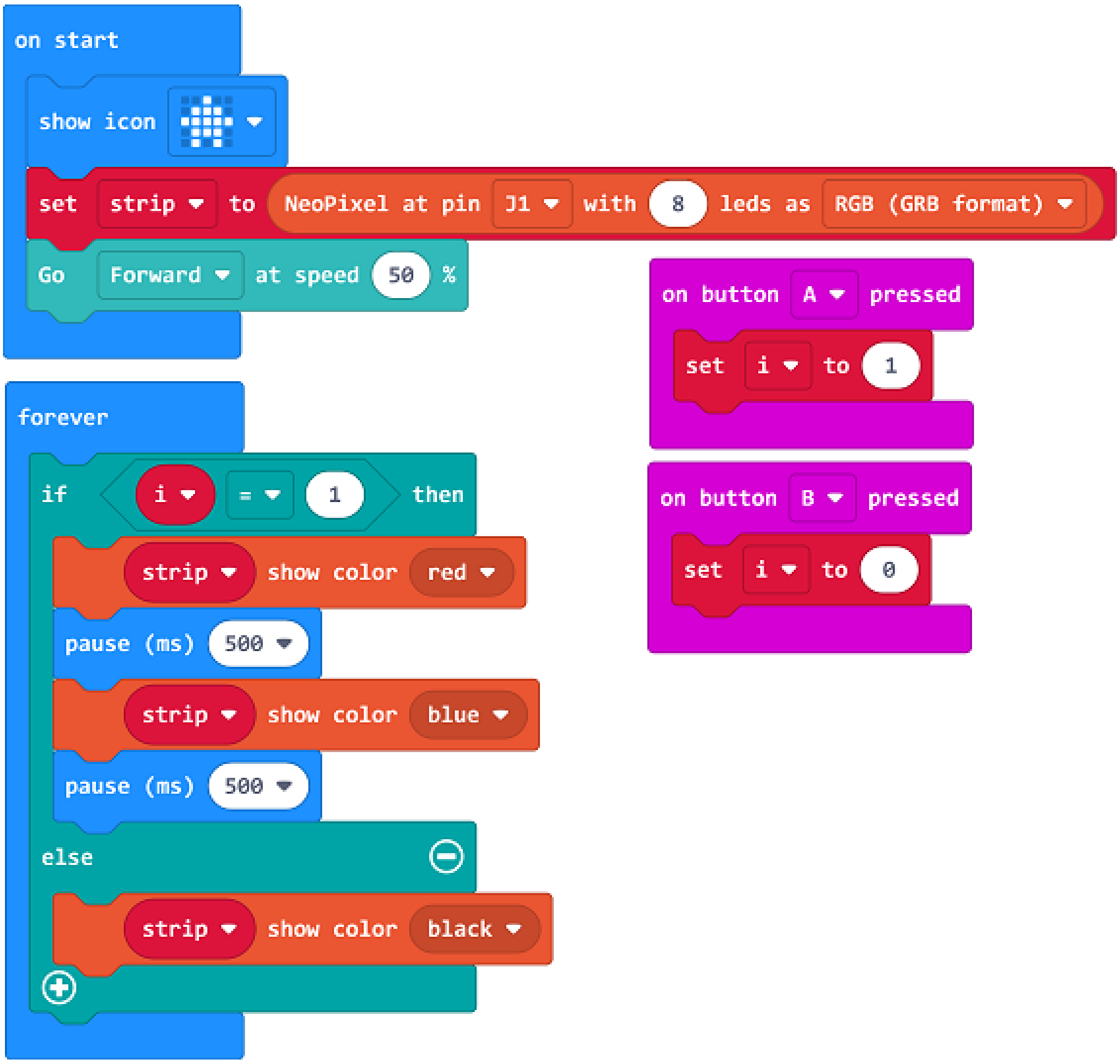


PlanetX

(行星X)The micro:bit new sensor series PlanetX with RJ11

17.6. Sample

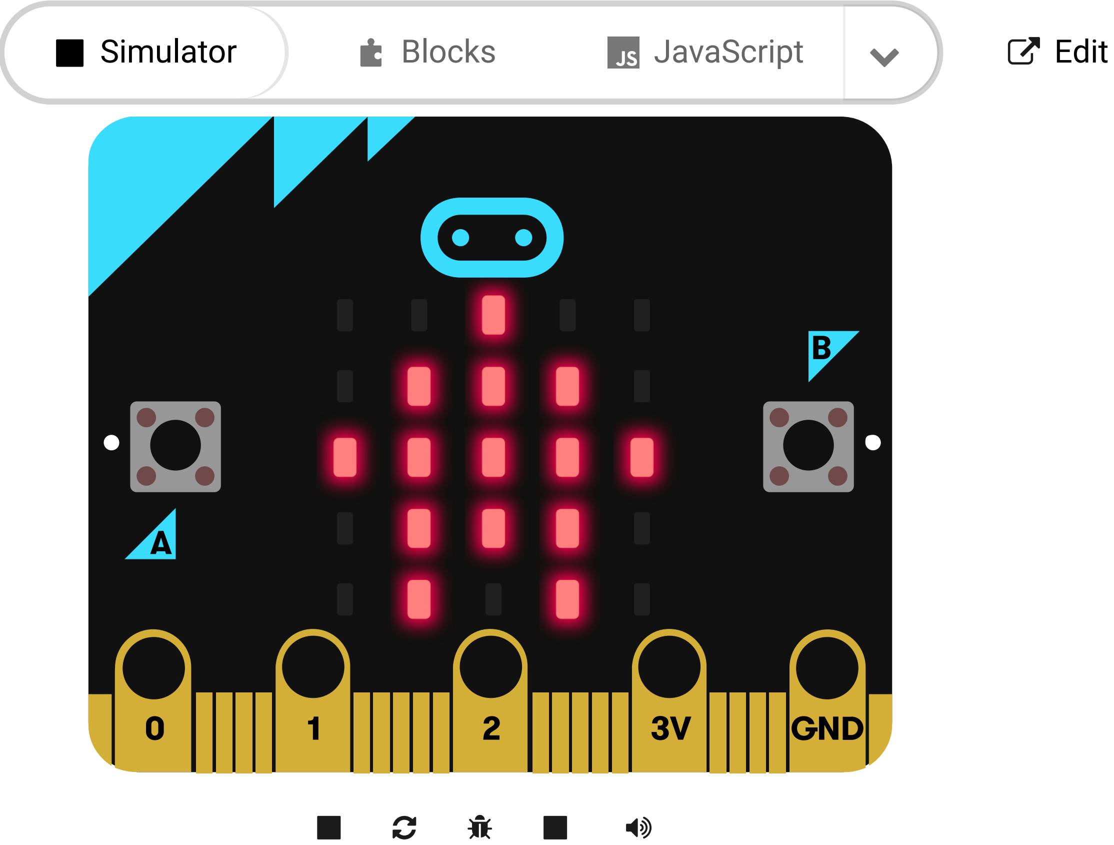
- In on start brick, initialize the led strip and has it connected to J1 port, set TPBot move forward at the speed of 50%.
- Save the variable “i” as 1 while pressing button A and set it as 0 while pressing button B.
- In forever brick, judge if the variable “i” is 1, if yes, set the led in red and pasue for 500ms, after in blue and pause another 500ms; or set it in black.



```
on start
    show icon
    set strip to NeoPixel at pin J1 with 8 leds as RGB (GRB format)
    Go Forward at speed 50 %

on button A pressed
    set i to 1

on button B pressed
    set i to 0

forever
    if i = 1 then
        strip show color red
        pause (ms) 500
        strip show color blue
        pause (ms) 500
    else
        strip show color black
```

Link

- Link：https://makecode.microbit.org/_TvrRaMJLKPWr
- You may also download it directly below:



17.7. Conclusion

- The TPBot moves forward after powering on, press button A on the micro:bit to turn on the LED cycling with red and blue, press button B to turn it off.

17.8. Exploration

17.9. FAQ

Q: While operating this case, why the car might not work properly?

A: It might be the low power of the batteries, please try adding the value of TPBot’s speed and test again.

