Safety Instructions

Warning : If user does not follow the instructions in this book properly, a serious injury, harm, or death may occur to user.

Caution : If user does not follow the instructions in this book properly, an injury to user or physical damage to the product may be occurred.

Electric Power

- Do not use any damaged power cord, plug, and loose outlet. It may cause an electric shock or fire.

- Make sure that the power plug is inserted firmly into the outlet so that the power cord does not

  get loosed. A loose connection may cause a fire.

- Do not forcibly bend or pull the power cord or have it pressed under a heavy object.

  It may cause an electric shock or fire.

- Do not handle the power cord with wet hands. It may cause an electric shock.

- Do not connect multiple electric devices to one outlet. It may cause an abnormal heat or fire.

- This product is not waterproof. Do not operate the product in a wet place in any case.

- Do not keep or operate the product in direct sunlight.

Usage

Warning

- Do not assemble the product when you are tired or physically in a bad condition particularly

  while intoxicated.

- Do not place your face too close to the robot.

- Do not use dangerous tools such as a knife or a drill but only recommended tool.

- Keep the remote control that contains batteries away from children's reach.

- When your kid swallowed a battery, consult with a doctor immediately.

- Do not keep or operate the robot in a place of high temperature or humidity.

- Keep small parts such as bolts, nuts, and joints away from children's reach.

- When your kid swallowed any product part, consult with a doctor immediately.

Caution

- Use the product only in an indoor environment.

- Do not disassemble, repair, and modify the product parts arbitrarily.

- Do not connect or disconnect cables while the robot product is in operation.

  It may cause a damage or failure to the product.

- Make sure that only designated devices be connected to connectors or connection ports of the product.

  It may cause a damage or failure to the product.

- When cleaning the product, do not use water or solvent such as benzene, and alcohol but use a soft

  and dry cloth only. It may cause a failure to the product.

- Keep the robot well, or parts away from kid's access.

- Do not leave the product with power on. Battery damage may cause a product failure.

 - Do not give excessive force while a torque is applied to the robot.

   This could cause the gear damage of robot module and product failure.

- When robot gets twisted by running wrong motions while programming, turn the power off quickly to

   prevent excessive torque from being transmitted to the robot.

- If your finger is put and pressed in between robot modules, turn the power off quickly and remove

   force applied to robot to prevent any physical injury.

- Do not operate near in baby or animal. It may cause injury to the life or product failure.

[Notice for Assembly and Operation]

· All users should follow the instructions in this user manual.

· The basic posture of standard platform (HUNO) robot is as shown in the below.

  If robot does not take the posture as the below after you press the center (⬤) button of

  IR remote controller, it means that robot was assembled in wrong way.

  Do not operate robot by force when robot was assembled in wrong way

  Otherwise, robot could be damaged and it gets out of order.
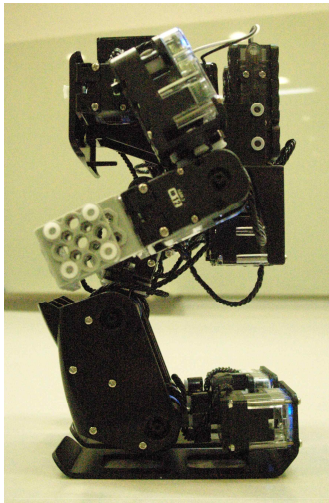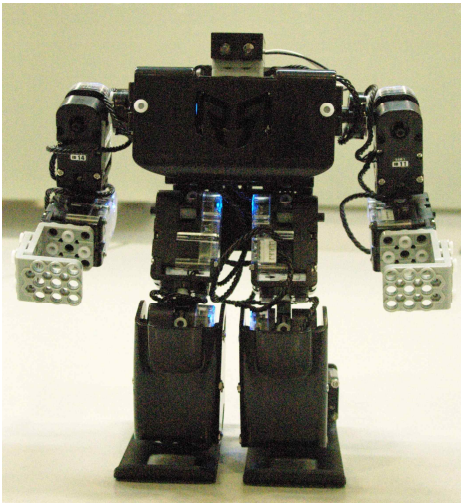
· Sometimes, smart servo does not rotate well when you assemble it by hand.

This happens when internal gears are stiff, not a defective problem.

This kind of problem will be solved when robot took the basic posture after

you power-on smart controller.

· Generally, it takes about one hour to assemble it by using '+' screw driver.

But this is the average assembly time. so it can take longer or less depends on users' working environment.

· Robot will walk well in the flat place. It can be fallen down when you put a robot in carpet or rugged place

· Basic motions (11 motions) are already pre-programmed.

  These motions are played by IR remote controller as soon as receiving robot.

. Make sure that nuts are not dropped into smart servo or smart controller during assembling robot.

< Table of Contents >

1. Basic Instruction

1.1 Product Introduction

RQ HUNO Kit is a new robotic DIY kit designed to provide robot enthusiasts with the value of Education and Entertainment. Design and build various robots simply by plugging together block-type robotic actuator modules. Without programming, users can download robotic motion files from the internet and play them on the RoboBuilder RQ platforms.

FEATURES

Quick & Simple Assembly : It can be assembled within one hour.

Robot File Sharing : Robot file can be shared via Internet. World First File Sharing by Precise Motion Control Technology.

Joint-Insert Style Assembly : Easily connected between modules by using provided various Joint.

Elaborate Motion : The angle of smart servo module can be adjusted freely, therefore, motion is smooth and natural. - Wheel Mode (360˚), Position Control Mode (0~332˚)

Individual Controller : RQ HUNO Smart Controller and Smart Servo module controller are separated, therefore, it is easy to upgrade and easy to find failure.

Built-in Connector : Signal line and power line can be connected directly onto Smart Servo module.

Unbounded Free Assembly Style : It can be built into various robot style, besides standard platform.

1.2 Product Usage

Operating Smart Controller

By manipulating the smart controller, you can select proper robot platform, and play motions. Also, you can change into various mode (such as PC direct control mode or firmware upgrade mode).
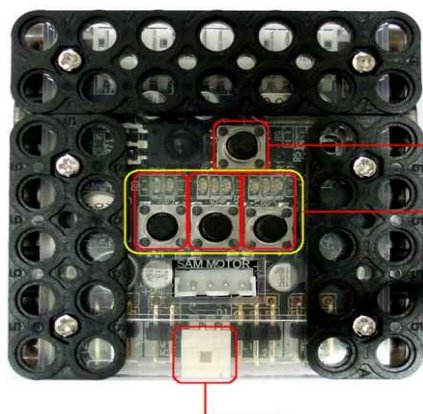
Button P : Power (ON/OFF) button / Run button

In smart controller, '1', '2', '3' numbers are written.

Below in each number, there are "button 1, button 2 and button 3".

Above in each number, there are "LED 1, LED 2, LED 3".

Power Connector

Function	Manipulation	Descriptions
Power On	Connect battery line to Power Connector and press Button P. LED indicates "STOP" state. ("STOP" state means LED lights but is NOT blinking.)	- It sets the latest platform. - It sets Standard platform, Non-standard platform, Zero position setting.
Platform Selection	Press button 3 in order to set "Standard platform" and "Non-standard platform" in "STOP" state. (RQ-HUNO is standard platform.)	
Power Off	Press button P more than 5 seconds.	All LEDs are off.
For more information, see the next page.		

IR remote controller registration

① Power-off the smart controller.

② Press button 2 then, press button P concurrently.

→ You can see LED2 - Green, Blue and Red lights together.

Button P

Button 2

LED1 LED2 LED3
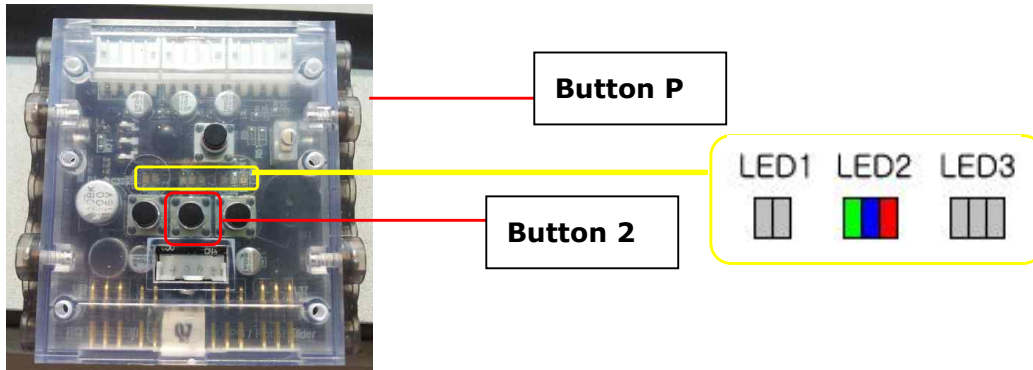
③ Make the IR remote controller close to smart controller towards <IR remote controller receiver>.

④ Press "stop" button in IR remote controller, then LED 2 "Green, Blue and Red" light will be blinking three times. Now IR remote controller is registered.


IR remote controller receiver

STOP button
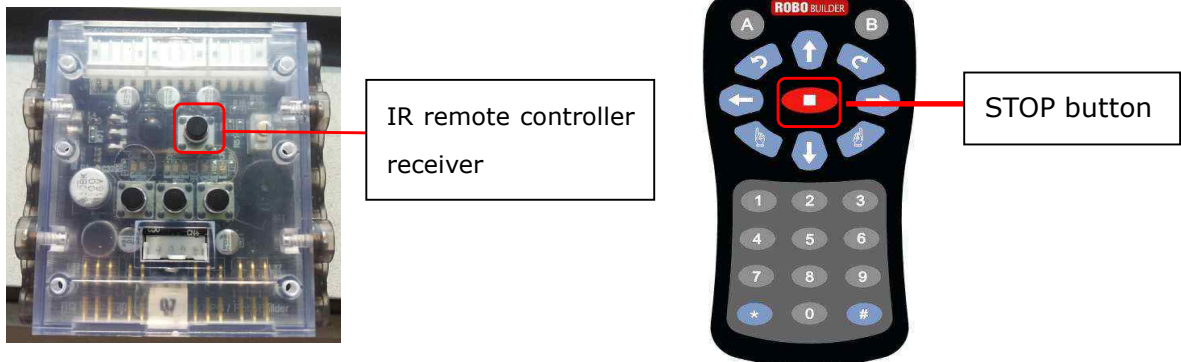
※ NOTE

‣ Unregistered remote controller can not control the smart controller.

‣ Each smart controller can memorize 5 remote controller in maximum. If you try to

  register 6th remote controller, then 1st registered remote controller is deleted.

‣ For the next remote controller registration, you can repeat the above procedures.

IR Remote Controller

The best way to use the remote control is to have remote controller point to the center of smart controller. Press STOP (⬛) button whenever power on RQ smart controller first to take the basic posture.   Otherwise, IR remote controller button would not work on robot.
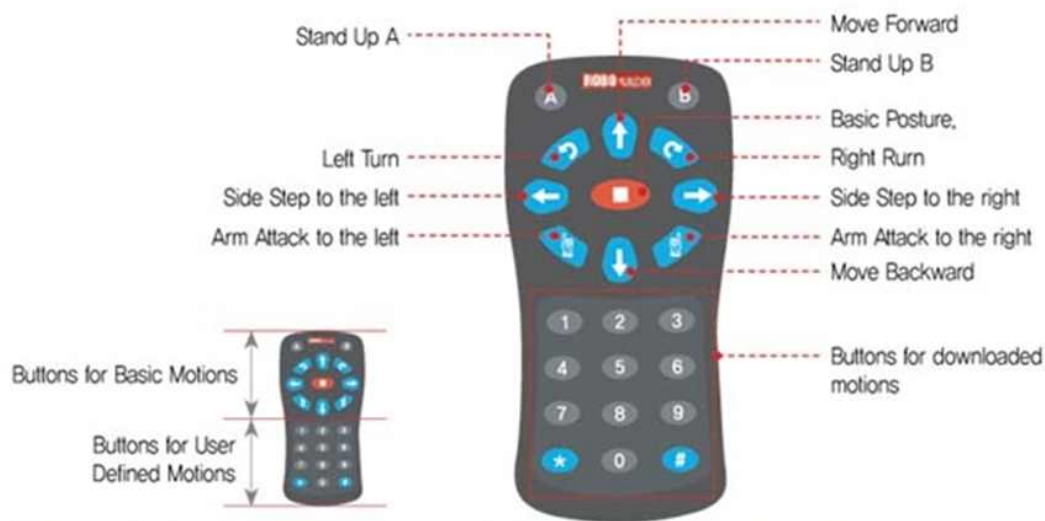
Button	Motion	Button	Motion	Button	Melody
1	Run Motion 1.	# + 1	Run Action 1.	* + 1	Ten little Indians
2	Run Motion 2.	# + 2	Run Action 2.	* + 2	Greeting
3	Run Motion 3.	# + 3	Run Action 3.	* + 3	Twinkle twinkle Little star
4	Run Motion 4.	# + 4	Run Action 4.	* + 4	Head and shoulder knees and toes
5	Run Motion 5.	# + 5	Run Action 5.	* + 5	Fur Elise
6	Run Motion 6.	# + 6	Run Action 6.	* + 6	Minuet(Mach)
7	Run Motion 7.	# + 7	Run Action 7.	* + 7	Congratulation
8	Run Motion 8.	# + 8	Run Action 8.	* + 8	Happy Birthday
9	Run Motion 9.	# + 9	Run Action 9.	* + 9	Arirang
0	Run Motion 10	# + 0	Run Action 10.	* + 0	Stop melody

* Motions and Actions are downloaded by users

W Cable and Smart Controller connection

Smart controller has four port to connect for smart servo by using "W cable".

You can connect any port regardless smart servo IDs.
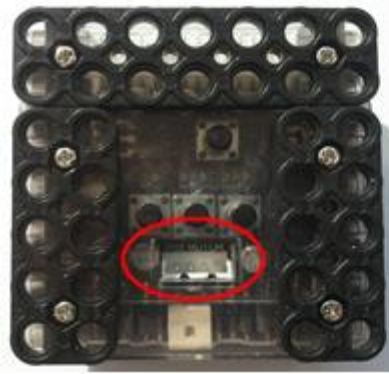
* NOTE

Rear side of COM port is for connection
with PC or Bluetooth chip.
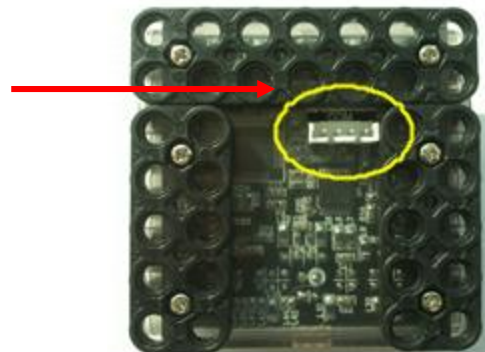
1.3 Rivet Tool

* Rivet Tool Usage

A	3s rivet / 2s rivet	This is for take out rivets.
B	3s rivet / 2s rivet / double rivet	This is for take out rivets after push it.
C	3s rivet / 2s rivet / double rivet	Insert rivets to rivet tool to connect various frames.
D	double rivet	This is for take out double rivet after intsert it.

C Insert rivet to frame #1

2s rivet 3s rivet double rivet

snap

< Example >

5 X 5

3 X 5

<Prepare 2 frames>   <Match the frame holes>   <Insert rivets in marked

1

2

3

4
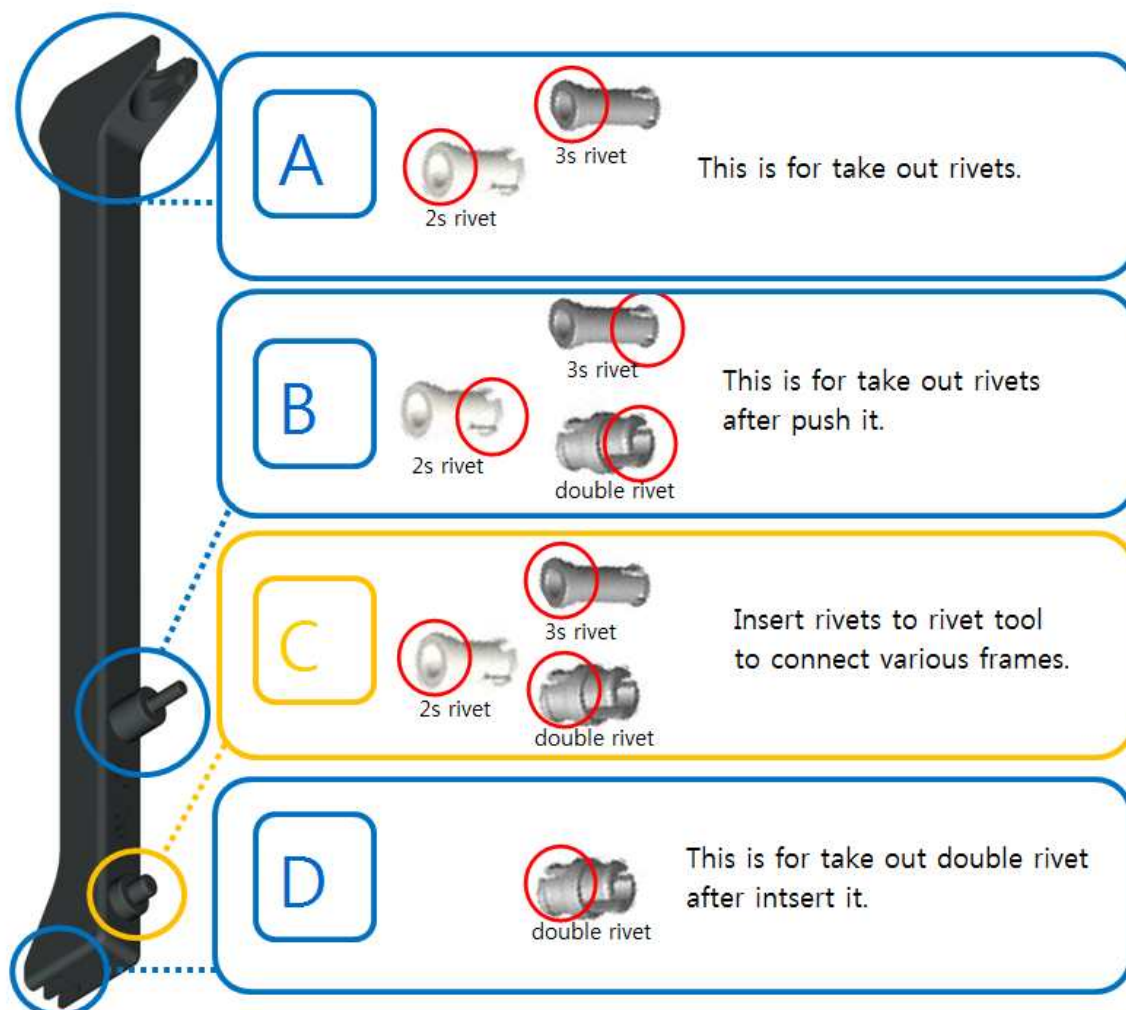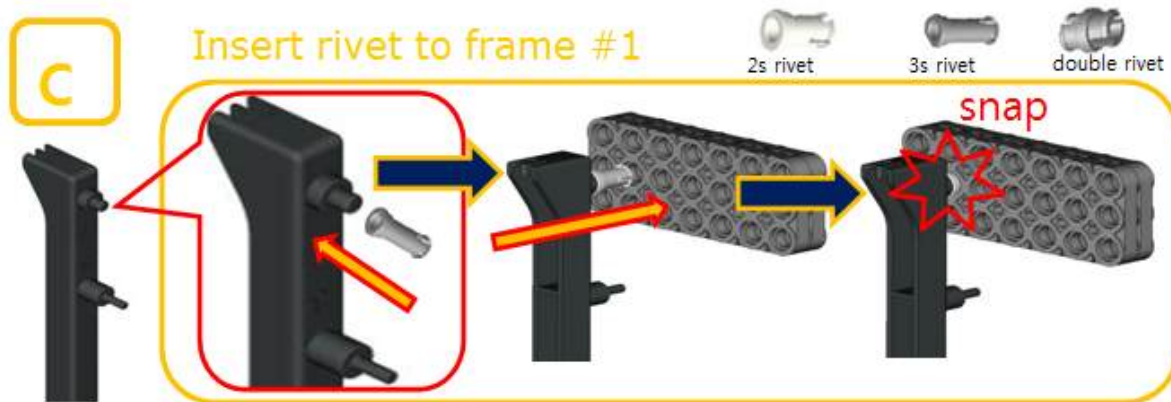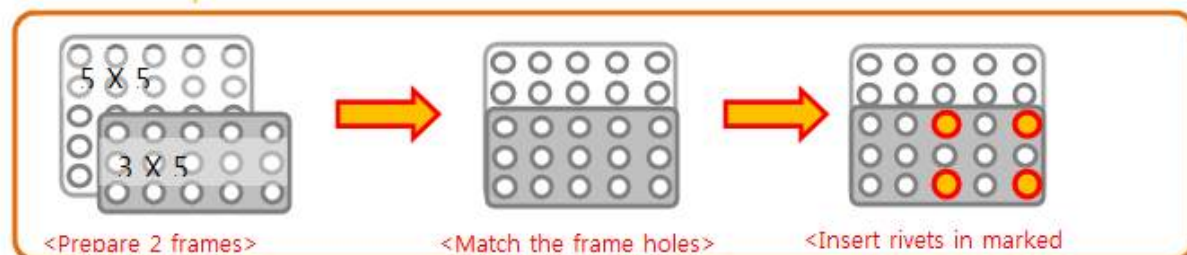
< Insert rivet to frames #2>

3 X 5 Frame → <Prepare 1 frame.> → <Insert rivets.> → 5 X 5 Frame <Match the holes of two frames> → <Push rivets to insert>
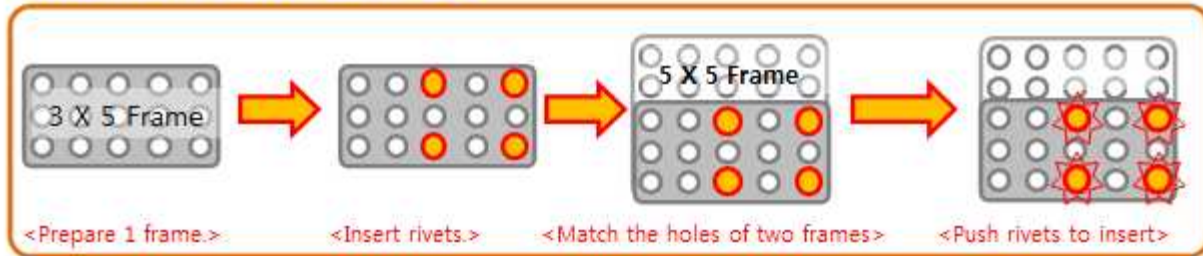
< Take out Rivets >

A ★ Take out rivet in overlapped two frames or more.

Applicable rivet types:

2s rivet   3s rivet

B ★ Take out rivet in one frame

Applicable rivet types:

2s rivet   3s rivet   Double rivet

D ★ Take out for double rivet only

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2. RQ-HUNO Assembly Guide

2.1 Check Part List

Place all the parts as the below for RQ-HUNO assembly.

2.2 Smart servo connection and set basic posture position

Set up the RQ-HUNO initial position value in advance before you assembly.
This prevents confusion of smart servo position when you connect joint frame with smart servo.

1. Place all smart servos and other parts as the below.

2. Connect smart servo with the other smart servo by using "w Cable", then also connect to smart controller at the end as the below.
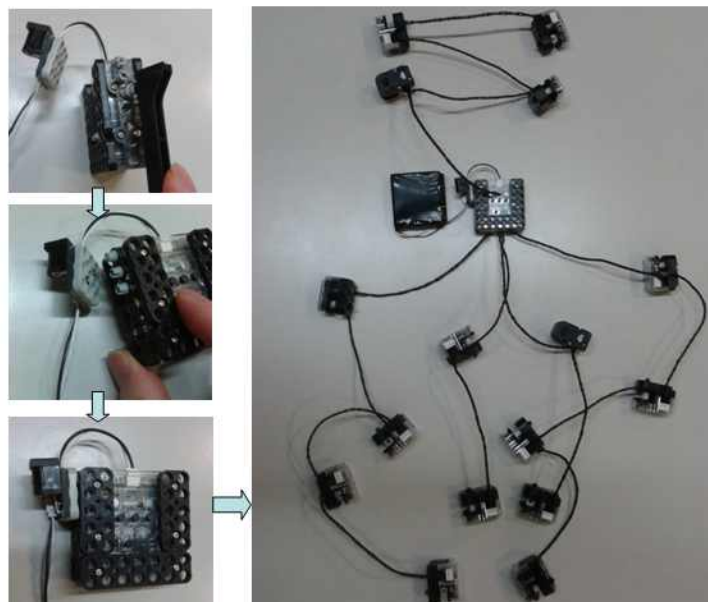
3. After power-on smart controller (it is "stop" state), press STOP button of IR remote controller.
   If IR remote controller is not working, check whether IR remote controller is registered.
   (See the page 8 - IR remote controller registration)

Button P   ➡   STOP button

4. Press button 1 in IR remote controller.

Button 1

Each smart servo set initial position after the above procedures.

Now, disconnect all the "w Cables" from the smart servos and smart controller in order to assemble RQ HUNO robot from the "RIGHT LEG ASSEMBLY".

2.3 Right LEG Assembly

Foot Frame

Smart Servo * 4
(ID 06, 07, 08, 09)

W Cable * 1

Knee Frame * 1   Front Horn * 1   Joint Frame * 2   'U' Frame * 1

3s rivet * 2

2s rivet * 8

Screw (P6) * 1, Bolt (B12) * 1
Bolt(B27)*4,   Bolt (B35) *5,   NUT * 10
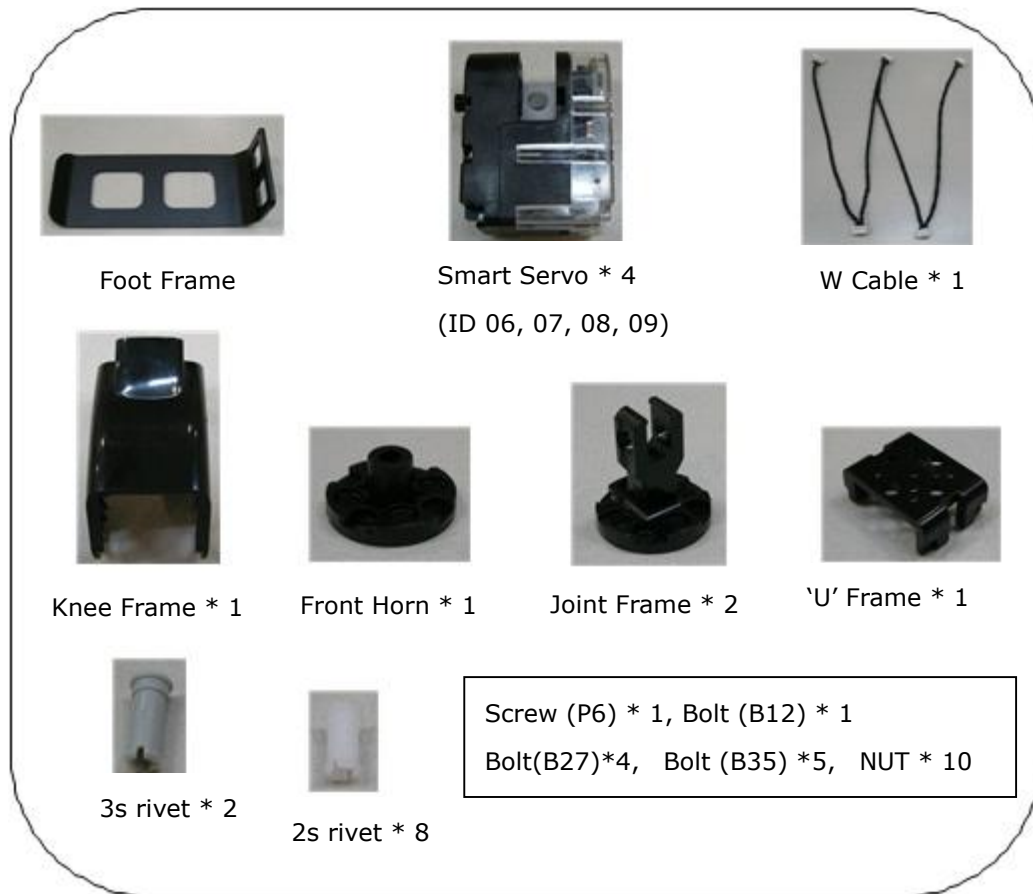
STEP1. Insert front horn to smart servo ID09, then fix it with screw (P6).

Before insert front horn to smart servo, check the chase mark as the below.

Front horn chase mark should be in center position (12 o'clock direction)

Be careful that smart servo initial position should not be rotated when you put screw into front
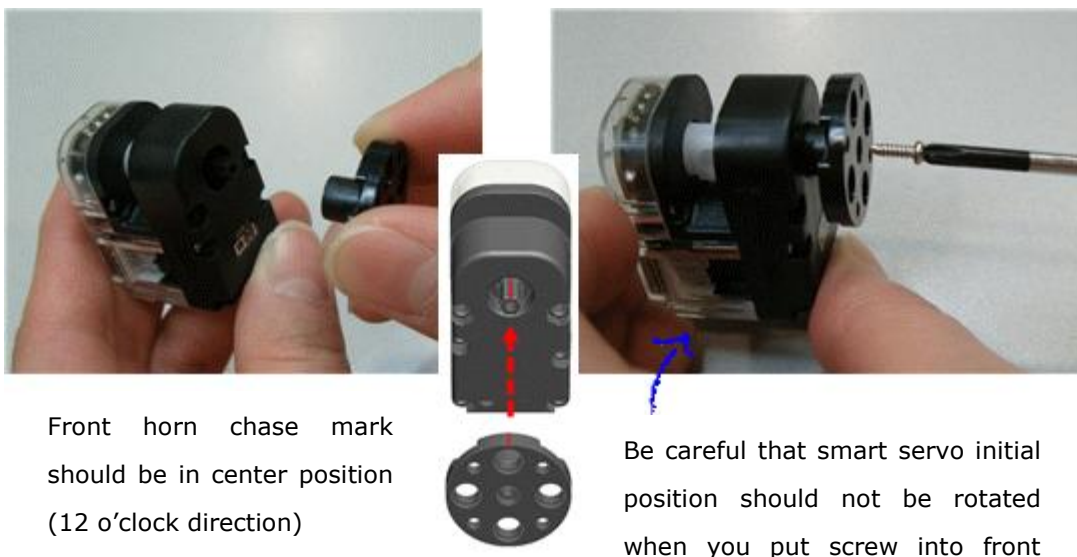
STEP2. Insert "2s rivet" to the "Joint Frame" to connect with "Front Horn".
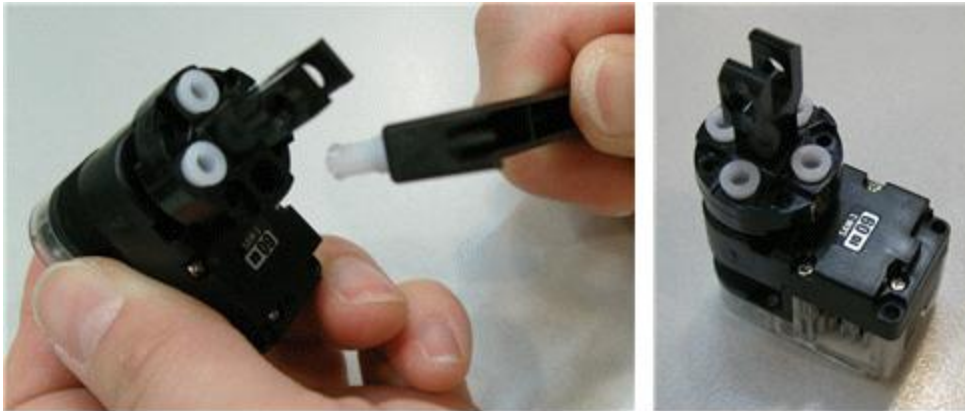
STEP3. Connect W Cable into smart servo "ID09" first, then connect foot frame by using Bolt and Nut.

(Left) Foot Frame and (Right) Foot Frame is same.

