Microbit Robotics Beginner Level 1

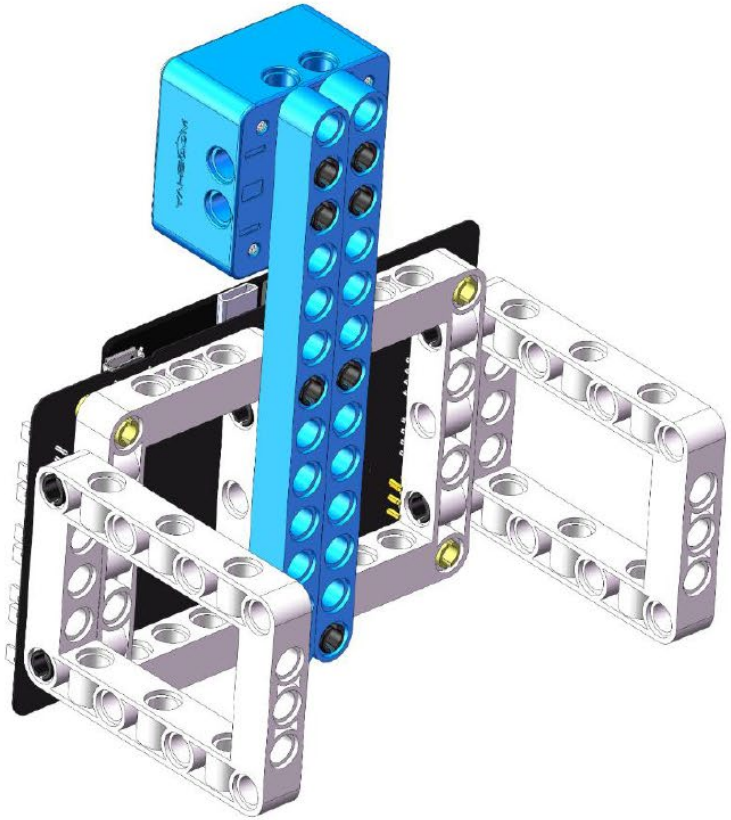
Lesson 7

Hand-held range Finder

Presented by Advanced Superlogic Team

Review previous lesson

Infrared Warning Device



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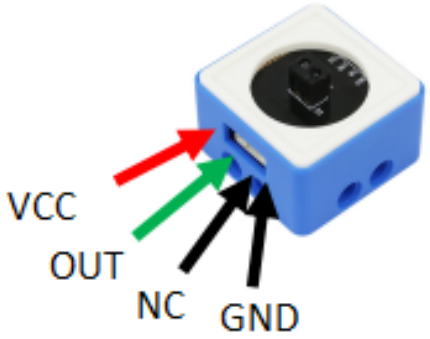
Infrared Sensor Module

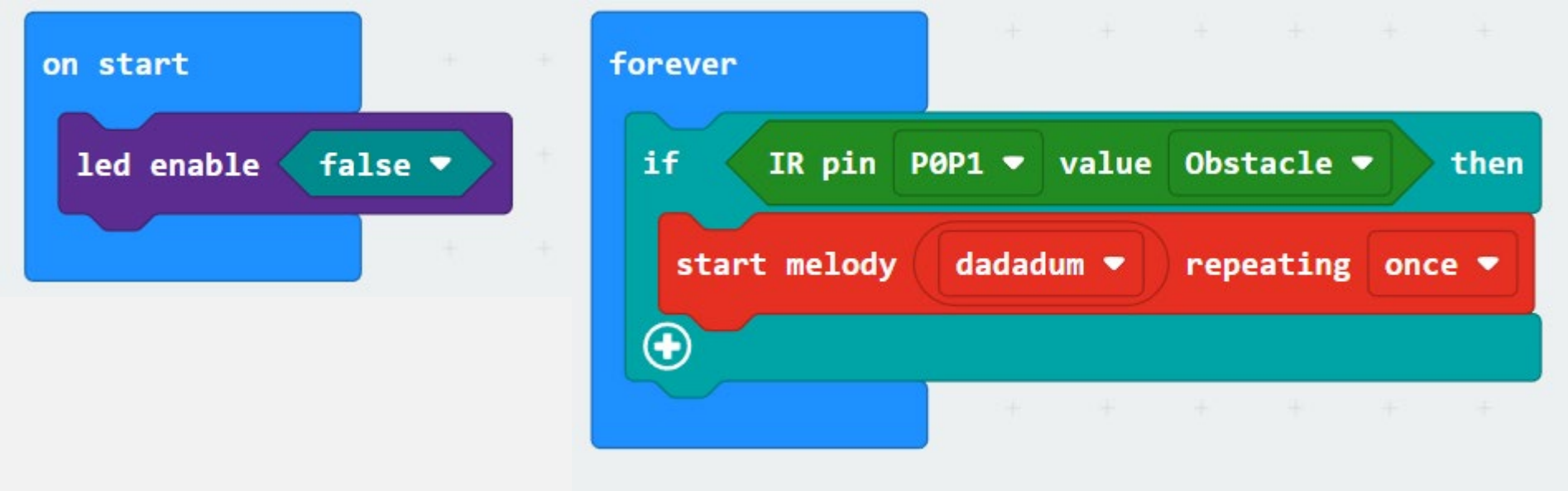


GND: connect gnd	VCC: Power supply interface, can be connected to 3.3V, 5V
OUT:Digital signal output	NC： no need connect
Working voltage：3.3V/5V	Size： 29.4mm*28.8mm

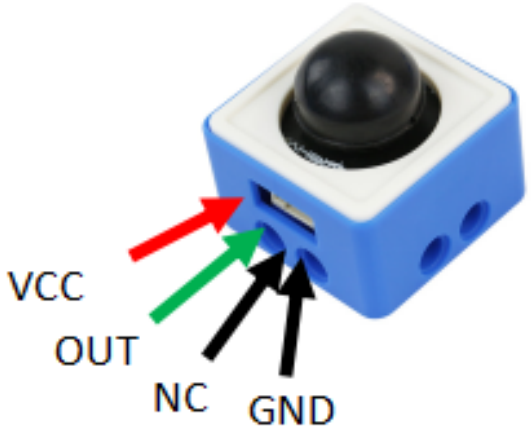
The basic principle of the infrared sensor is to use the reflective nature of the object. Within a certain range, if there is an obstacle, the infrared rays will encounter obstacle and will be reflected to reach the sensor receiving pin.

After processing, the signal is returned to the micro-controller through the digital sensor interface, and the micro-controller can use the return signal to identify changes in the surrounding environment.

