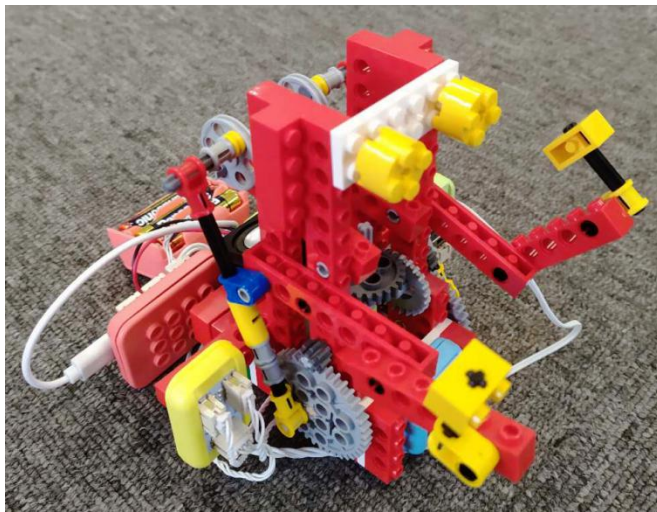


# Guide for Cheering Robot Workshop

## Overview

In this workshop, students need to work in teams to design and make a cheering robot. Every time you pass by the cheering robot, it will cheer you up by making actions and sounds.

Difficulty Level: 3



## Setup

Age: k2-k6

Number of Participants: 2~24

- 2~3 students for one team
- Prepare a name label for each student in case they don't know each other
- Arrange tables and chairs in U-shape for each team
- Put tools and other materials in two specified places of the room

## Learning Goals

- Design and make a cheering robot
- Develop teamwork skills
- Learn to build up circuits with BOSON
- Use digital media tools to shoot video clips

## **Materials**

- BOSON Inventor Kit V1.0 (Refer to introduction for more details)
- Lego Blocks

## **Tool**

- Camera or Smart Phone

## **Time**

2~3 hours.

## **Award and Evaluation Criteria**

Students should be informed of the award and evaluation criteria. Special awards will be given to individuals or teams who perform well in the competition.

## **Process**

- Warm-up

5min      Get to know a robot

- Introduction

8~12min    a. What is BOSON?    b. Project interaction display    c. Get to know modules and learn how to connect

- Start Making

20~40min    a. Analyze and check    b. Build up and assemble

- Test

5min            a. Test structure and function

- Optimization

5~10min    a. Project optimization

- Share

5~20min    a. Video shooting    b. Project presentation

- Evaluation

5min      Project evaluation

- Clean up

5min Dismantle projects and clean up

- Rethink

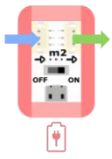

5min Projects review

**Warm-up (5min):** teachers ask questions to lead students to get to know what a robot is.

- What is a robot?
- Have you ever seen a robot in movies or cartoons? What does it look like?
- What can a robot do?

### Introduction(8~12min)

- What is BOSON?
- Project interaction display
- Get to know modules and learn how to connect

What is BOSON?	<p>Teachers play the video below to show students what BOSON is.</p> <p><a href="https://www.youtube.com/watch?v=5OnNy8uKOzw">https://www.youtube.com/watch?v=5OnNy8uKOzw</a></p>
Project interaction present	<ul style="list-style-type: none"> <li>● Teachers demonstrate the project interaction effect using material objects.</li> <li>● Present the project effect by playing video</li> </ul>
BOSON module function and connection	<p>Teachers tell students the module name and similar applications in daily life.</p> <p>The cheering robot needs power from main-board and power source.</p> <p><b>m2 Mainboard-110</b></p> <p>Mainboard-110 can be used to supply power for other modules. Connect the input module to the left, output module to the right, a basic project is ready. Don't forget to connect an external power source to the module.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;"> <p><b>Real Case Simulation</b></p>  <p>Phone Charger      Power Adapter</p> </div> </div> <p>The cheering robot needs to detect the presence and</p>

movement of people in a certain range, so a motion sensor is required in this project.

#### i13 Motion Sensor

The motion sensor in the kit is designed to sense the IR radiation emitted by humans or animals and then output switch signal. It can be widely used in all applications requiring human moving detection.



#### Real Case Simulation



Outdoor Security  
Movement Detector

A speaker and a voice recorder module are used here to let the cheering robot make sounds, and they are actuators.

#### o7 Voice Recorder Module

The voice recorder module integrates voice recording and playing functions. Press the button, speak, and release, then your voice will be recorded. The module is able to playback 10 seconds in total.



#### Real Case Simulation



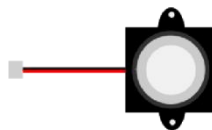
Recorder



Smartphone

#### Speaker

The speaker is a sound device.



#### Real Case Simulation



Loudspeaker

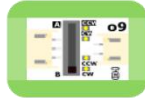


Loudspeaker

The robot still has to do cheer-up actions, so the motor controller module and motor are necessary here, they are also actuators.

#### o9 Motor Controller Module

Motors are widely used to drive car, conveyer belt, and sliding device. To realize complicated functions, sometime we have to change the direction and speed of a motor.