17.10. Relevant File

18. Case17：Gesture-controlled TPBot

18.1. Purpose

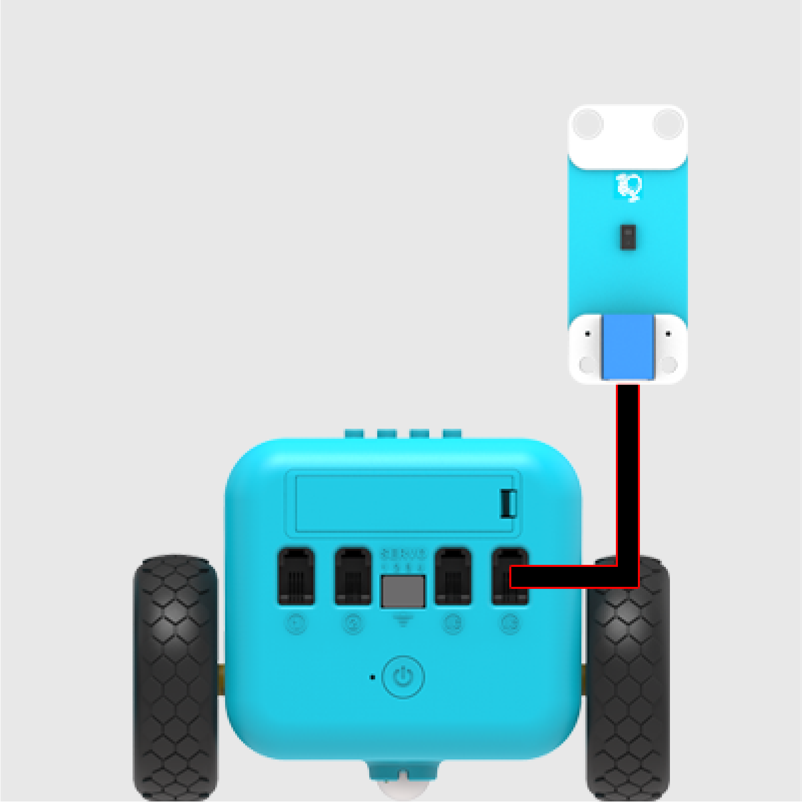
- Control the movement(forward, back, turn left/right) by your hands gesture.

18.2. Material

1 x TPBot

18.3. Hardware connection

Connect gesture sensor to IIC port on TPBot.

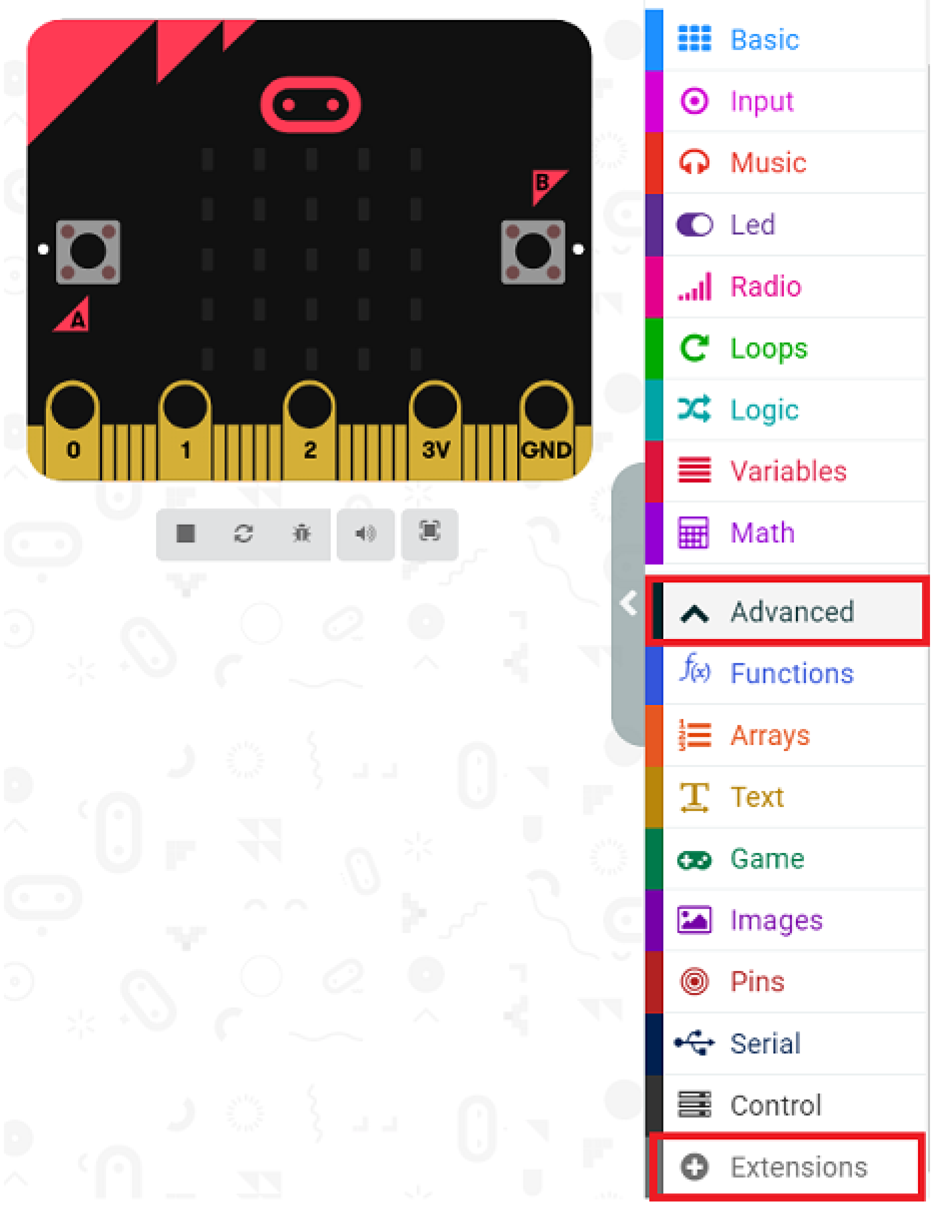


18.4. Software

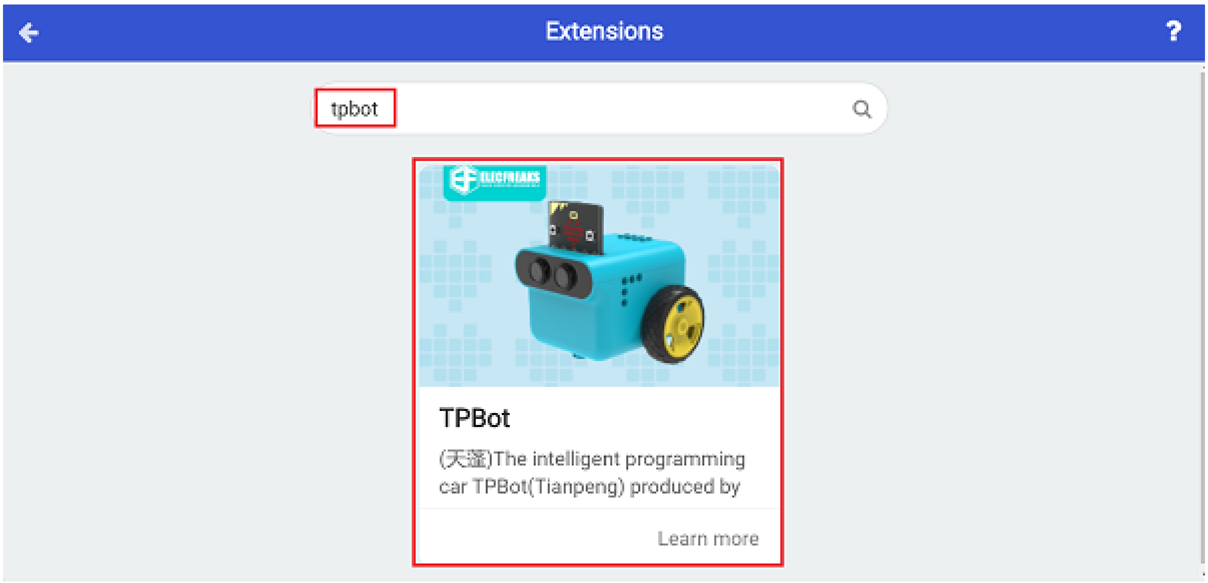
MicroSoftmakecode

18.5. Programming

Click “Advanced” to see more choices in the MakeCode drawer.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.