W Cable

STEP4.　Connect W Cable (that is already connected with ID09) with smart servo ID08 and ID07.
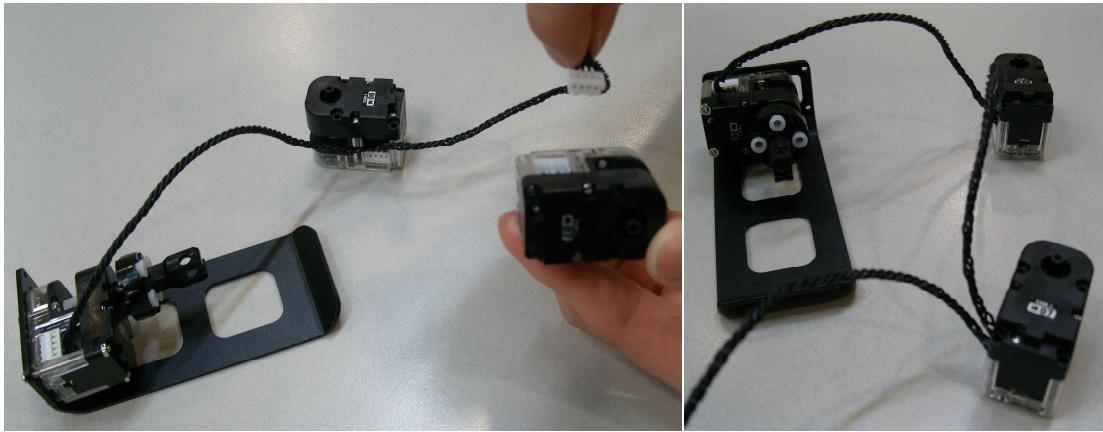
STEP5.　Connect ID09 and ID08 by using "3s rivet".　Rotate W Cable one time and fix it.
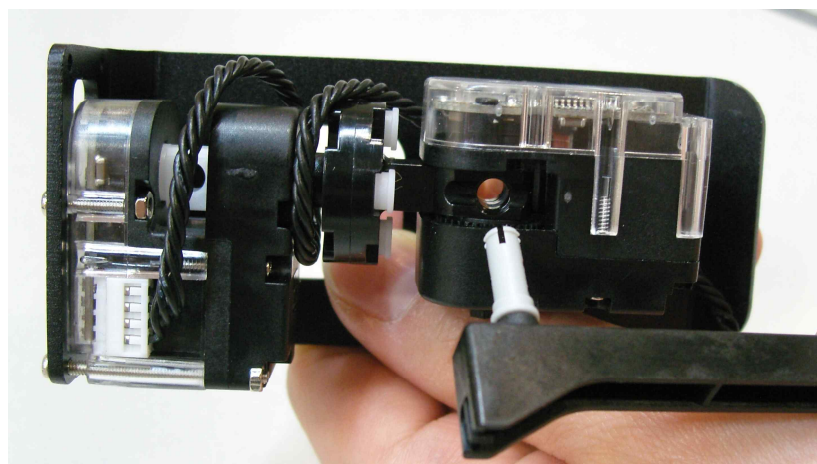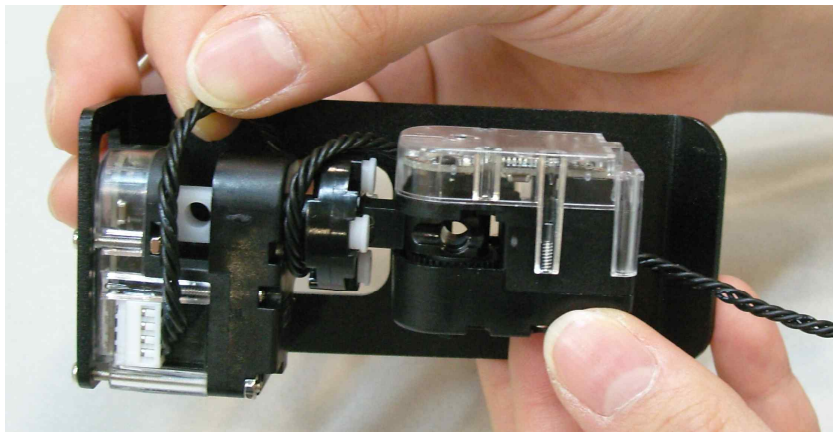
STEP6.   Use the Bolt (B35) and Nut to connect "ID08" and "ID07" with "Knee Frame".
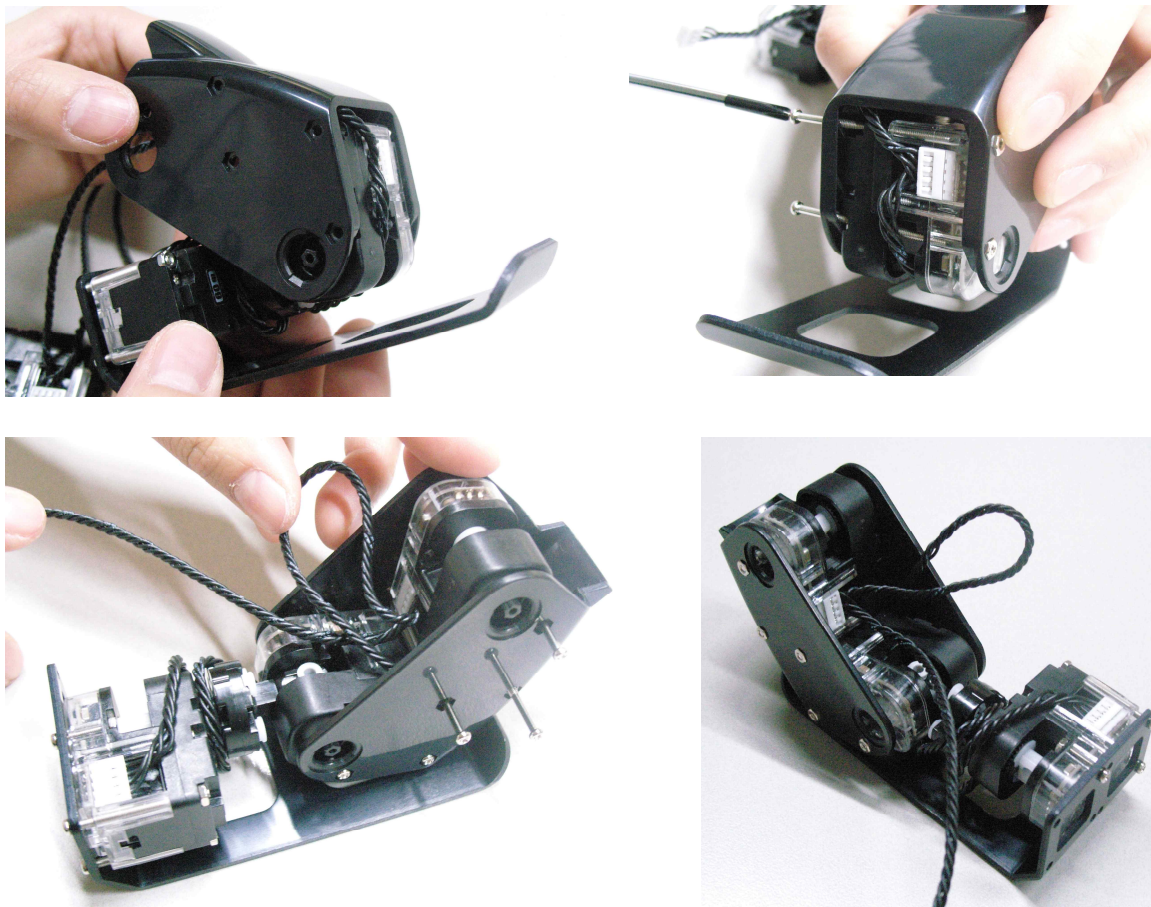
STEP7.   Twist cable 3~4 times between "ID08" and "ID07" and put into empty space.
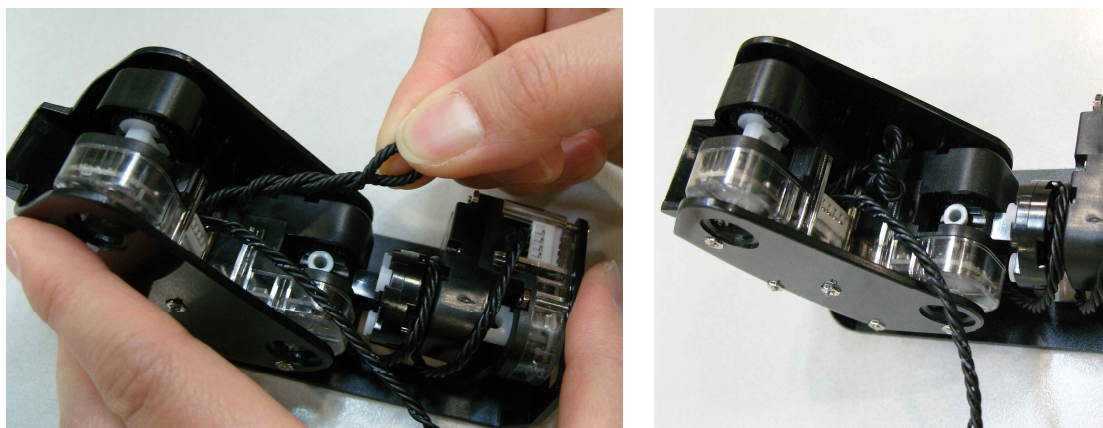
STEP8. Connect ID06 and 'U' frame by using Bolt (B27) and Nut. Then use the "2s rivet" to fix with "Joint Frame".

NUT

Be careful JOINT frame direction

STEP9. Connect ID07 with "Joint Frame" by using "3s rivet". Rotate W cable two times and connect to ID06.

2.4 LEFT LEG Assembly

Foot Frame

Smart Servo * 4
(ID 01, 02, 03, 04)

W Cable * 1

Knee Frame * 1   Front Horn * 1   Joint Frame * 2   'U' Frame * 1

3s rivet * 2

2s rivet * 8

Screw (P6) * 1, Bolt (B12) * 1

Bolt(B27)*4,   Bolt (B35) *5,   NUT * 10
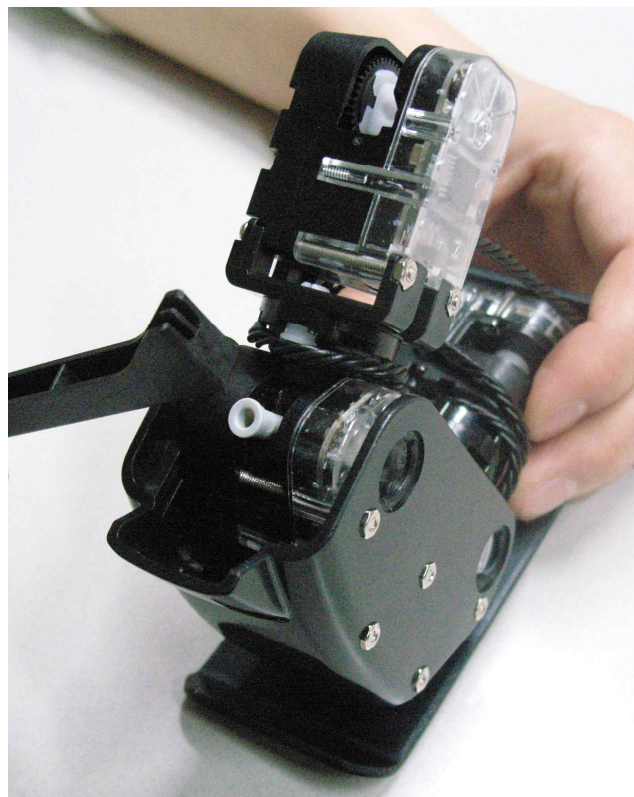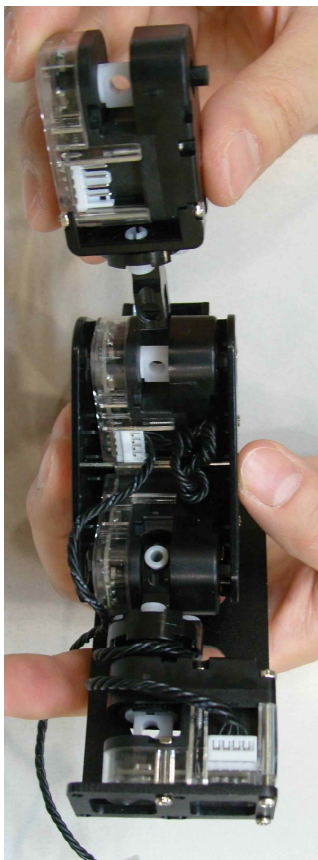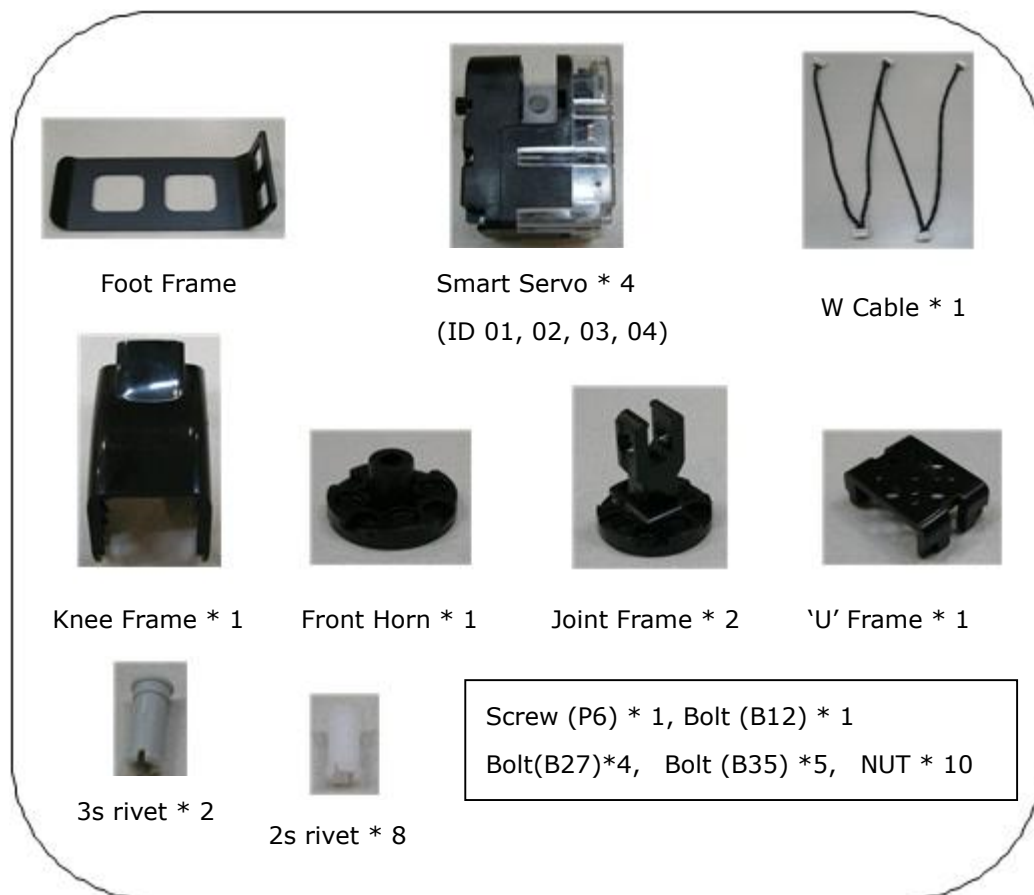
STEP1. Connect Front Horn to smart servo "ID04" by using screw (P6).

Front horn chase mark should be in center position (12 o'clock direction)

STEP2.   Connect Front Horn and Joint Frame by using 2s rivets.
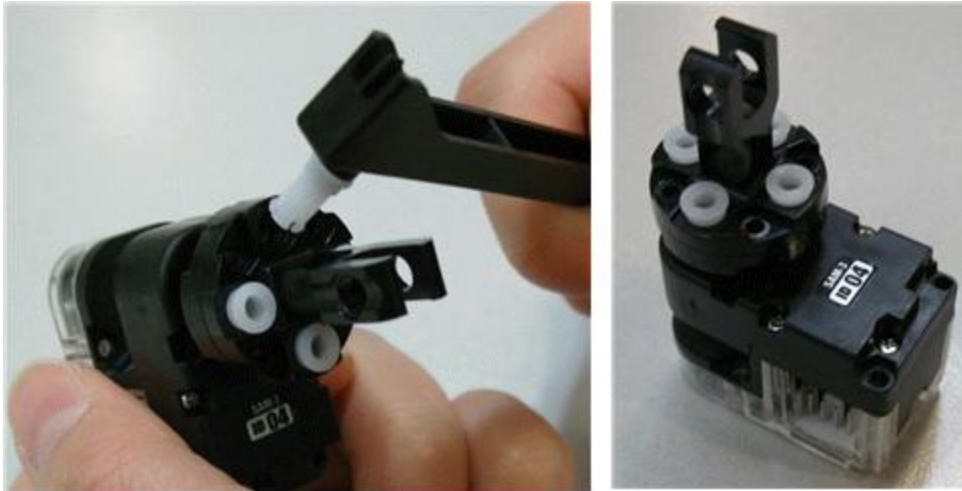
Be careful with Joint Frame direction.

STEP3.   Insert "W Cable" with ID04, then connect Foot Frame by using Bolt(B12, B27) and Nut.
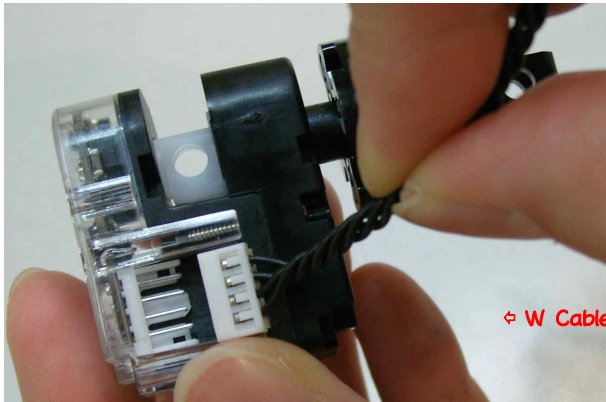
⇦ W Cable connection to ID04

NUT connect position
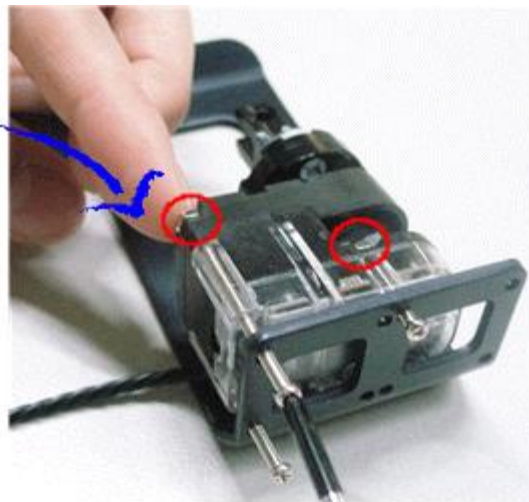
STEP4．　Connect W Cable with ID03 and ID02.
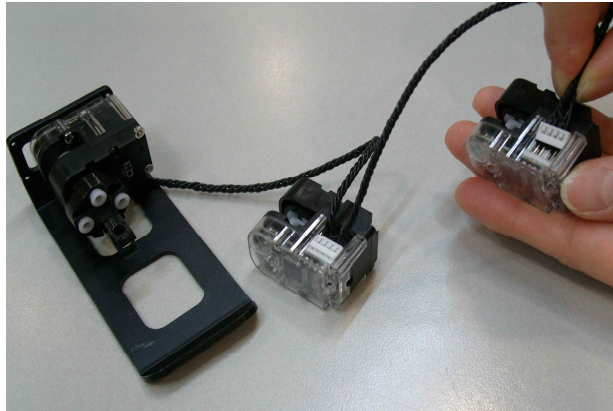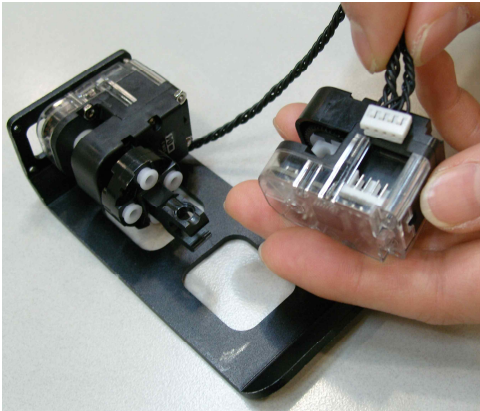
STEP5．　Connect "Joint Frame" with ID03 by using 3s rivet. Then, rotate W Cable1~2 times and fix it.
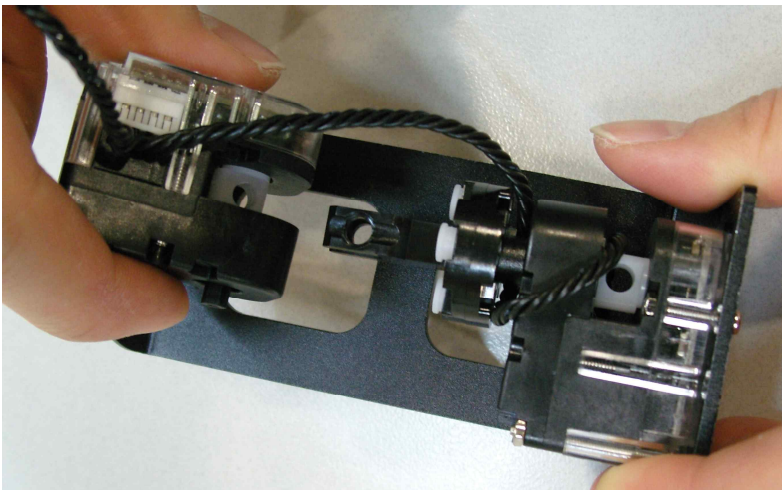
STEP6. Connect ID03 and ID02 with "Knee Frame" by using Bolt (B35) and Nut. Then, rotate the W Cable 3~4 times and put into empty space.
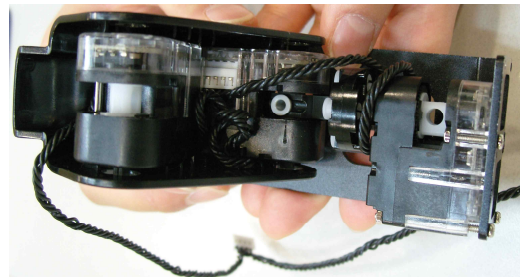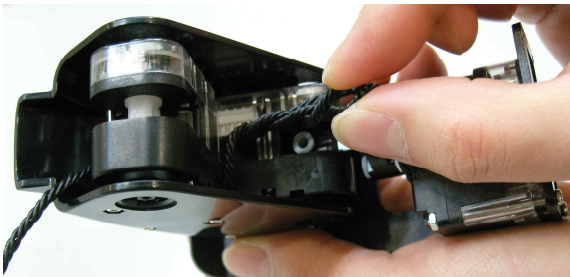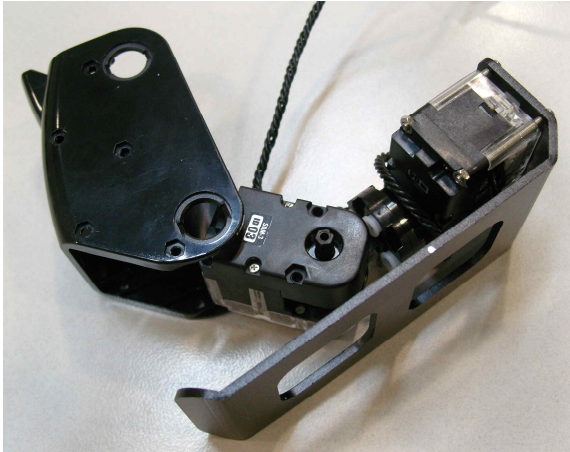
STEP7.   Connect ID01 and 'U' frame by using Bolt (B27). Then use the 2s rivet to fix with "Joint Frame".

NUT
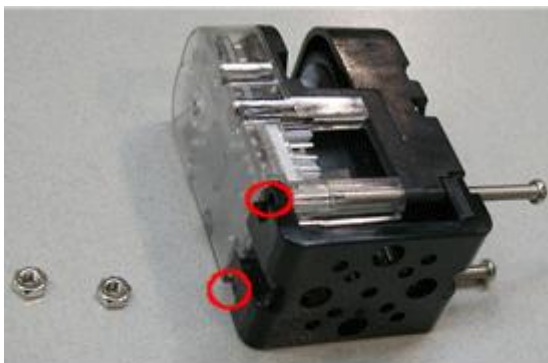
Be careful JOINT frame direction

STEP8. Connect ID02 and "Joint Frame" by using "3s rivet".

Then, rotate "W Cable" two times and connect with ID01.
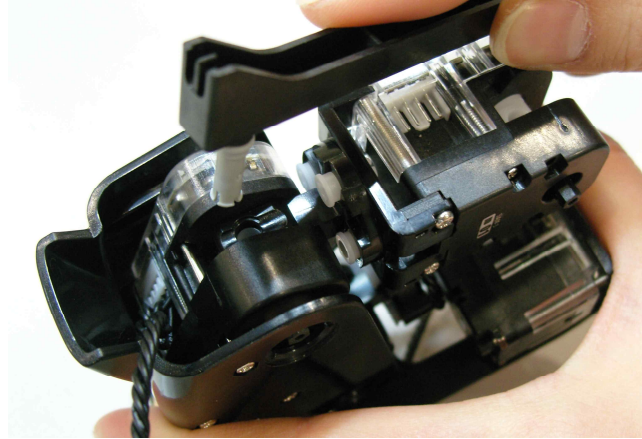
2.5 RIGHT ARM Assembly
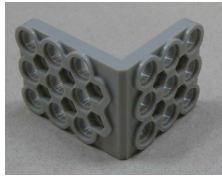
3*6 L type Frame x 2   Smart Servo x 2(ID14, ID15)   'U' Frame x 2
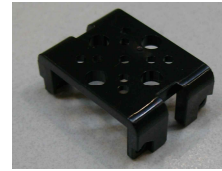
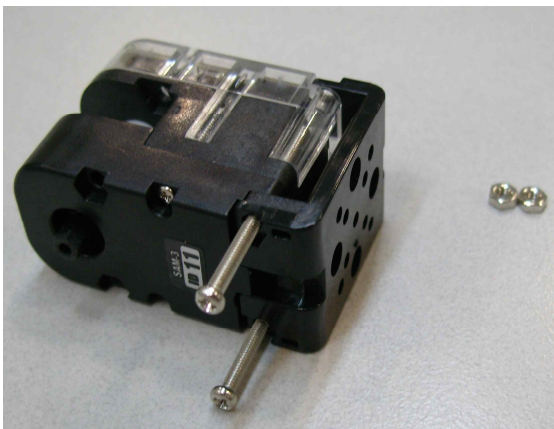Joint Frame x 1   3s rivet x 1   2s rivet x 12

Bolt (B27) x 4, NUT x 4

STEP1.   Make "Hand" part by using the two "3*6 L type Frame" and "2s rivets" as shown in the below.
Becareful with "3*6 L type Frame" part direction because the both sides are not same.
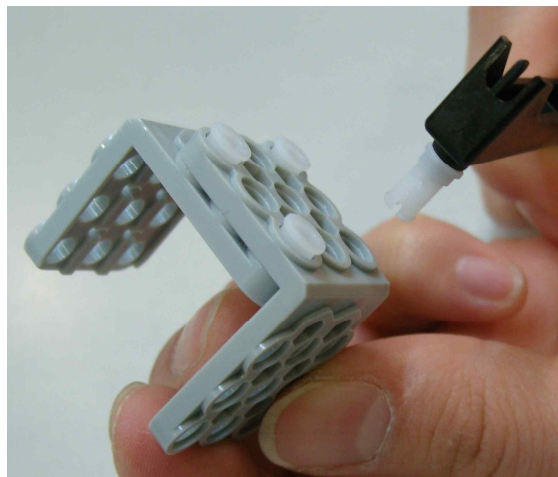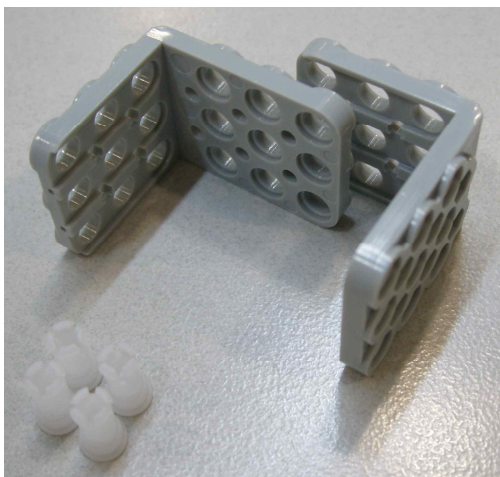
STEP2. Connect ID15 and 'U' Frame by using Bolt (B27) and Nut, then connect with "Hand" part by using 2s rivets.
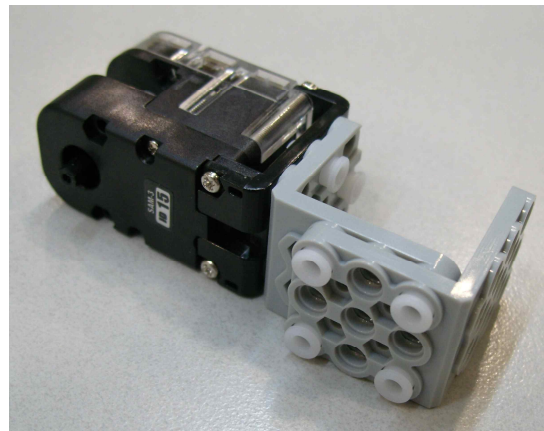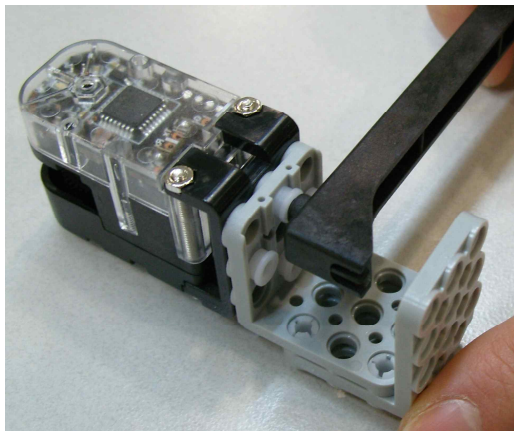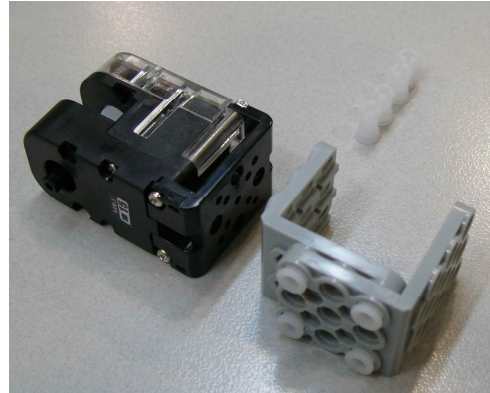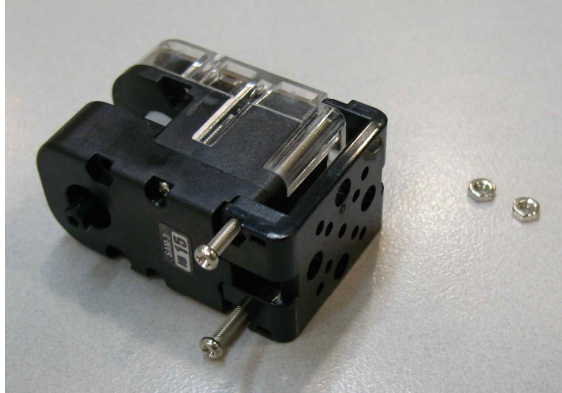
STEP3. Connect ID14 and 'U' Frame by using Bolt (B27) and Nut, then, connect with Joint Frame.

Be careful of Joint Frame direction when you connect with smart servo.
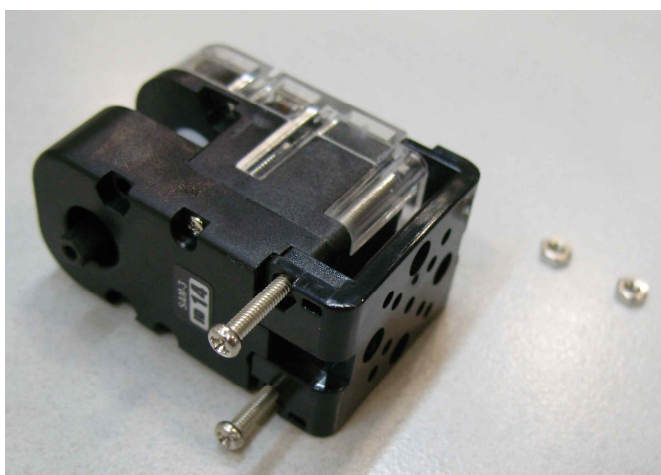
STEP4.   Connect "Joint Frame" that connected with ID14 and ID15 by using 3s rivet.
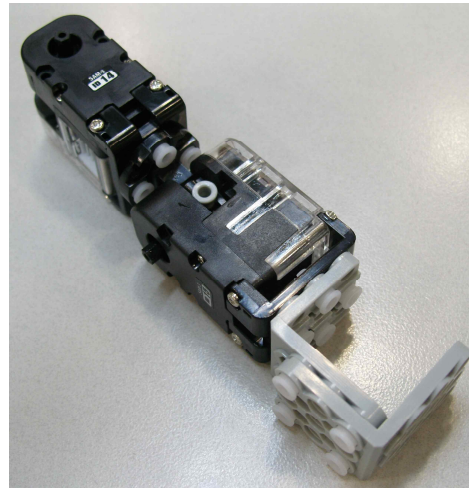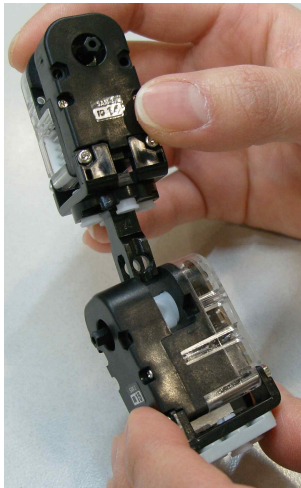
2.6 LEFT ARM Assembly
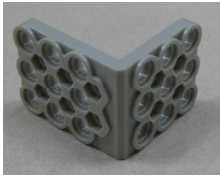
3*6 L type Frame x 2   Smart Servo x 2(ID11, ID12)   'U' Frame x 2
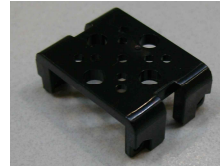
Joint Frame x 1   3s rivet x 1   2s rivet x 12

Bolt (B27) x 4, NUT x 4

STEP1.   Make "Hand" part by using the two 3*6 L type Frame and "2s rivets" as shown in the below.