Combine Blocks



Human body infrared sensor

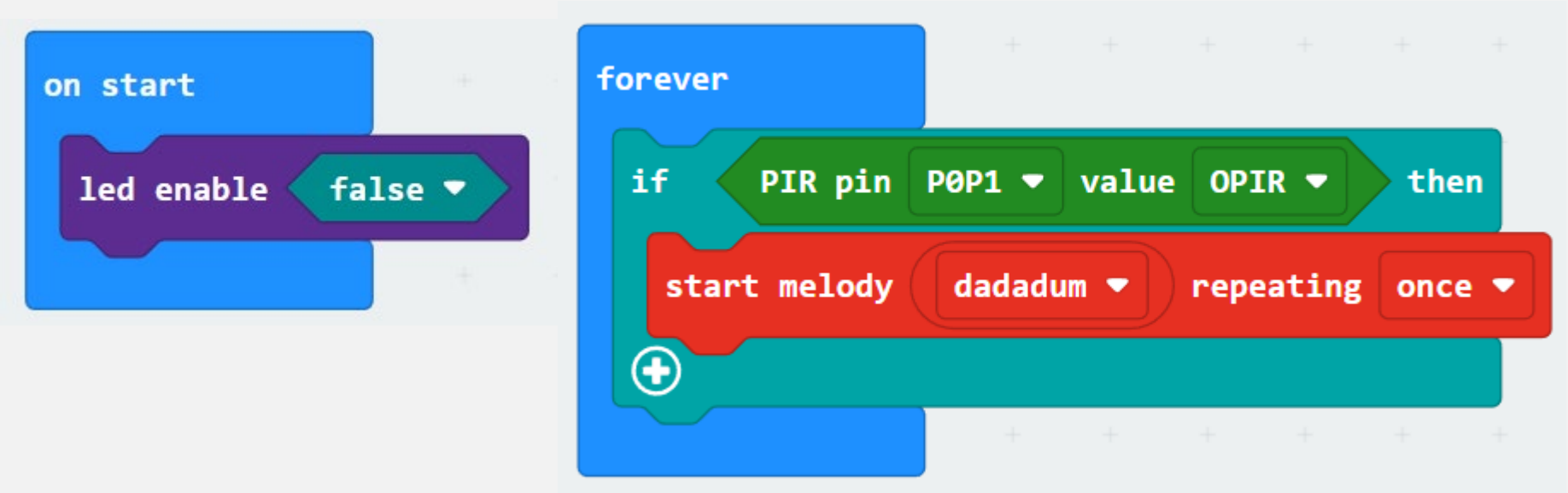


GND: connect gnd	VCC: Power supply interface, can be connected to 3.3V, 5V
OUT: signal output	NC: No need connect
Working voltage: 3.3V/5V	Size: 29.4mm*28.8mm

The human body infrared sensor module, which works by detecting the infrared rays of about 10 um emitted by the human body. A Fresnel lens filter is attached to the surface to reduce the interference of the external environment on the detection.

Once a person enters the detection area, the infrared radiation of the human body is focused by a part of the mirror, and an alarm signal is generated after processing, and the pin outputs a high level, otherwise it outputs a low level.

Combine Blocks



Do a quick self-check of your learning outcome...

1. What does IR stand for?
2. What is the difference between Infrared sensor and Human body infrared sensor?
3. What application can we use on Infrared sensor in real life?
4. What application can we use on Human body infrared sensor in real life?

L6 – Mission

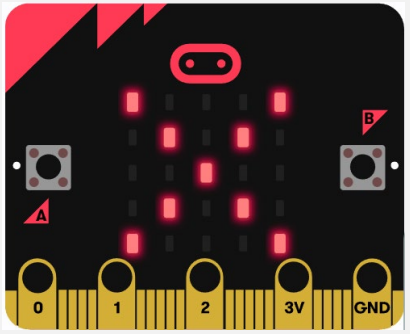
Using 3 modules Infrared, Button, and RGB:

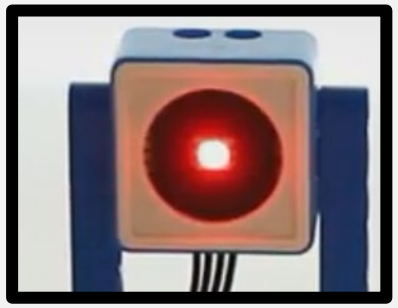
Make a controlled pedestrian crossing light that changes red when button is pressed, pause for 10 seconds for pedestrian crossing, then changes to green.

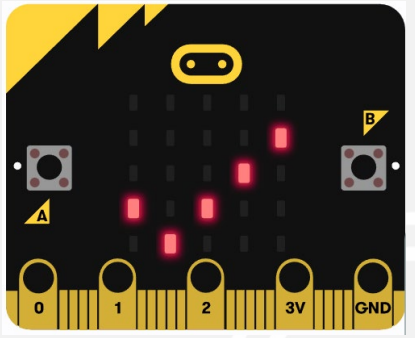
Condition:

1. **RGB will changes light to red when button is pressed and there is no obstacle. If button is pressed and there is obstacle, it won't turn to red.**

2. **Show LED for pedestrian. When green light, LED will show stop . When red light, LED will show safe to cross**







Today's Topic

1. Build Hand-held range Finder device with World of Modules
2. Ultrasonic and Digital Tube module connection method
3. Ultrasonic and Digital Tube Programming

Learning Outcome

1. Able to build Hand-held range Finder device with instruction manual
2. Understand how Ultrasonic programming work
3. Understand how Digital Tube programming work
4. Able to program Ultrasonic and Digital Tube module

Hand-held range Finder

Step 1

Step 2

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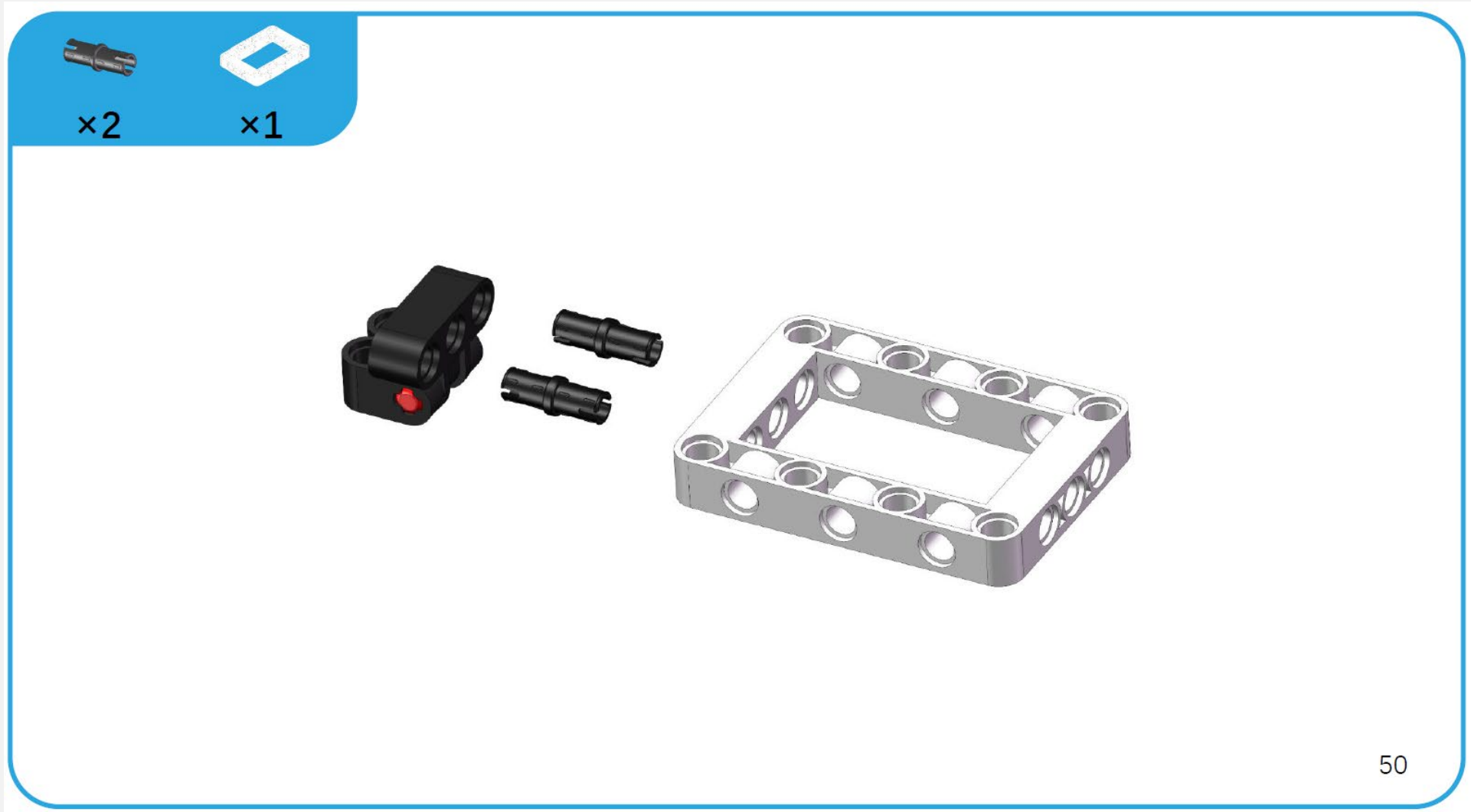
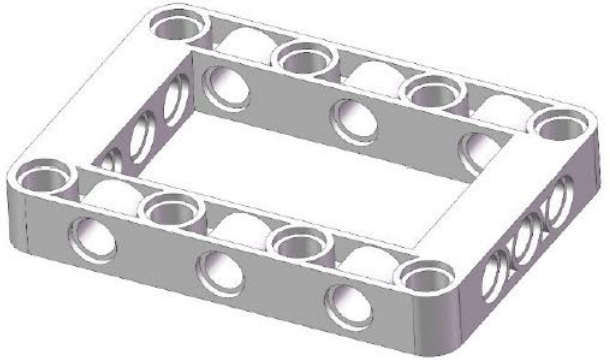
Step 3