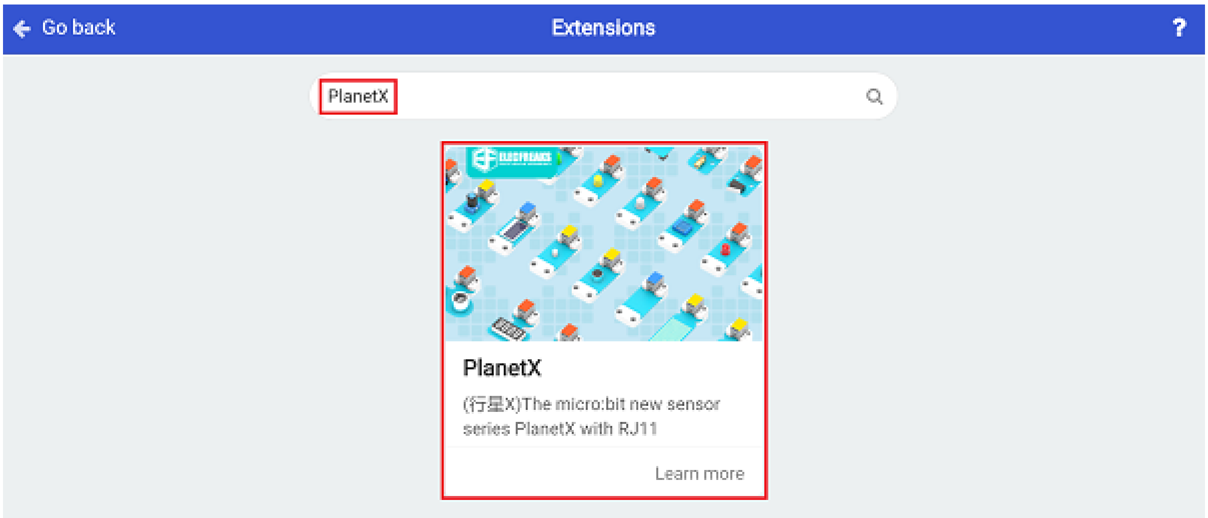


tpbot

TPBot

(天蓬)The intelligent programming car TPBot(Tianpeng) produced by

- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “PlanetX” in the dialogue box to download it.

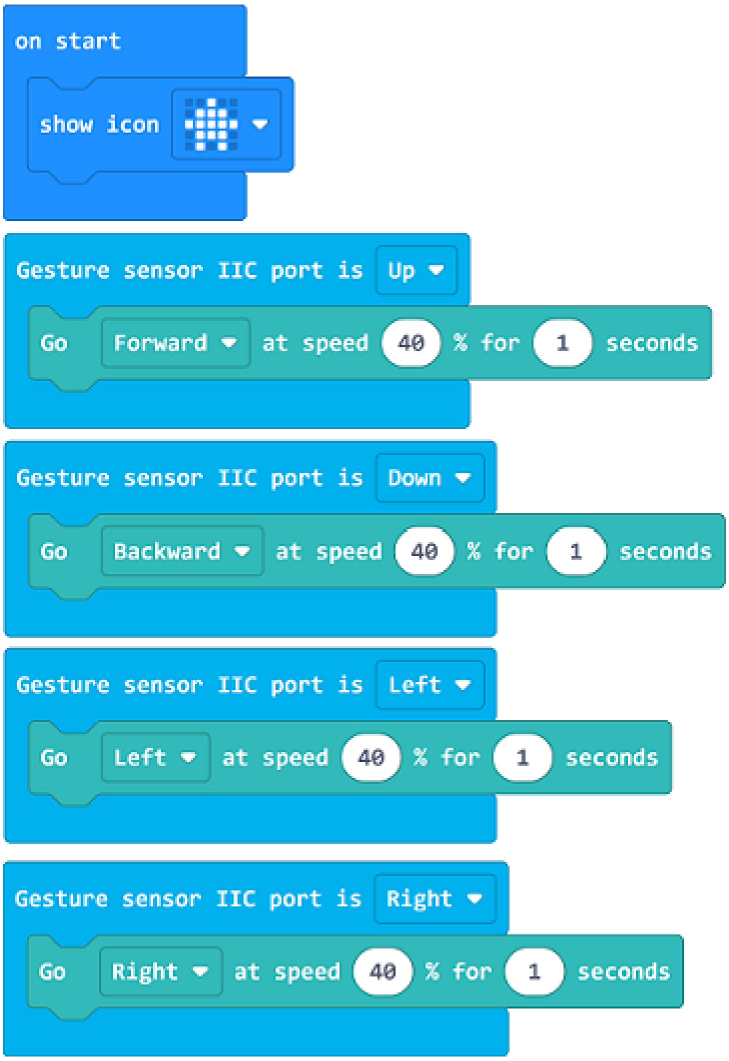


PlanetX

(行星X)The micro:bit new sensor series PlanetX with RJ11

18.6. Sample

- Drag the show icon brick into on start.
- Detect the hands gesture through the gesture sensor, set the car to move forward at the speed of 40% for 1s while detecting your hand waving upward.
- Code with a similar way for the gesture of waving downward, left and right.

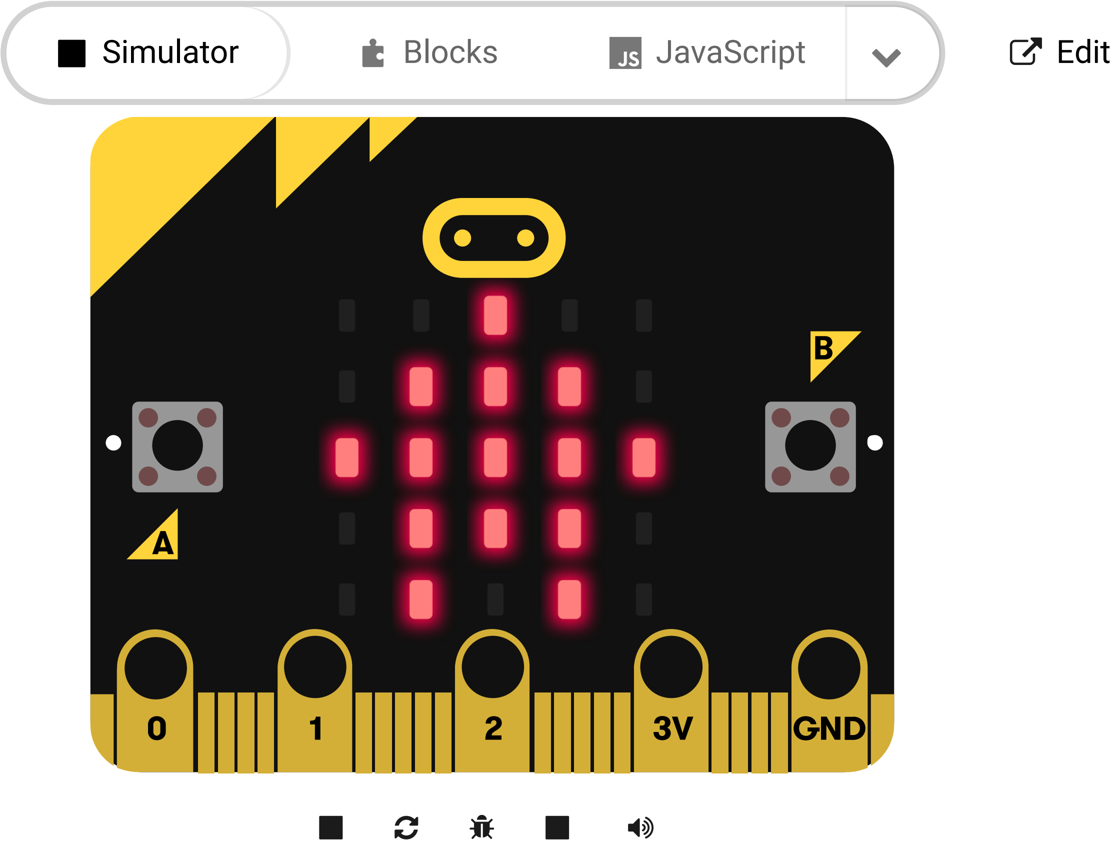


```
on start
    show icon

Gesture sensor IIC port is Up
    Go Forward at speed 40 % for 1 seconds

Gesture sensor IIC port is Down
    Go Backward at speed 40 % for 1 seconds

Gesture sensor IIC port is Left
    Go Left at speed 40 % for 1 seconds

Gesture sensor IIC port is Right
    Go Right at speed 40 % for 1 seconds
```

Link

- Link：https://makecode.microbit.org/_PqAPVDY7hDRR

- You may also download it directly below:



18.7. Conclusion

- Face your hands onto the gesture sensor, control TPBot’s movement with your hands gesture.