Becareful with 3*6 L type Frame part direction because the both sides are not same.
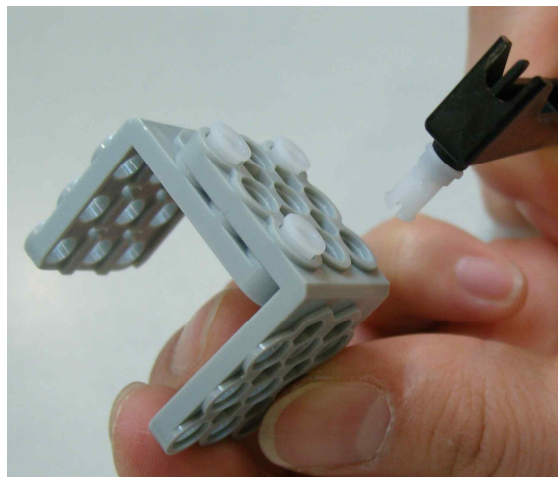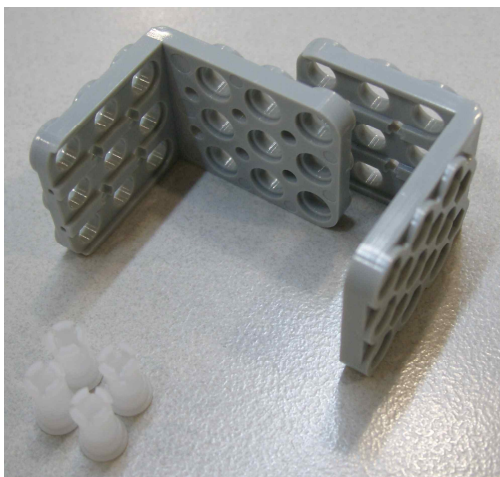
STEP2. Connect ID12 and 'U' Frame by using Bolt (B27) and Nut, then connect with "Hand" part by using 2s rivets.
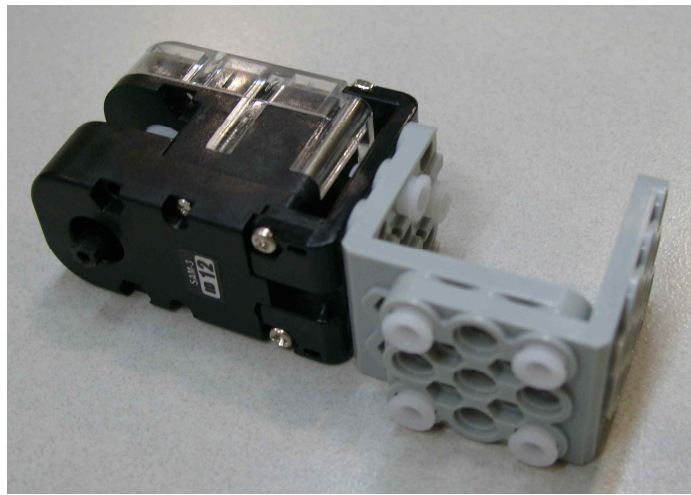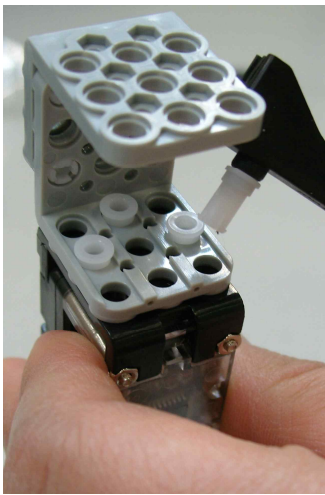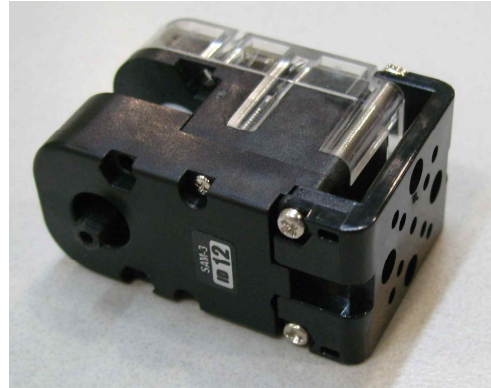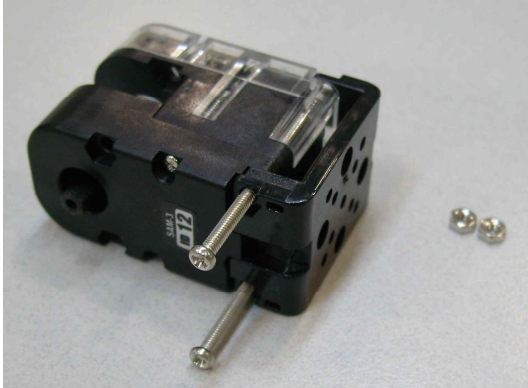
STEP3. Connect ID11 and 'U' Frame by using Bolt (B27) and Nut, then, connect with Joint Frame.

Be careful of Joint Frame direction when you connect with smart servo.

STEP4. Connect Joint Frame that connected with ID14 and ID15 by using 3s rivet.
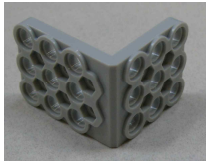
33
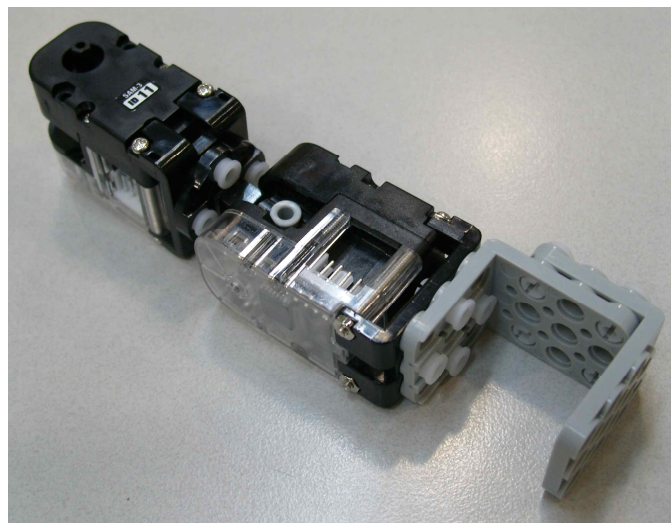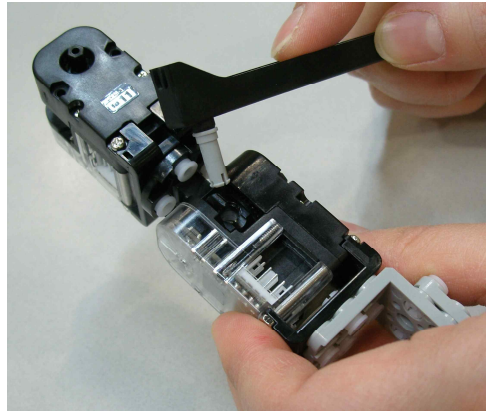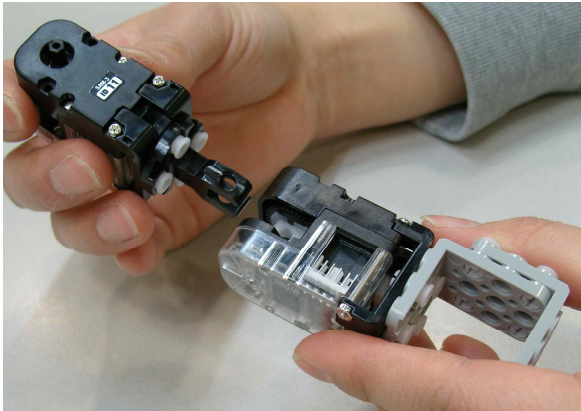
2.7 BODY Assembly

Body Frame x 1   Smart Servo x 4(ID00, ID05, ID10, ID13)   W Cable x 2
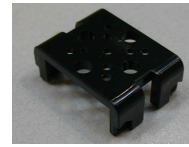
3*6 L type Frame x 2   Front Horn x 4   Joint Frame x 4   U Frame x 2

3*3 Frame x 1   3s rivet x 8   2s   rivet x 20   double rivet x 10   IR x 1
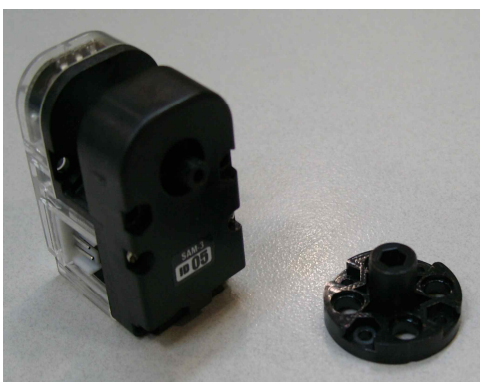
Smart Controller x 1   Li-Poly Battery x 1   Charging Board*1

Screw(P6) x 4, Bolt (B6) x 2, Bolt (B27) x 4, Bolt (B30) x 4,   Nut x 10

STEP1.   Connect Front Horn to ID05 by using screw (P6).

Front horn chase mark should be in center position (12 o'clock direction)
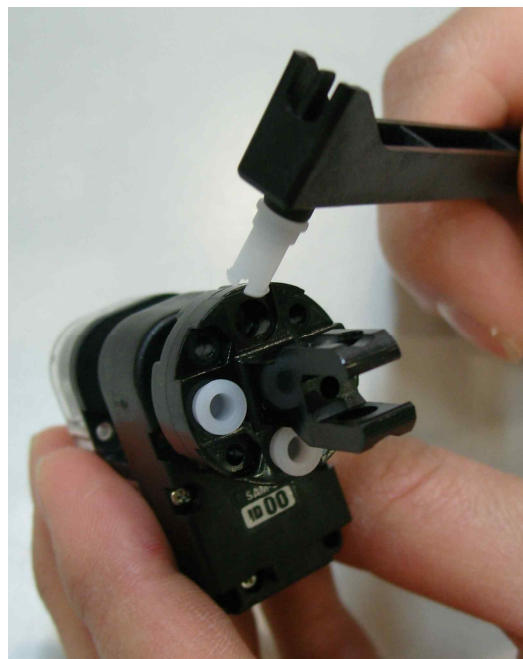
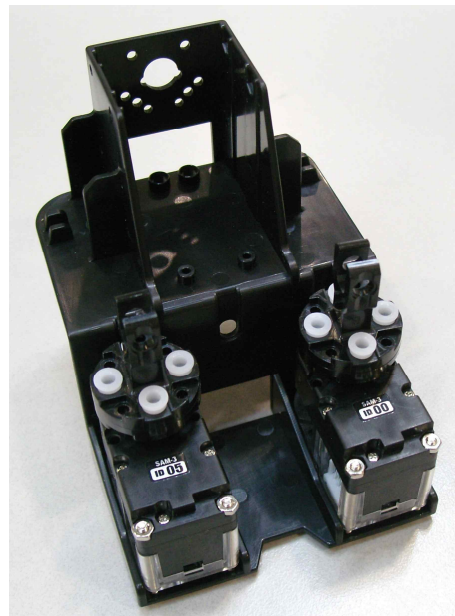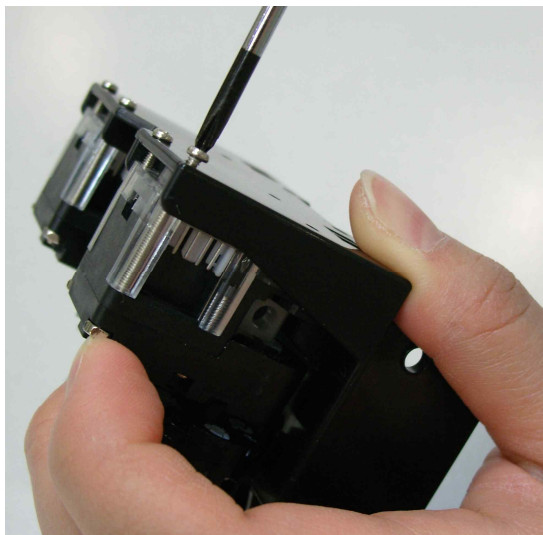STEP2. Connect "Front Horn" and "Joint Frame" by using "2s rivet" as the below.
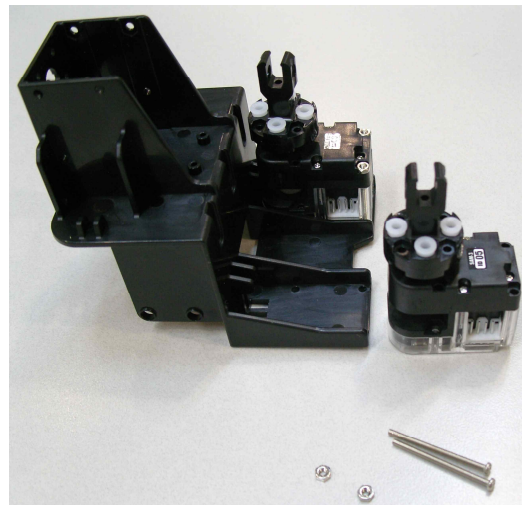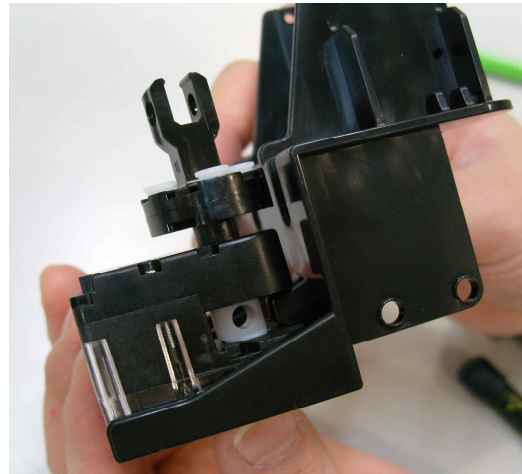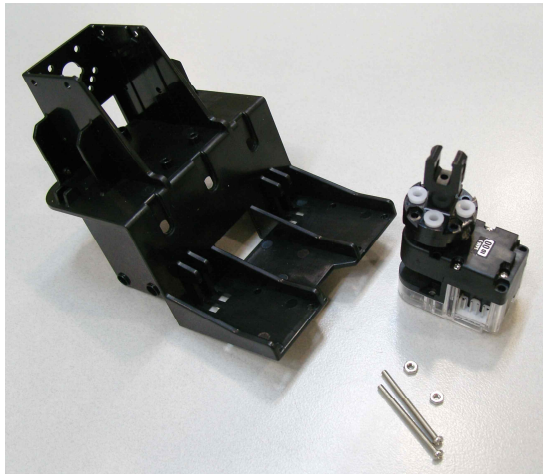

STEP3. Connect Front Horn and Joint Frame with ID00 same as the ID05 connection.

Front horn chase mark should be in center position (12 o'clock direction)
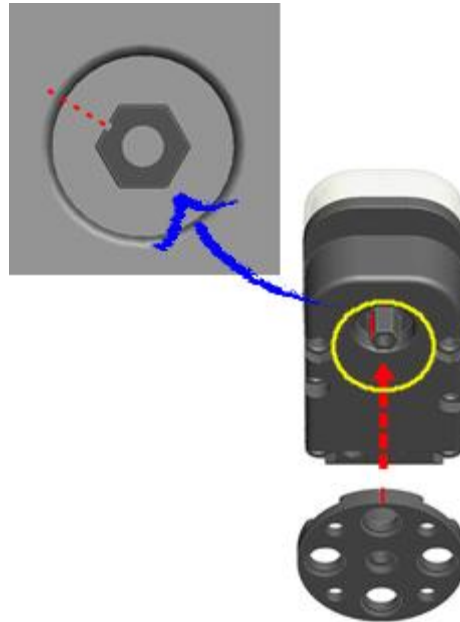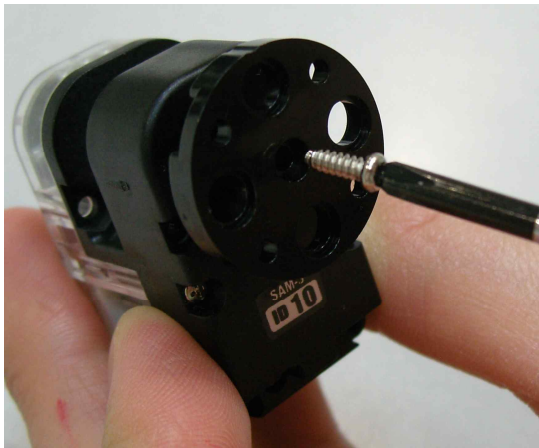
STEP4.   Connect ID00 and ID05 with Body Frame by using Bolt (B27) and Nut.

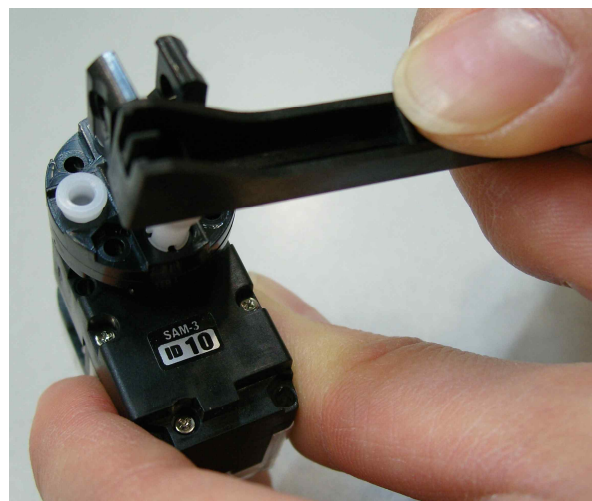Check the ID05 and ID00 connect position well as shown in the below.

STEP5.   Connect "Front Horn" with ID10.   Check the "Front Horn" and ID00 mark position.

- Smart servo mark position is 11 o'clock while Front Horn mark position is 12 o'clock as shown in the below.
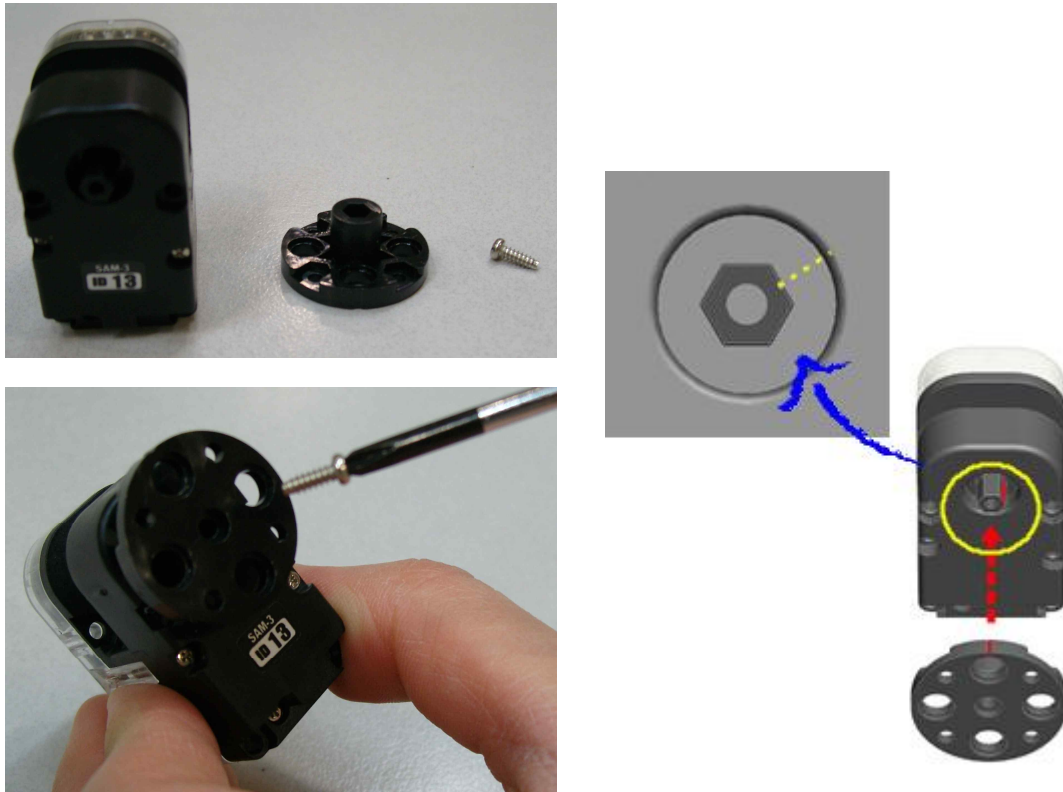

STEP6.   Connect "Joint Frame" with "Front Horn" by using "2s rivets" as shown in the below.

STEP7. Connect Front Horn with ID13.   Check the Front Horn and ID00 mark position.
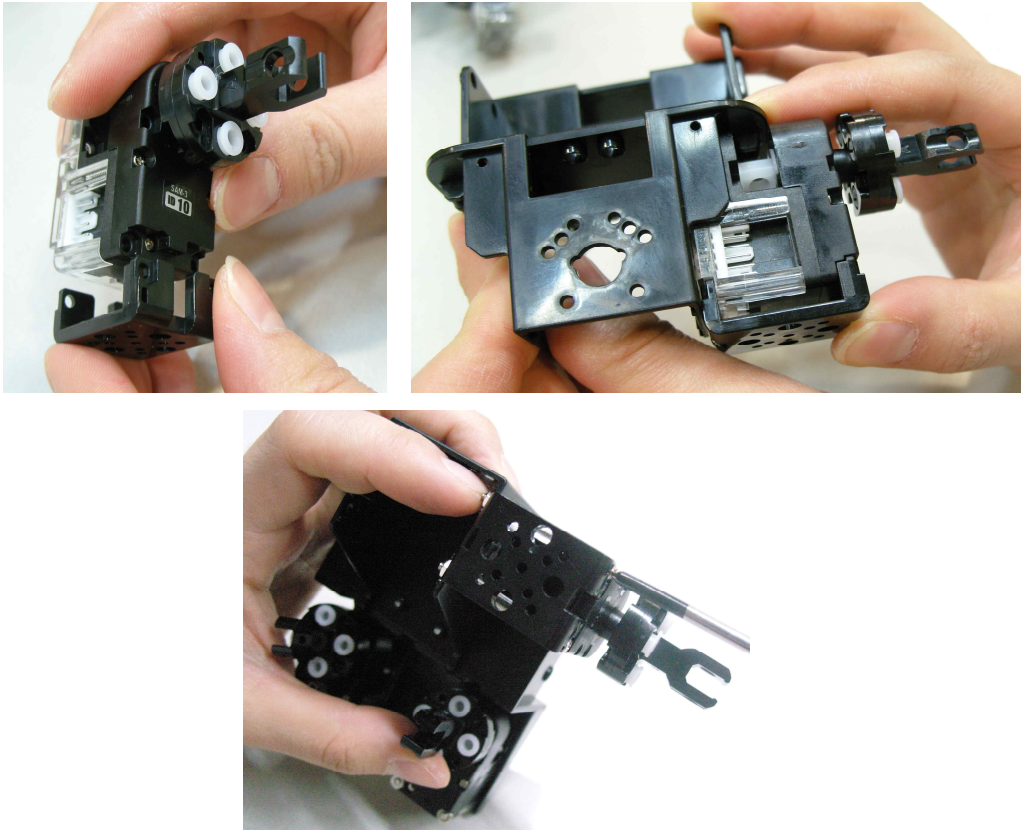
- Smart servo mark position is 1 o'clock while Front Horn mark position is 12 o'clock as shown in the below.
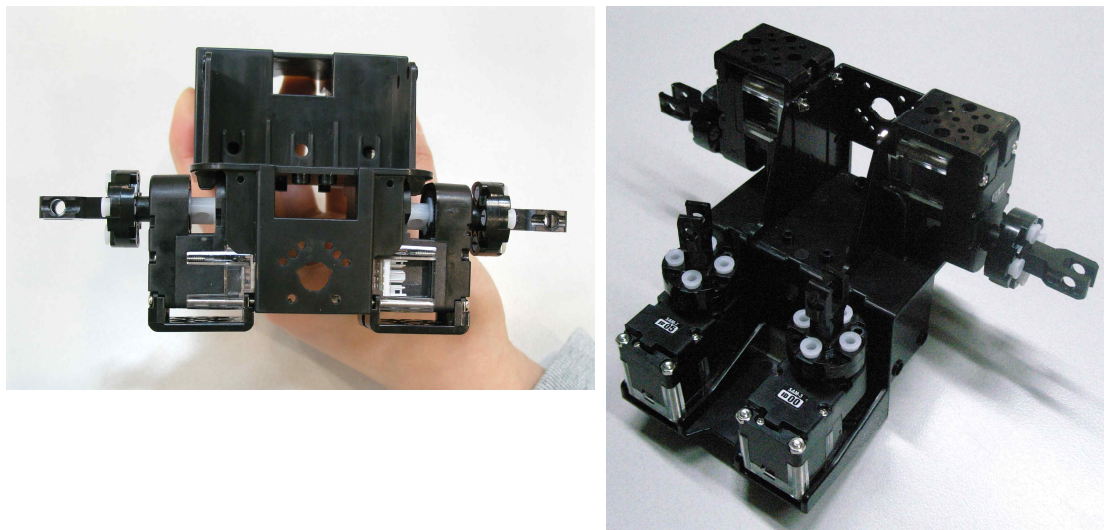

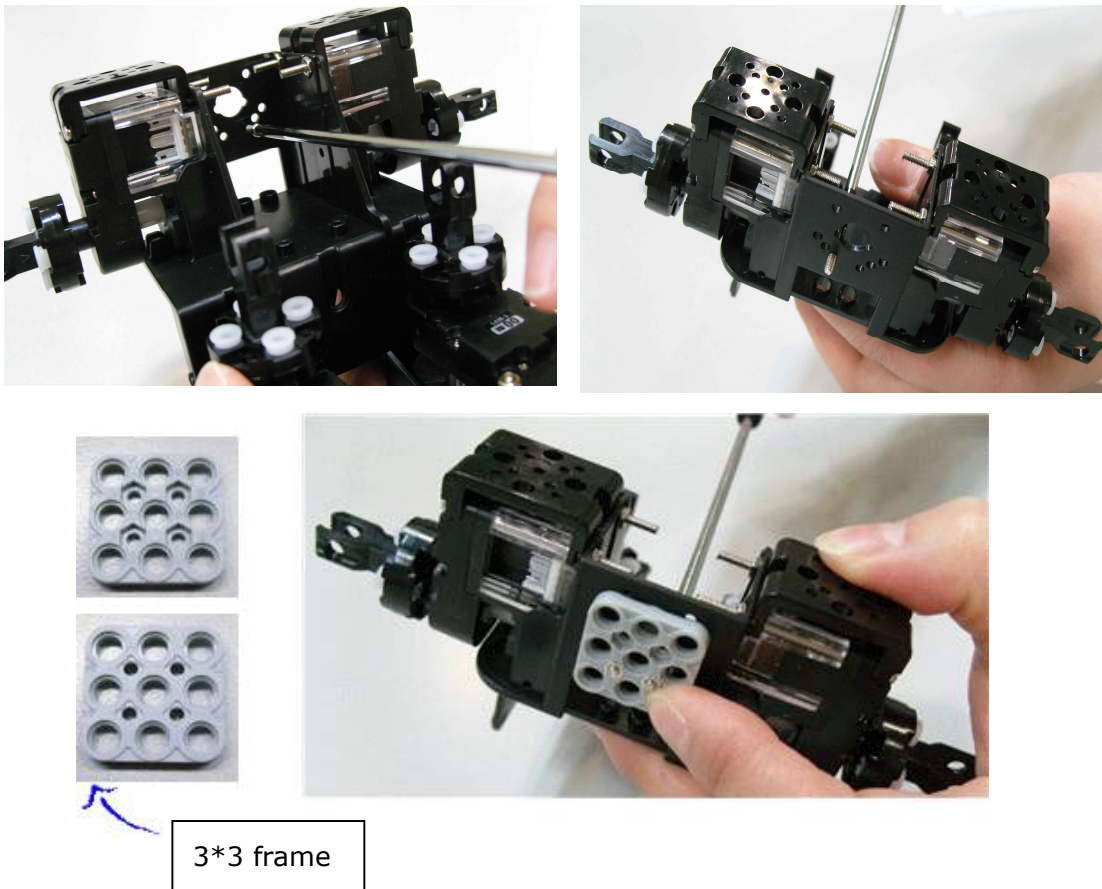STEP8. Connect Joint Frame with Front Horn by using 2s rivets as shown in the below.

STEP9.   Connect 'U' Frame with ID10 as shown in the below and connect with Body Frame by using Bolt (B30).
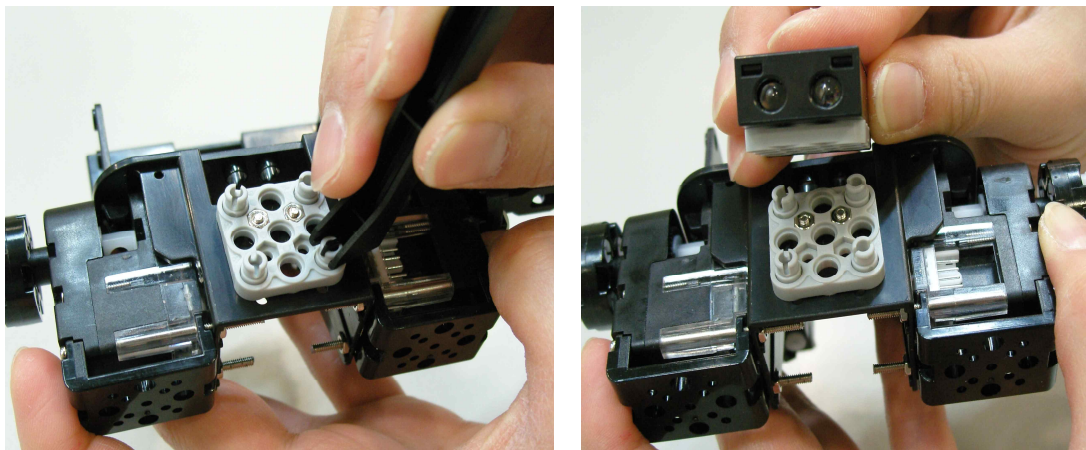

STEP10.   Connect 'U' Frame with ID13 as shown in the above and finish the RQ HUNO shoulder.
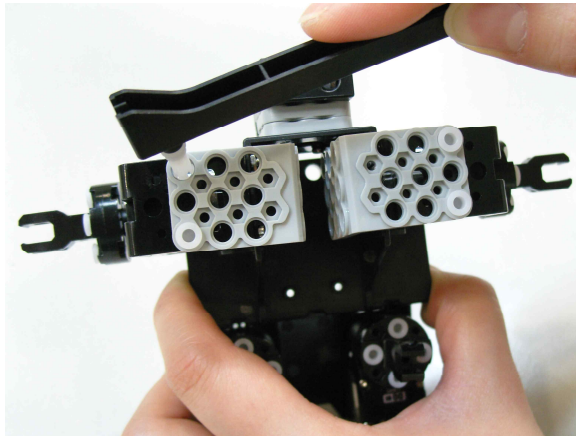
STEP11. Assemble Head part. Connect 3*3 frame with Body Frame by using Bolt (B6) and Nut.
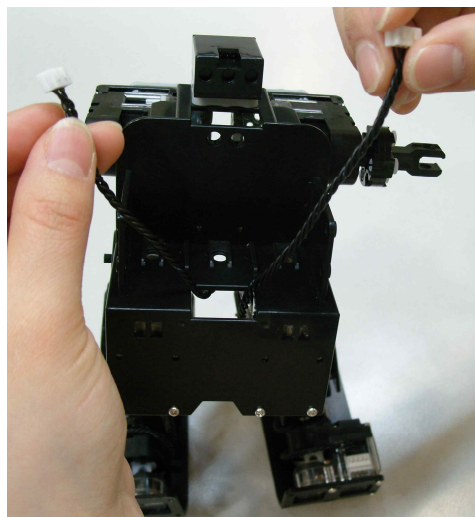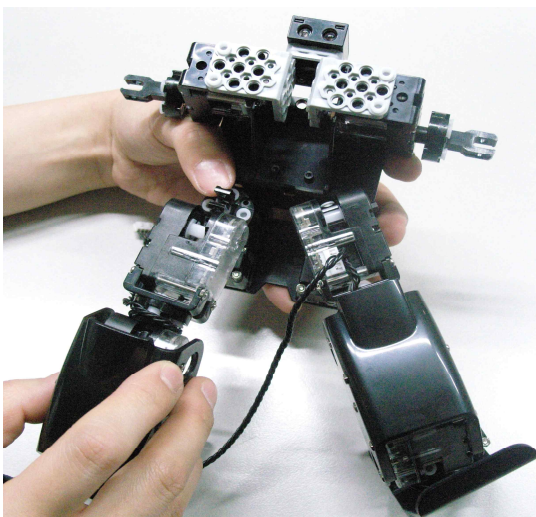

3*3 frame

STEP12. Connect IR (Infrared Sensor) into 3*3 frame by using double rivets. .

STEP13.   Connect 3*6 L type frame onto chest part.