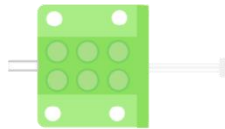
#### Real Case Simulation



Remote Control

#### Motor

Motors are widely used to drive car, conveyer belt, and sliding device. To realize complicated functions, sometime we have to change the direction and speed of a motor.



#### Real Case Simulation

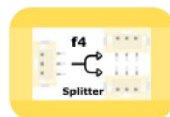


Motor

When the presence of people is detected, the cheering robot will do the cheer-up actions and make sounds simultaneously. How can one signal of a motion sensor control two actuators at the same time? A splitter module, also function module, does the work.

#### f4 Splitter Module

The splitter module splits 1-way input signal into 2-way signal.

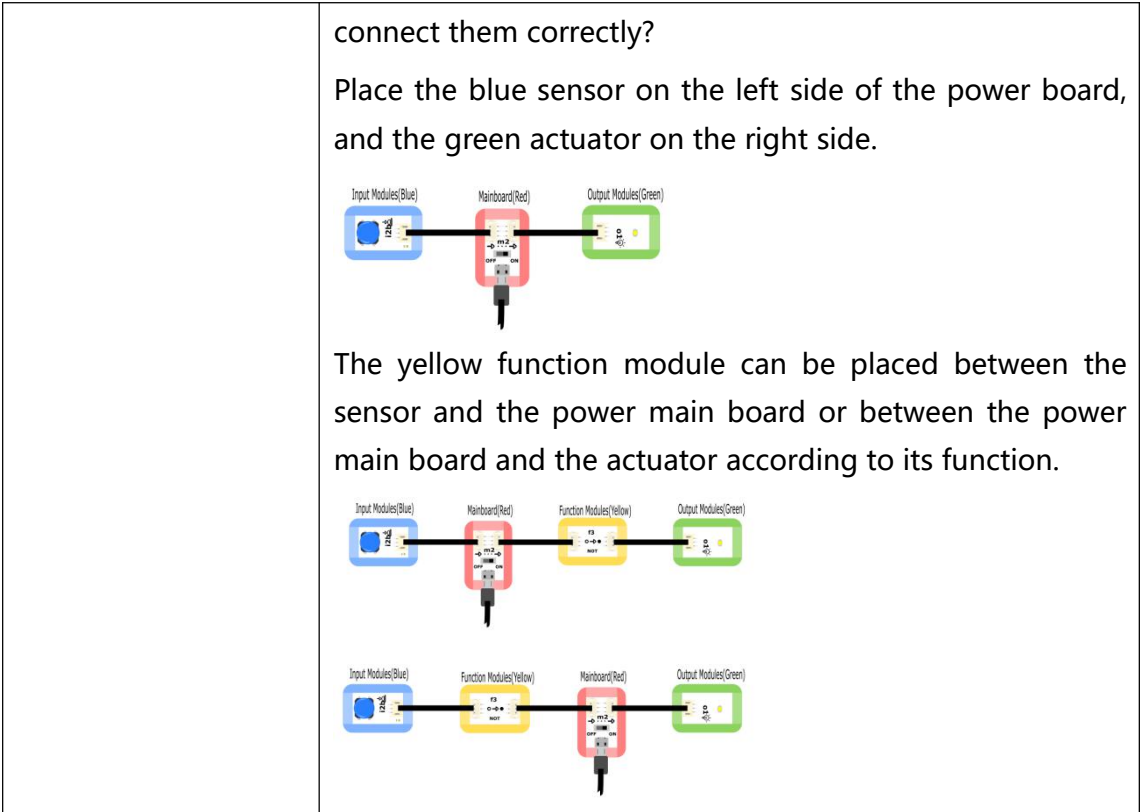


#### Real Case Simulation




USB Hub

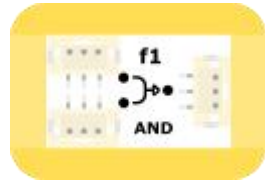
Have you noticed the color of these BOSON modules? Red is always for power supply, blue for sensor, green for actuator, and yellow for function module. How can we



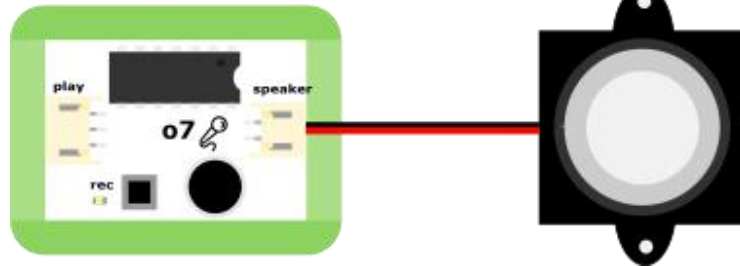
**Start Making (20min~40min):**

Analyze(how to realize functions and connect hardware) and check; build up and assemble.