18.8. Exploration

18.9. FAQ

Q: While operating this case, why the car might not work properly?

A: It might be the low power of the batteries, please try adding the value of TPBot’s speed and test again.

18.10. Relevant File

19. Case18： Color-controlled TPBot

19.1. Purpose

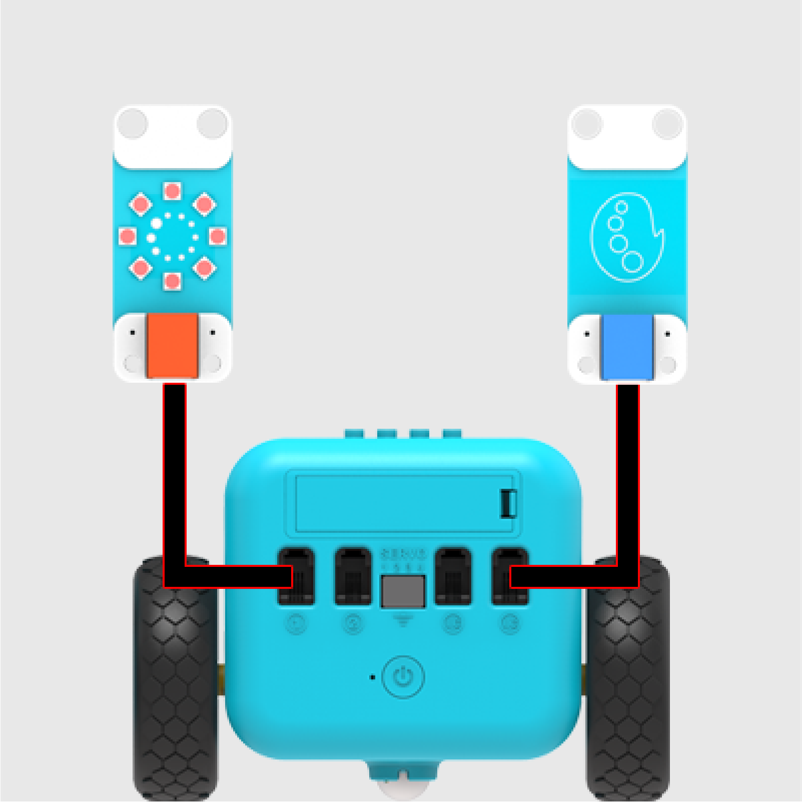
- The rainbow LED changes in accordance with the color of the cards and it executes the defined functions accordingly(move forward,;change the color of the headlights at random; obstacles avoidance; line-following)

19.2. Material

1 x TPBot

19.3. Hardware connection

Connect rainbow led to port 1 and color sensor to IIC port on TPBot.