Step 4



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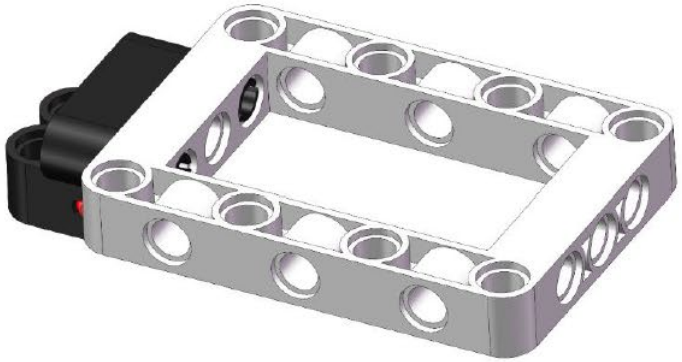
Step 5



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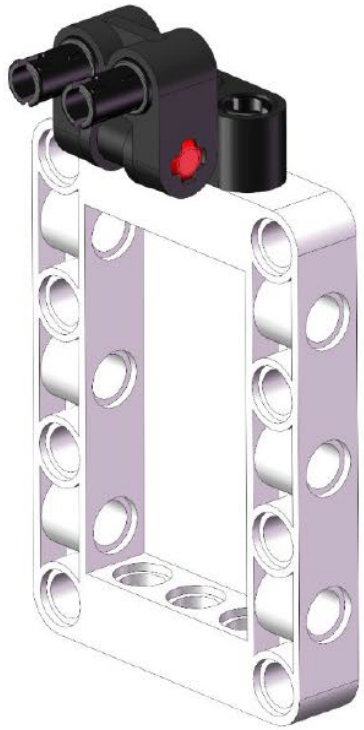
Step 6


×2


×1

53

Step 7



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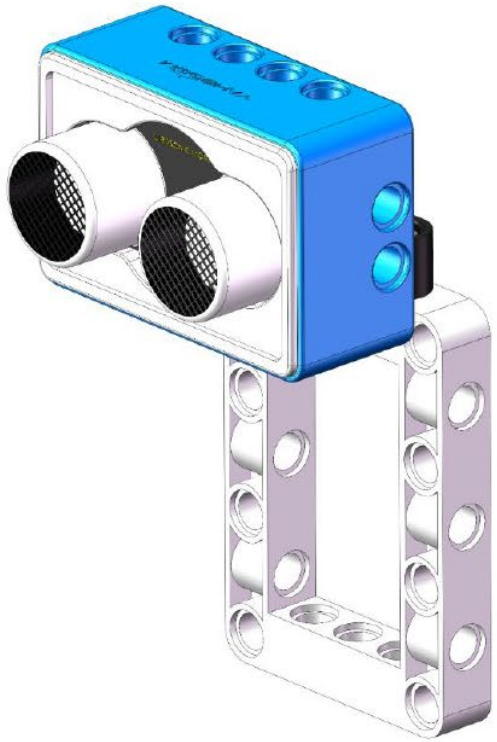
Step 8



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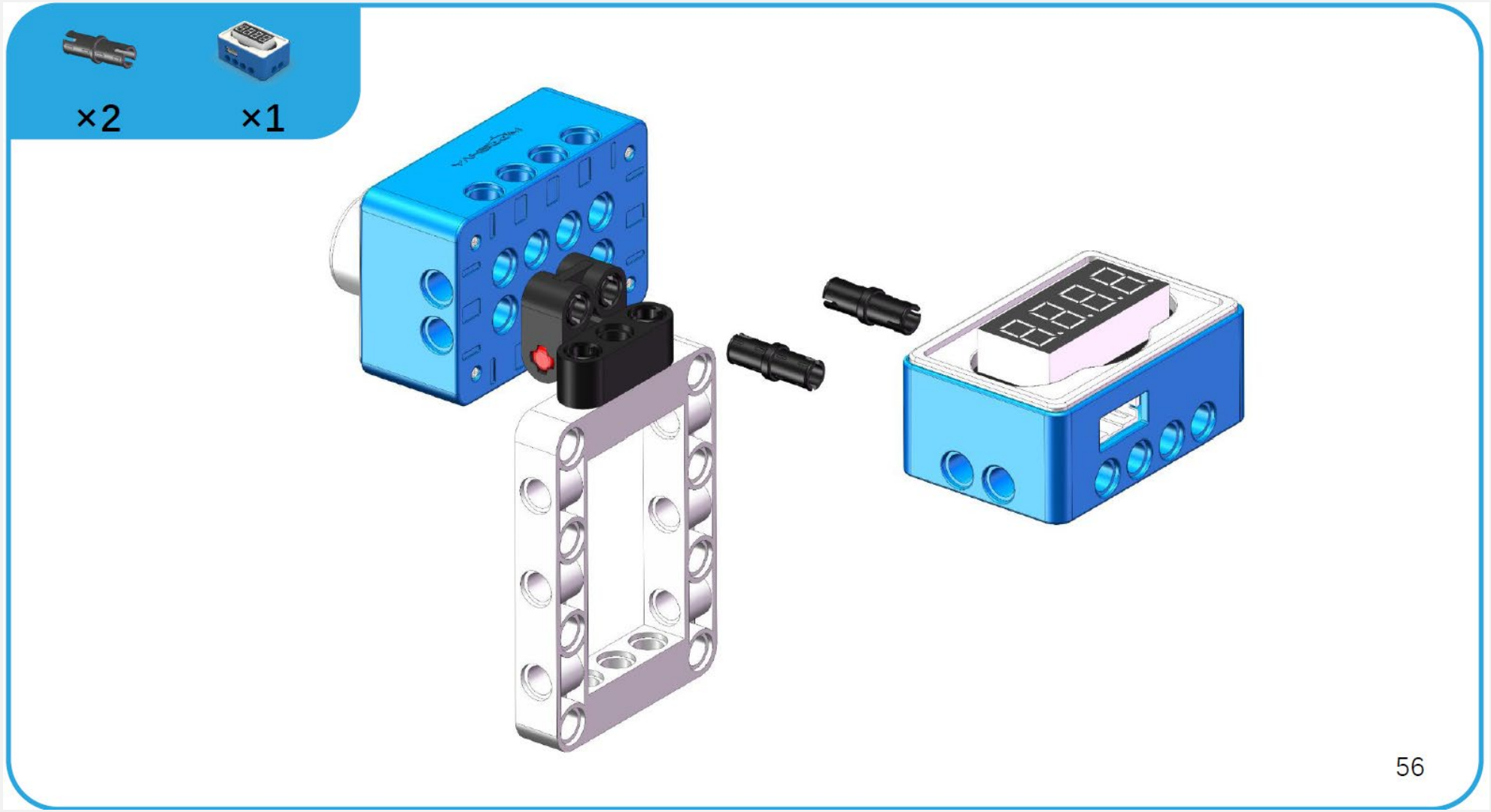
Step 9



