The 3rd Belt and Road Teenager Maker Camp & Teacher Workshop

INTELLIGENT ROBOT

SEPTEMBER 24-30,2019

GUANGXI · CHINA

What is Robot?

A robot is a machine—especially one programmable by a computer— capable of carrying out a complex series of actions automatically. Robots can be guided by an external control device or the control may be embedded within. Robots may be constructed on the lines of human form, but most robots are machines designed to perform a task with no regard to their aesthetics.

The term comes from a Czech word, robota, meaning "forced labor"; the word 'robot' was first used to denote a fictional humanoid in a 1920 play R.U.R. (Rossum's Universal Robots) by the Czech writer.

Robots have replaced humans in performing repetitive and dangerous tasks which humans prefer not to do, or are unable to do because of size limitations, or which take place in extreme environments such as outer space or the bottom of the sea.

What problems we are facing?

There are concerns about the increasing use of robots and their role in society. Robots are blamed for rising technological unemployment as they replace workers in increasing numbers of functions.

The use of robots in military combat raises ethical concerns. The possibilities of robot autonomy and potential repercussions have been addressed in fiction and may be a realistic concern in the future.

What are we going to learn in this course?

Robot technology is a complex and interdisciplinary technology. Now we mainly learn some important basic concepts and techniques about robots.

- Construction of Hardware System
- Concept of Software System and Programming
- Manual remote control and automatic control

At the end of the course, we need to design a robot to solve real life problems independently.

Activity 1: Have light!

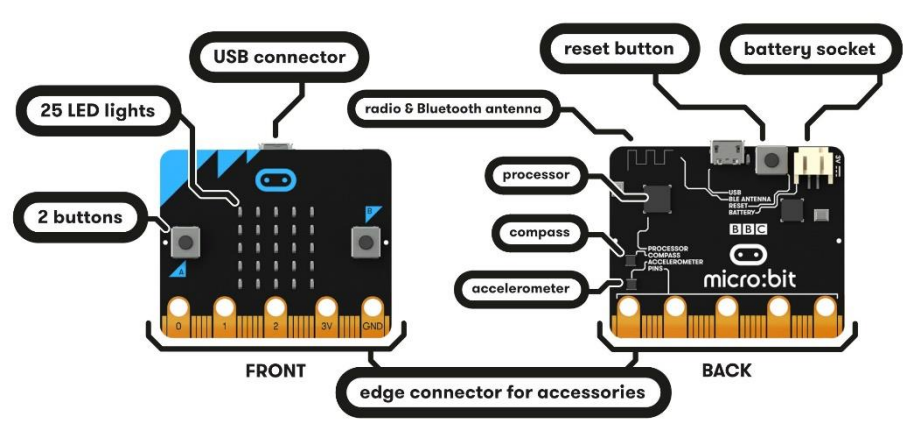
Maybe you've used similar controllers and programming software, and you've got a whole concept of robots. In order for all students to have the same foundation, the teacher will lead you to understand the hardware system we will use and how to program in the next two days.

Material:

- MICRO: BIT Control Board
- Computer with SCRATCH installed
- Battery pack

Technological process:

1. Connect the battery to the control board correctly under the guidance of the teacher; connect the controller and computer with USB data line
2. Write the software and download the program to the control board
3. Debug until you succeed in getting the LED on the control panel to light up the way you want it to.



Activity 2: Move up!

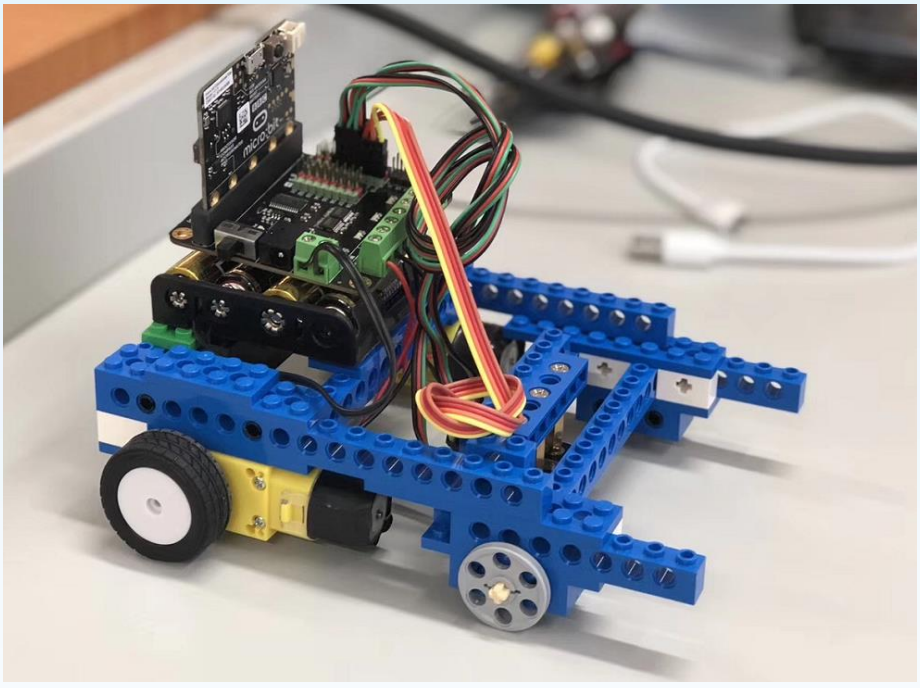
With the motor and the steering gear, design a motion to make the robot move.