STEP14.   Connect "ID00 with ID01" and "ID05 with ID06" by using "3s rivet", respectively .   Then, pull the Cable outside from inside as shown in the below.
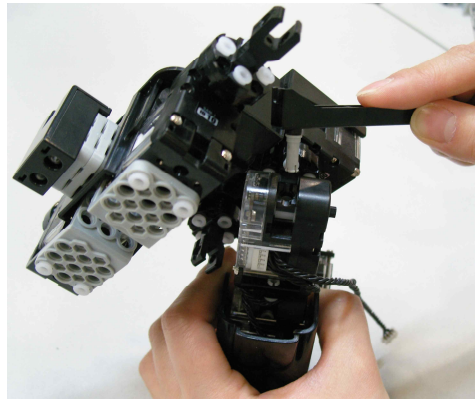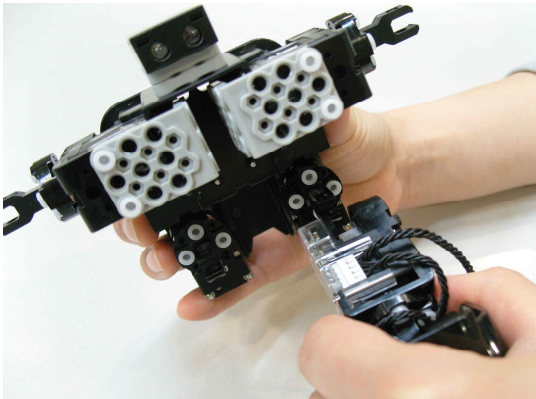
STEP15.   Connect "ID10 with ID11",   and "ID13 with ID14" by using "3s rivet", respectively.
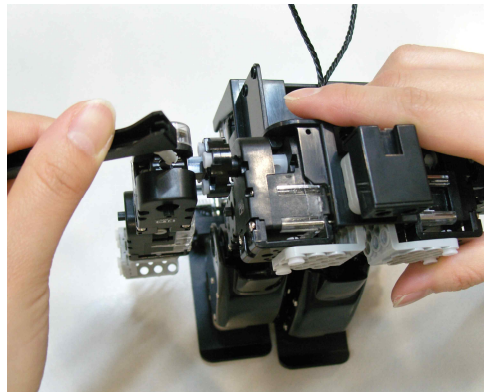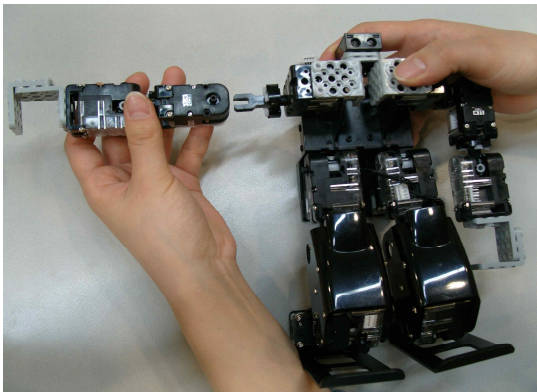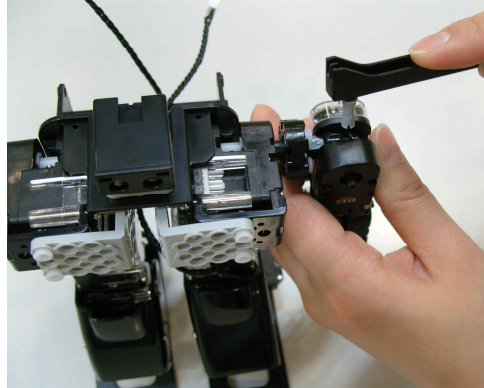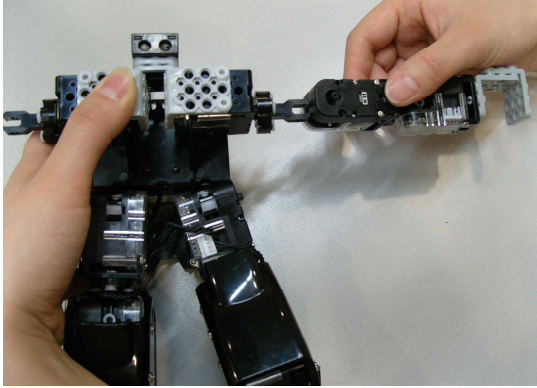
STEP16.   Put the first connector of W Cable into ID12, and rotate W Cable 1~2 times then put

the second connector of W Cable into ID 11 as shown in the below.
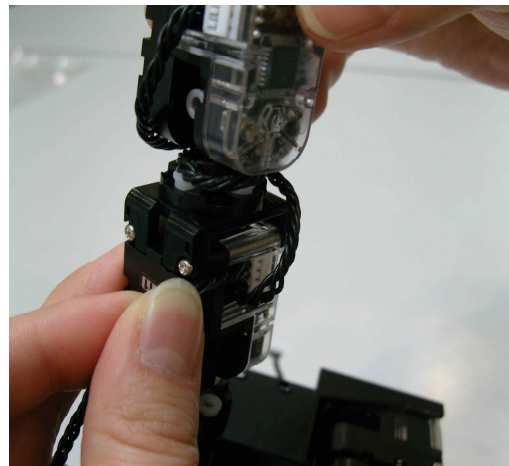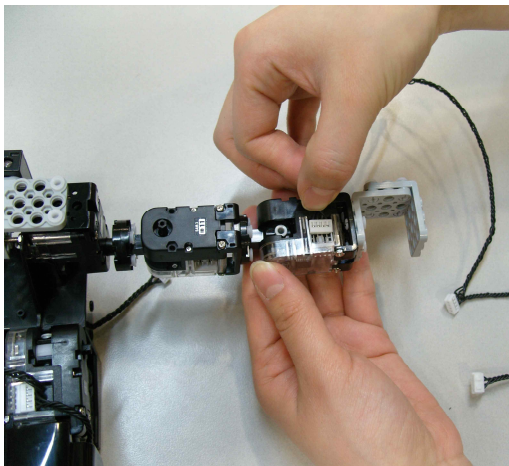
STEP17.   Then, put the third connector of W Cable into ID 10.   Put the fourth connector of W Cable

Inside, then connect with ID00.
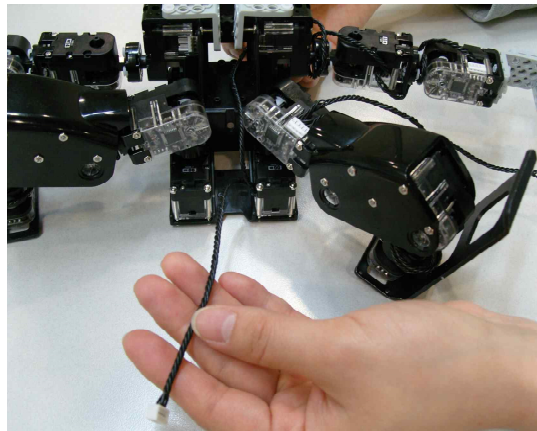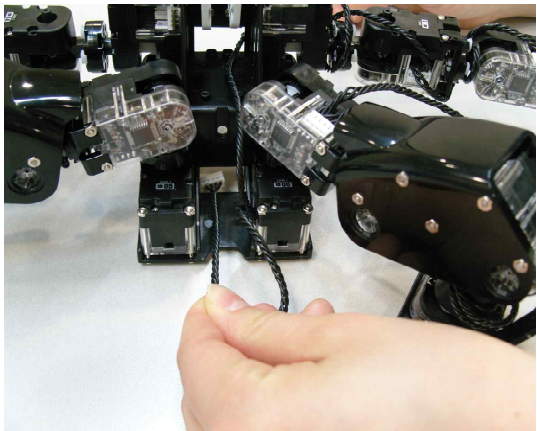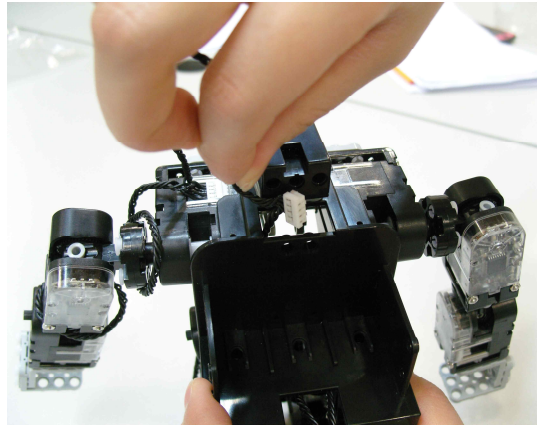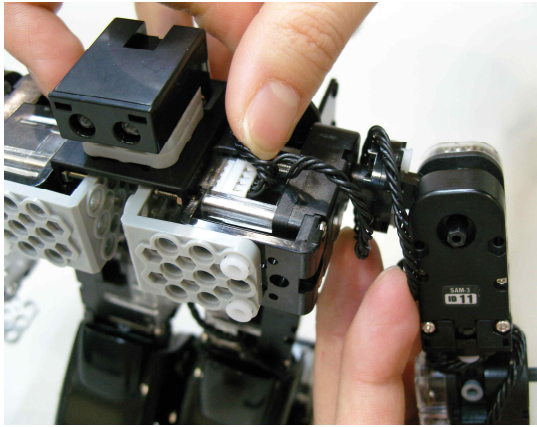
STEP18. Put the first connector of W Cable into ID15, and rotate W Cable 1~2 times then put

the second connector of W Cable into ID 14 as shown in the below.
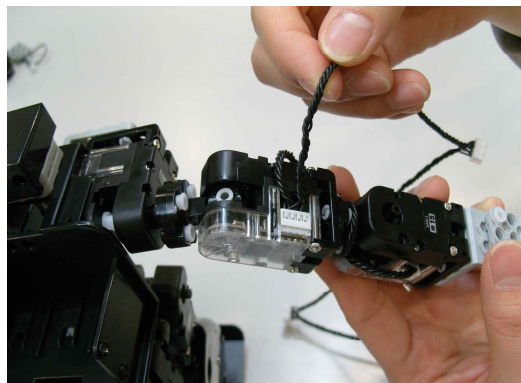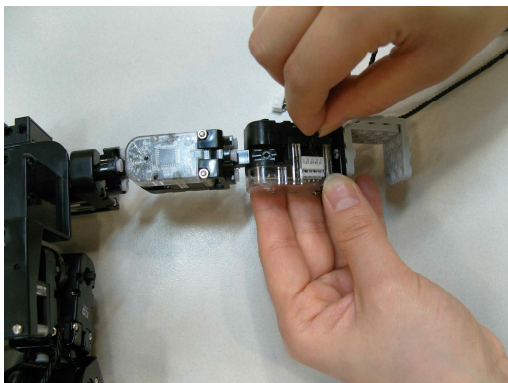
STEP19. Put the third connector of W Cable into ID13, and put the fourth connector of W Cable into ID05.
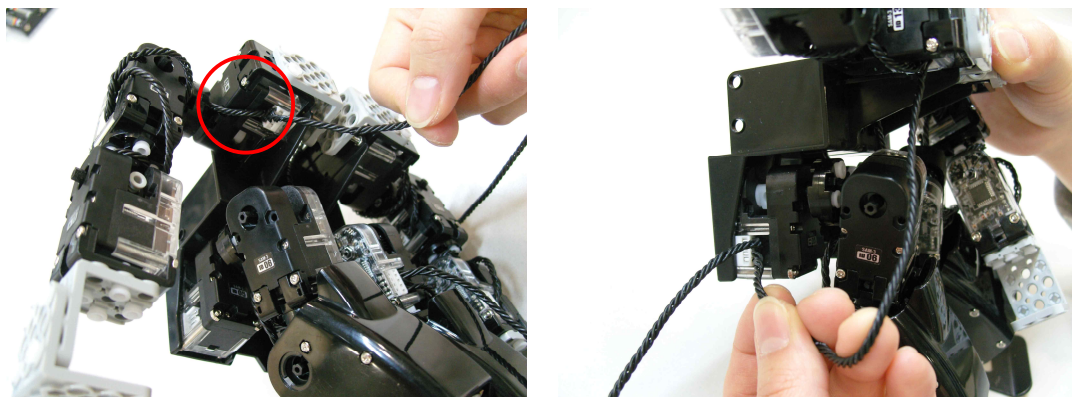
STEP20. Arrange the "W Cabe" as shown in the below, and pull out the "W Cable" from the bottom side of "Body Frame" to upside.
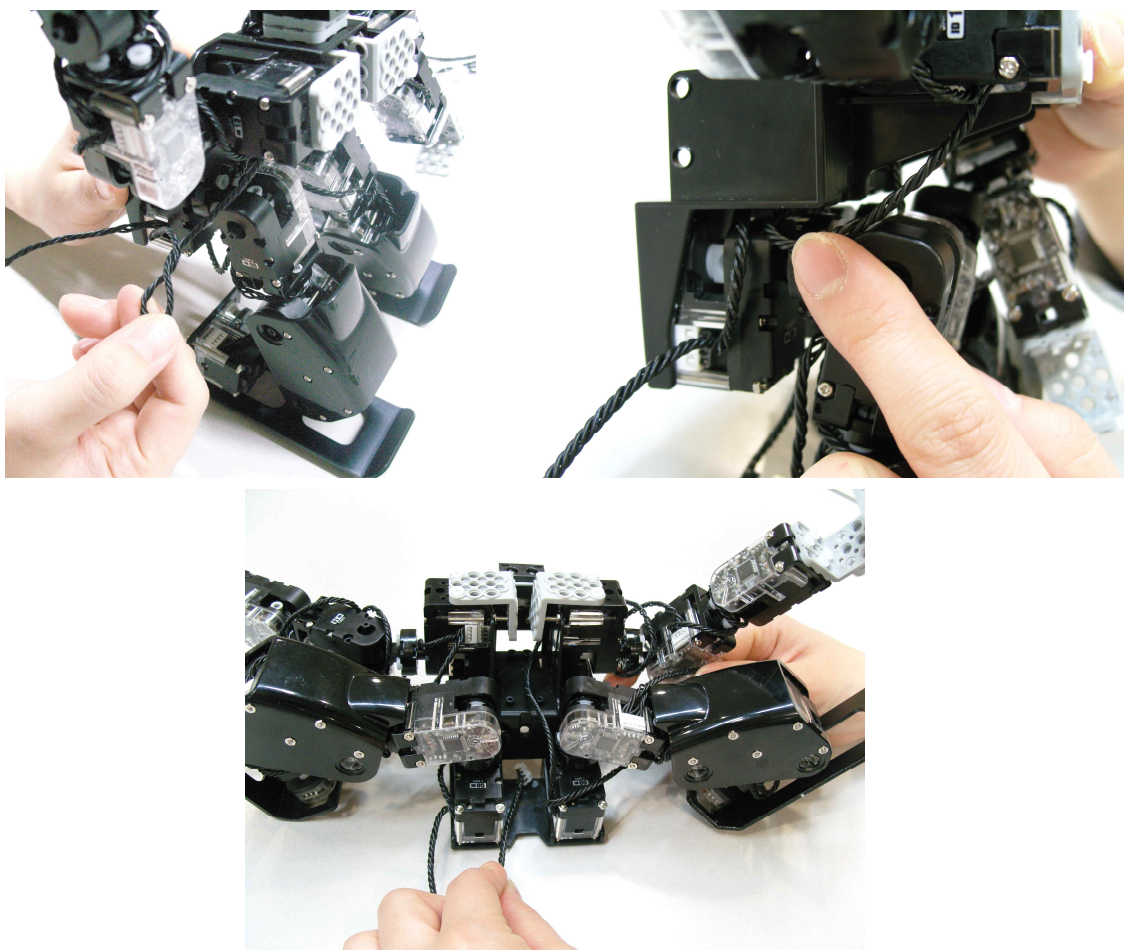
STEP21. Insert four "3s rivets" to "Body frame" to fix Smart Controller as shown in the below.
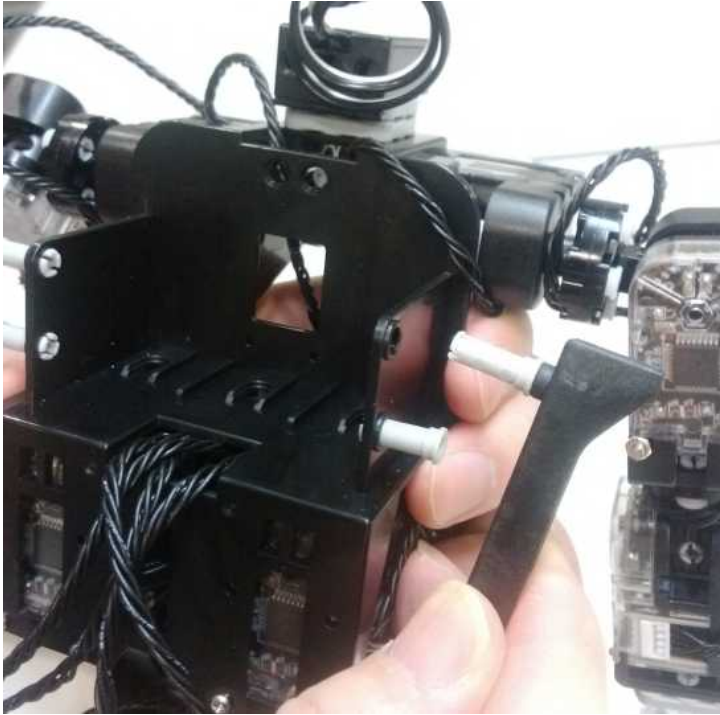
STEP22. Insert two "double rivets" to "Body frame" to fix "Battery" as shown in the below.
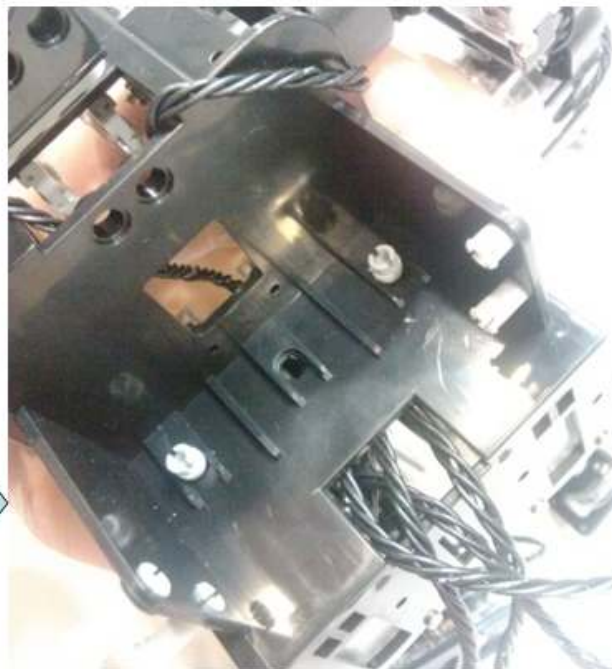
STEP23. Put "Battery" to "Body Frame" as shown in the below.
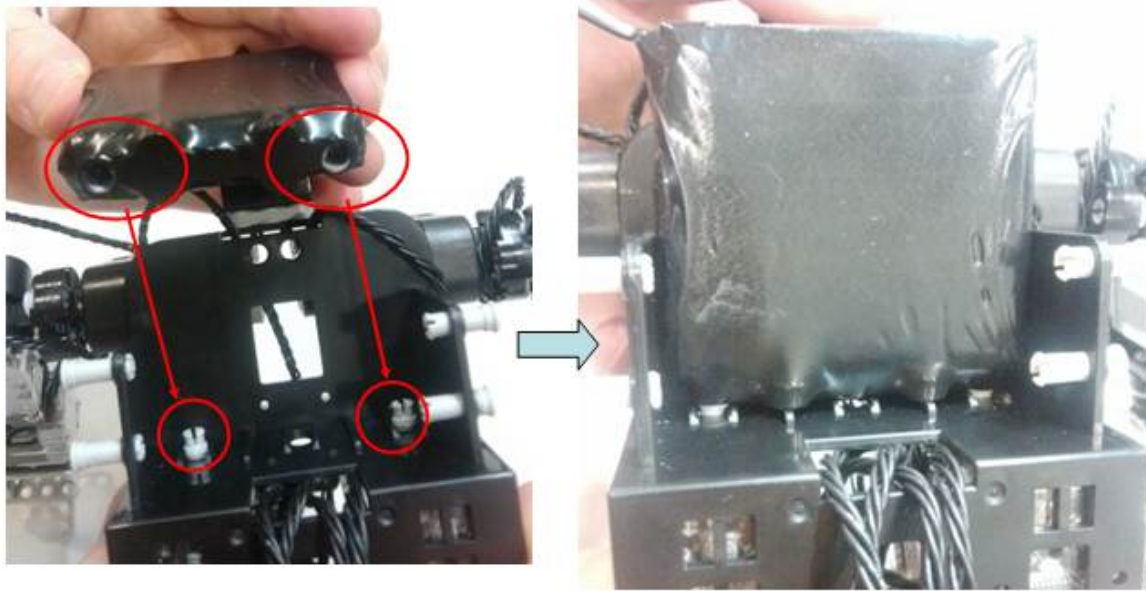
STEP24. Connect "W Cable" and fix Smart Controller with "Body Frame" as shown in the below.
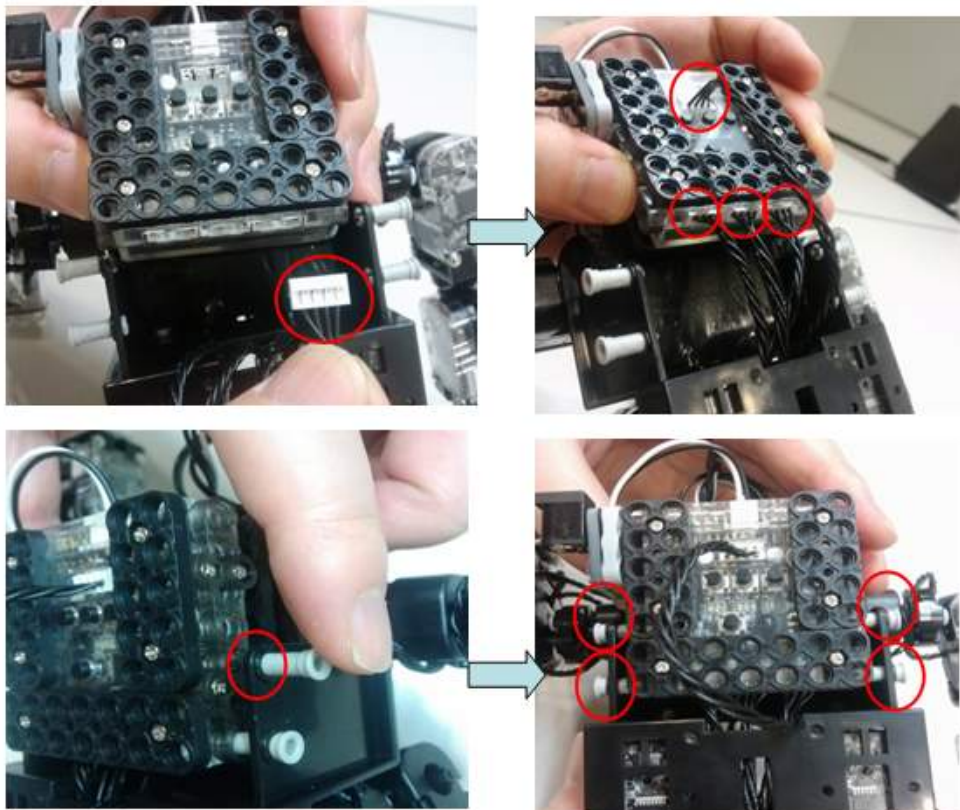
STEP25.   Connect battery connector, then also connect "power cable of charing board" to the "Smart Controller power connector" as shown in the below.

battery connector

power cable of charging board
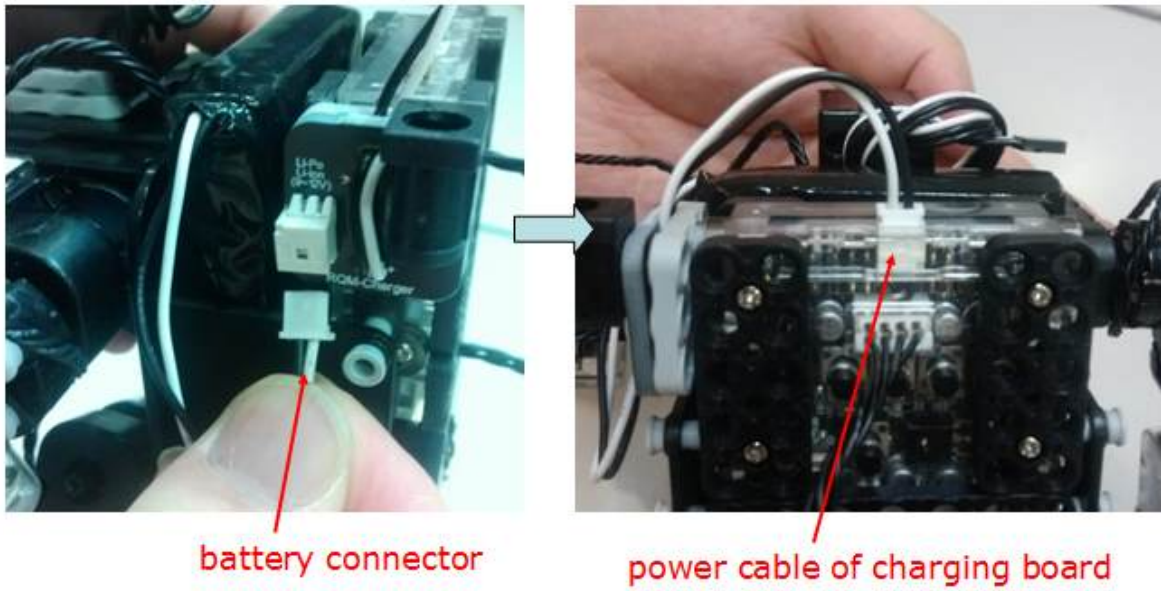
STEP26.   Assembly completed.
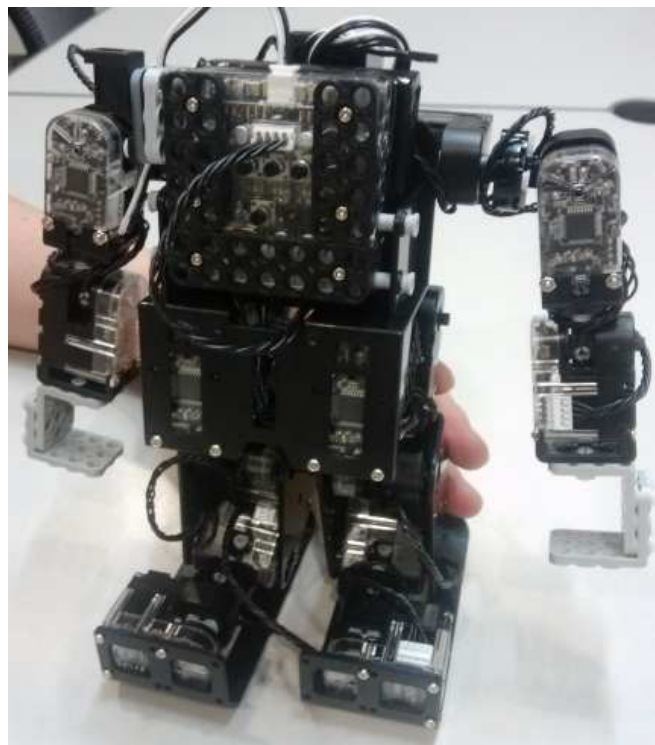
2.8 Check Assembled Robot

<Basic Posture>

Let's find out how Robot works after assembly.   Firstly, power on (press button 'P') in smart controller.

Then, press 'stop' button of IR remote controller towards IR remote controller receiver.
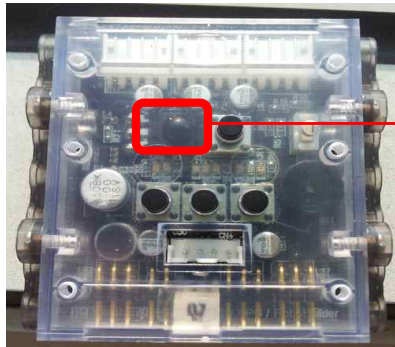
IR remote controller receiver

Then Robot will take the basic posture as shown in the below.

<Attention Posture>
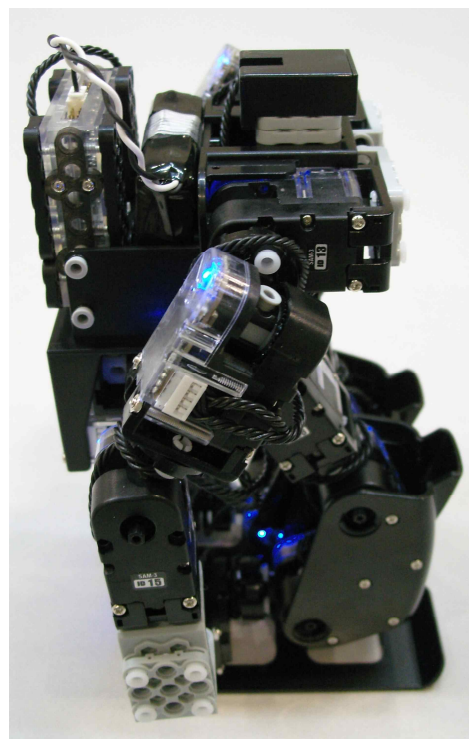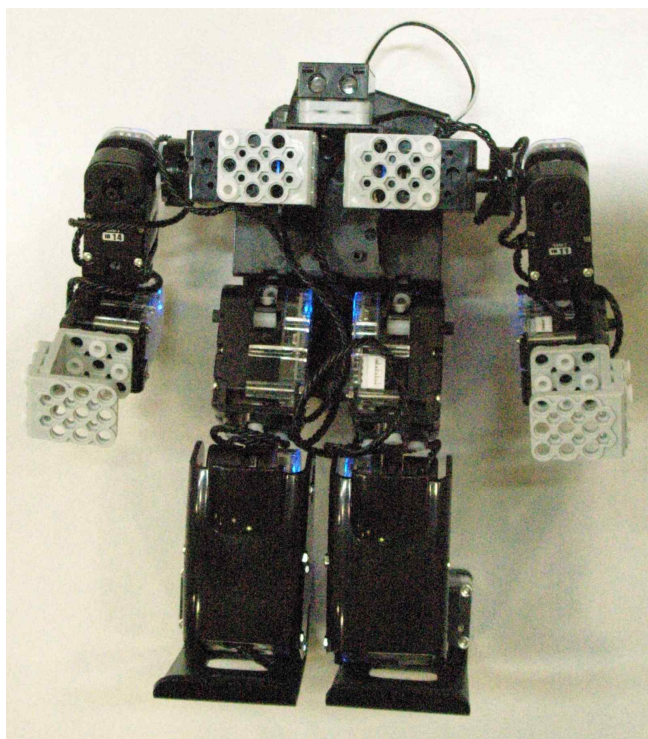
Robot will take the "Attention!" posture if you press "button 1" in IR remote controller.
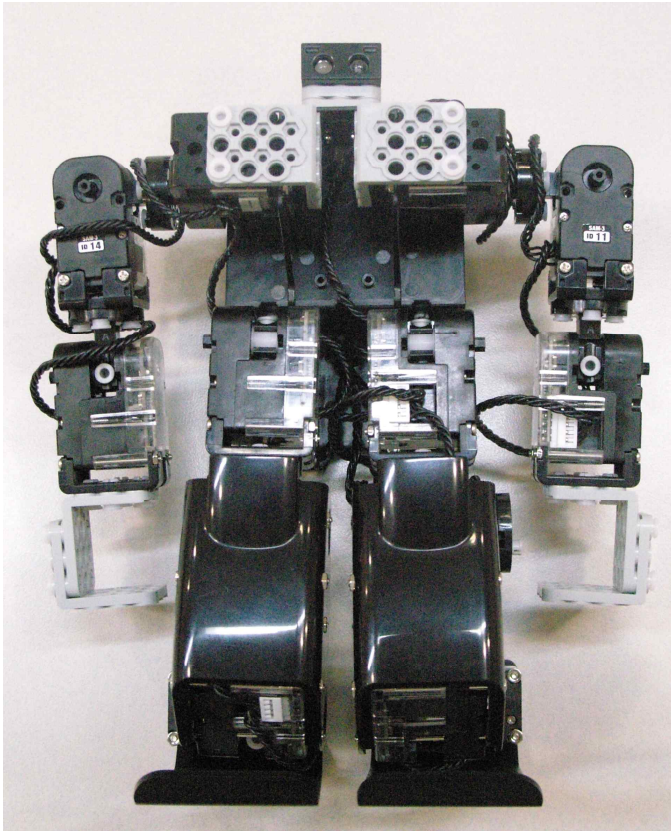
- Please check the assembly guide from the STEP1 again if robot posture is not the same as shown in

  the above.

3. Zero Position Adjustment

Zero position is robot standard posture information in order to know the difference of each robot basic posture.

Every robot basic posture would be different a little because every smart servo has own tolerance. For instance, 'A' robot motion would play a little bit different in 'B' robot because of smart servo tolerance. This difference can be reduced as you ajdust "zero position adjustment".

<RQ-HUNO zero position adjustment?

FrontHorn mark

standard line

i)   Prepare "zero position tool".

ii)   Fix Front Horn with zero position tool by using 2s rivets.
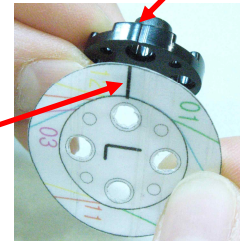
iii)   Put FrontHorn into smart servo to be adjusted.   Stand line and FrontHorn mark should be matched as the below.

'L' mark zero position tool is to adjust robot "left arm" and "left leg".

'R' mark zero position tool is to adjust robot "right arm" and "right leg".
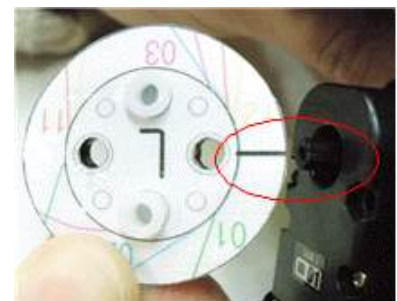
iv)   Make power-off the smart controller.

v)   Press button P while button 1 pressed.

⇨   LED 1 blue and red LED lights, also, smart servo ID00 blue LED lights.

(Zero position adjustment starts from smart servo ID00.)
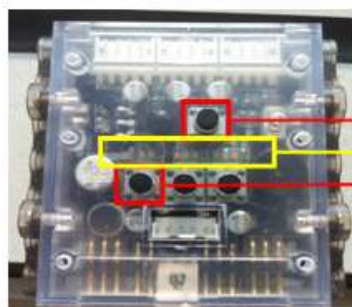
Button P

Button 1

LED1   LED2   LED3

vi)   Press button 1 for selecting smart servo ID, then press button 2 or button 3 for smart servo rotating direction.

Button 1	Button 2	Button 3
Every time you press button 1, smart servo is selected in order. "ID01, ID02, ID03…. ID15, ID00".	Smart servo moves counter clockwise direction.	Smart servo moves clockwise direction.
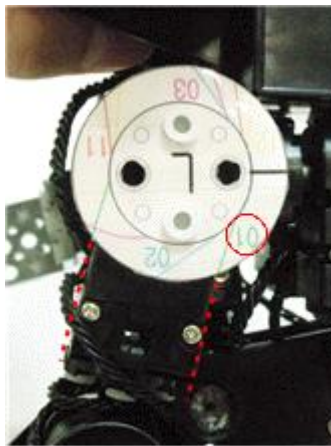
For example, smart servo ID01 blue LED lighs when ID01 zero position adjustment is started.

⇨   Make sure that 01 adjustment line is matched with smart servo ID01.

01 means smart servo ID01.

Adjust smart servo ID01 to fit with 01 number.

vii)   Press button P to save the "zero position".

TIP.

=> Each smart servo is to be adjusted to conform with zero position adjustment line.
But for ID02, ID03, ID07, ID08 is to conform with Knee Frame, not a smart servo.
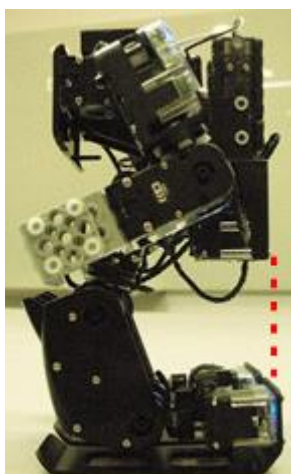
=> RQ-HUNO Body Frame should be conform with the rear side of Foot after zero position.