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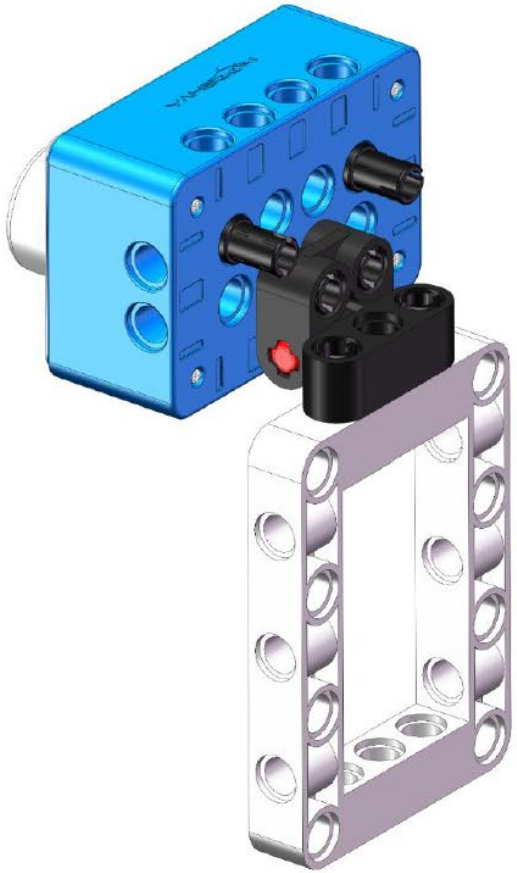

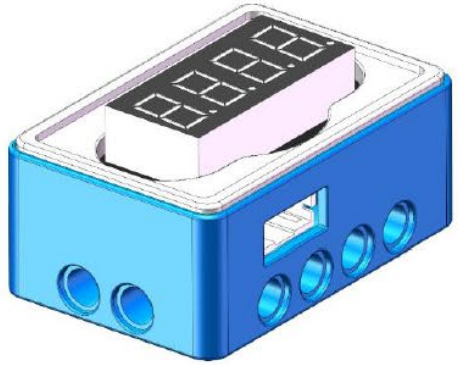

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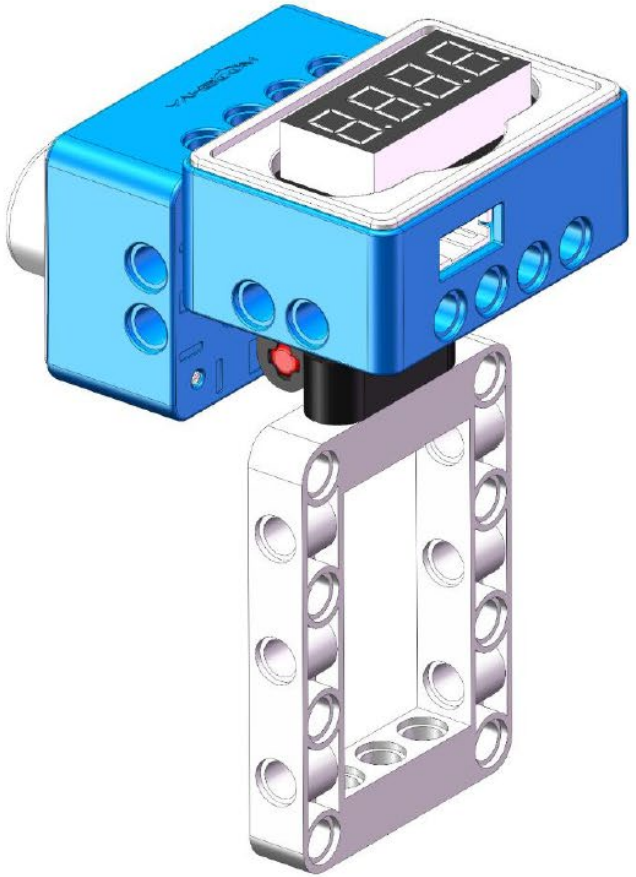
Step 11