Material:

- MICRO: BIT Control Board
- SCRATCH computer installed
- Battery pack
- Motor
- Some Lego bricks and wheels

Technological process:

1. Connect the motor and steering gear to the control board correctly under the guidance of the teacher
2. Write the software and download the program to the control board
3. Debug until you succeed in getting the power components of the control panel to move in the way you want them to.



Activity 3: Walk around

Next we need to add "eyes", "ears" and "legs" to the robot. The light intensity can be perceived by the photosensitive sensor robot, the distance between the robot and other objects can be perceived by the ultrasonic sensor robot, and the robot can walk in the environment through the wheel or leg structure.

Material:

- MICRO: BIT Control Board
- SCRATCH computer installed
- Battery pack
- Photosensitive Sensor
- Ultrasound Sensor
- Base (finished in activity 2)

Technological process:

1. Correctly connect the sensor to the control board under the guidance of the teacher
2. Write the software and download the program to the control board
3. Debugging until it succeeds in getting the robot to move around the classroom without getting stuck somewhere.

Activity 4: Remote Control

Next, we will learn how to control the robot remotely. Contrary to the usual view, remote control does not mean that programming is simple. In fact, in order for the remote controller to control the hardware of the robot according to his own idea, it is necessary to combine the actual structure with the details of software design, and debug repeatedly.

Material:

- MICRO: BIT Control Board
- SCRATCH computer installed
- Photosensitive Sensor
- Ultrasound Sensor
- Base, wheel
- Bluetooth remote control module
- Install APP on mobile phone

Technological process:

1. Under the guidance of the teacher, install Bluetooth module correctly and download APP.
2. Write the software and download the program to the control board
3. Debugging until successful control of each action on the customized remote control panel of the mobile phone.

Activity 5: Garbage Classification

Let's have a competition! All the students will be divide into two teams. Each team control your robot to transport the garbages from your own sites to the corresponding trash can. Start at the same time, the team that takes less time will win.

Material:

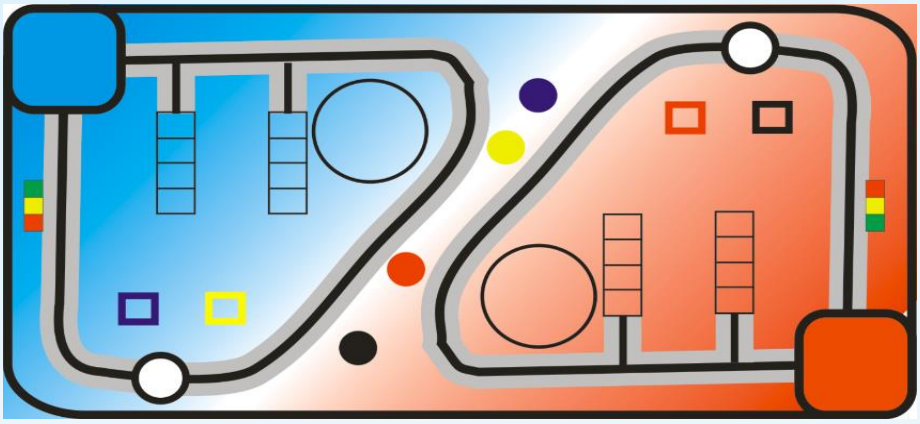
- Debugged Movable Robot (finished in activity 4)
- servo motors

Technological process:

1. Remote control the designed robot to finish launch task. Discuss how to design the robot.
2. Clarify the four garbages and put them into corresponding trash can.

STEM Project: Intelligence City

In the future, our city will have all kinds of smart facilities in all corners. And these intelligent devices, often called robots, are designed and built by you, future robotic engineers. Look at the map carefully. According to the teacher's instructions, discuss with your partners and design a robot that can independently complete a variety of urban services.



Material:

- Main control board
- Expansion board
- remote control
- sensors
- batteries
- Structural parts.
- Debugged robot.

Process:

1. Discuss with your team: what functions you will designed for the robot.
2. Write the software and download the program to the control board
3. Debug your robot until it works the way you want it to.
4. Introduce your robot to the rest of class.

Evaluative Dimension	
Scientificity	The process of project design and making should be scientific and reliable.
Creativity	In one or more aspects of project design and making, etc. the team should show strong creativity.
Teamwork	Task allocation should be clear and cooperation should be in order.
Practicability	Projects should be of use in reality.
Expression	1.The presentation should be clear and brief； 2.Understanding the basic scientific principles related to the project; 3.The extent to which work is carried out independently; 4. Answering questions clearly and briefly.

Project Sheet

(Only one sheet needed for each group)

Name of your group	
Member of your group	

Design Chart (How you're your robot looks like, and how will it complete the tasks)	

Materials List	
Personnel division (List the division of work for each person in your group. Note that one of them needs to act as a spokesperson to speak on behalf of your group.)	