4. Download Cable (UART) driver Installation

You need to install the download cable driver in order to use robot programming software, such as MotionBuilder, ActionBuilder, Diagnostic Tool and Firmware Upgrade Tool.

1) Download "USB Download Cable Driver" from www.RQWORLD.com and click to start installation.

2) Click "I accept the terms of license agreement", then click "Next".
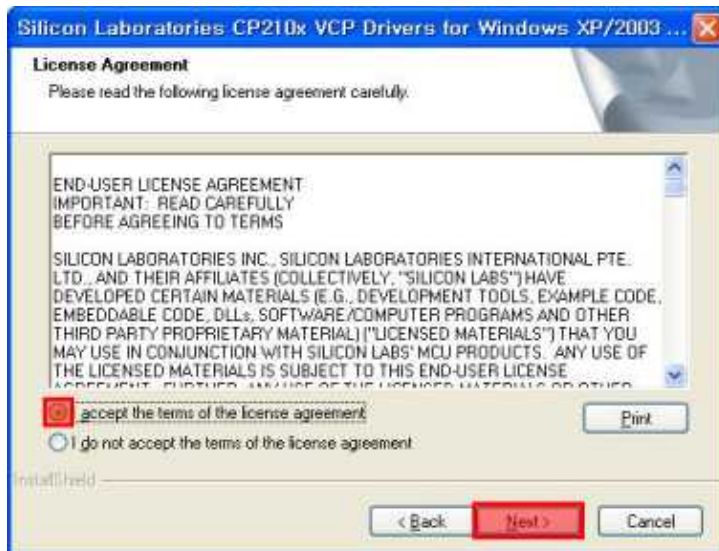
3) Click "Next" and finish the installation as shown in the below..
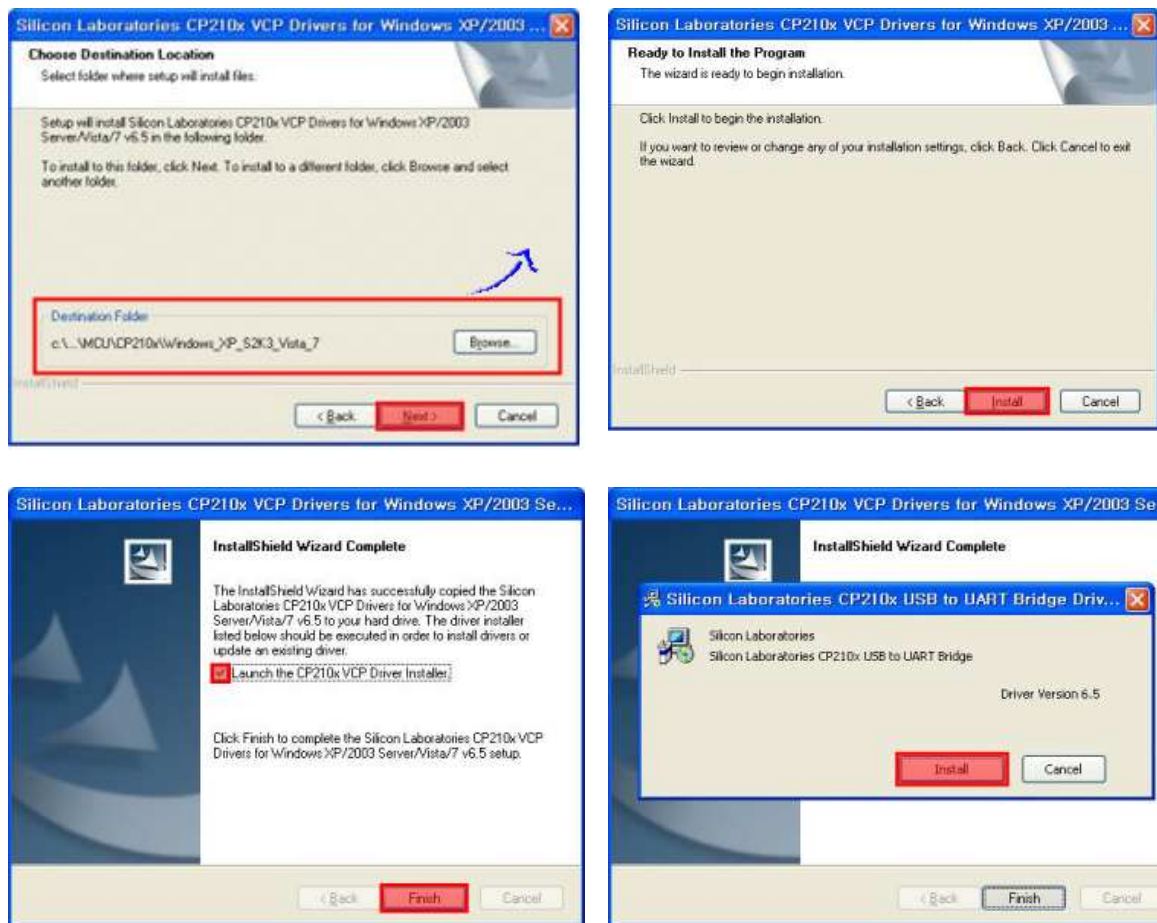
5. Download Tool

5.1 Introduction

Download Tool is used for downloading a number of Motion files (*.rbm) or Action files (*.rba) at one time. Users can designate the download positions in remote controller.

Layout description
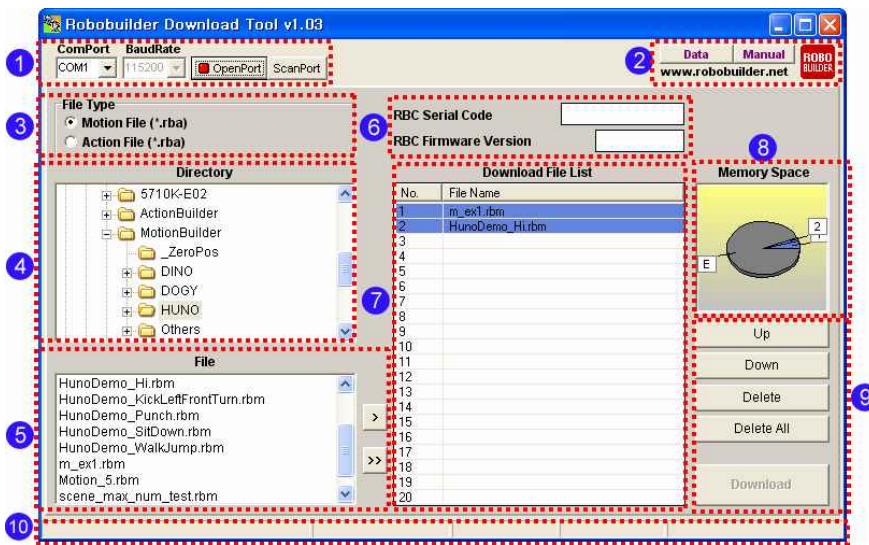
PC Port Connection Part

. COM Port : Designate available COM port for connection of RoboBuilder.

. BaudRate : It shows data transferring speed.

. OpenPort : Open PC COM port in order to connect a RoboBuilder.

. ScanPort : Find available COM port and opens it automatically.

5.2 Download File

In RoboBuilder Download Tool, it shows the folders and downloaded (made) motion files.

Click "Delete All" in order to delete the previous downloaded files in the list.
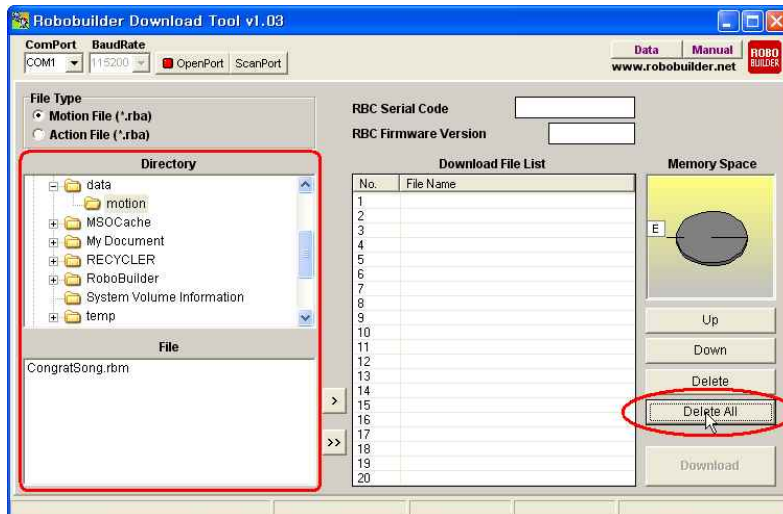
In order to insert into Download File List section, select the file then, click '>' button.
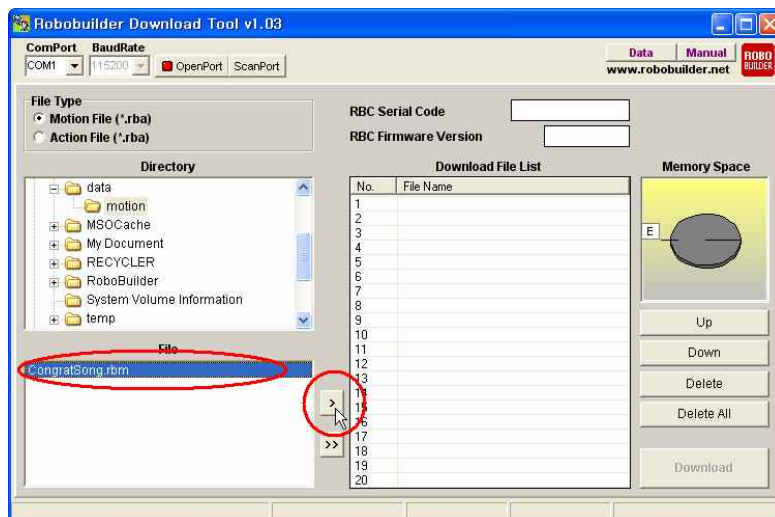
※ Users can use Drag & Drop function.

If you click a file in the Download File List, it shows file name, file size, robot platform, scene number, performance time.
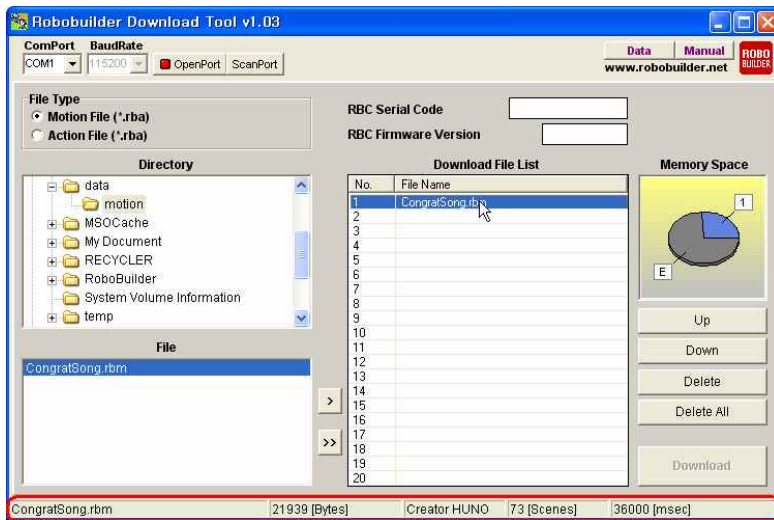
※ If registered files are more than one in the 'Download File List', users can change the downloading sequence by clicking "Up" or "Down" button.

※ Users can do this function by using Keyboard.
  'Up' button = '+' Key
  'Down' button = '-' Key
  'Delete' button = 'Delete' Key

Connect RQ-HUNO and Download (UART) Cable as shown in the below.
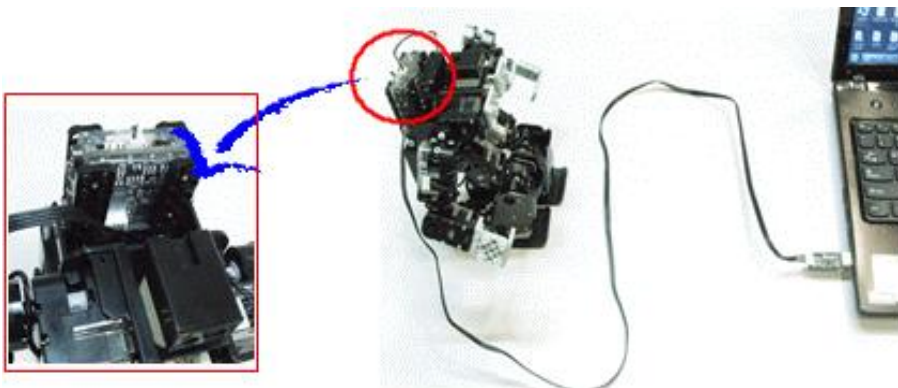
Click 'ScanPort' button in order to find available COM Port.
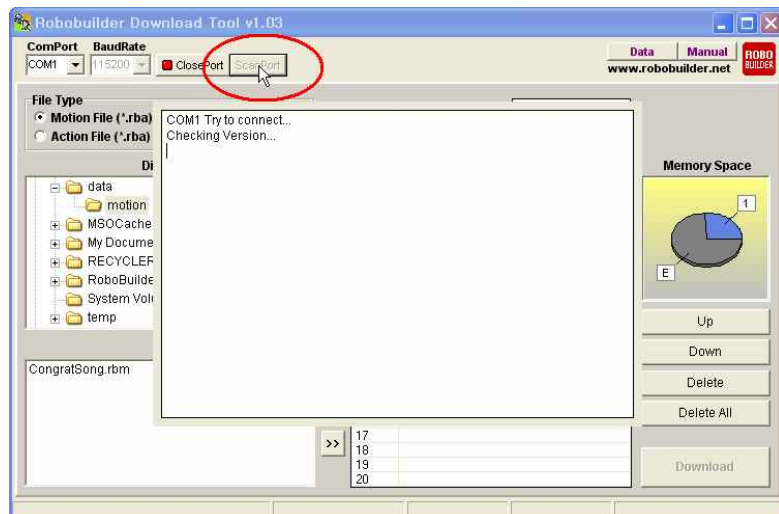
RBC serial code and Firmware Version will be shown if connected properly.

And "ClosePort" button will be shown as well.
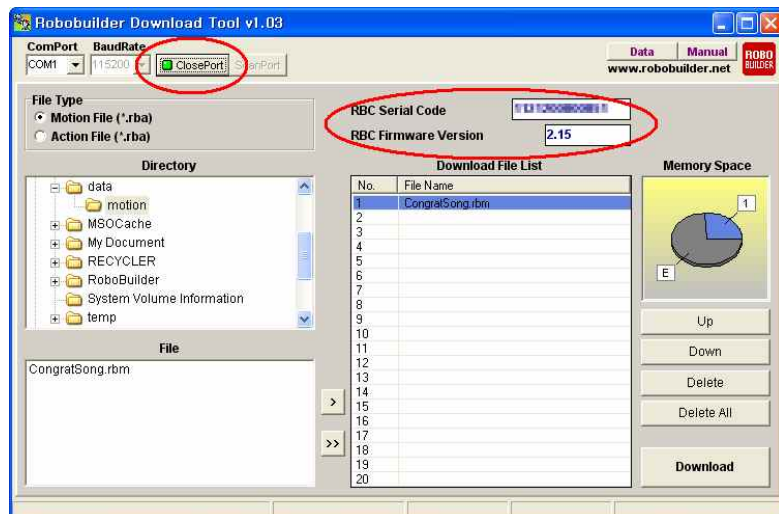
Click 'Download" button, in order to all files in the "Download File List".

Then it starts downloading into RBC Box. Following message box will shown after downloaded completely.

6. MotionBuilder

6.1 Introduction

This document explains how to use MotionBuilder the motion building tool for RQ-HUNO.
What are project file, motion file, scene, frame, transition time?
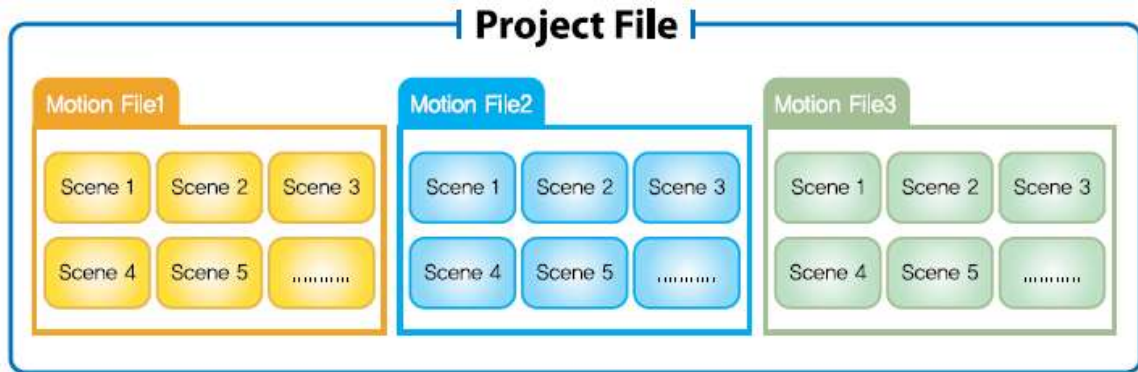
Project file(*.prj)

: A project file contains the information such as the robot's type and more. It is used to manage multiple motion files of a robot efficiently. Therefore, one project file includes one or more motion files.

Motion file(*.rbm)

: A motion file contains the complete data to execute its movement. One motion file consists of multiple scenes.

Scene

: A scene is a smaller motion unit that constitutes a complete motion file. A scene consists of start position and destination position. Except the first scene, the start position of a scene is the destination position of its previous scene. When a scene is executed, the frame data is generated automatically according to the predefiend number of frames and delivered to each actuator modules.

Frame

: A frame is the smallest motion unit that constitutes a scene. Each frame can be considered as the still image that is actually sent to robot actuators. The more frames you define, the smoother the motion becomes. One scene can have from 1 up to 100 frames.
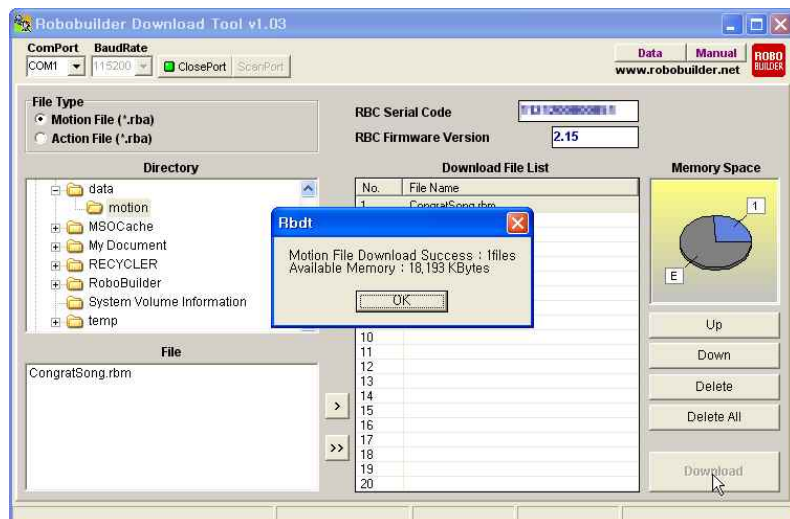
Transition Time

: Transition time is the time duration that is taken to execute a scene. Transition time is closely related with the number of frames. It can have value from 20msec up to 6000msec. The minimum transition time that can be allocated for a frame is 20msec.

   e.g)   If scene A has 10 frames, the transition time can be selected from 200 up to 60000.

Screen Layout

This is the screen layout of the MotionBuilder.

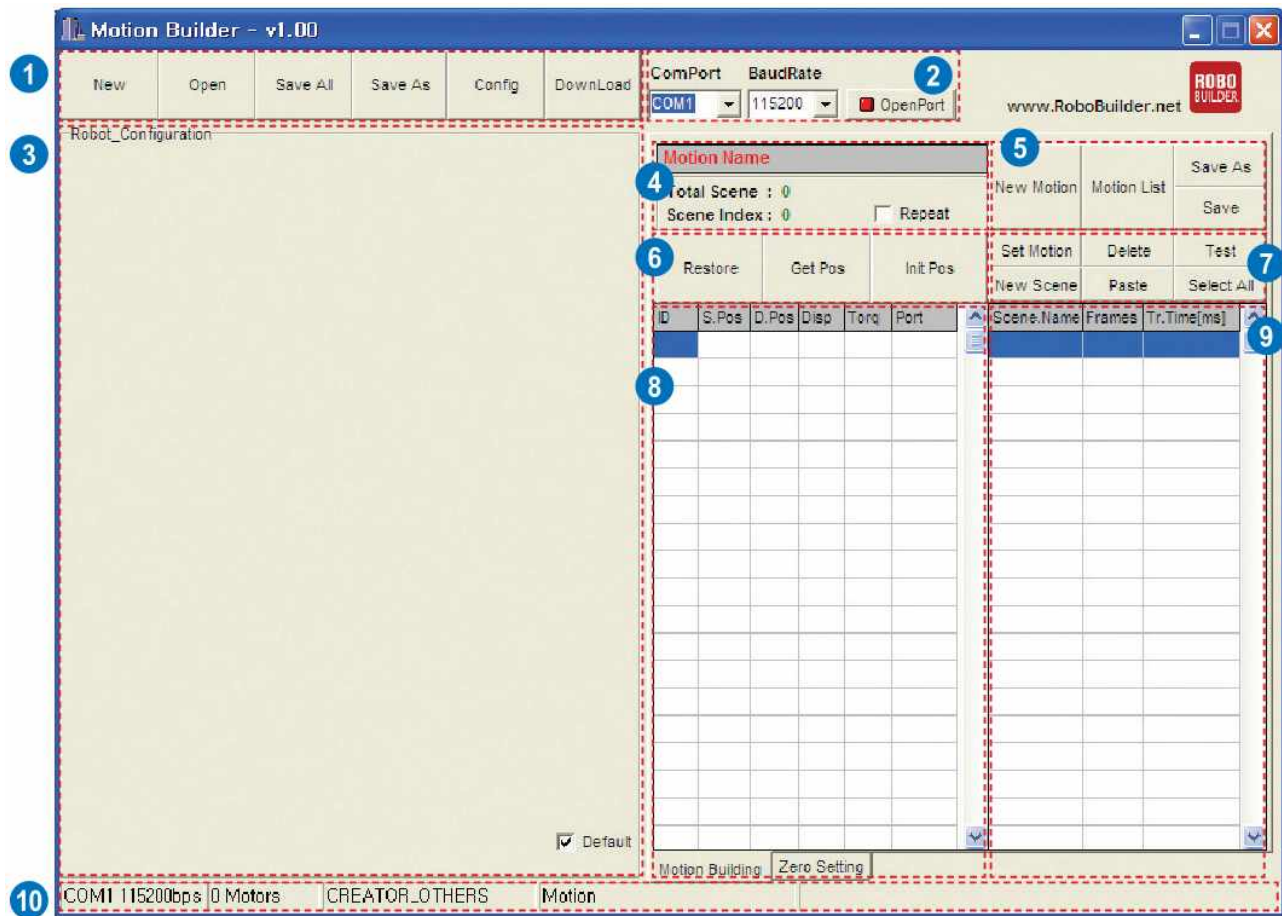| No.	Area Name	Functions & Descriptions
①	Menu Bar	· New: creates a new project by defining project name, file path, robot type etc. · Open: opens an existing project file. (*.prj) · Save All: stores the running project file and all data related to the project. · Save As: saves the running project file as a different name. · Config: configures and sets the wCK module. · Download: transfers robot files to control box.
②	PC Port connection	· ComPort: sets the port on PC to connect RoboBuilder with. · BaudRate: sets the data communication speed. (default: 115,200kbps) · OpenPort: opens the set PC port to connect RoboBuilder with.
③	Robot Configuration	· This area illustrates the mechanical construction of the wCK modules. Using the jog dial pad, you can control the movement of each wCK module. *If the [Default] button is not checked, you can freely relocate the jog dial pads of the wCK modules by dragging them with your mouse(right-click). When [Default] is selected, they return to their original default position.*
④	Motion File Information	· Motion Name: displays the name of the motion file running. · Total Scene: displays the total number of scenes that constitutes the motion file running. · Scene Index: displays the number of the selected scene in the running motion file. · Repeat: is used to repeat and test the selected one or more scenes.
⑤	Motion File Management	· New Motion: creates a new motion file. · Motion List: add, open, modify, or remove motion files. · Save As: saves the running motion file as a different name. · Save: saves the running motion file.
⑥	Position Control	· Restore: sets all modules' displacement angles of the selected scene to "0". · Get Pos: captures the desired posture of a robot after adjusting the posture manually with user's hands. Captured posture is saved as in a scene. · Init Pos: sets the initial torque and angle of the selected wCK module.
⑦	Scene Management	· Set Motion: sets the name and saved path of the motion file, configures PID gains of wCK modules. · Delete: deletes the selected scene. · Test: run the selected scene.(multiple scene selection available) · New Scene: adds a new scene. · Paste: pastes the copied scene in the selected position. · Select All: selects all scenes in a motion file.
⑧	wCK module Control Detail	· ID: displays the ID number of the wCK module. · S.Pos: stands for Start Position and it displays the start position of the wCK module in unit of control angle. · D.Pos: stands for Destination Position and it displays the destination position of the wCK module in unit of control angle. · Disp: stands for Displacement and it displays the control angle difference between S.Pos and D.Pos. · Torq: It displays the speed of the wCK module.(0: Very fast, -4: Very slow) · Port: displays the status of the LED installed on the I/O port of the wCK module.
⑨	Scene Editing	· Scene Name: displays the scene name. · Frames: displays the number of frames, into which a scene is divided. · Tr.Time[ms]: displays the transition time that is used for operating the corresponding scene.
⑩	Task Info	· displays the task related information such as the PC port connected, communication speed, number of wCK modules connected, robot type, etc.

6.2 Motion Programming #1

Let's try one simple motion programming for RQ-HUNO.
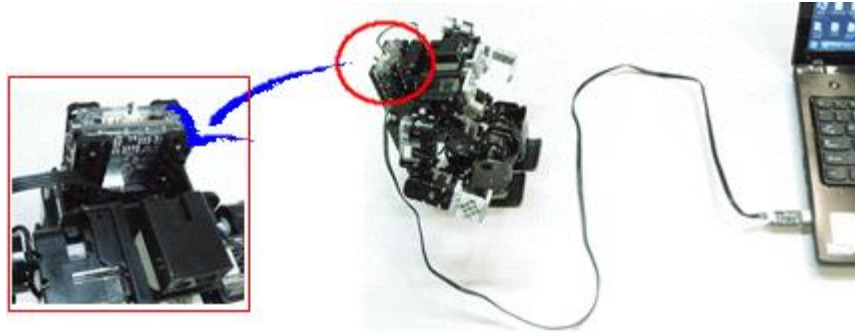
1) Run "MotionBuilder" and click "New".
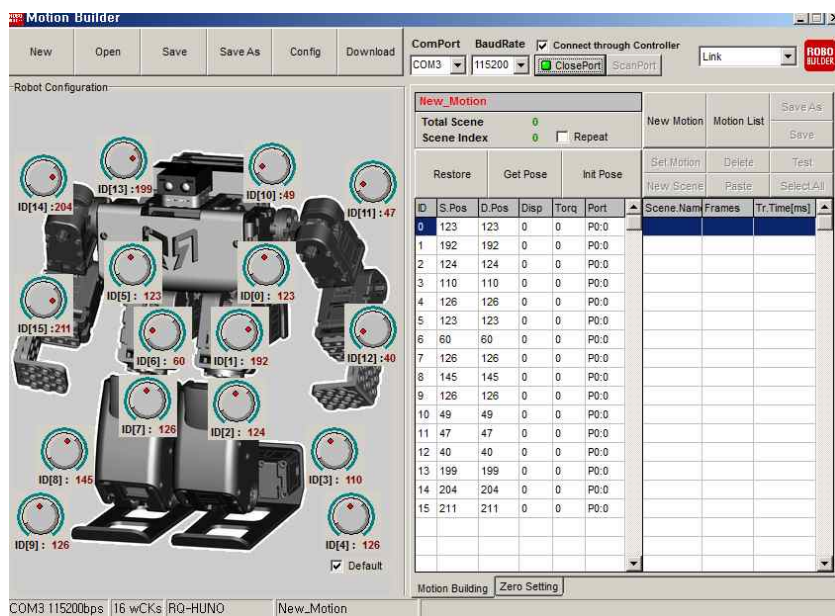   Input "greeting" in Project Name, then select Robot Platform "**RQ-HUNO**".
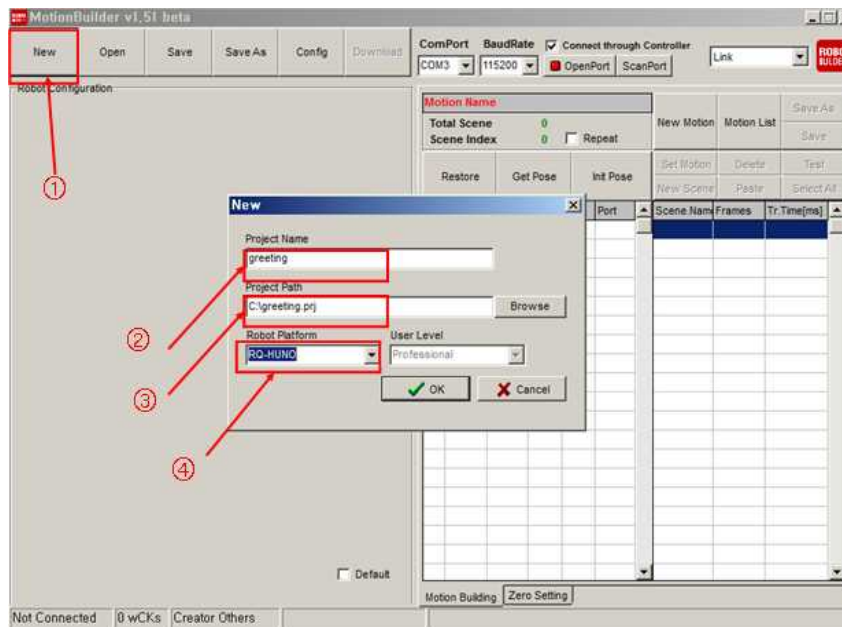
2) Click "OK", then it shows as below.
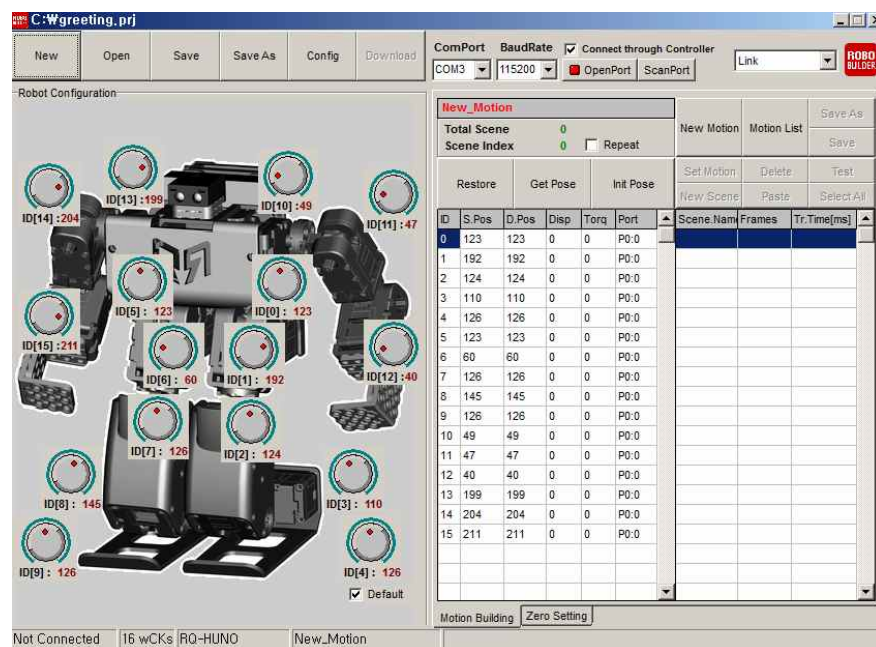
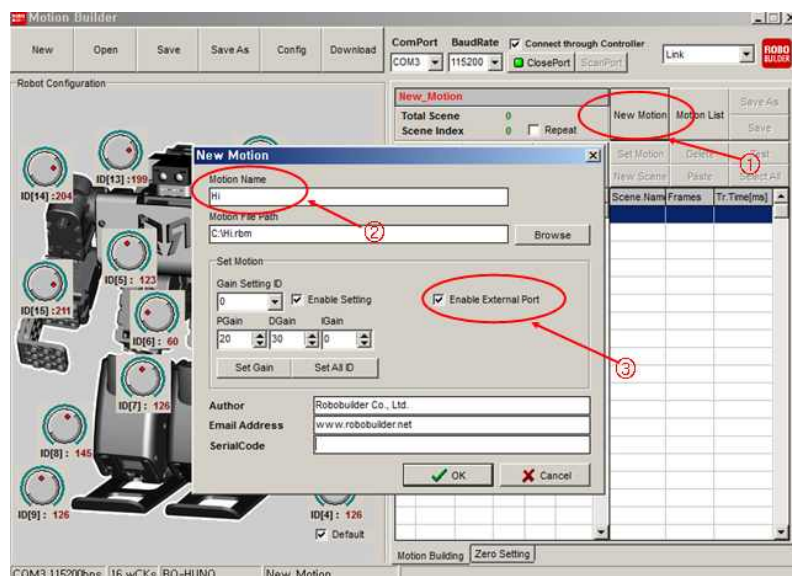3) Connect RQ-HUNO with PC by using "Down Cable (UART)" then, power on smart controller (Button P)

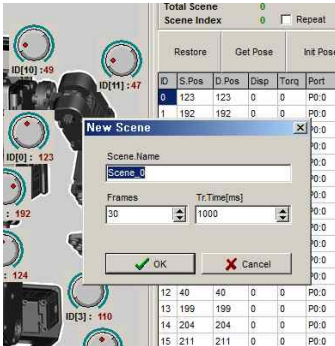4) Click "Scan Port" to search correct COM Port, or you can click "Open Port" if you know the COM Port No.