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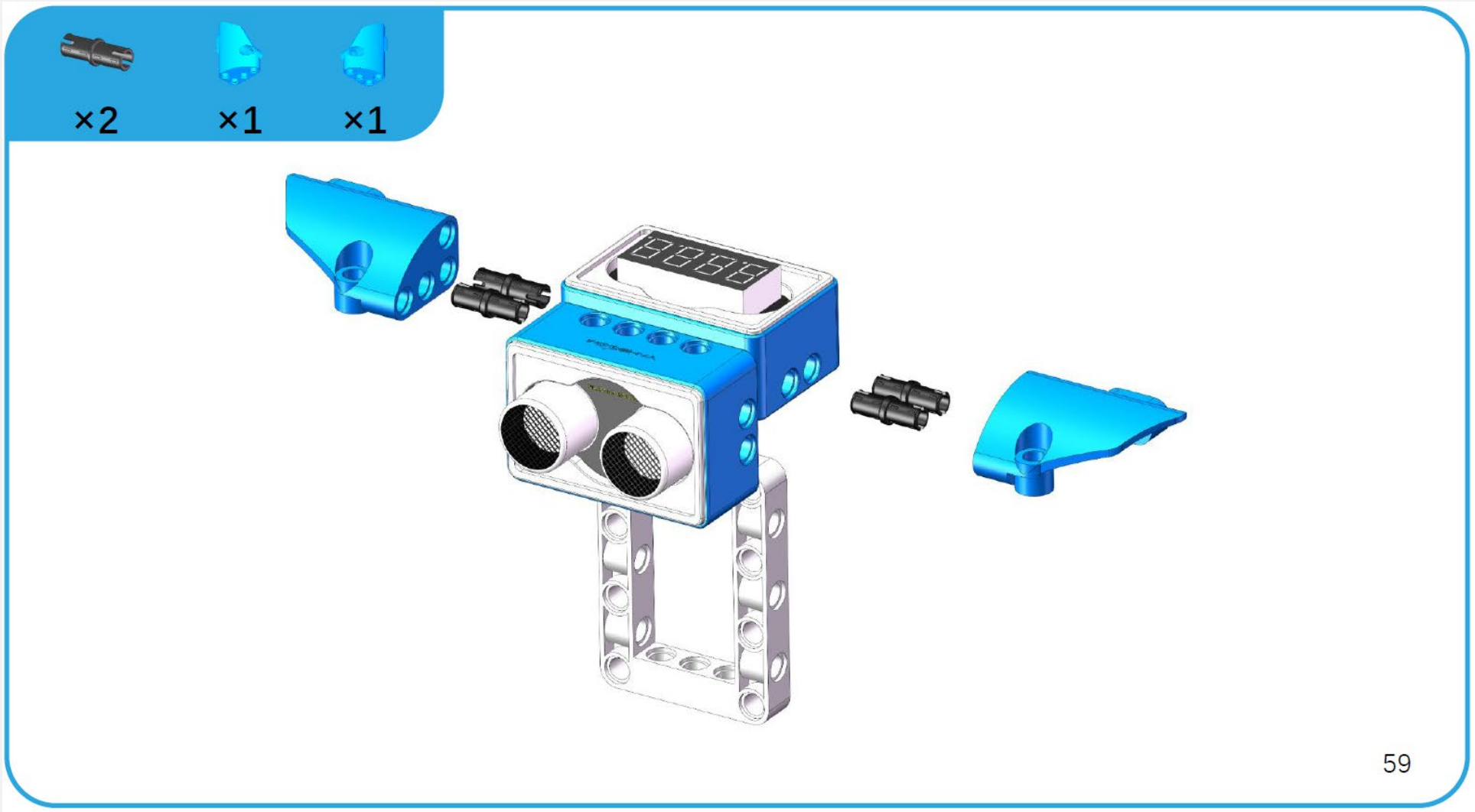
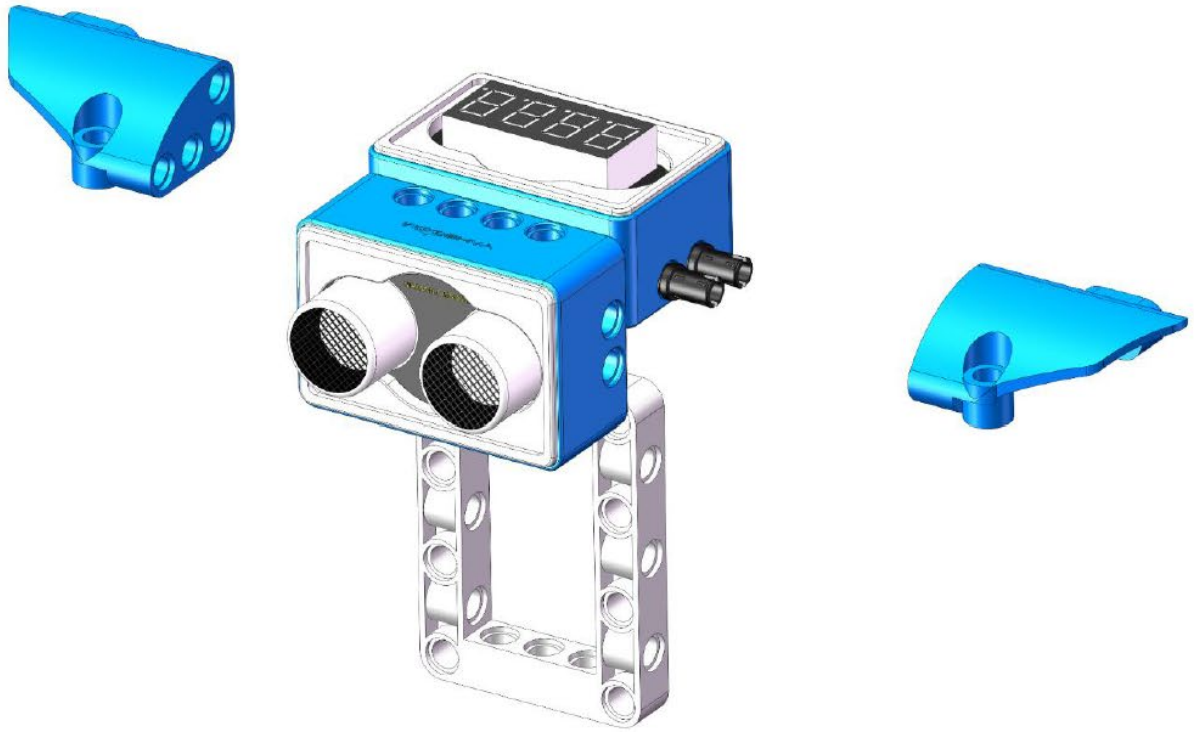
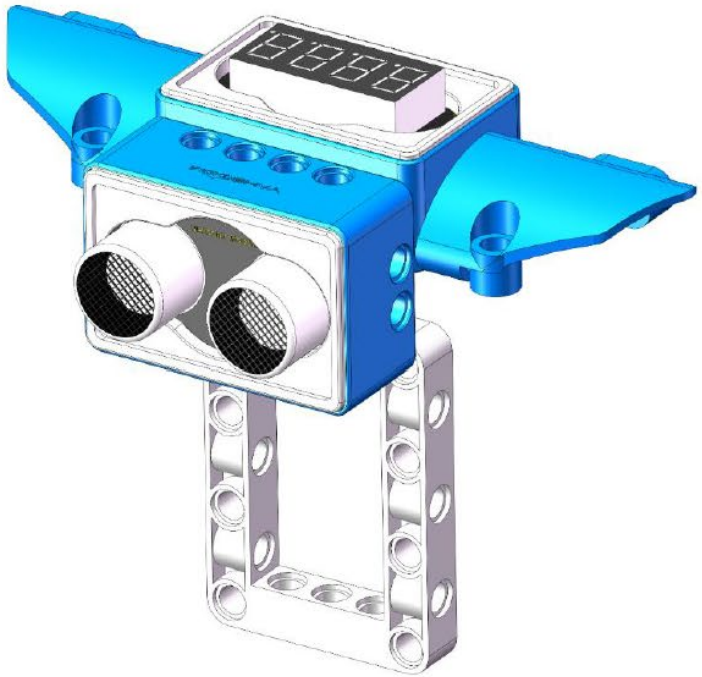
Step 12



Step 13



Step 13



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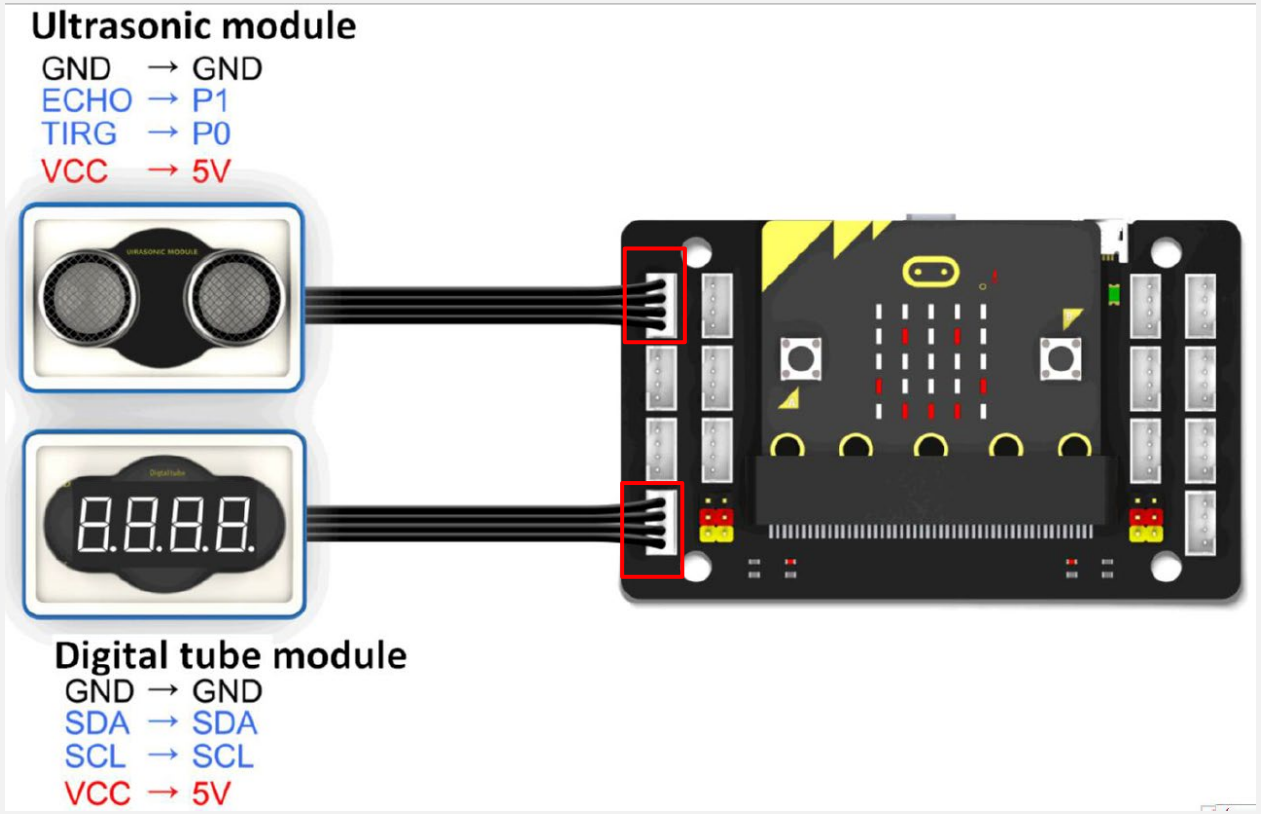
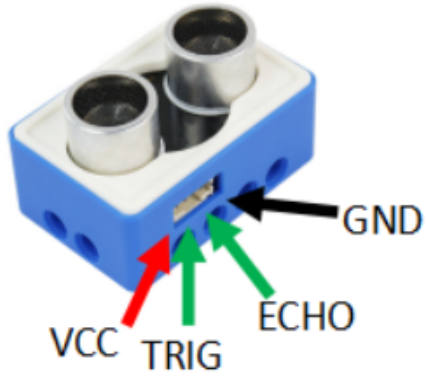
Wire Connection

Connect the modules



Let's connect the module like this.