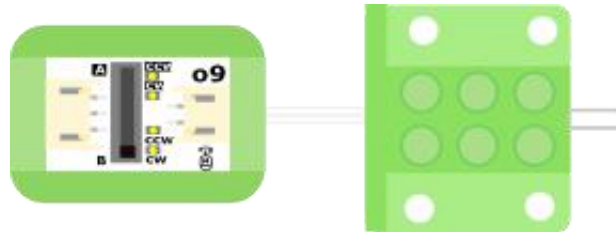
<p>a. Analyze and check</p>	<p>1. Students first need to list all the functions of the cheering robot, and then consider how to use BOSON modules to realize these functions.</p> <p>Motion sensor—detect the presence of people</p>  <p>Let the speaker and motor work at the same time.</p>
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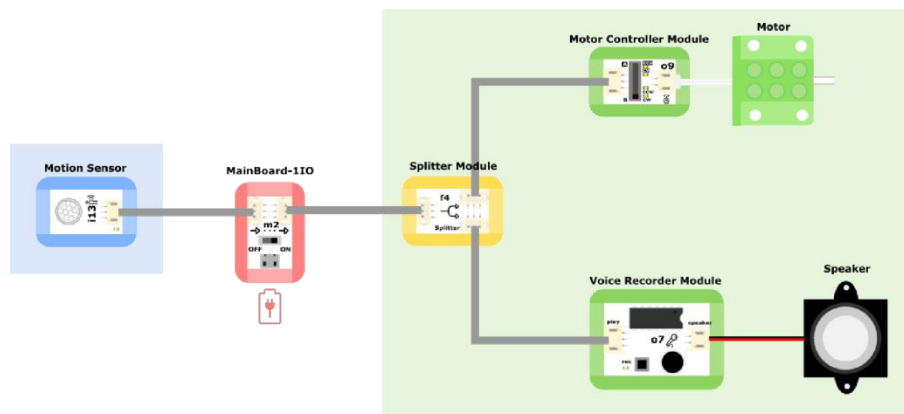
Make sounds:



Do the cheer-up actions:



2. Sort out all modules and draw the connection diagram.



3. Connect the BOSON module as the designed diagram, and then check whether all the functions are realized as expected. If it failed, analyze the reason and revise the connection, try it again.

b. Build up and Assemble

Build up the Lego blocks step by step, and consider where should the BOSON modules be placed to make it easy to connect the wires.



### **Test (5min):**

Test whether the project structure is firm and all the modules are tightly clamped.

Function test: teachers maintain the order of the workshop to let students test their projects.

- No people around the cheering robot, motor and speaker not work
- People walk by the cheering robot, motor and speaker work at the same time

### **Optimization (5~10min):**

- Use more Lego blocks to decorate the robot
- Improve the project structure
- Connect with more BOSON modules to add functions

### **Share(5~20min)**

a. Shoot a video for the project, and post it to social account.

- Project display



- Effect demonstration
- Group photo
- b. Present and introduce the project on stage
  - Introduce the basic function of the project
  - What improvements have you made? And why do you do that?
  - What' s the highlight of your project?

### **Evaluation (5min)**

Assess students' works according to the Evaluation Criteria(see appendix) and select the best one.

### **Clean up (5min)**

- Dismantle the BOSON module on the project
- Put all modules back to the BOSON box.
- Put Inventor Kit and Tools to the specified place.
- Put away all Lego bricks and put the Lego box to the specified place.
- Clean up the litters on the table and ground.

### **Rethink (5min)**

- Why can the cheering robot talk and do actions simultaneously when it detected the presence of people.
- Now we want to let the robot make sound, do actions, and light up LED at the same time when people passing by, can you draw the related circuit connection to realize that?

### **Note**

Here are some factors that should be taken into account when designing this workshop, and teachers can adjust, add, or cancel some unimportant parts of the process as actual conditions.

- Age: adjust the requirement of skill and knowledge according to students' age and cognitive ability.
- Time: 50 minutes or more.
- Number of Students: control the number of students and choose to carry out a

project in the form of individuals or groups as the actual scene.

## Appendix

**Material in daily life:** single-use cup, colored paper, etc.

**Evaluation Criteria:** teachers can observe students in the whole process to evaluate their performance.

Aspect	Marks	Content	Score
Problem analysis and solving ability	5	Be able to identify problems quickly, analyze problems correctly and put forward solutions with clear ideas.	
	3	Able to analyze and solve problems independently but struggle a little bit.	
	1	Only can analyze and deal with problems with the help of others.	
Creativity with BOSON modules	5	Able to understand the operation mechanism of BOSON circuit, achieve the expected effect, and use various materials to make improvements to the work.	
	3	Successfully finish the project and make some improvements	
	1	Can finish the work, but struggle a lot	
Expressing ability	5	Able to clearly express his/her ideas, or even make wonderful speeches to share the project.	
	3	Generally can express his/her idea to show the project.	
	1	Barely express his/her opinions and remain silent in the sharing process	
Teamwork skill	5	Get along well with team members and clear responsibility management	
	3	Work friendly with team members but the responsibility for each person is not clear.	

	1	Argue or cannot work with others in the process.	
Artistic expression ability	5	The work features aesthetic, can combine aesthetic with practicality.	
	3	Beautiful project with certain design	
	1	Rough project with a messy appearance	
Total			