5) Click "New Motion". Then input "hi" in Motion Name.

If you want to use smart servo LED, check the "Enable External Port", then, click "OK".

6) If you see the New Scene window, click "OK".

You can adjust "Frames", and "Motion Run Time (ms)".

- Frames : If you increase the Frames, robot moves smoothly.

-Motion Run Time : Each frame run time range is 20~1000msec.

TIP. It is recommended that first scene and last scene is for robot basic posture for stable motion movement

Therefore, do not revise the Frames and Run Time value of Scene0

7) In order to move up and shake the arm, add the second scene. For adding new scene, you should select next empty scene before click "New Scene".
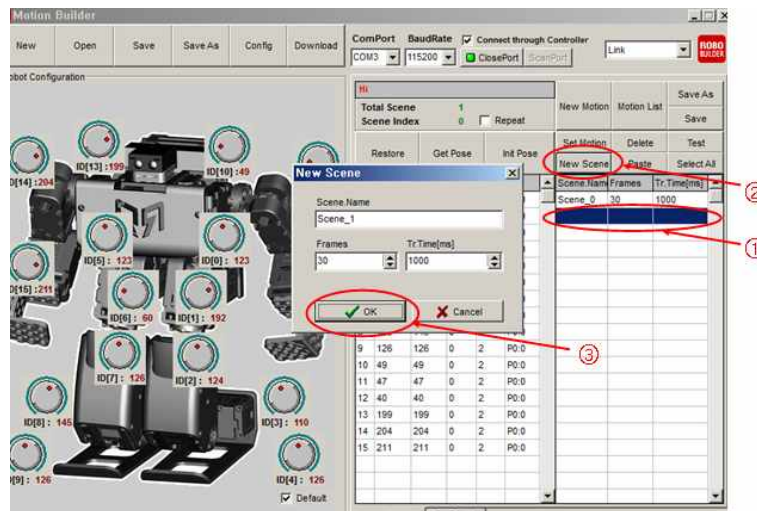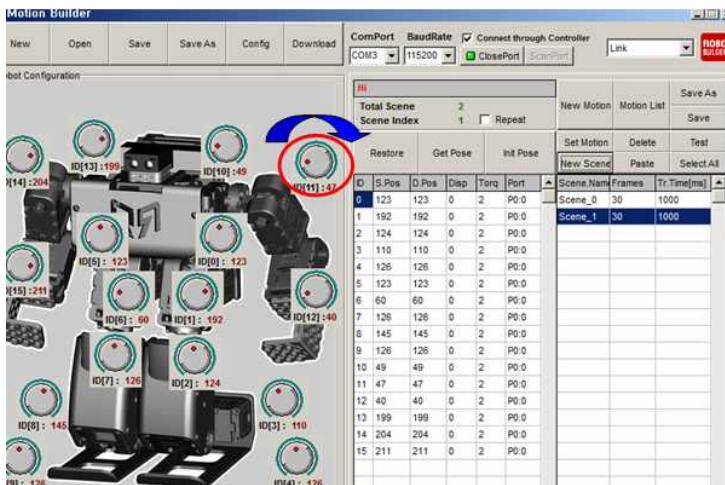

8) In order to move up and shake the arm, add the second scene. For adding new scene, you should select next empty scene before click "New Scene".   Move the Jog Dial of "ID10".
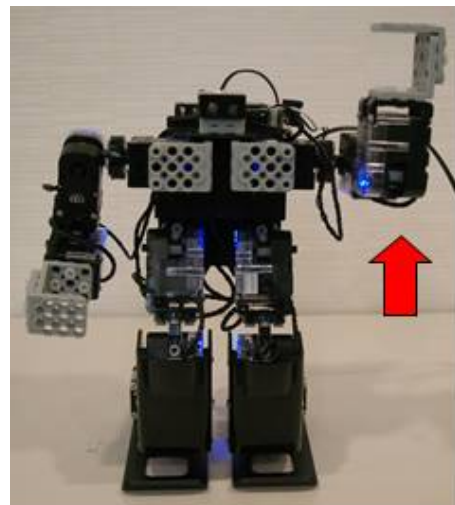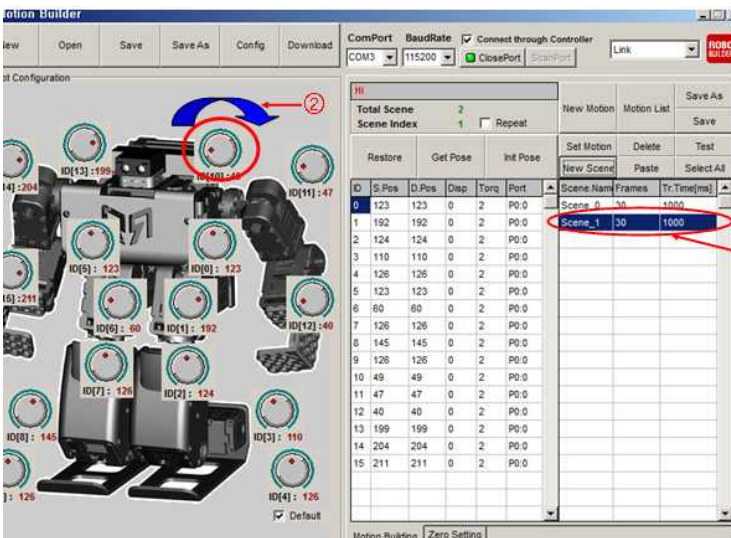
9) Move the Jog Dial of "ID11".
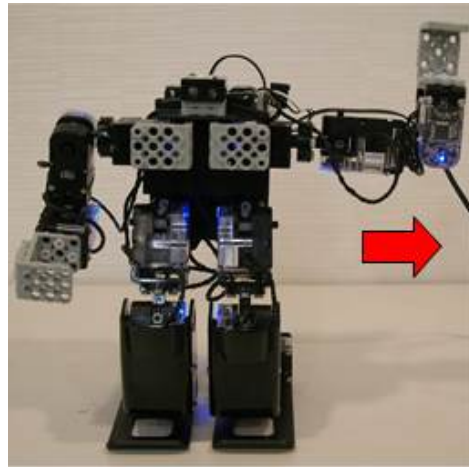
10) For the next movement, add the third scene.
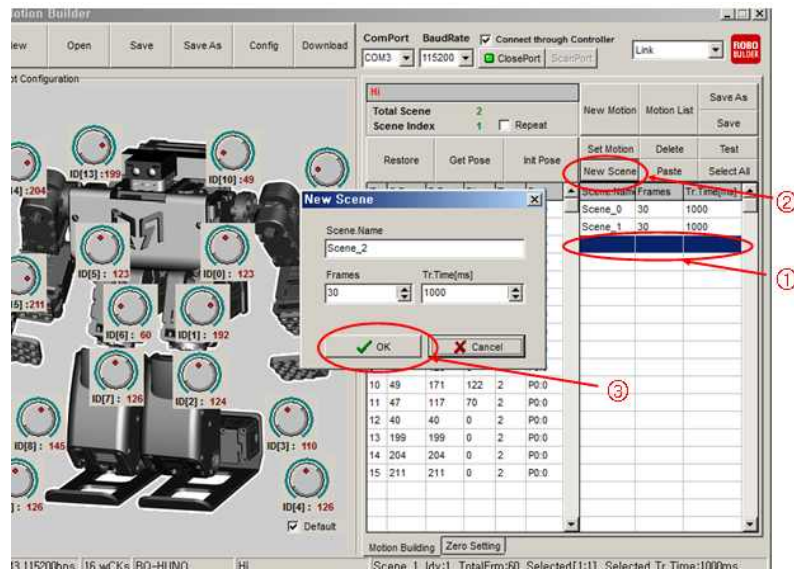
11) Move the Jog Dial of ID12.
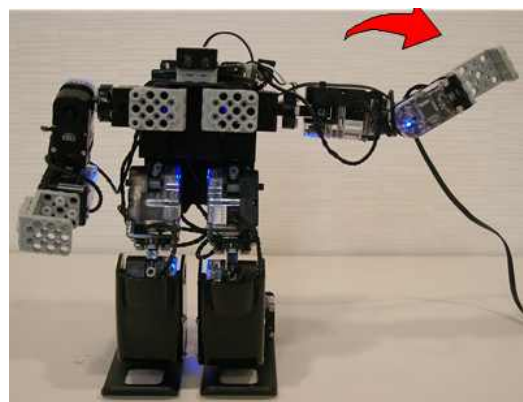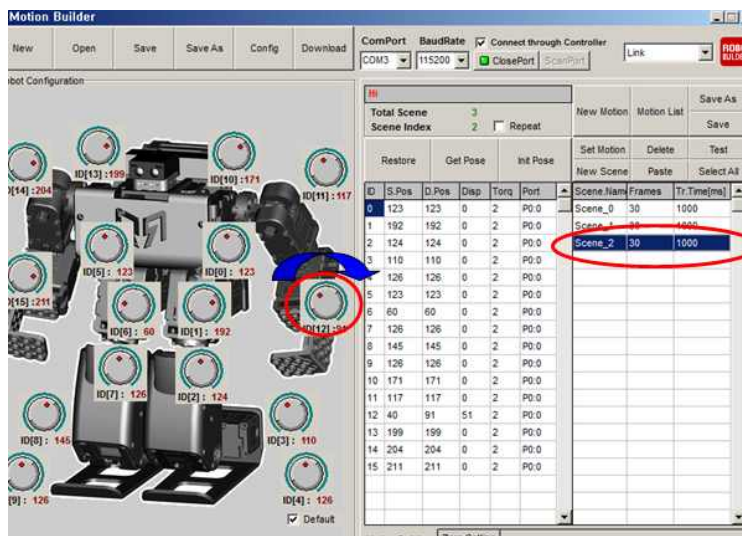
12) Then, let's make the arm shaking motion like "saying Hi".   Copy the Scene 1 and Scene 2.
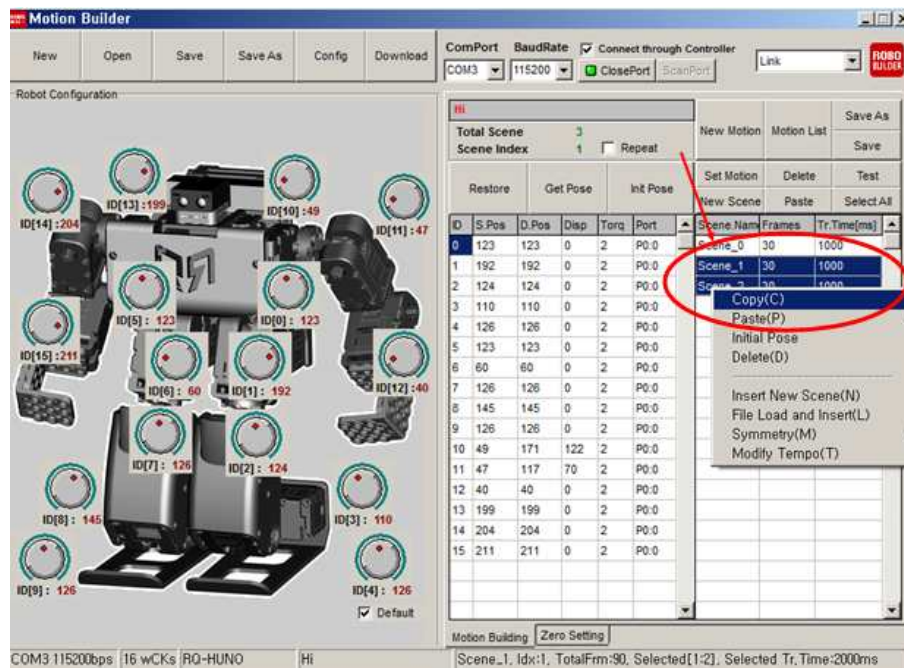
13) Paste the Scene 1 and Scene 2 to the next empty scene space, and do the paste again.

Lastly, copy the "Scene 0" and paste to the last scene.

14) Save the Motion file, Click "select All" and then click "Test" button.

15) Completed "Hi.rbm" motion movement is as follows.
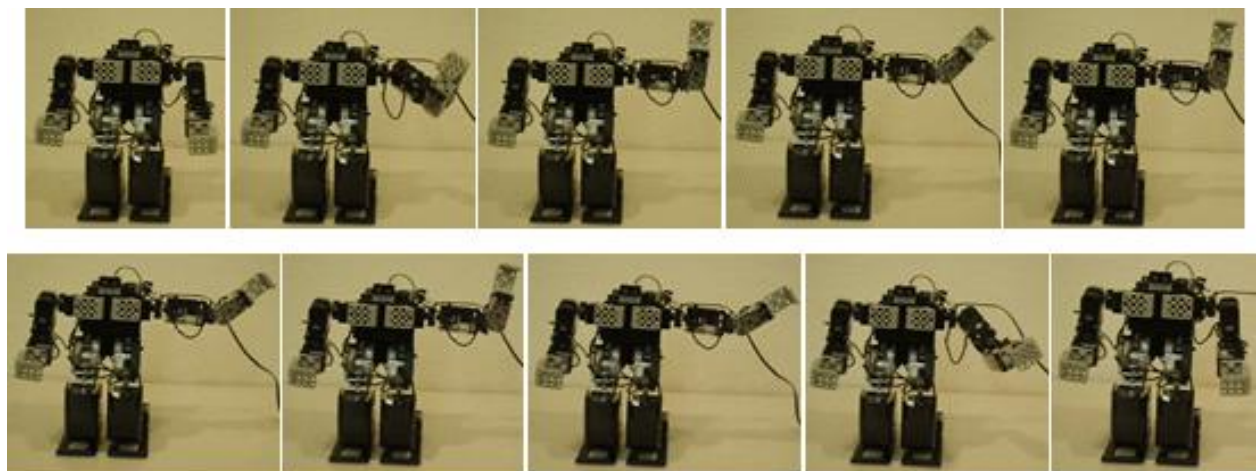
6.3 Change Motion Speed

Let's find out about frame and motion run time.

We have applied basic frame and motion run time (30 frames, 1000 msec) in the previous motion

1) If you look at the scene part, you can see all the frame value is 30 and time value is 1000. you can change the frames and time as you double-click related scene.
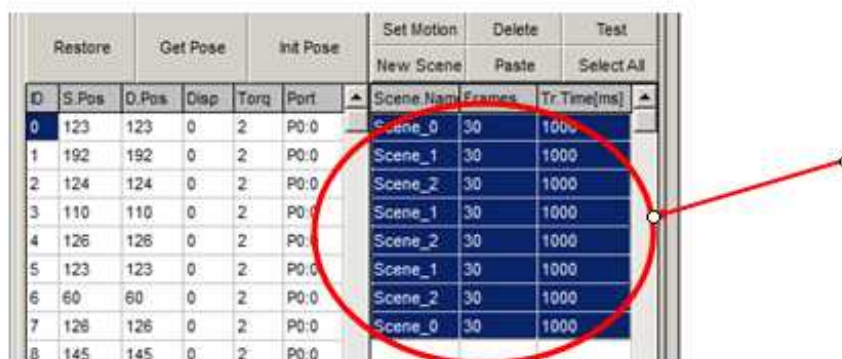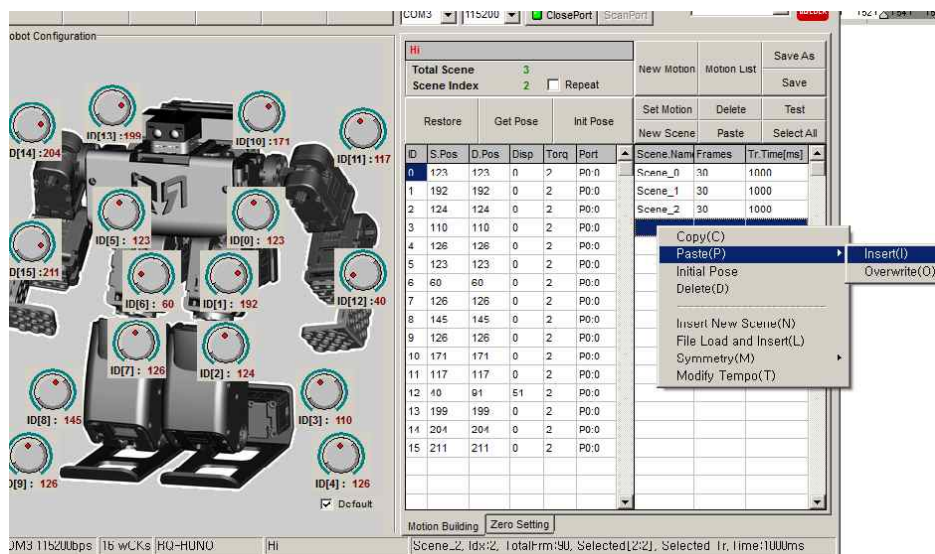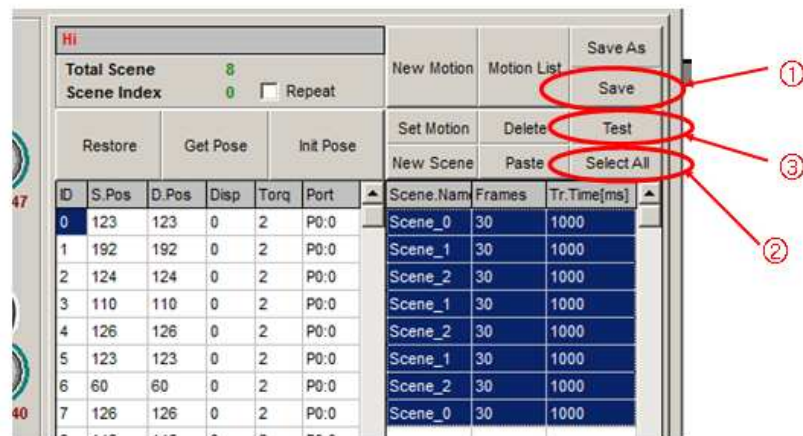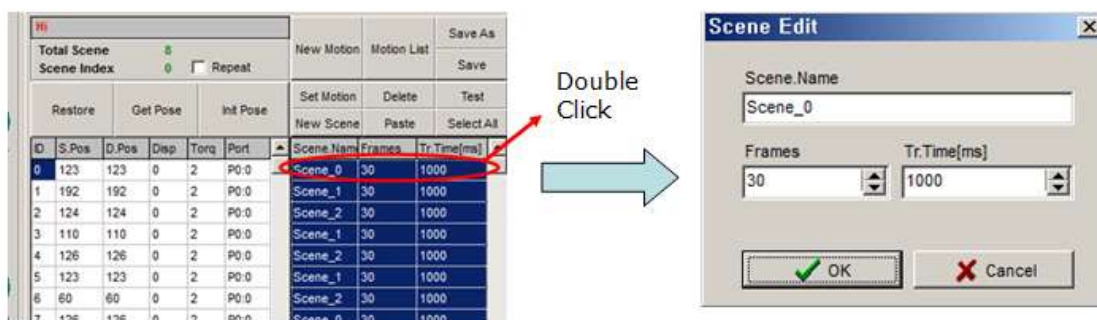

2) Minimum motion run time is 20msec for each frame. Therefore, time value should be at least 600 msec if frames are 30. Change the frame value first, then input proper time value.

3) Try to change the frame value to 15, and time value is 300msec then click "Test" as shown below.

4) You can see that motion speed is faster than before.

6.4 Motion Programming #2

In this section, we will make a deep bow HUNO motion.

1) Click "New Motion", then input motion name as a "deep_bow".
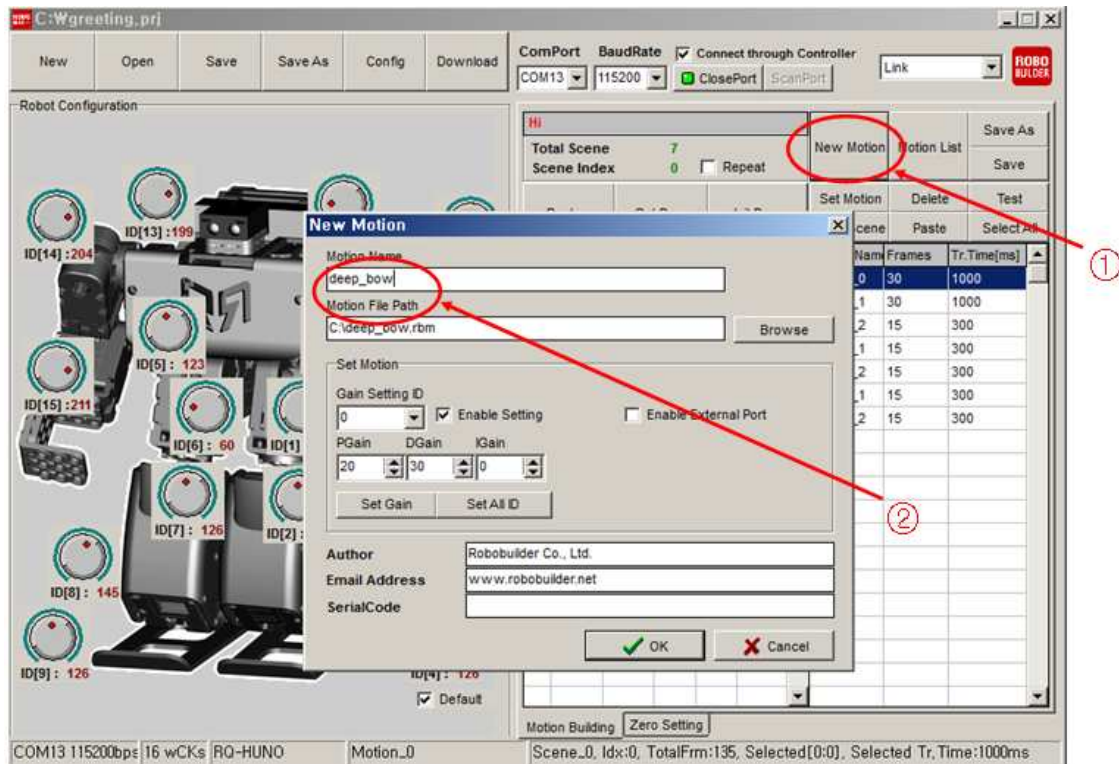
2) Click "New Scene" to add new scene.
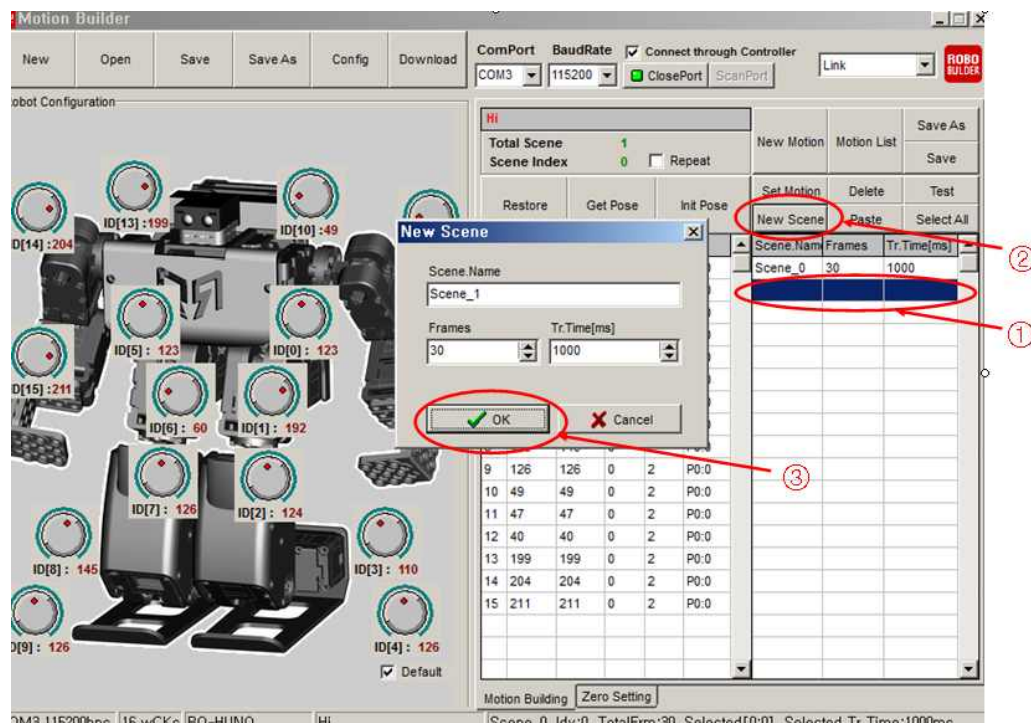
3) Click "Get Pose", you can see "Motor Enable" window, then check "Check All".
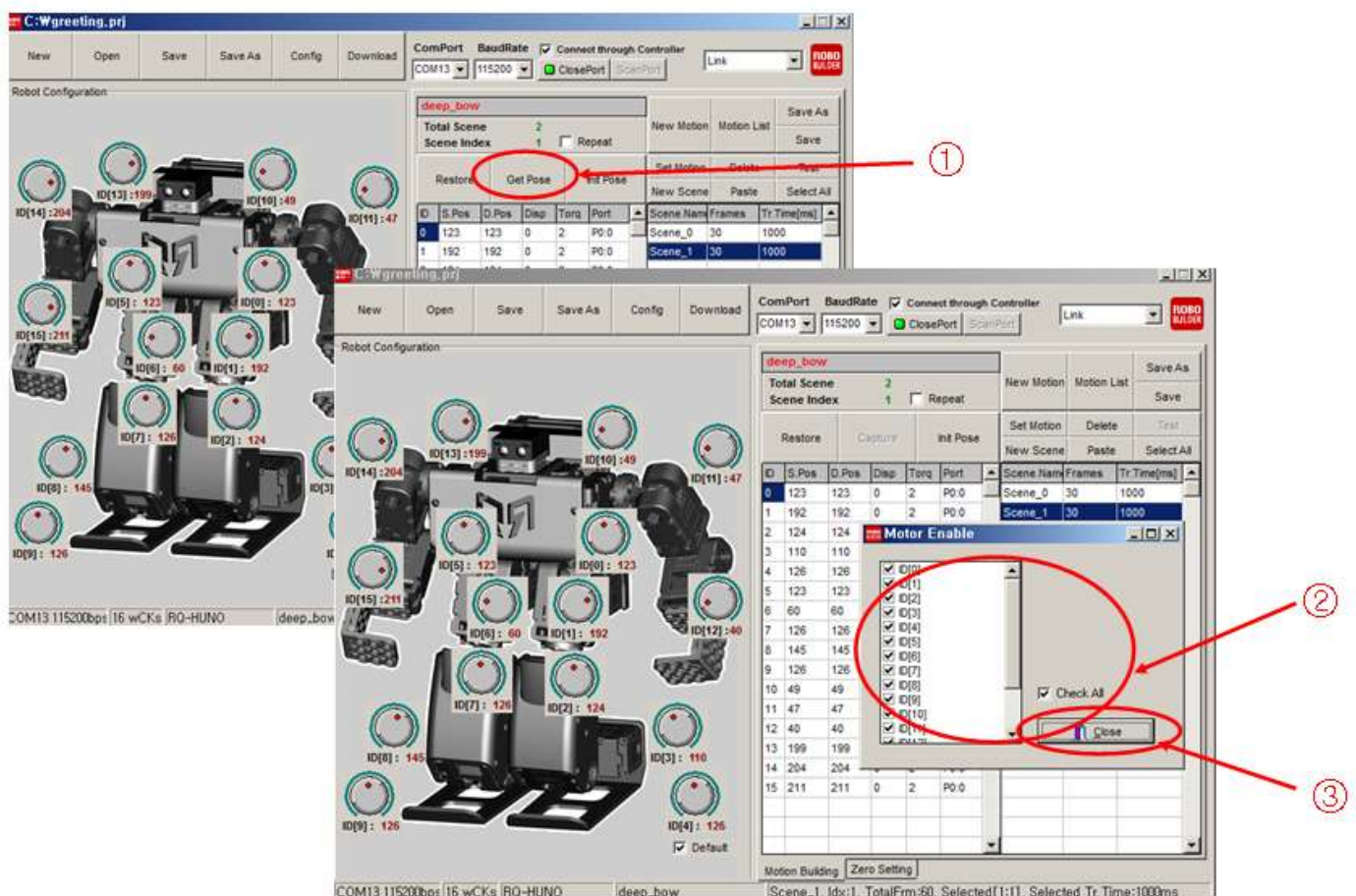
4) Then, you can make the RQ-HUNO posture by using your hand (Not by Jog Dial) as shown in the below.

5) Then, click "Capture" to complete the above scene.

6) Click "New Scene" to add new scene.

7) Click "Get Pose", you can see "Motor Enable" window, then check "Check All".
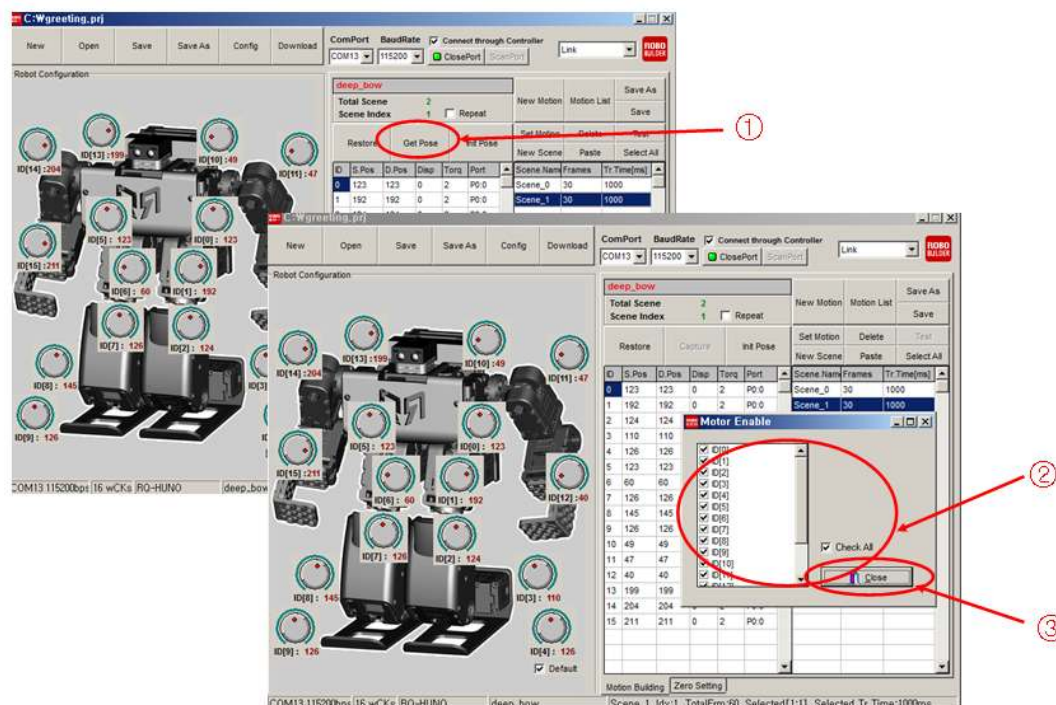
8) Then, you can make the RQ-HUNO posture by using your hand (Not by Jog Dial) as shown in the below.
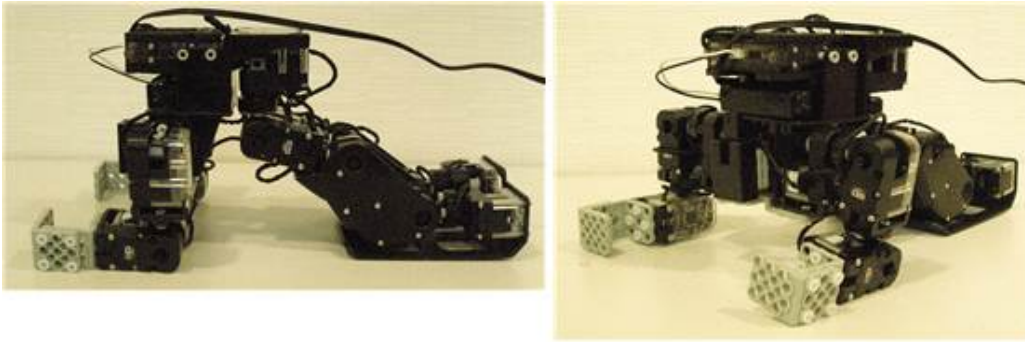
9) Then, click "Capture" to complete the above scene.
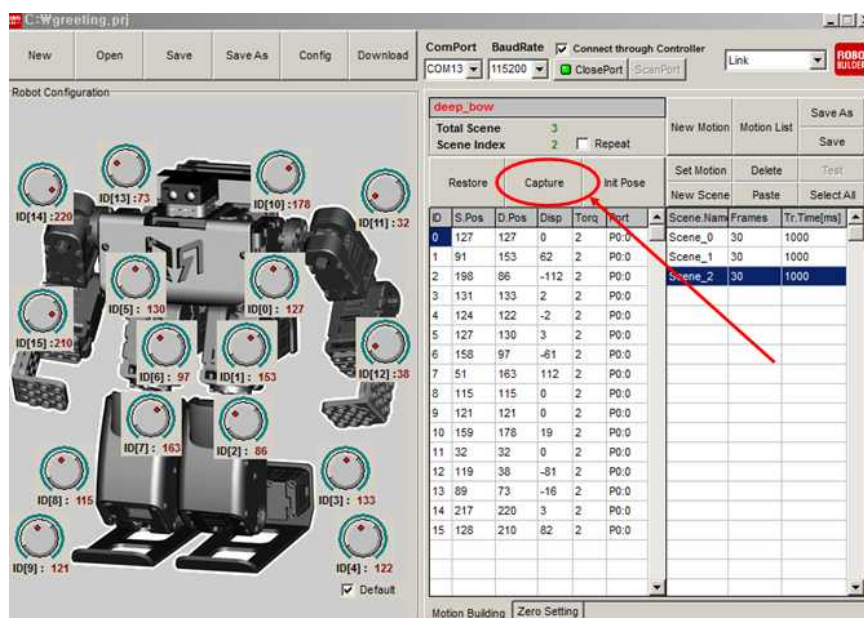
10) Now, Copy the "Scene_1" to ready get up.