Introducing the Ultrasonic Module



GND: connect GND	VCC: connect 3.3V, 5V
TRIG: Transmit a signal	ECHO: Receive signal
Working Voltage: 3.3V/5V	Size of module: 44.7mm*28.8mm
Accuracy: 0.5cm	Range: 2cm~500cm

Ultrasonic sensor is designed to take advantage of the characteristics of ultrasonic waves. When working normally, the TRIG pin sends out ultrasonic signal. When encountering obstacles, the ultrasonic signal will be returned. After the ECHO pin receives the returned ultrasonic signal, the signal will be transmitted to the MCU. The MCU can calculates the time for ECHO to receive the signal to judge the current distance. The frequency of sound waves that can be heard by human ears is 20HZ ~ 20KHz, and the frequency of sound emitted by the ultrasonic module is greater than 20KHz, so the sound of the ultrasonic module cannot be heard by human ears.

Introducing the Digital Tube Module

GND: connect gnd	VCC: Power supply interface, can be connected to 3.3V, 5V
SCL: IIC clock line	SDA: IIC data line
Working voltage: 3.3V/5V	Size: 44.7mm*28.8mm
Digital I2C base address: 0x34	Digital register I2C base address: 0x24

The module integrates the TM1650 chip, which can directly drive the digital tube display through I2C. It greatly reduces the difficulty of using the digital tube and saves the CPU occupancy rate of the single-chip microcomputer. The operation is convenient and flexible.

MakeCode Programming

https://github.com/YahboomTechnology/Module-World.