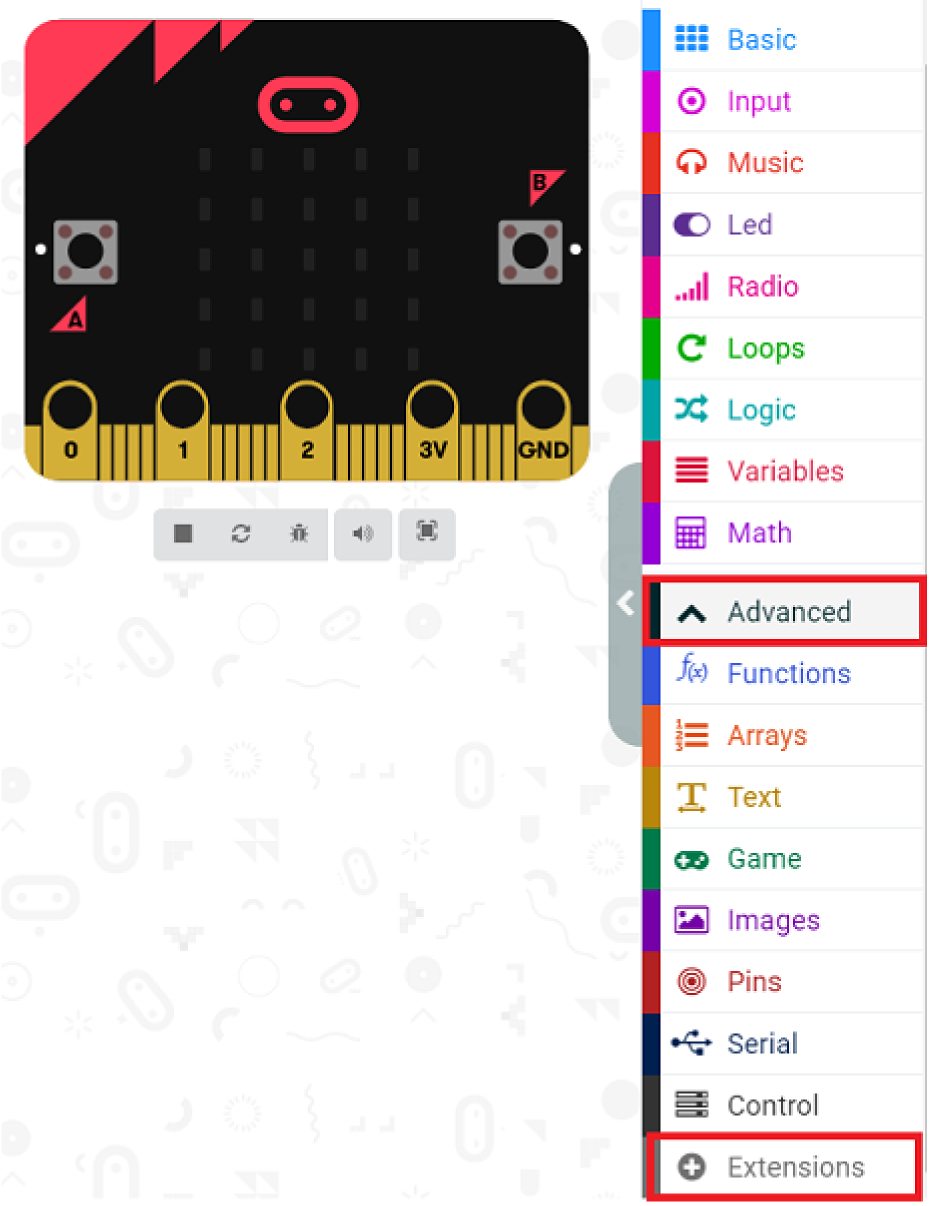


19.4. Software

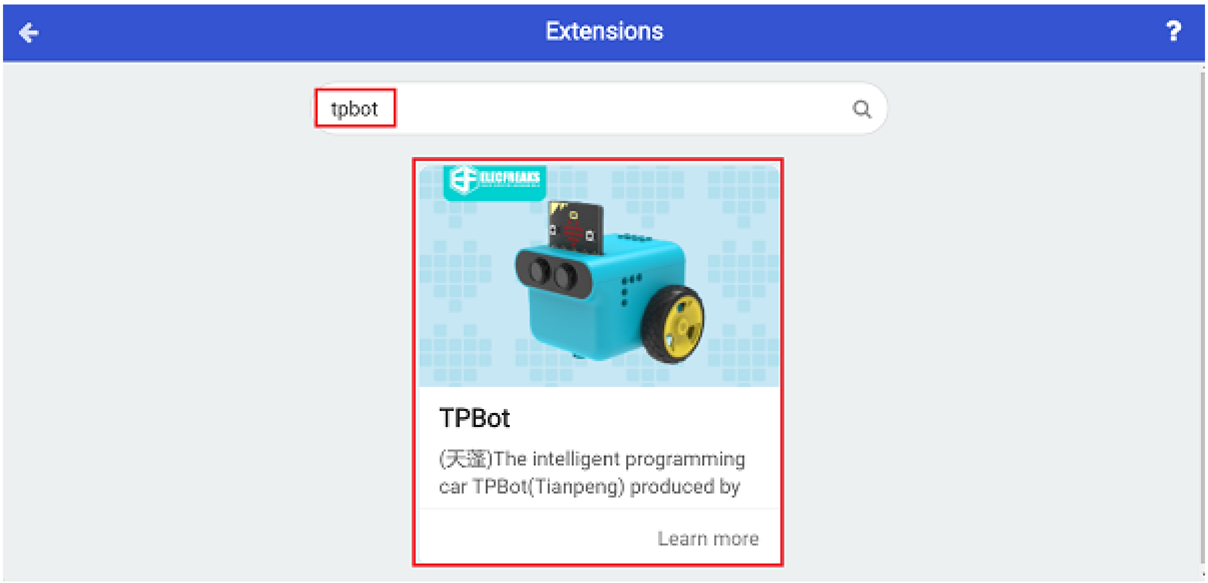
MicroSoftmakecode

19.5. Programming

Click “Advanced” to see more choices in the MakeCode drawer.



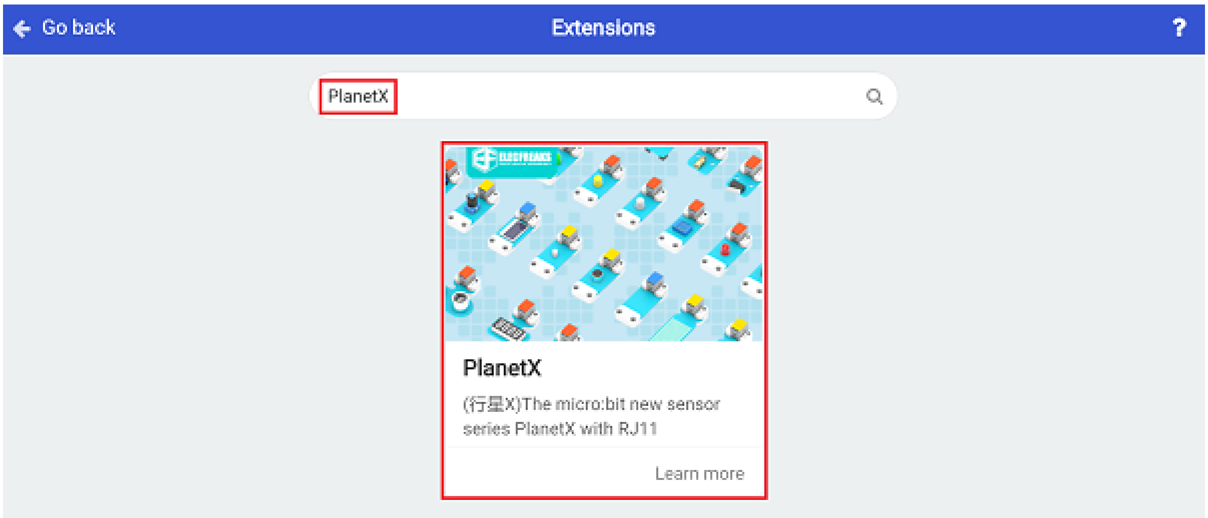
- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” in the dialogue box to download it.



TPBot

(天蓬)The intelligent programming car TPBot(Tianpeng) produced by

- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “PlanetX” in the dialogue box to download it.

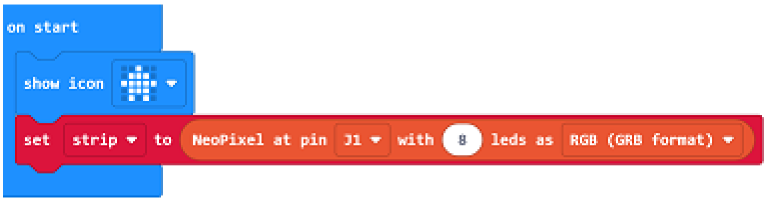


PlanetX

(行星X)The micro:bit new sensor series PlanetX with RJ11

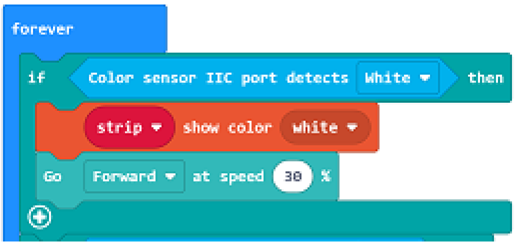
19.6. Sample

- In on start brick, drag the show icon brick into it and initialize the led strip and has it connected to J1 port.



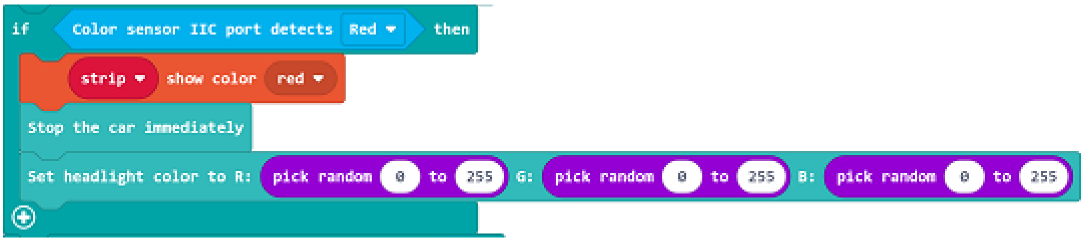
```
on start
    show icon
    set strip to NeoPixel at pin J1 with 8 leds as RGB (GRB format)
```

- In forever brick, set the rainbow led in white if the color sensor detects white, and set TPBot move forward at the speed of 30%.



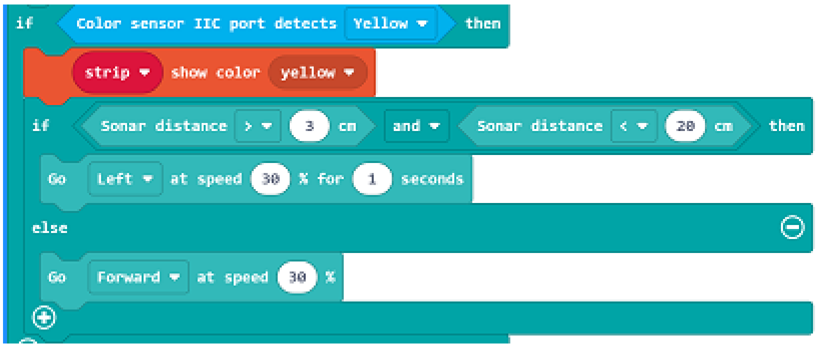
```
forever
    if Color sensor IIC port detects White then
        strip show color white
        Go Forward at speed 30 %
```

- Set the rainbow led in red if the color sensor detects red, set TPBot stop moving and the RGB value of the headlight a random number among 0~225.



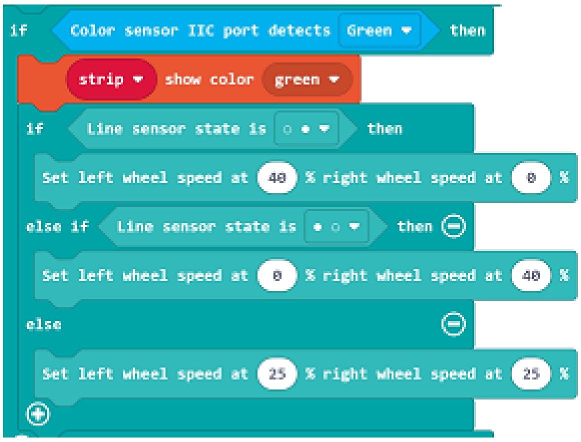
```
if Color sensor IIC port detects Red then
    strip show color red
    Stop the car immediately
    Set headlight color to R: pick random 0 to 255 G: pick random 0 to 255 B: pick random 0 to 255
```

- Set the rainbow led in yellow if the color sensor detects yellow, and judge if the returned value from the sonar:bit is between 3~20. If yes, set TPBot turn left for 1s at the speed of 30% or move forward at the speed of 30%.