11) Mouse right click, then paste-insert to the next empty scene space after Scene_2.

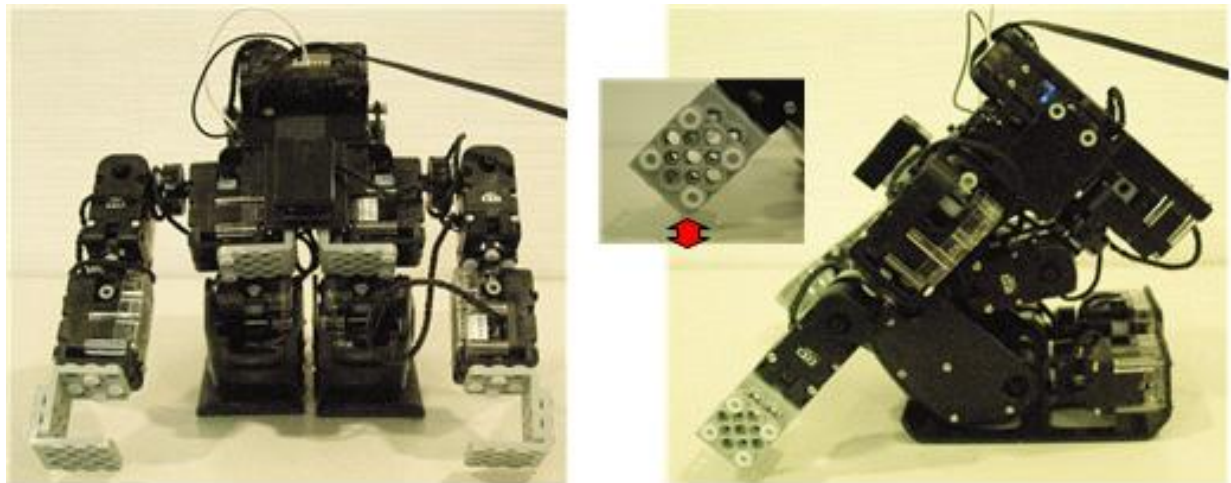| ID	S.Pos	D.Pos	Disp	Torq	Port	Scene.Nam	Frames	Tr.Time[ms]
0	127	127	0	2	P0:0	Scene_0	30	1000
1	91	153	62	2	P0:0	Scene_1	30	1000
2	198	86	-112	2	P0:0	Scene_2	30	1000
3	131	133	2	2	P0:0			
4	124	123	-1	2	P0:0			
5	127	131	4	2	P0:0			
6	158	97	-61	2	P0:0			
7	51	163	112	2	P0:0			
8	115	115	0	2	P0:0			
9	121	121	0	2	P0:0			
10	159	178	19	2	P0:0			
11	32	32	0	2	P0:0			
12	119	38	-81	2	P0:0			
13	89	73	-16	2	P0:0			
14	217	220	3	2	P0:0			
15	128	210	82	2	P0:0			

12) Copy the "Scene_0" to take a basic posture.

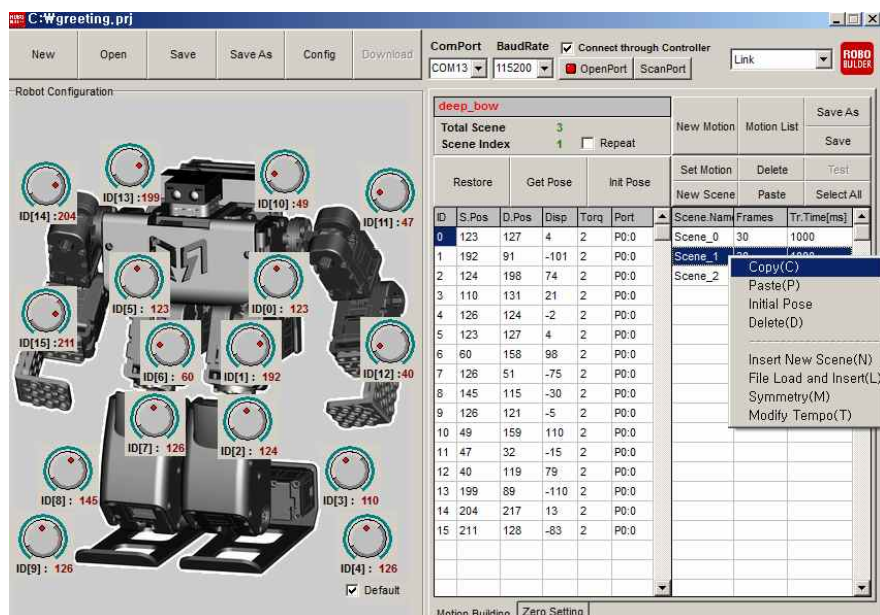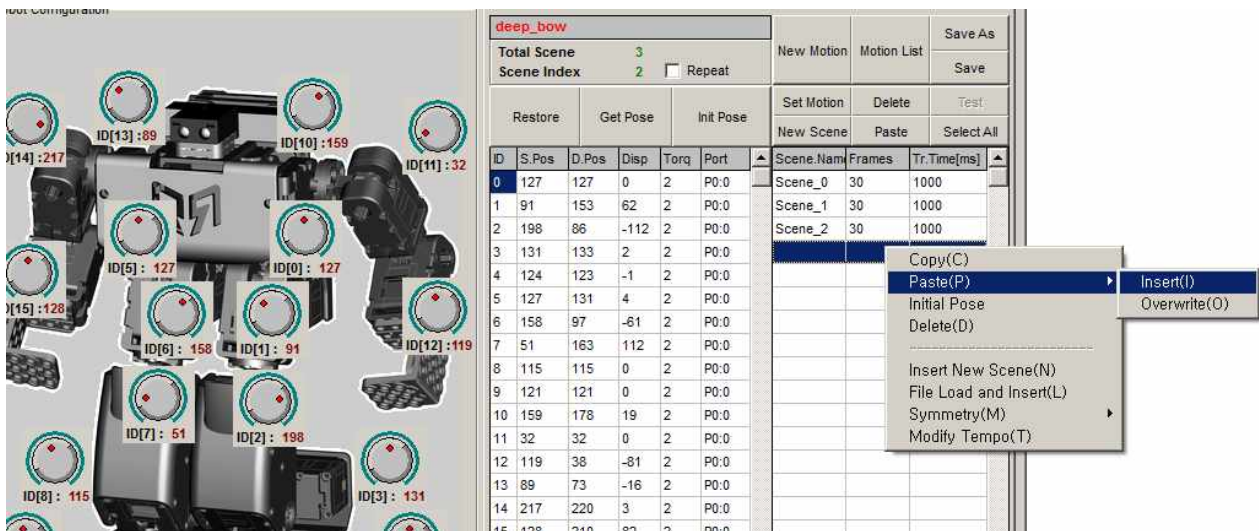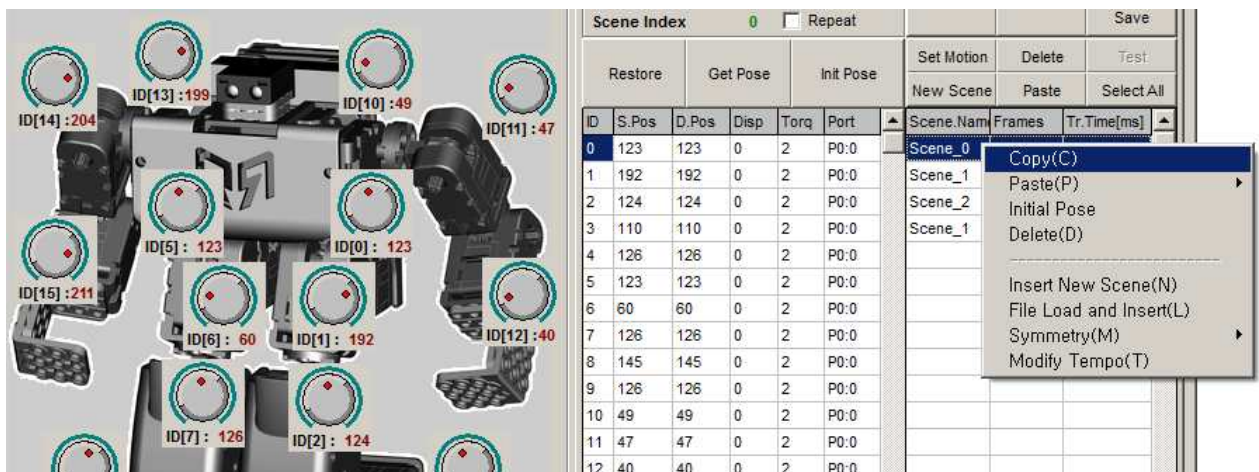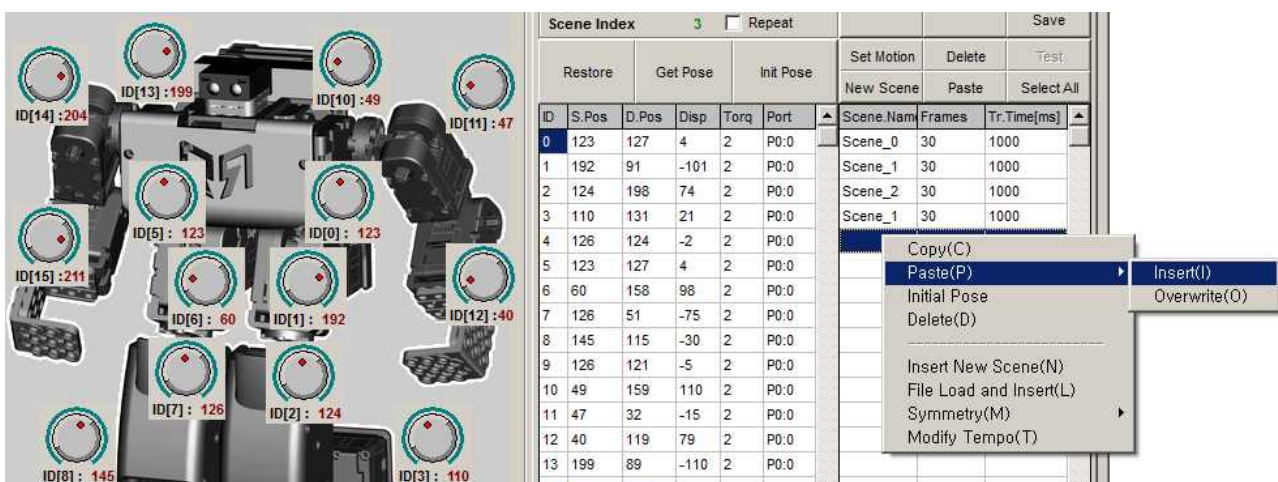| ID	S.Pos	D.Pos	Disp	Torq	Port	Scene.Nam
0	123	123	0	2	P0:0	Scene_0
1	192	192	0	2	P0:0	Scene_1
2	124	124	0	2	P0:0	Scene_2
3	110	110	0	2	P0:0	Scene_1
4	126	126	0	2	P0:0	
5	123	123	0	2	P0:0	
6	60	60	0	2	P0:0	
7	126	126	0	2	P0:0	
8	145	145	0	2	P0:0	
9	126	126	0	2	P0:0	
10	49	49	0	2	P0:0	
11	47	47	0	2	P0:0	
12	40	40	0	2	P0:0	

13) Mouse right click, then paste-insert to the next empty scene space after Scene_1

ID	S.Pos	D.Pos	Disp	Torq	Port	Scene.Nam	Frames	Tr.Time[ms]
0	123	127	4	2	P0:0	Scene_0	30	1000
1	192	91	-101	2	P0:0	Scene_1	30	1000
2	124	198	74	2	P0:0	Scene_2	30	1000
3	110	131	21	2	P0:0	Scene_1	30	1000
4	126	124	-2	2	P0:0			
5	123	127	4	2	P0:0			
6	60	158	98	2	P0:0			
7	126	51	-75	2	P0:0			
8	145	115	-30	2	P0:0			
9	126	121	-5	2	P0:0			
10	49	159	110	2	P0:0			
11	47	32	-15	2	P0:0			
12	40	119	79	2	P0:0			
13	199	89	-110	2	P0:0			
14	204	217	13	2	P0:0			

14) Now, click "Select All" and then click "Test".

15) Click "Save" to save a "deep_bow.rbm" file.
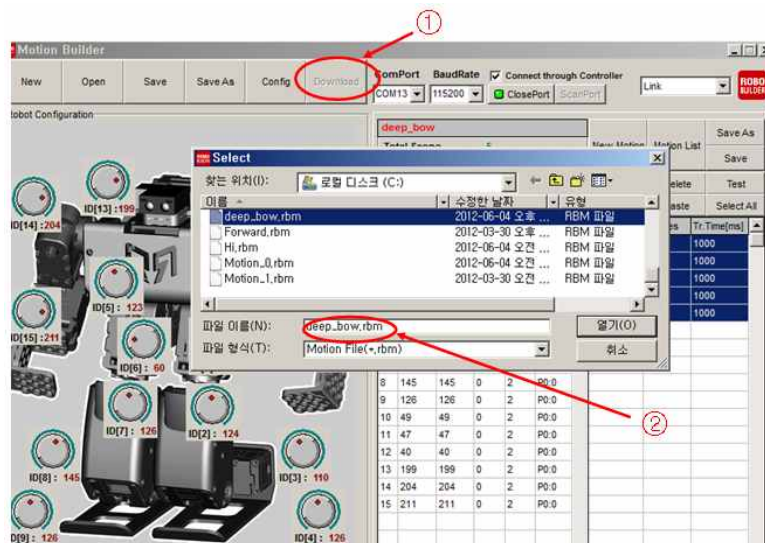
16) "deep_bow.rbm" motion is downloaded successfully.

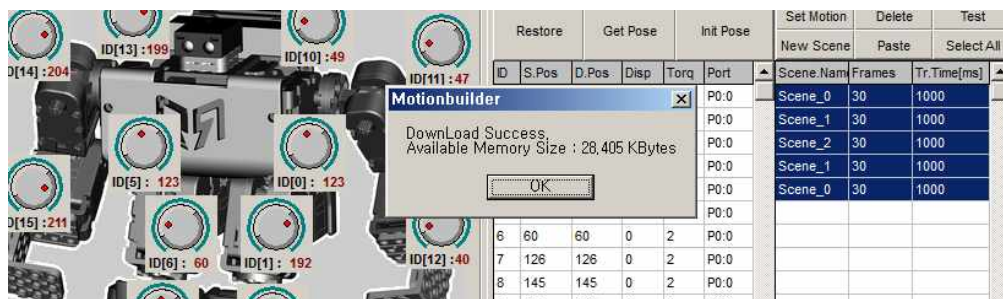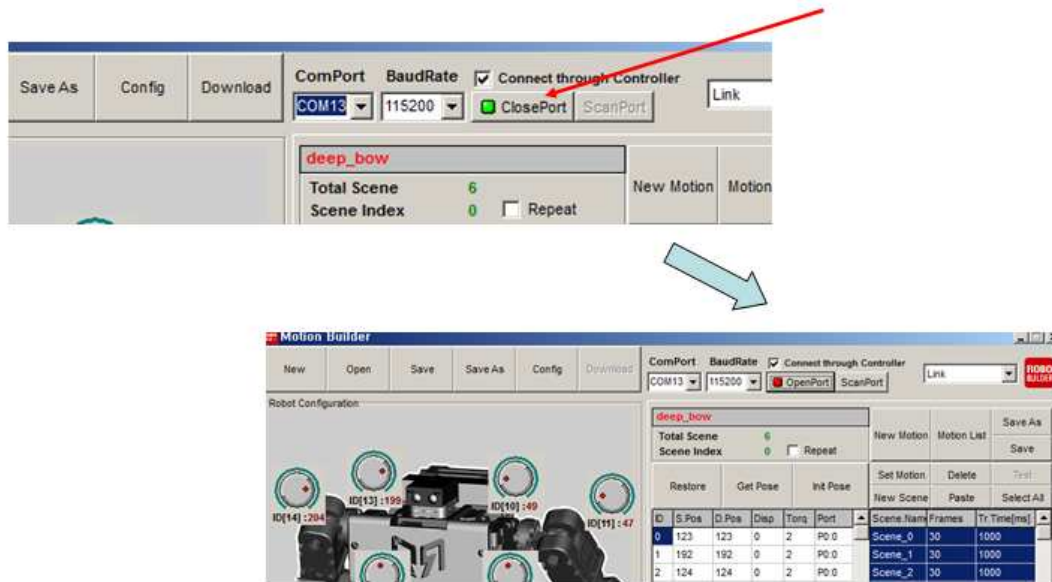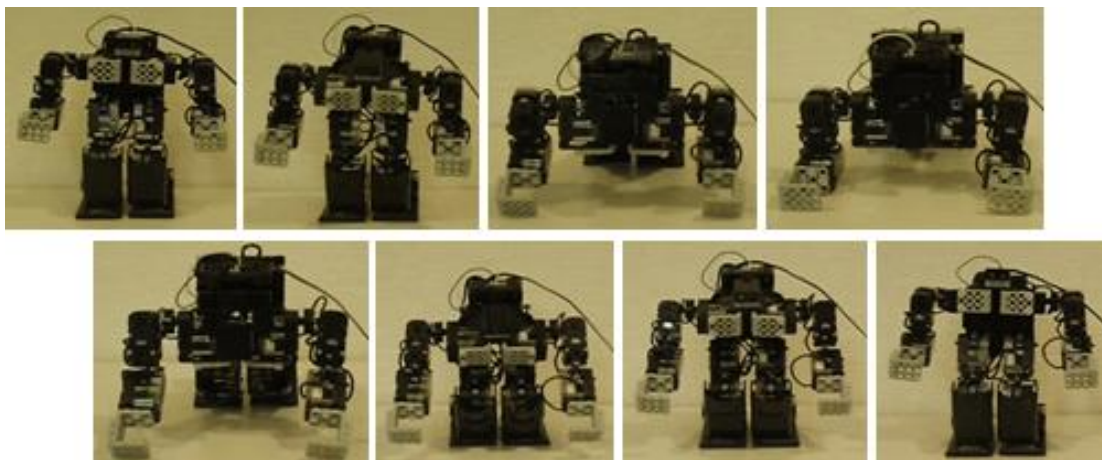17) Click "Close Port" to control RQ-HUNO by IR remote controller

18) Press button 1 of IR remote controller, "deep_bow.rbm" motion is played.

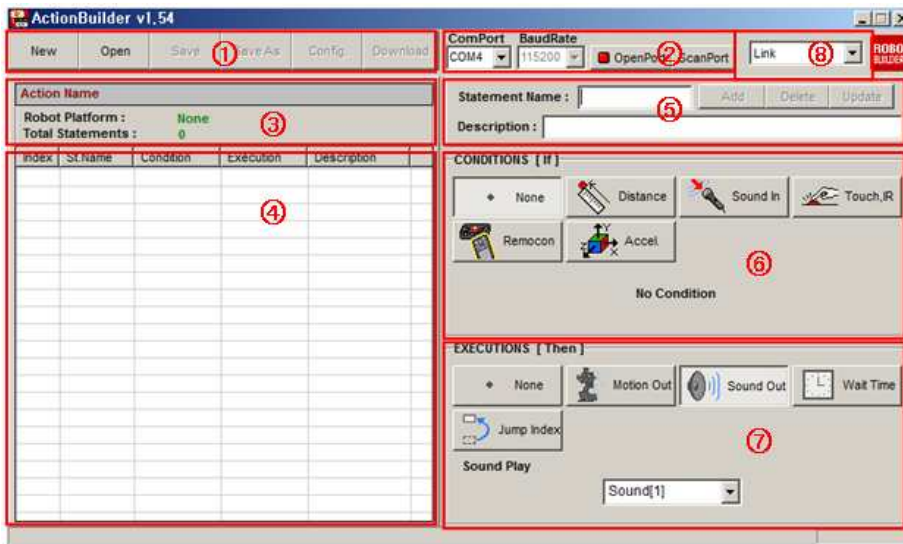19) Completed "Hi.rbm" motion movement is as follows.

7. ActionBuilder

7.1 Introduction

ActionBuilder is the robot action programming software that uses various sensors of robot.

Layout

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① Menu Bar

- New File : Create new action file.

- Open : Load existed action file.

- Save : Save action file.

- Save As : Save action file with new name.

- Config : Revise action file information.

- Download : Download action file to RQ smart controller

② PC COM Port

- COM Port : Choose correct COM Port.

- Baudrate : Display data communication speed.

- OpenPort : Open COM Port connect PC with RQ HUNO.

- ScanPort : Scan correct COM Port automatically.

- Config : Revise action file information.

③ Action Information

- Action Name : Display action file name.

- Robot Platform : Display action file robot platform.

- Total Statements : Display action file line numbers.

④ Action list

- Index : Display action line index.

- St. Name : Display statement name.

- Condition : Display condition data.

- Execution : Display execution data.

- Description : Display description of statement.

⑤ Action Information

- Statement Name : Display statement name and user can revise it.

- Description : Display description of statement.

- Add : Add action statement from list

- Delete : Delete action statement from list.

- Update : Update action statement from list.

⑥ CONDITIONS [If]

- None : No condition

- Distance : Distance condition (unit : cm, 10~50cm)

- Sound : Sound condition (0~255, General clapping sound value is 10~15)

- Touch, IR : Input from button

- Remocon : Input from IR / Joystick remote controller

- Accel : Input X,Y,Z acceleration value

⑦ EXECUTIONS [Then]

- None : No execution

- Motion Out : Run motion

- Sound Out : Run sound

- Wait Time : Wait for designated time.

- Jump Index : Jump to designated index.

7.2 Action Programming #1 (Continuous Motions)

- Robot Action : Basic Posture => Go => Back => Left => Right.

    1) Click "New" to create new action file, then input "Action Name, File Name" and select "RQ-HUNO" platform as the below.
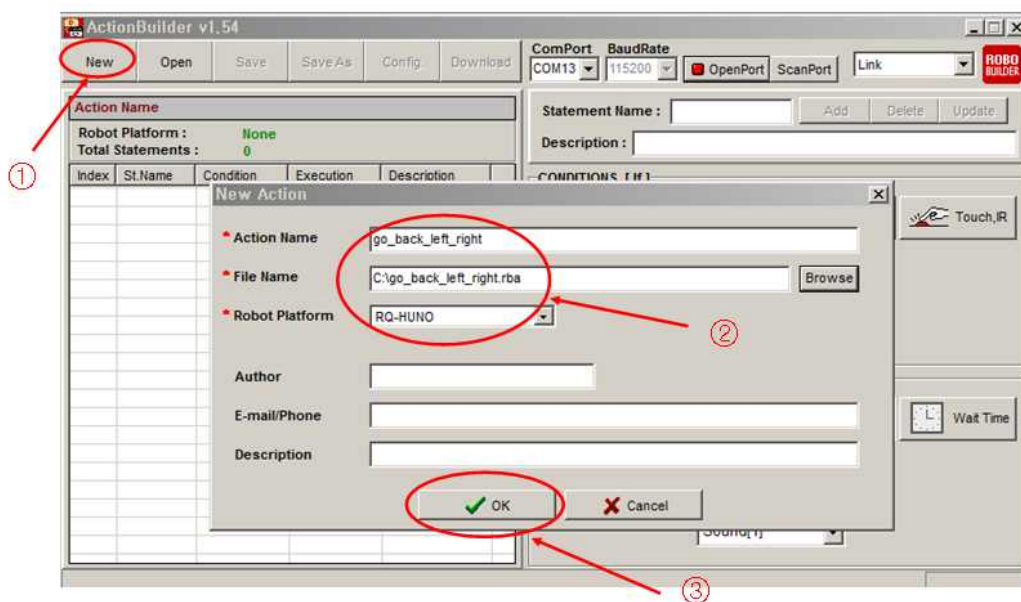
    2) Connect RQ-HUNO with PC by using "Down Cable (UART)" then, power on smart controller.
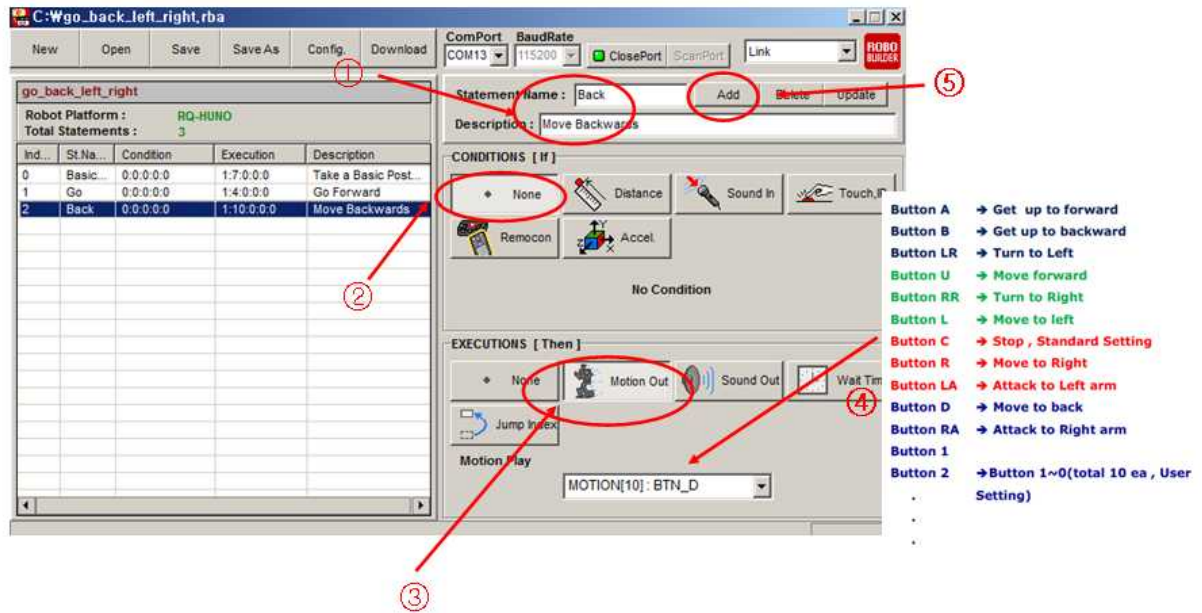

    3) Click "Open Port".

4) Click as the below procedures (1,2,3,4,5) by number to add robot basic posture motion..

5) Click as the below procedures (1,2,3,4,5) by number to add robot "go" motion.
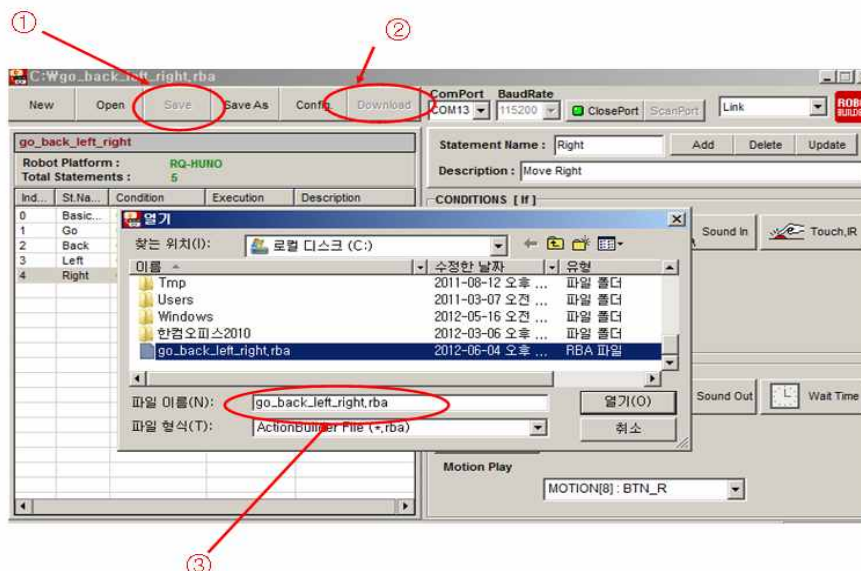
6) Click as the below procedures (1,2,3,4,5) by number to add robot "back" motion.

7) For "Left" and "Right" motion, it is same procedures except "Motion Play" section.
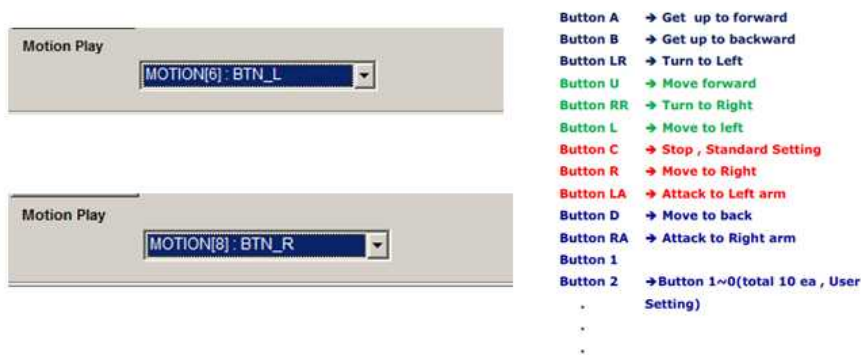
8) Click below procedures (1,2,3) to save action file and download to RO smart controller.
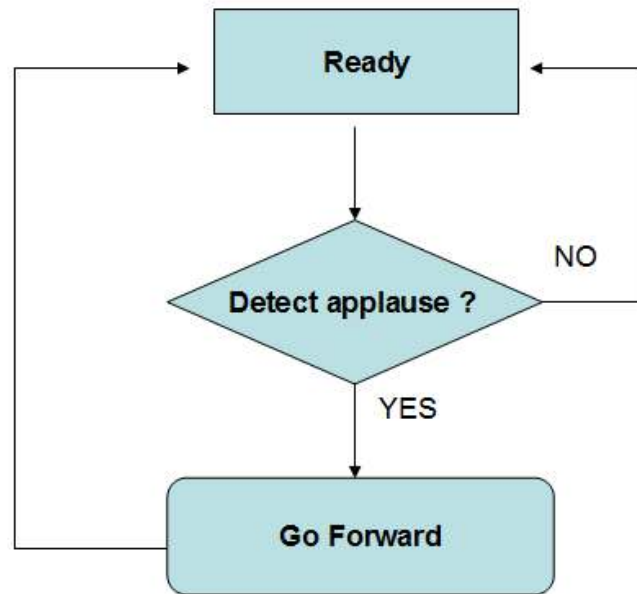
9) Press "#" + "1" of IR remote controller, then robot moves "Basic Posture => Go forward=> Backwards => Move Left => Move Right)
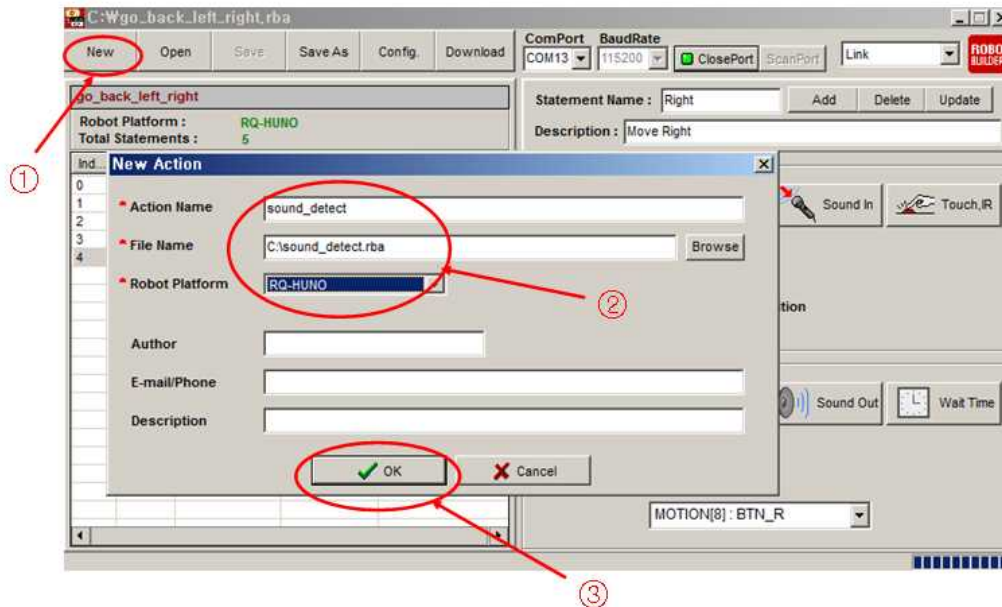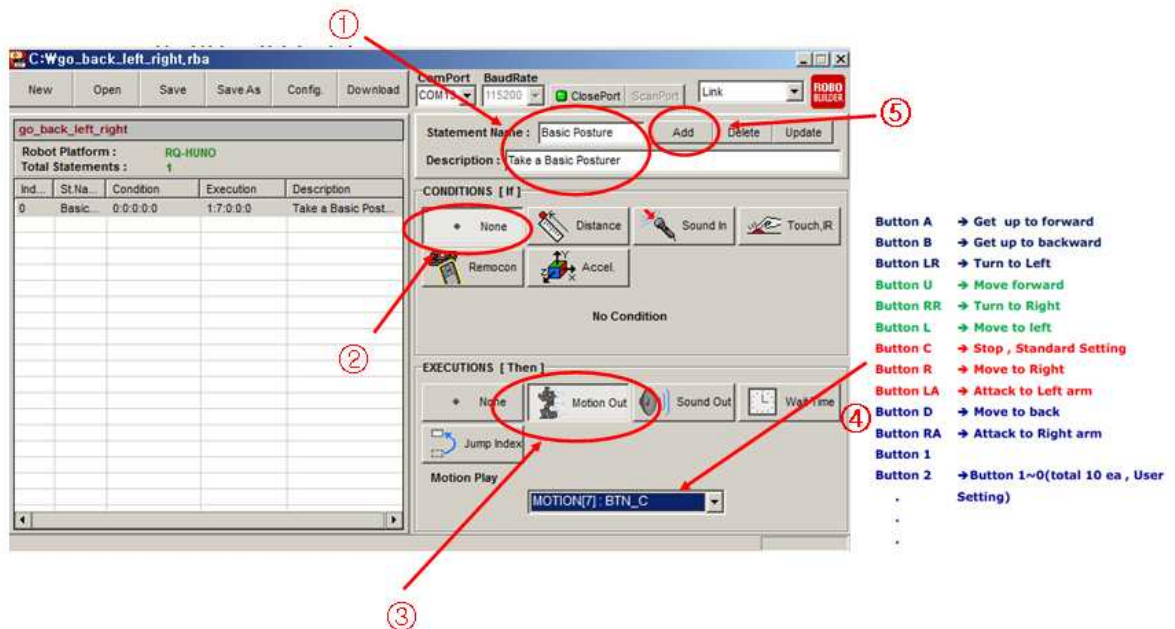
7.3 Action Programming #2 (Using Sound Sensor)

- Robot Action : Ready => If applause detected, move forward
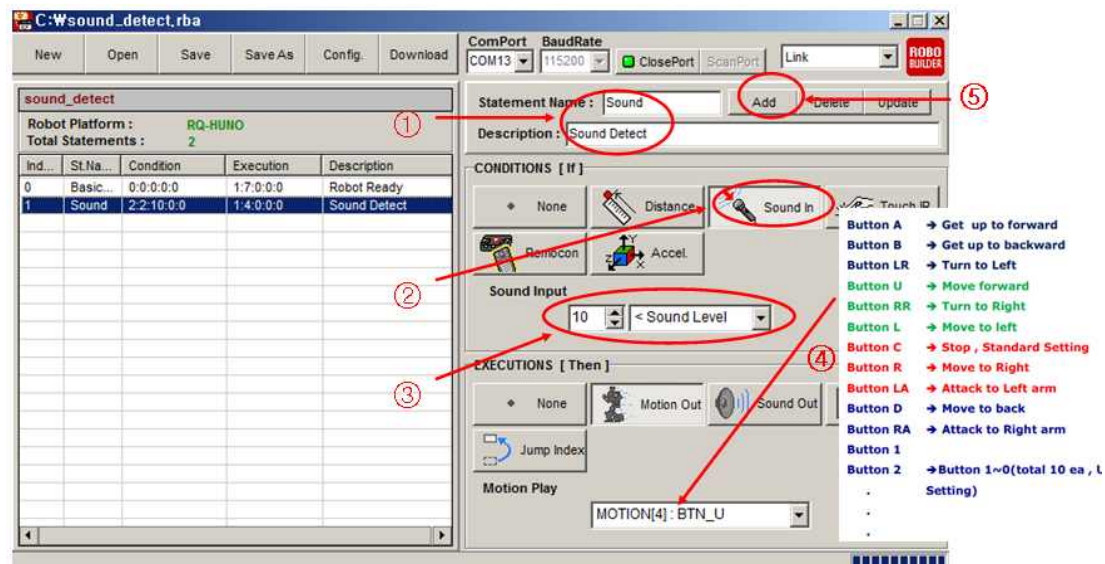
1) Click "New" to create new action file, then input "Action Name, File Name" and select "RQ-HUNO" platform as the below.