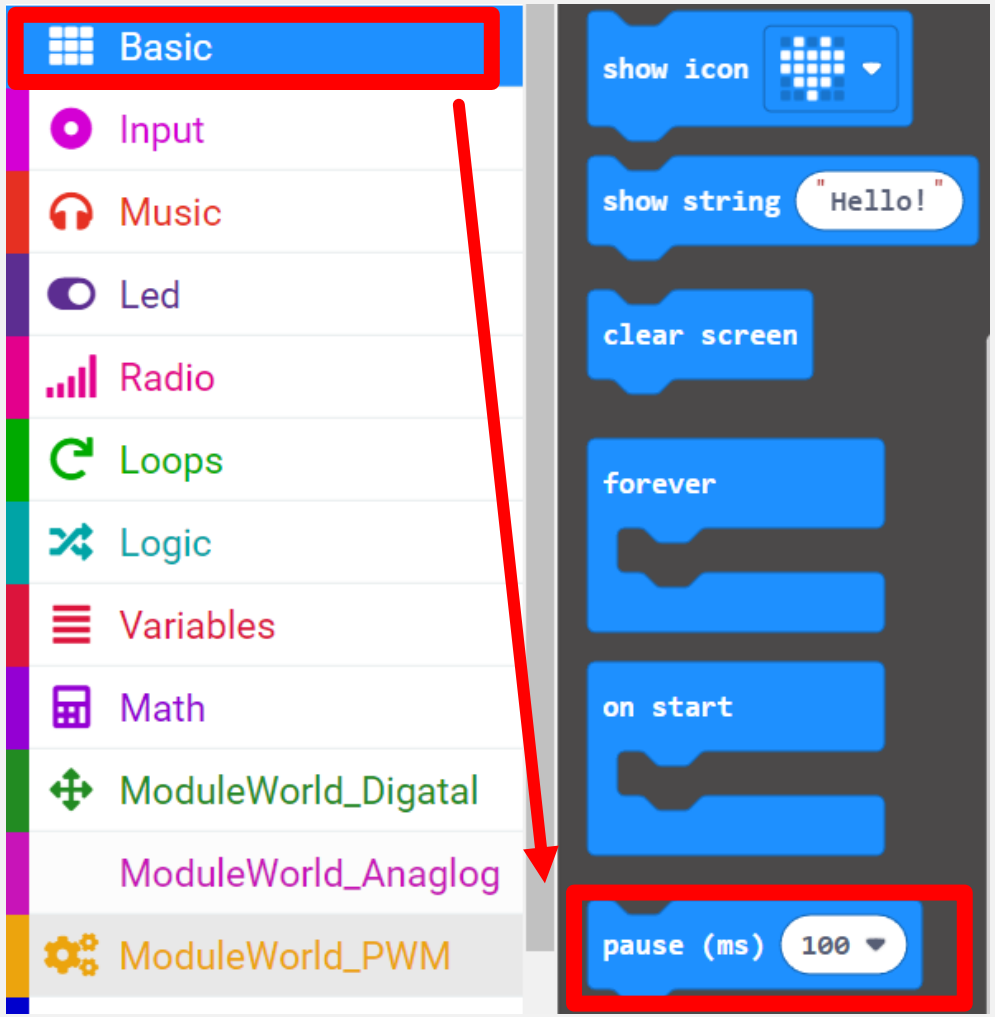
And

https://github.com/YahboomTechnology/tm1650

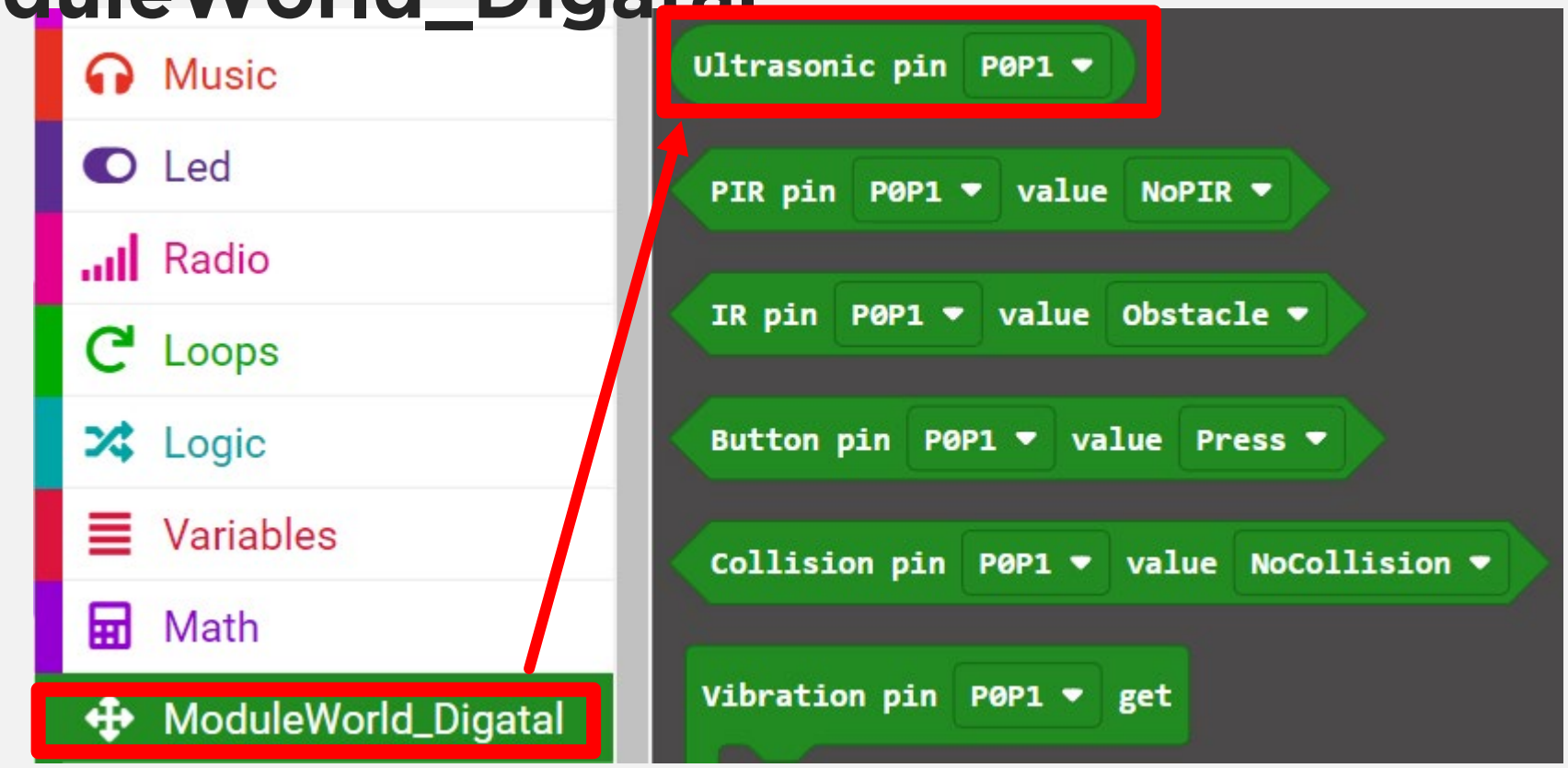
Or search YahboomTechnology/Module-World in the extension block