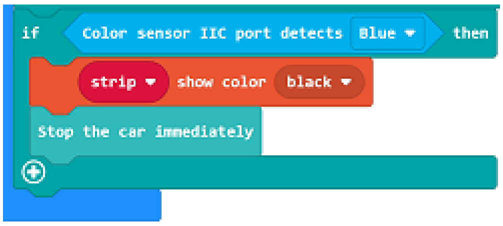
```
if Color sensor IIC port detects Yellow then
    strip show color yellow
    if Sonar distance > 3 cm and Sonar distance < 20 cm then
        Go Left at speed 30 % for 1 seconds
    else
        Go Forward at speed 30 %
```

- Set the rainbow led in green if the color sensor detects green, and judge the status of the two-way line-tracking sensor. If black is detected on the left, set the speed of the left wheel as 0 and right as 40; if it is detected on the right, set the speed of the left wheel as 40 and right as 0; if it is detected on both sides, it means the TPBot does not deviate from the black line, and set it move foreward at the speed of 25%.



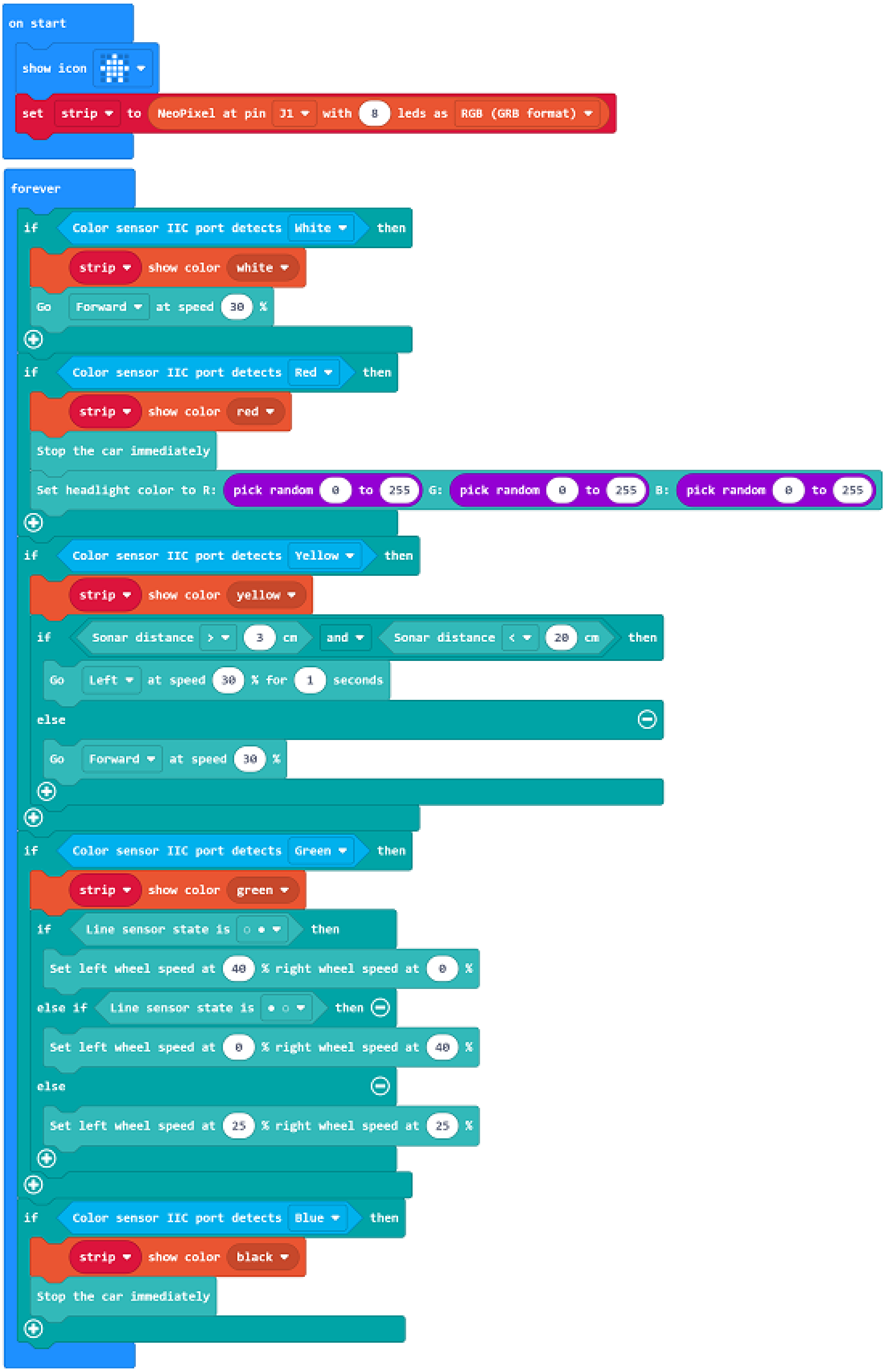
```
if Color sensor IIC port detects Green then
    strip show color green
    if Line sensor state is ○ ● then
        Set left wheel speed at 40 % right wheel speed at 0 %
    else if Line sensor state is ● ○ then
        Set left wheel speed at 0 % right wheel speed at 40 %
    else
        Set left wheel speed at 25 % right wheel speed at 25 %
```

- Set the rainbow led in blue if the color sensor detectsblue, set the TPBot stop moving.



```
if Color sensor IIC port detects Blue then
    strip show color black
    Stop the car immediately
```

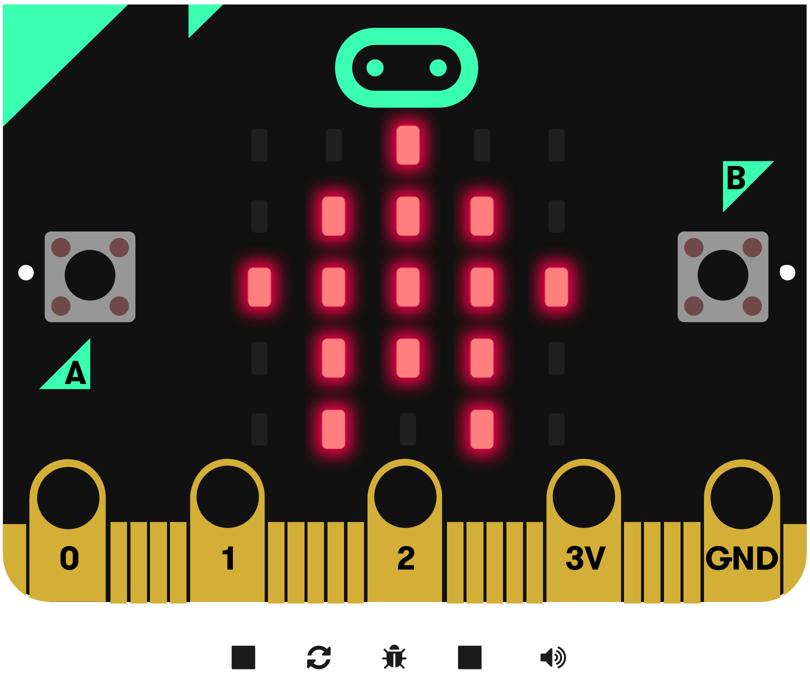
Code：



```
on start
  show icon
  set strip to NeoPixel at pin J1 with 8 leds as RGB (GRB format)

forever
  if Color sensor IIC port detects White then
    strip show color white
    Go Forward at speed 30 %
  if Color sensor IIC port detects Red then
    strip show color red
    Stop the car immediately
    Set headlight color to R: pick random 0 to 255 G: pick random 0 to 255 B: pick random 0 to 255
  if Color sensor IIC port detects Yellow then
    strip show color yellow
    if Sonar distance > 3 cm and Sonar distance < 20 cm then
      Go Left at speed 30 % for 1 seconds
    else
      Go Forward at speed 30 %
  if Color sensor IIC port detects Green then
    strip show color green
    if Line sensor state is ○ ● then
      Set left wheel speed at 40 % right wheel speed at 0 %
    else if Line sensor state is ● ○ then
      Set left wheel speed at 0 % right wheel speed at 40 %
    else
      Set left wheel speed at 25 % right wheel speed at 25 %
  if Color sensor IIC port detects Blue then
    strip show color black
    Stop the car immediately
```