2) Click as the below procedures (1,2,3,4,5) to add "basic posture" motion.
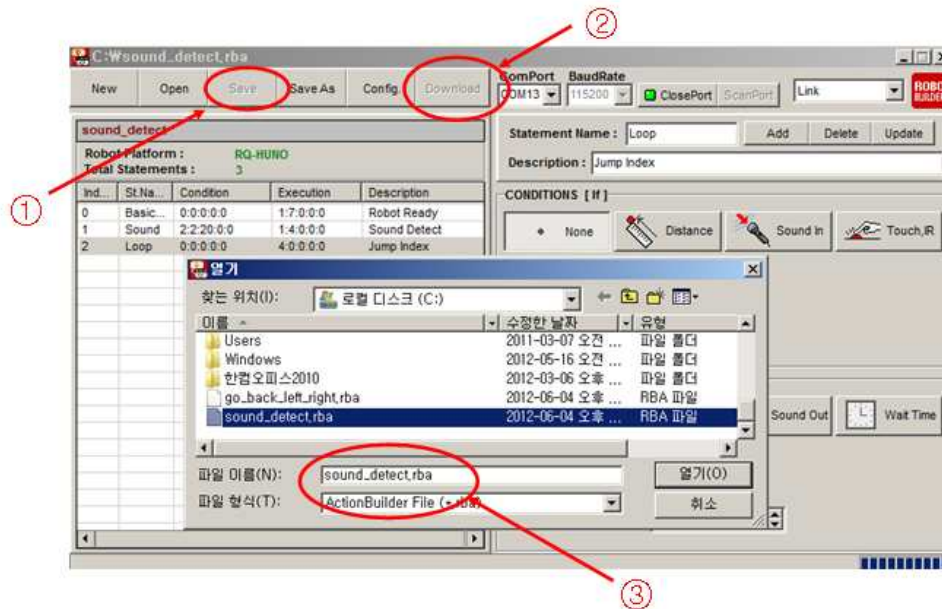
3) Click as the below procedures (1,2,3,4,5) to detect applause sound and add "go forward" motion.

4) Click as the below procedures (1, 2, 3, 4, 5) to be in "infinite loop" state.
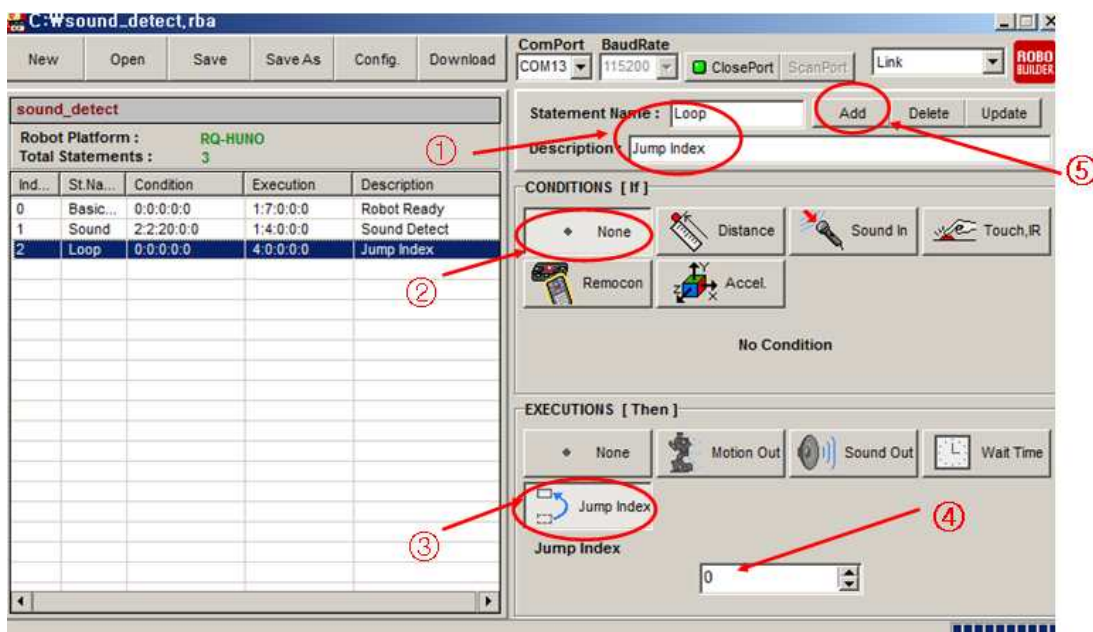
5) Click below procedures (1, 2, 3) to save action file and download to RO smart controller.

6) Press "#" + "2" of IR remote controller, then clap near RQ smart controller.

8. Appendix

8.1 Auto power-saving mode

If there is no input or movement during certain time, RQ-HUNO goes into power-saving mode automatically. You can set the entry time as below.

1) Power-off the smart controller.

2) Press button 3 and then, press button P concurrently.

  → LED3 "Green, Blue and Red" light up.

3) You can adjust the power-saving entry time as shown in the below.
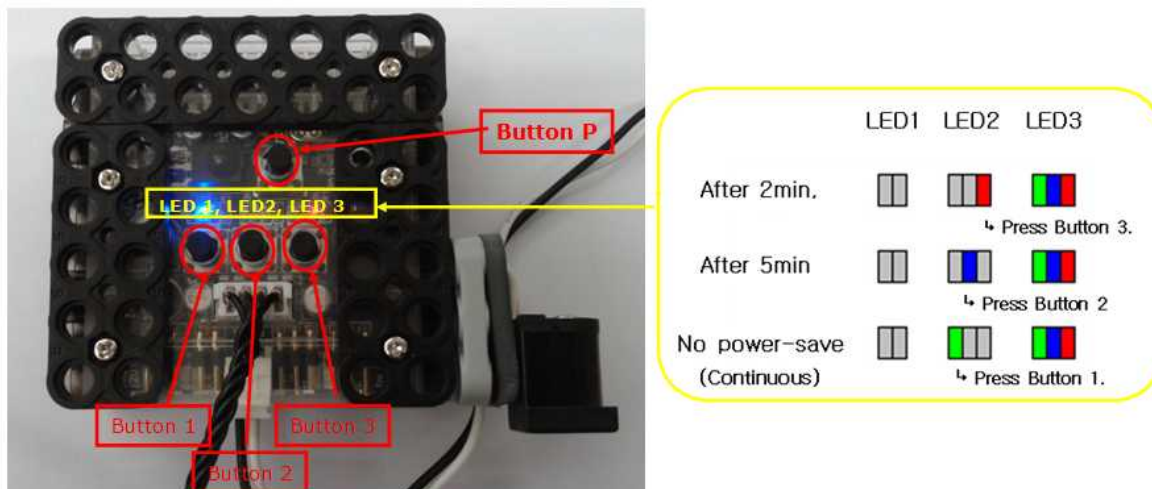
4) Press "Button P" to save current setting after selecting power-saving entry time.

8.2 How to Change Smart Servo ID Number

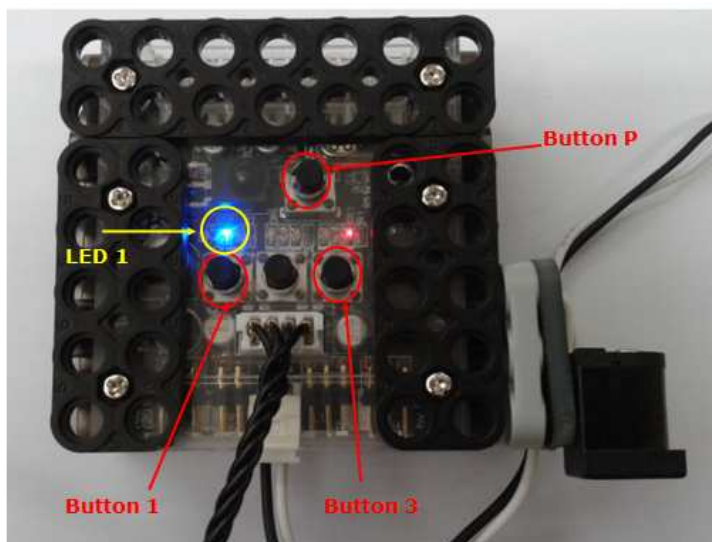1) Connect single smart servo cable as shown in the below.
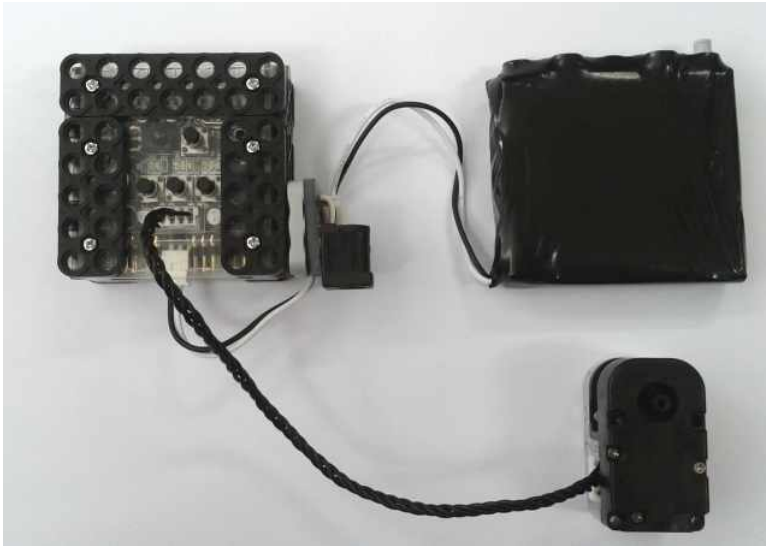
2) Make sure that Smart Controller power is "OFF" state.

3) Press "Button P" as "Button 1" and "Button 3" are pressed together.

You can see "LED 1" is BLUE light. LED2 and LED3 indicates current Smart Servo ID. Yo

You can change Smart Servo ID by pressing "Button 1" or "Button 3".
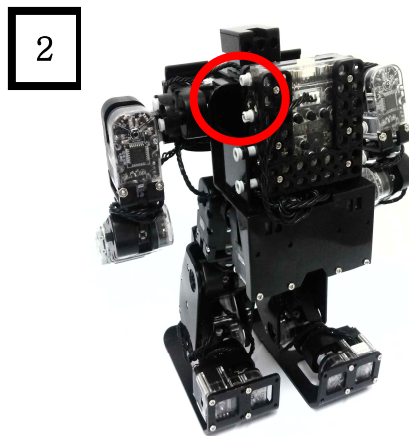

- Button 1 is to increase Smart Servo ID number.

- Button 2 is to cancel Smart Servo ID changes.

- Button 3 is to decrease Smart Servo ID number.

4) Press "Button P" to save current Smart Servo ID after change ID number.

8.3 How to charge

1

In first, You need to plug in Charger.

Then Green light on and you can charge.

(If Green light off, you need to check electricity.)

2

Please connect charging cable on charging board.

3

RED lights while Charging.

4

GREEN lights when charging is finished.
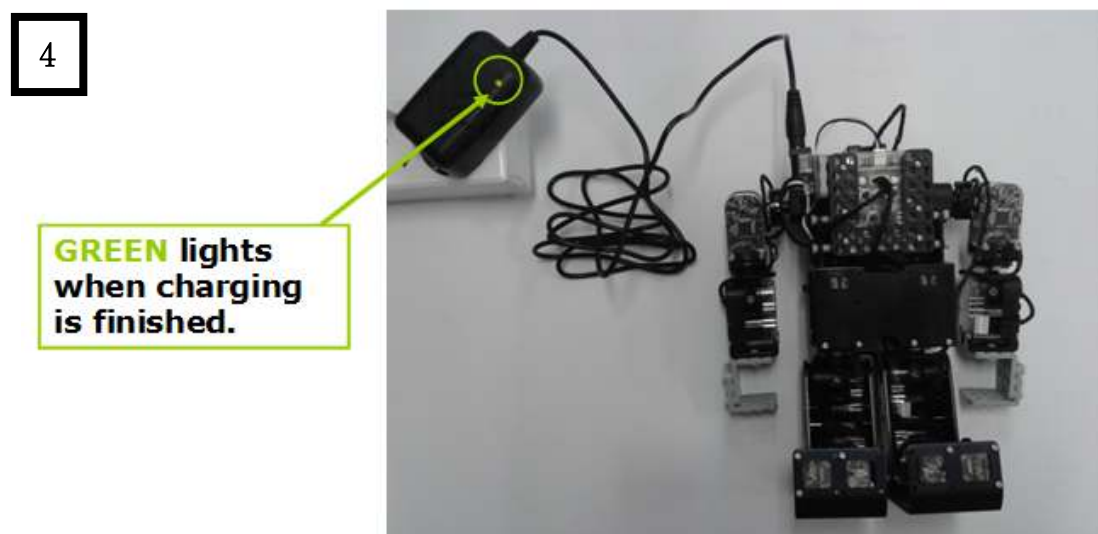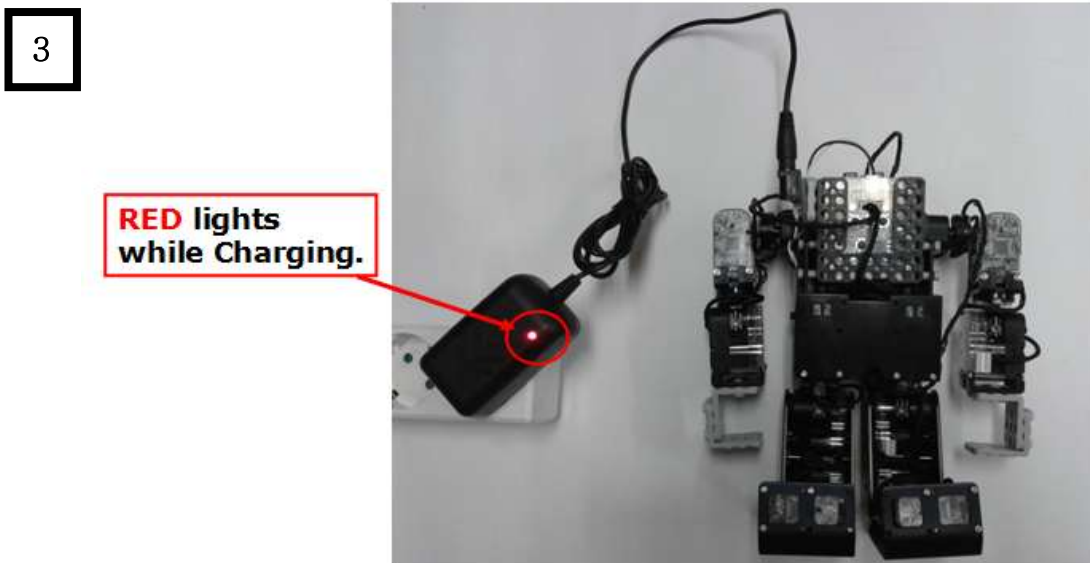
* Please disconnect charging adapter when green lights in order to prevent over-charging.

8.4 How to Upgrade Firmware

1. Run "RQC Firmware Upgrade Tool".
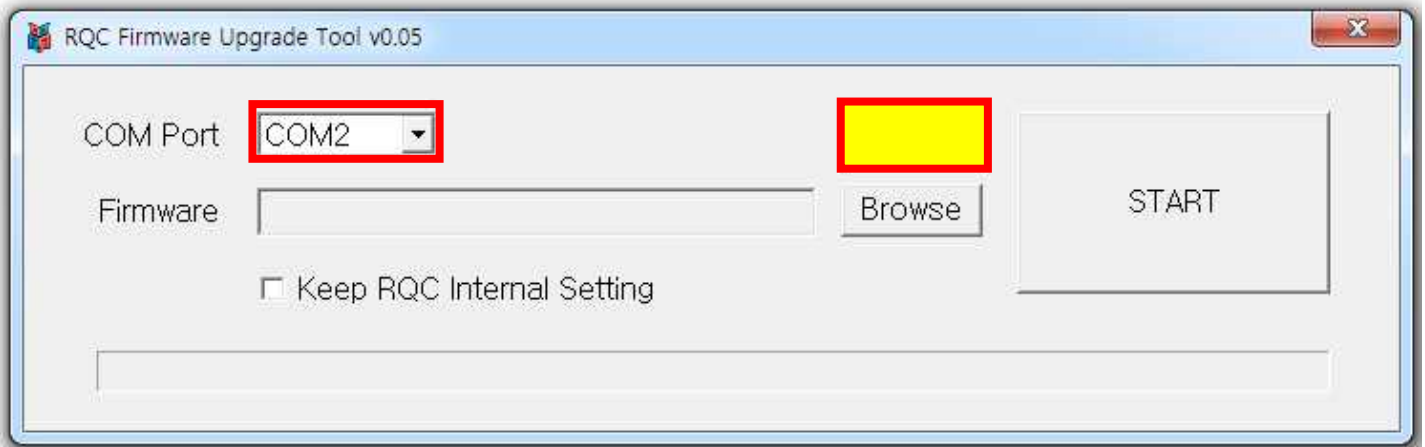
2. Click the **Scan** button, then you can search the **COM Port** as above.
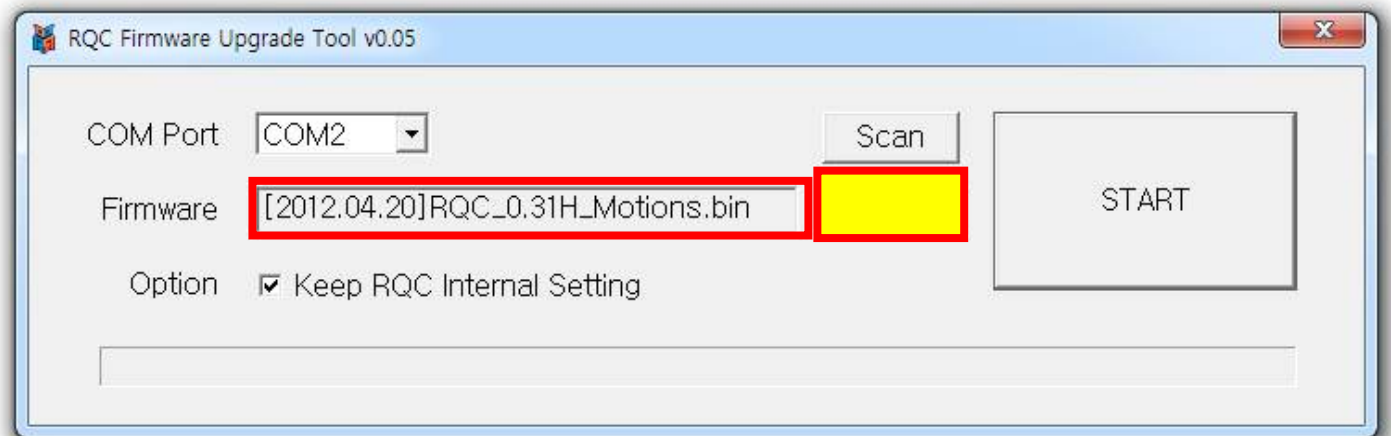
3. Click the **Browse** button and select the "**Firmware File (*.bin)**"

4. Connect the USB U-ART cable to "COM Port" of RQ Controller .
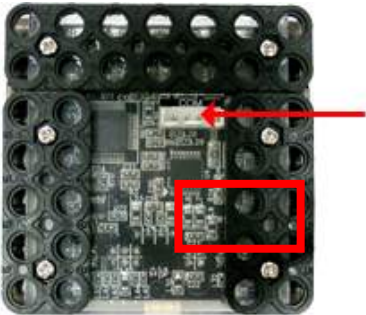
5. Take out "Power Connector" from RQ Controller first.

6. Connect "Power Connector" again after pressing <u>Download button</u> of RQ Controller by using "B35 bolt" as below
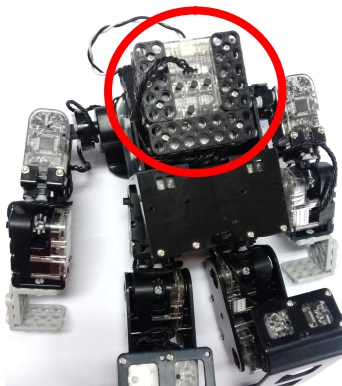
Download button
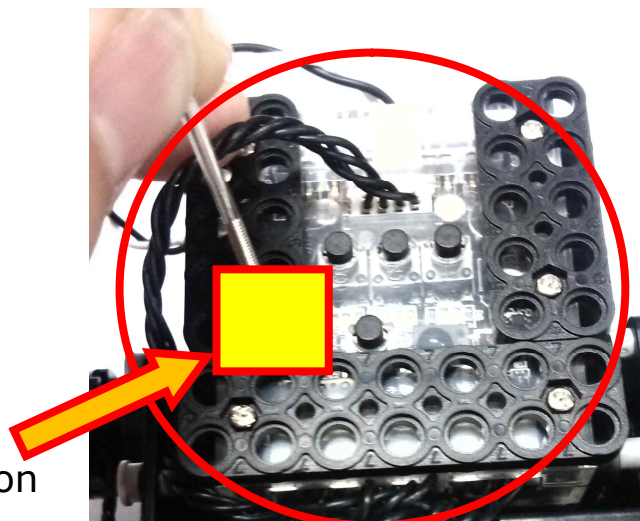
7. Click START button to start upgrading firmware.
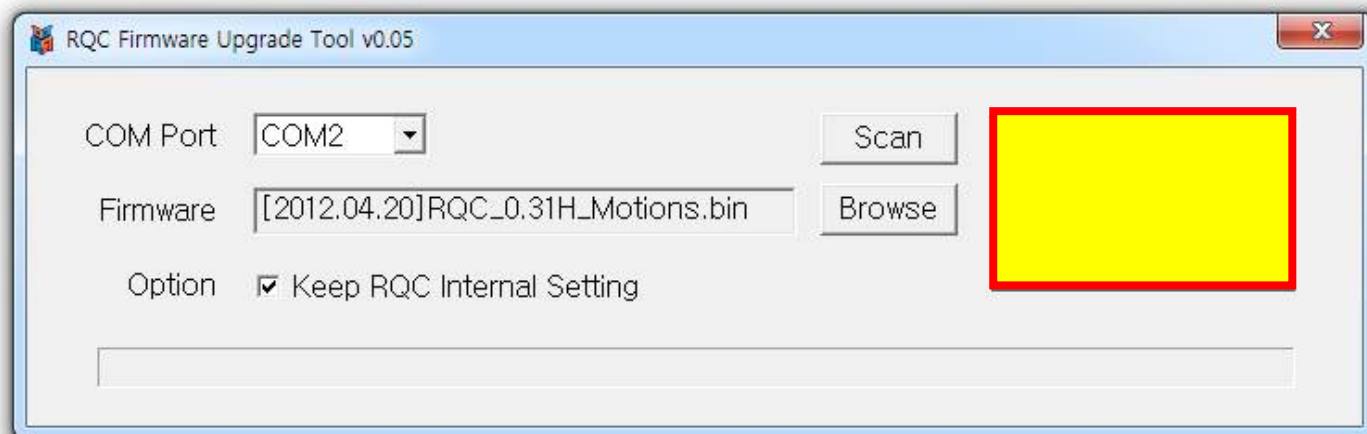
8. Please click the OK button when firmware upgrade completed as below.
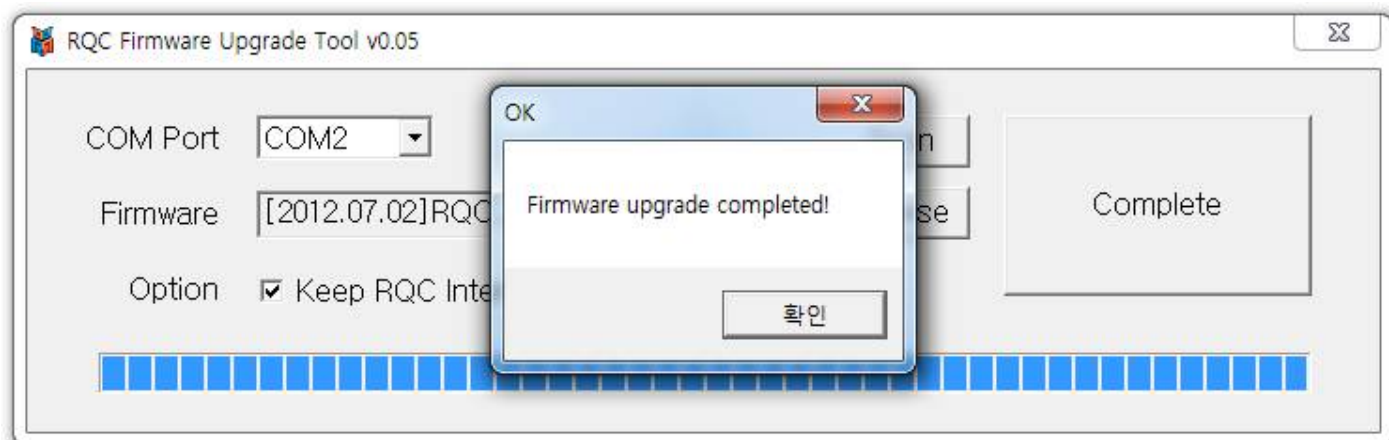
8.5 How to Use Diagnostic Tool

1. Please run the "RoboBuilder Diagnostic Tool"
2. Click the " **2.Check wCk(SAM)" button** an upper.
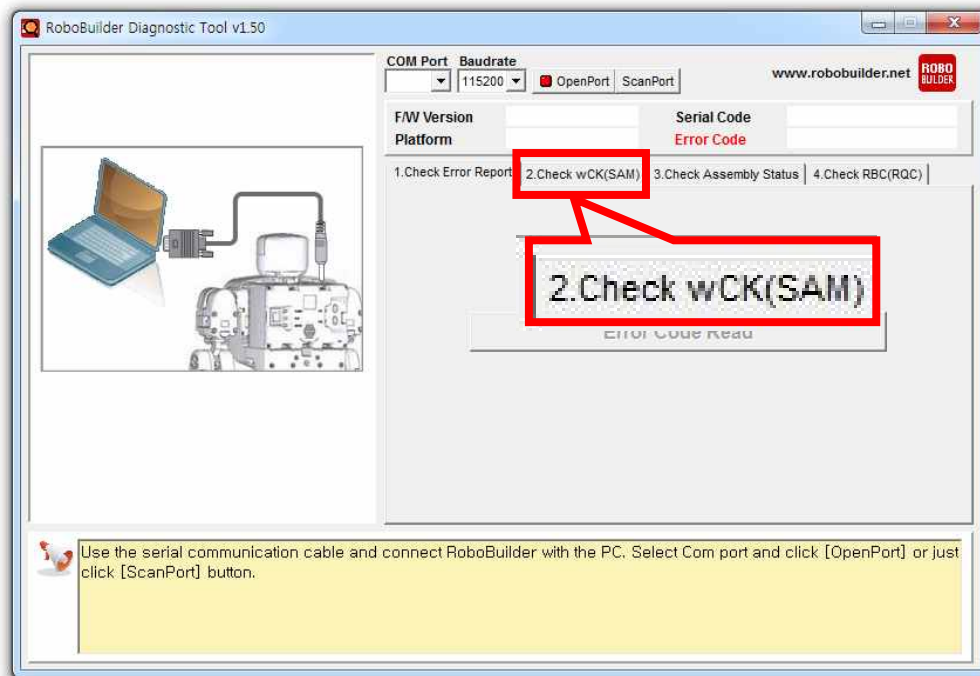
3. Click the ScanPort button, then you can search automatically your ComPort. If it don't work, please confirm your comport.

4. Please click the "Check wCK(SAM) Connections" after Green light on.

RoboBuilder Diagnostic Tool v1.50

COM Port   Baudrate
COM2   115200   🟢 ClosePort   ScanPort   www.robobuilder.net   ROBO BUILDER

F/W Version   0.36   Serial Code
Platform   RQ-HUNO   Error Code   11

1.Check Error Report | 2.Check wCK(SAM) | 3.Check Assembly Status | 4.Check RBC(RQC)

wCK(SAM) IDs for Test

☑ 0   ☑ 5   ☑ 10   ☑ 15   ☐ 20   ☐ 25   ☐ 30
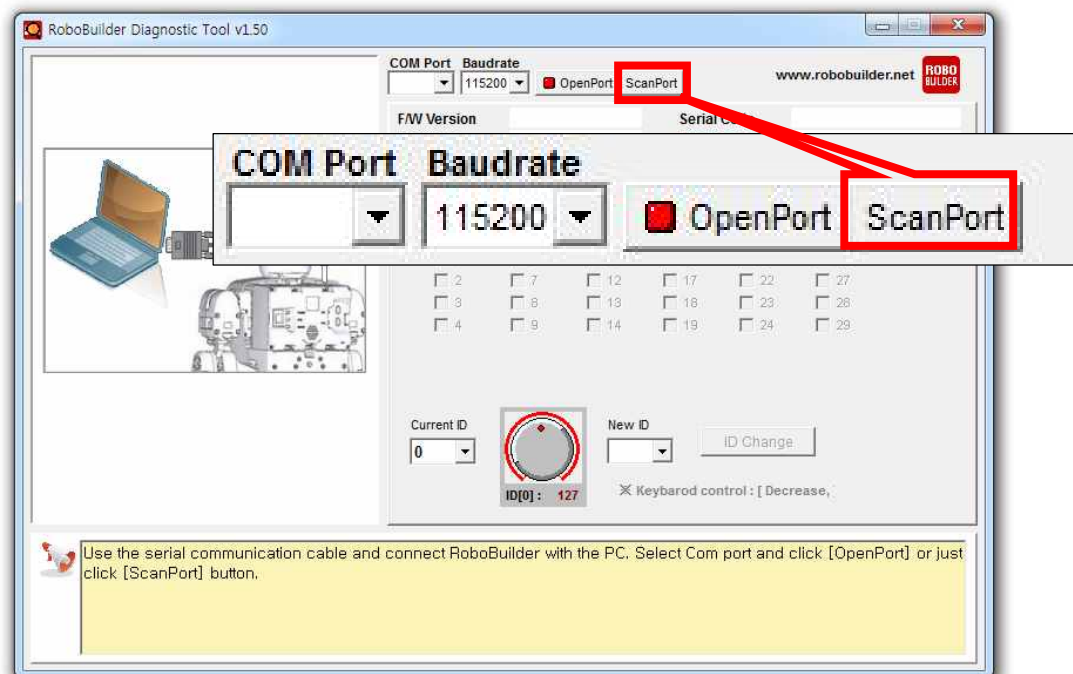☑ 1   ☑ 6   ☑ 11   ☐ 16   ☐ 21   ☐ 26
☑ 2   ☑ 7   ☑ 12   ☐ 17   ☐ 22   ☐ 27
☑ 3   ☑ 8   ☑ 13   ☐ 18   ☐ 23   ☐ 28
☑ 4   ☑ 9   ☑ 14   ☐ 19   ☐ 24   ☐ 29

Check wCK(SAM) communication...   STOP

Current ID   New ID
0   ID Change

ID[0] :   127   ※ Keybarod control : [Decrease,

Robot joint labels: 14, 13, 10, 11, 15, 05, 00, 12, 06, 01, 07, 02, 08, 03, 09, 04

There are 4 wCK(SAM) modules with no response.
Please check if any of the wCK cables is not connected.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15