HUMAN-ROBOT INTERACTION

Robots can do many things on their own. As humans, we want to build robots that interact with us. You may already interact with robots every day. Some cars can parallel park themselves. Other robots assemble the manufactured goods you use.

Human-robot interaction studies the interactions between humans and robots. This field combines robotics and psychology. It seeks to answer a number of questions. How can humans better control robots? How can humans and robots work together? And, in general, how can we improve the human experience and make robots more effective tools?

In this module, we will program the NAO to interact with humans. The NAO appeals to humans because of its humanoid shape. It is also designed to look "cute". By the end of this lesson, you will have completed three tasks in which the robot interacts with humans. You will make the Nao communicate with hand motions, including shaking hands, giving a high five, and waving goodbye. You will program the NAO to play peek-a-boo with children. Finally, you will re-enact a scene from a play. After finishing this module, show off the results to children, adults or fellow students outside your class!

BASIC TASK
GREETINGS

IN THIS MODULE, WE'LL FOCUS ON HOW ROBOTS CAN INTERACT WITH HUMANS. WE'LL TEACH THE NAO TO SHAKE HANDS, GIVE A HIGH FIVE, AND WAVE GOODBYE.

01/

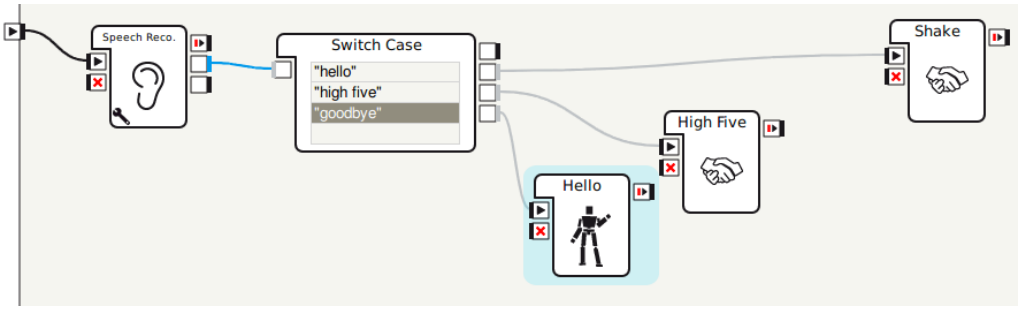
Create a new Choregraphe project, with three new Timeline boxes for keyframe motions.

02/

You should be well-versed by now at creating keyframe motions. For one keyframe motion, make the NAO do a hand shaking motion. For the second, make the NAO give a high five. For the third, make the NAO wave goodbye (you can use the Hello motion box).

03/

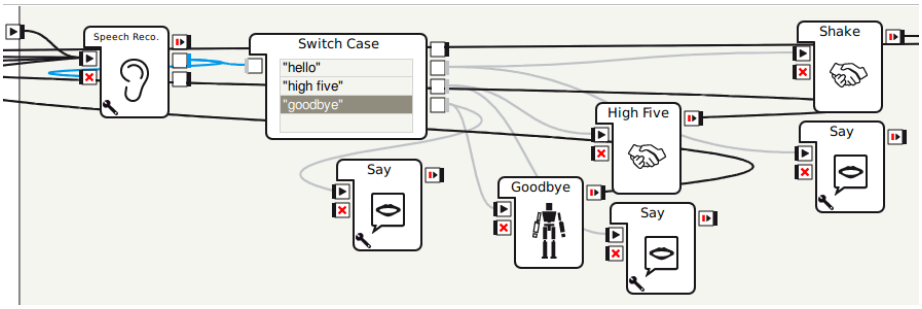
Now add a Speech Recognition box and a Switch Case box. Set the word list for the speech recognition box to be "hello;high five;goodbye", and set these three words in the Switch Case box. Connect these two boxes to the motion boxes as shown below.



04/

Now add Say boxes, one for each action, connected to the same output of the Switch Case box. For each Say box, make the robot say a message related to the associated action.

With this setup, the Speech Recognition box continues running while the robot speaks. If our greeting when we shake hands includes the word “hello”, the robot will recognize itself as having said “hello” and continue shaking hands forever. To fix this, connect the output of the speech recognition box to the red X on the same box. Then connect each of the motion boxes to the speech recognition box to make the behavior run continuously. The final result should be similar to that shown below.



05/

Now run the behavior, and try saying each phrase on the word list.

INTERMEDIATE TASK
PEEK-A-BOO

NEXT, WE'LL MAKE THE NAO PLAY
THE CHILDREN'S GAME "PEEK-A-BOO".

01/

Create a new Choregraphe project, with two new Timeline boxes for keyframe motions.

02/

For one keyframe motion, make the NAO hide his face with his hands. For the other, make him put his hands at his side. Be sure to make these gradual transitions.

03/

Add a speech recognition box, which recognizes the phrases "peek a boo" and "I see you". Also add a face recognition box connected to a switch case box, which does nothing on receiving 0 and continues on in the default case. The robot should play the game in a cycle.

04/

The order of actions should be as follows. The final result is shown below.

a. Hide the NAO's face with its hands.
b. Say "Where am I?"
c. Recognize the speech. This box should link to its own X on completion.
d. Remove the hands from the robot's face.
e. Say "You found me! Now you hide."
f. Recognize a face. Again, link this box to its own X on completion.
g. Say "Peek a boo! I see you!" after detecting a face.
h. Hide the NAO's face with its hands again and repeat.

05/

Try playing peek-a-boo with the NAO.

ADVANCED TASK **STORYTELLING**

NEXT, WE'LL MAKE THE NAO EITHER TELL A STORY OR ACT OUT A SCENE FROM A PLAY.

Choose either a short scene or a skit that interests you. Use a combination of voices and motions on the robot. You have already learned all the skills needed to do this exercise, so no step-by-step instructions will be provided. A few hints and suggestions:

01/

If the scene has multiple characters, try changing the voice parameters and head lights to differentiate between them.

02/

Use expressive hand gestures and move the NAO's head.

03/

Use a variety of lights.

04/

Try including sound effects.

05/

Use the "Wait for Signals" box to wait for multiple boxes to finish (i.e., speech and motion) before beginning the next action.

06/

Use "Wait" boxes to insert dramatic pauses into the script.

07/

Be creative!