Education Robotics Kit 1

EQ1-1 Topics
1. What is a rocket?
2. What is creative power?
3. Mechanism-1
4. Mechanism-2

For use with kit EQ1
01 What is a robot?

Definition of a Robot
A robot is a machine that is remote-controlled or autonomous, meaning it moves using pre-programmed behaviors. Furthermore, it means it is an automated intellectual machine that recognizes the conditions of itself and the environment to make conclusions and act.

Origin of the word ROBOT
At first, the word ROBOT was used in the science fiction R.U.R. of Czechoslovakia. It came from ‘robota’ which means ‘labor’.

History of ROBOT
Robots were used in diverse industrial fields in the 1960s ~ 1970s. And they have been used in cleaning, medical fields, and as humanoids.

The 3 Laws of Robotics
Isaac Asimov first announced the 3 Laws of Robotics in 1942.

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey orders given it by human beings except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.
02 Parts for EQ-ROBO1

The number in ( ) is the quantity.

1-brick (4)
2-brick (4)
3-brick (4)
4-brick (4)
5-brick (4)
1X2-frame (4)
1X3-frame (4)
1X5-frame (4)
1X7-frame (4)
2X5-frame (2)
2X7-frame (2)
2X12-frame (2)
8X9-frame (2)
1X4-servo frame (2)
1X5-servo frame (2)
1X5-servo bended frame (2)
1X2-obtuse frame (10)
1X2-right angle frame (10)
1X7-servo link frame (2)
1X5-servo bended frame (2)
25mm axis (10) 25mm bushing axis (8) 50mm axis (6) 75mm axis (2)
1-hole bushing (20) 2-hole bushing (4) 3-hole bushing (4) connecting bushing (2)
small gear (2) sub wheel (2) rubber shoe (4) large gear (2) middle wheel (2)
1x6-sheet (4) 1x13-sheet (2) 2x3-sheet (2) 2x5-sheet (2) 2x9-sheet (2)
equilateral triangle sheet (4) 2x3-sheet (2) 3x5-sheet (2) 3x11-sheet (2) semicircle sheet (4)
3x3-right triangle sheet (4) 3x4-right triangle sheet (4) 3mm spacer (4) 6mm spacer (4)
locking nut (10) M4-nut (30) M4x8-bolt (20) M4x10-link bolt (10) M4x12-bolt (20)
driver (01) spanner (1)
You can learn more about how to use the mainboard and the remote controller in EQ1-2.
Assembling methods of brick

Assembling methods of frame

Making various shapes

triangle  rectangle  octagon  circle

M4X10 link bolt

locking nut
You can learn some assembling tips and how to use tools by making some of the models of animals or bugs.

- Giraffe
- Fox
Make an Elephant

tail part

1

2

3

4
Creative Power

Creative Power - the ability to think of new things and to express what one thinks.
- thinking: to recognize things and judge them.
- expressing: to show in action or in words what one thinks.

Why do you need creative power?
You can get lots of information from books or the Internet, whenever and wherever.
We don’t need a person who has a lot of information, but a person who can create good conclusions from the available information.

Christopher Columbus
Thomas Edison
Albert Einstein
Jang YoungSil

EQ-ROBO Class - Imagine and Make
You can express the character of humans or things creatively.

Let’s make a swimmer.

1) Brain - Memory
   to choose proper parts considering shape and color.
2) Hand - Assembling
   to assemble parts based on appearance and what you think.
3) Brain - Association
   to create a name. Example: ‘marine boy’
Design and make the special features of these Olympic sports stars.

- swimmer
- skier
- weight lifter
- goalkeeper
- striker
- tennis player
- fencer
- figure skater

Try to express the specific models by describing what they do.
07 Make Moving Models

Make a Windmill

1  

2  

3  

Make a Rocking Chair
Make a Boat

1. Place the rear side where the empty place is.

2. Place the rear side where the empty place is.

3. (L)1

4. 1
Lock it only on one side.
Make a Helicopter

1.  

2.  

3.  

4.  

Robotics Class
Make a Bicycle
Make a Motorcycle, a Cannon, an Airplane

motorcycle

cannon

airplane
Levers

A lever is a rigid object that is used with an appropriate fulcrum point to multiply the mechanical force that can be applied to another object.

Lever Examples

- Scissors (class 1)
- Nail clipper (class 2)
- Opener (class 2)
- Forceps (class 3)

Friction

Friction is the force that makes it difficult for things to move.

Properties of Friction

- The direction of friction is the opposite to the through the contact surface.
- The magnitude of friction is in proportion to the weight of things.

Friction Examples

1) A wet bar of soap slips off easily: weak friction
2) Driving on sand spread on the icy road: strong friction
09 Lever and Friction Models

Make a Seesaw

1. remark: 3mm spacer

2

3

END
Make a Viking

This model moves because friction is created between the two rubber wheels.

1. Notice the frame direction.

2. Make the opposite side.
Make sure the wheel rotates freely.

Insert the axis through the second hole of the 3-brick.
Make sure the two wheels meet tightly.

The axis should be inserted through the cross hole of the large gear.
Elastic Force

Elastic Force, Restoring Force, and Elastic Limit
- The force that returns an object to its original shape when deformed by an external force.
- If a material gets too much force, permanent deformation will occur. This limitation is called Elastic Limit.

Spring
A spring is an elastic object used to store and buffer mechanical energy.

Types of Springs
1) Coil spring: a spring made from a metal wire or band.
   You can see them in a ball point pen, a watch, a bed, the saddle of a bike.
2) Plate spring: a spring that uses the elastic force of bended metal plates.
   You can see them in a car or train.
3) Air spring: a spring that uses the air in a sealed container.
   The tires of a car is one example of an air spring.

Usage of the Elastic Force of Rubber Bands
- Rubber bands have an excellent elastic and restoring force that you can use with the power supplier of the models you build.
- The more stretched and thicker the rubber band is, the stronger the power is.
1) The restoring power when rubber band is twisted: propeller of an airplane
2) The restoring power when rubber band is wound: a catapult
Rubber Band Model

Make models move without a motor.

Rubber Band Catapult

1. Insert the axis through the third holes of the 5-bricks.

2. Note: rubber band is not included EQ-ROBO1 kit

3. Notice the assembling position.
This brick is just placed to hold two frames together.

Notice the assembling position.

This brick is used to hold the frames too.
The axis is supposed to go through the center hole of the 1X7-frame.

Using the gear to wind the rubber band is more powerful.

The catapult will work by removing the axis.
Assemble at the last center hole of the frame.
You can tie the rubber band at the last step. Check the direction and how to tie the rubber band.
Pull your car backwards and then let it go. Your car will move forwards. If not, change the tying direction of your rubber band.

Decorate Your Own Car
This Scissor-bot moves the scissors while the wheels are moving. Moving power is driven by a rubber band. Think by yourself. You can refer to these pictures as hints.

Refer to the 3D model on our website.