Link

- Link：https://makecode.microbit.org/_YrH0rDiLJEKg
- You may also download it directly below:



-- --- ## Conclusion ---

- Place the cards in different color in the front of the gesture sensor to activate different functions:
- White card: Rainbow LED lights on in white and TPBot moves forward.
- Red card: Rainbow LED lights on in red and TPBot stops moving with the headlights changing the colors at random.
- Yellow card: Rainbow LED lights on in yellow and TPBot goes into the obstacle-avoidance mode.
- Green card: Rainbow LED lights on in green and TPBot goes into the line-tracking mode.
- Blue card: Rainbow LED lights on in blue and TPBot stops moving.

19.7. Exploration

19.8. FAQ

Q: While operating this case, why the car might not work properly?

A: It might be the low power of the batteries, please try adding the value of TPBot’s speed and test again.

19.9. Relevant File

20. Case 19: Sweeper

20.1. Purpose

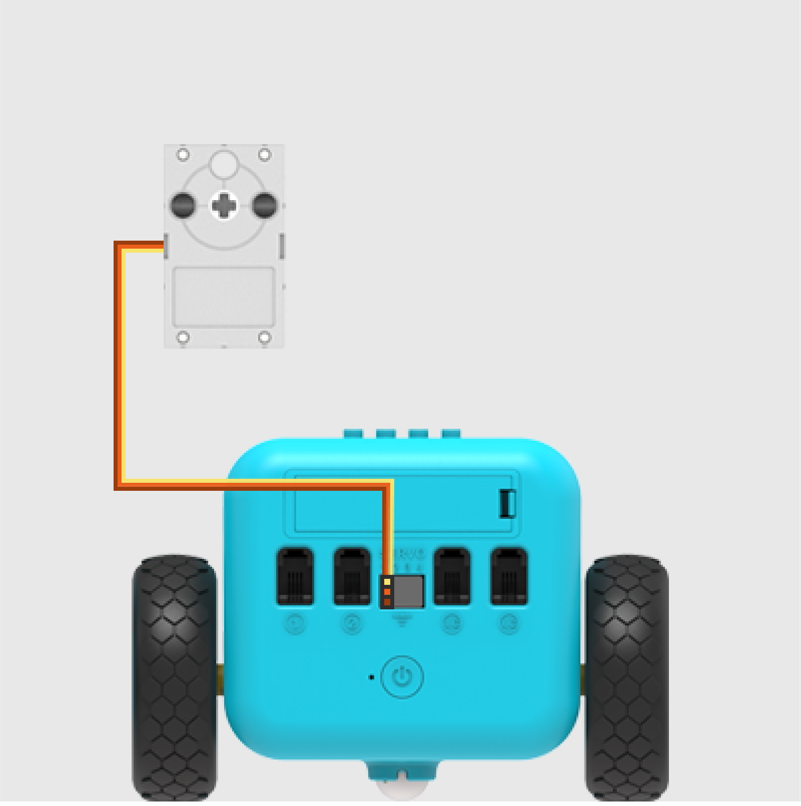
- Build a TPBot sweeper.

20.2. Material

- 1 x TPBot Smart Car

20.3. Hardware Connection

Connect the 360 degrees servo to servo 1 port on TPBot. (Servos are not included in our TPBot kit)