Or search YahboomTechnology/tm1650 in the extension block

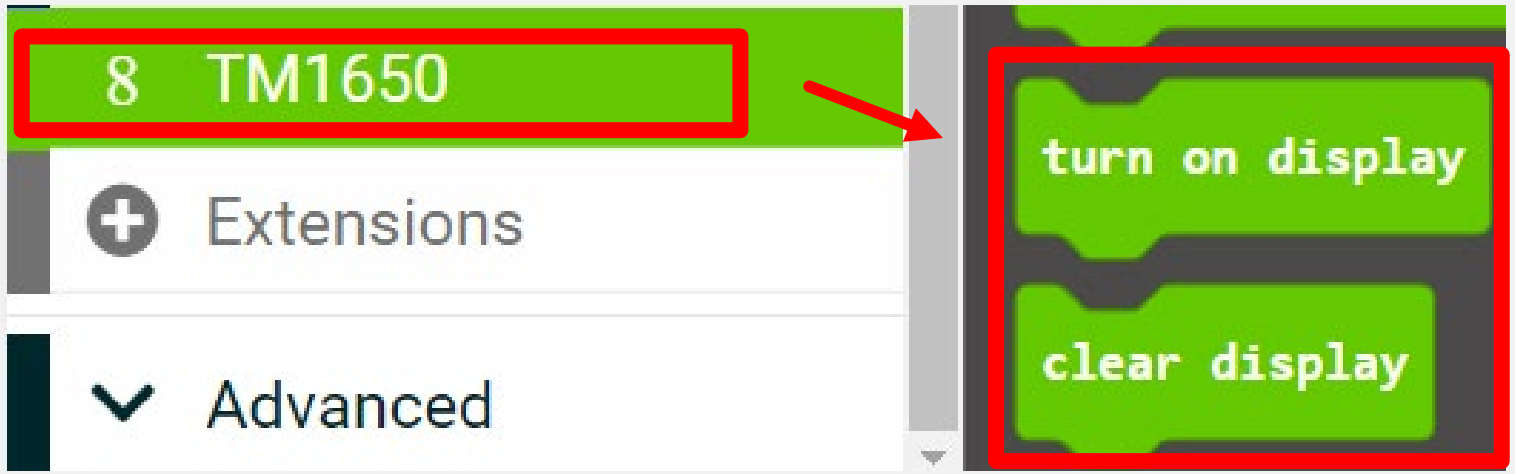
Coding – Basic



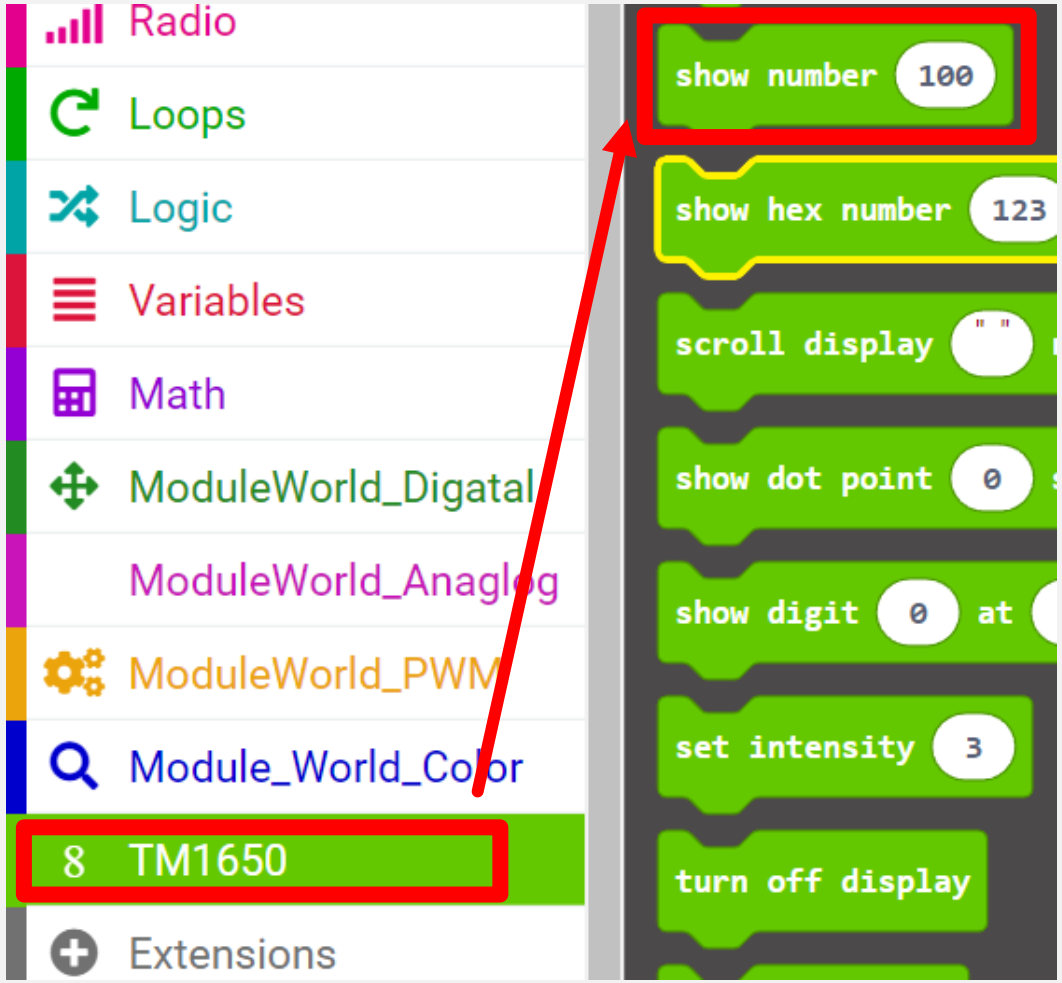
Coding – ModuleWorld_Digatal



Coding – TM1650



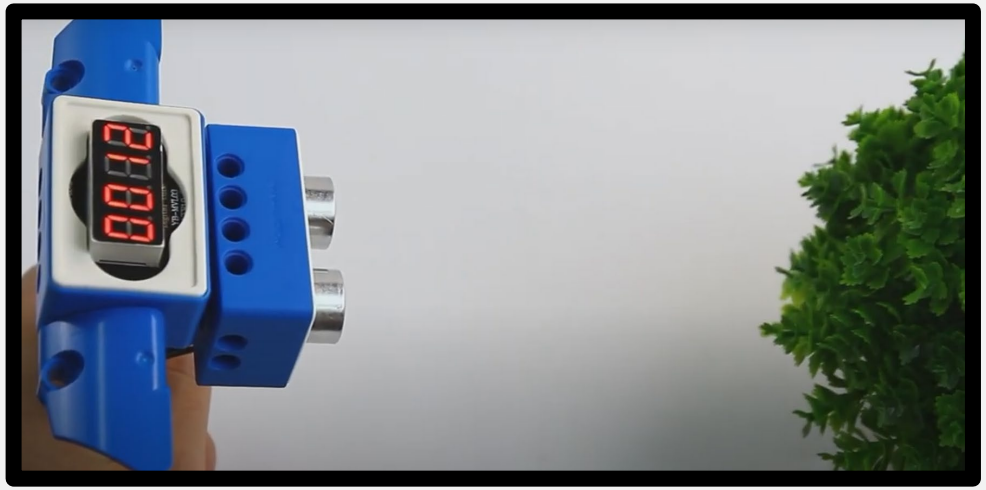
Coding – TM1650

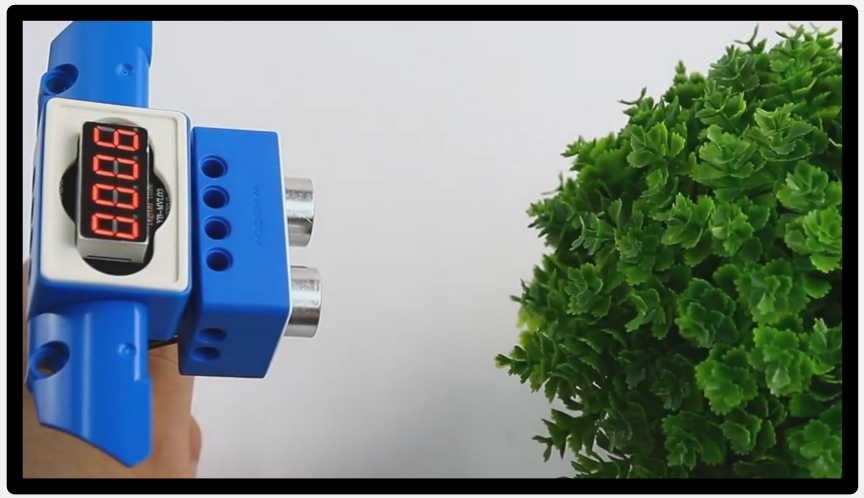


Combine Blocks

Phenomenon

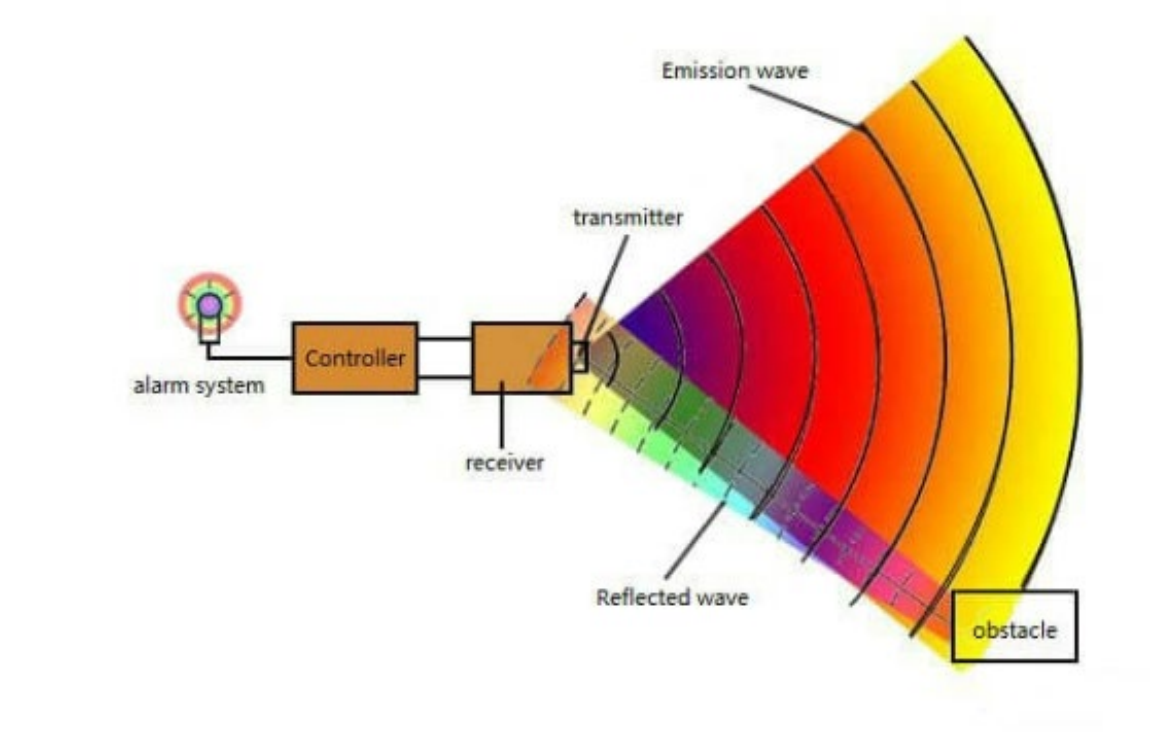
After the program is downloaded successfully.
The digital tube will display the distance.





Real life application

Car Parking Sensor



How does a car parking sensor work? Image result for car parking sensor How does parking sensor work? The **Ultrasonic sensors** – just like bats – use **high-frequency sound waves** to detect objects. These sensors **emit sound pulses** that reflect off of nearby objects. A receiver detects the **reflected waves** and **calculates the distance** from your vehicle to the object.

Do a quick self-check of your learning outcome...

1. Is Digital display module coding block in the Module-World extension?
2. How many string or number can the digital tube module show at once?
3. Is Ultrasonic sensor module giving digital or analog signal?
4. Can you give 2 real life examples for the application of Ultrasonic sensor?

CHALLENGE

for : Lesson 7

L7 –

Parking sensor:

After the program is downloaded successfully.

When something is too close with the ultrasonic,

Digital Tube will display “STOP”

Buzzer will make a ‘ba ding’ sound.

Parking sensor level 2:

Add button module, to act as an on/off switch.

Parking sensor level 3:

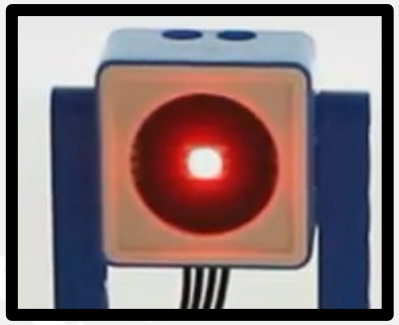
The closer the obstacle, the louder the buzzer sound.

L7 – Mission

Using 3 modules Ultrasonic , Button, and RGB:

Danger Lamp Sensor:
Make a remote for light switch that turns red and make a sound when an object is close to ultrasonic. When the object get far away, the light changes to white.

The button functions as an on/off switch.



Any Questions?

Thank you :)