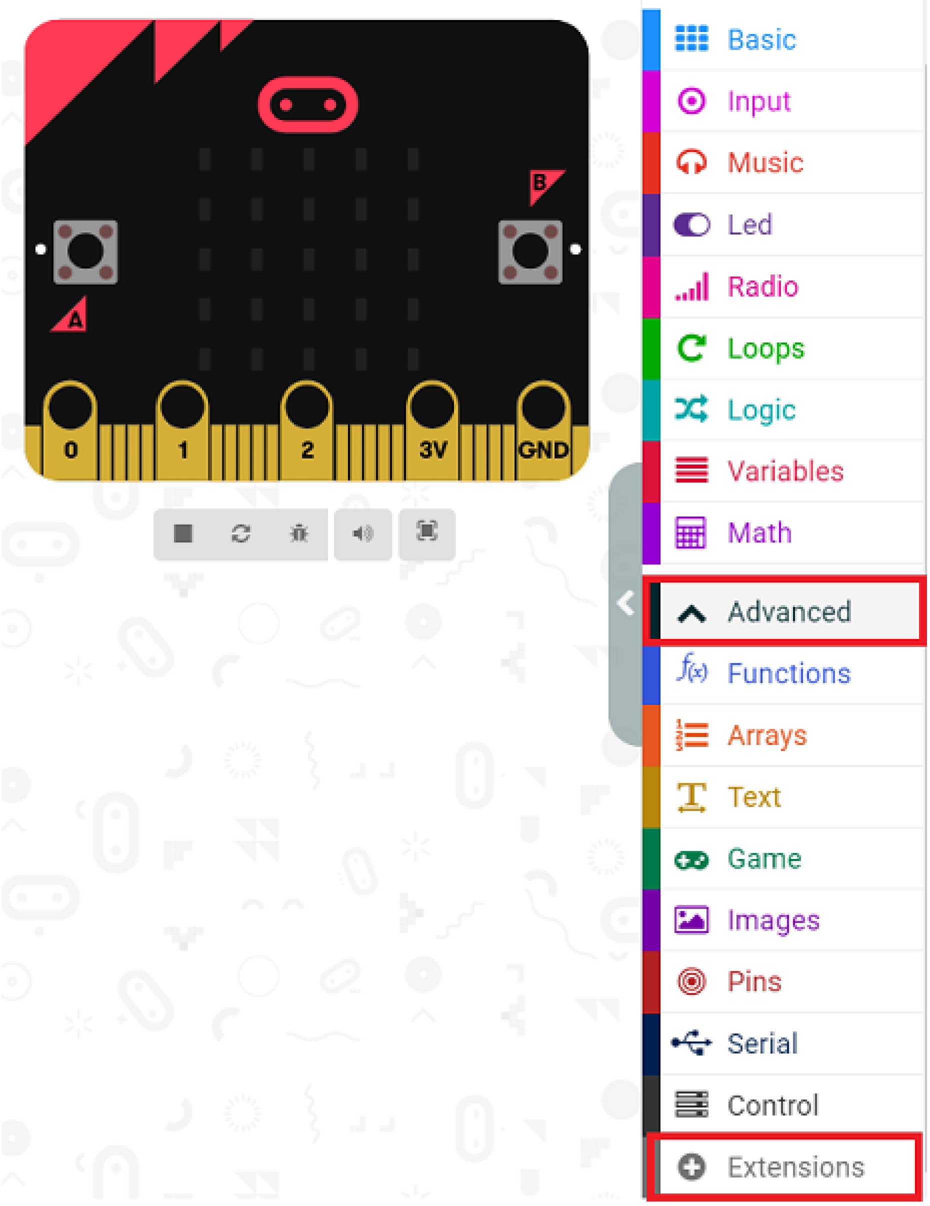


20.4. Software

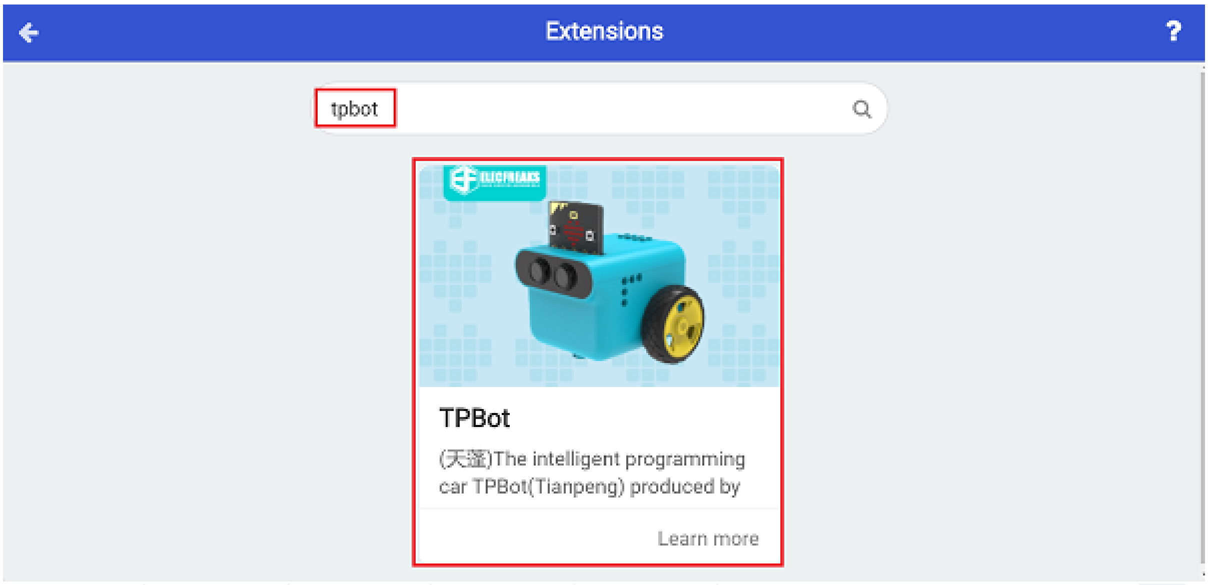
MicroSoft makecode

20.5. Programming

- Click “Advanced” in the MakeCode drawer to see more choices.



- We need to add a package for programming. Click “Extensions” in the bottom of the drawer and search with “tpbot” to download it.

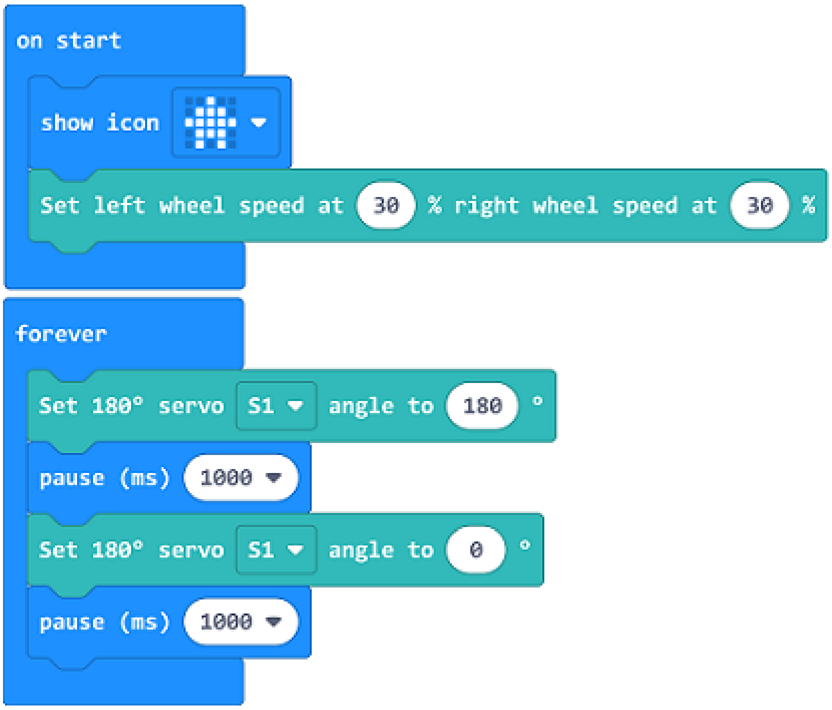


TPBot

(天蓬)The intelligent programming car TPBot(Tianpeng) produced by

##Sample

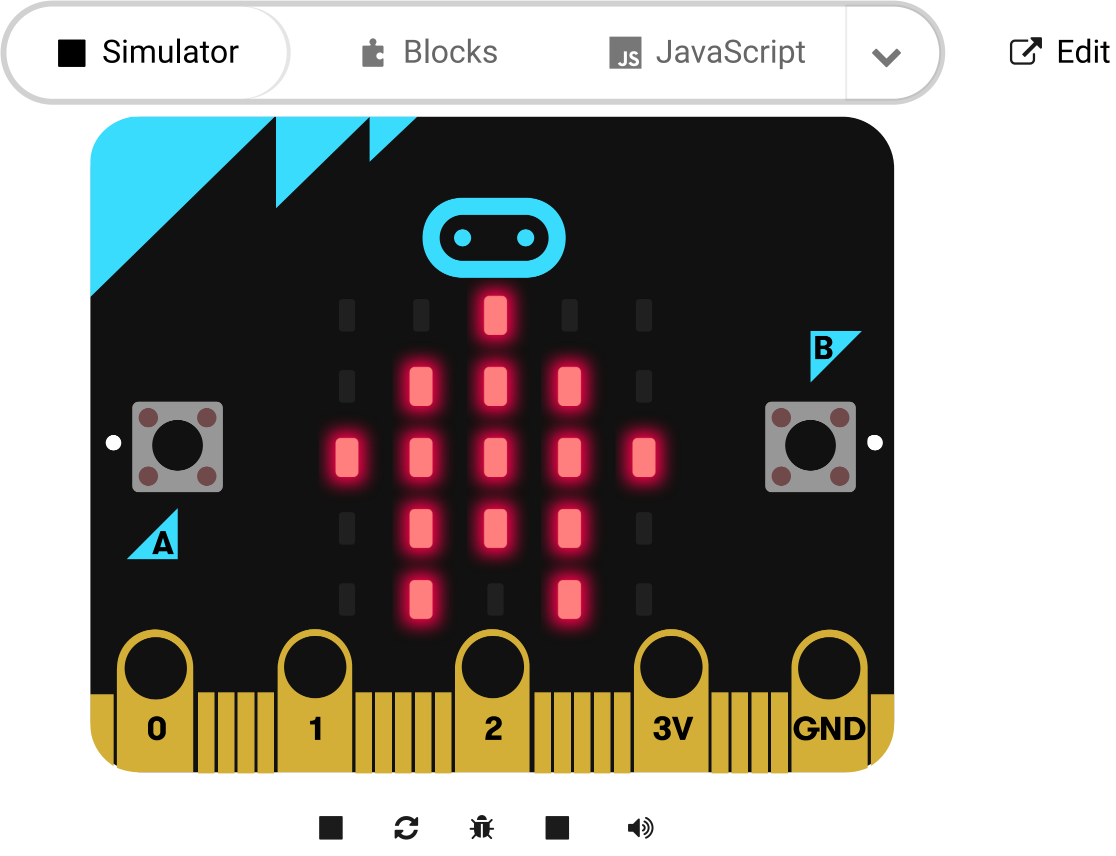
- Drag the show icon brick in the on start and set the car to move forward at the speed of 30%; in forever brick, set the servo connecting to S1 rotate to 180 degrees and pause for 1000ms, and set it rotate to 0 degree and pause for 1000ms.



```
on start
    show icon
    Set left wheel speed at 30 % right wheel speed at 30 %
forever
    Set 180° servo S1 angle to 180 °
    pause (ms) 1000
    Set 180° servo S1 angle to 0 °
    pause (ms) 1000
```

Link

- Link：https://makecode.microbit.org/_664VpuAVMcCa
- You may also download it directly below:



-- --- ## Conclusion ---

The car move forward with the servo rotating.

20.6. Exploration

20.7. FAQ

Q: The car cannot move with the code in this case? A: It might be a lack power of the battery, please add the value of the parameter for the speed of the car and test it.

20.8. Revelant File