

NAO PROGRAMMING (BLOCK-BASED) – Activity 1

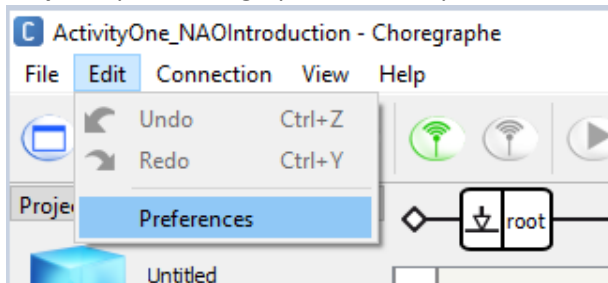
(Time required 30-45 minutes session)

Introduction

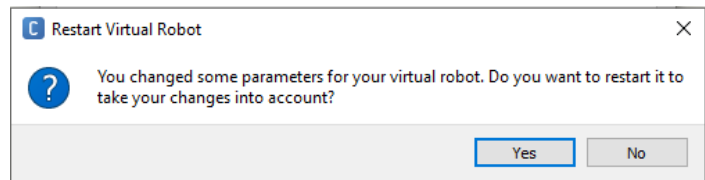
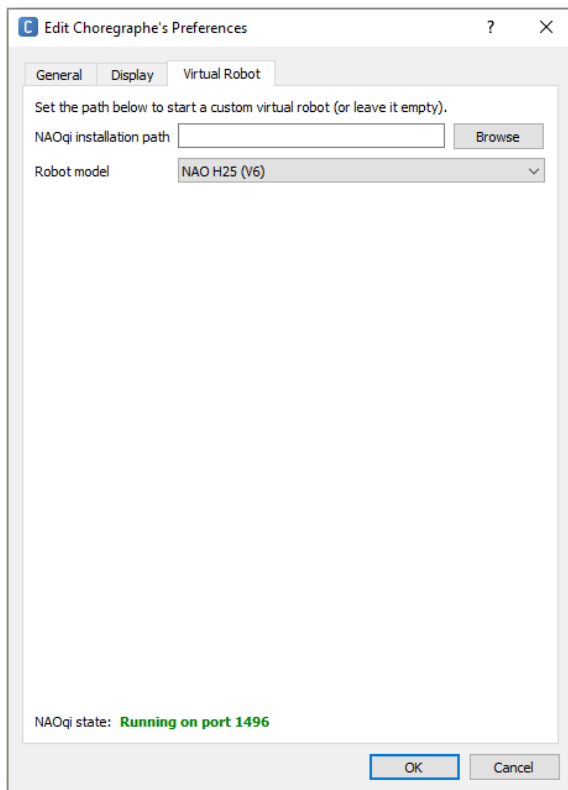
In this activity you will be learning some of the NAO robot basic movement to introduce itself to welcome you to the GenCyber summer camp. You will be using the Choregraphe IDE, the welcome message will be output through the NAO robot speakers. To complete the activity follow the steps below:

Setting up Choregraphe to make connection with the Virtual Robot

Step 1: Open Choregraphe, once it opens, click **Edit | Preferences**.

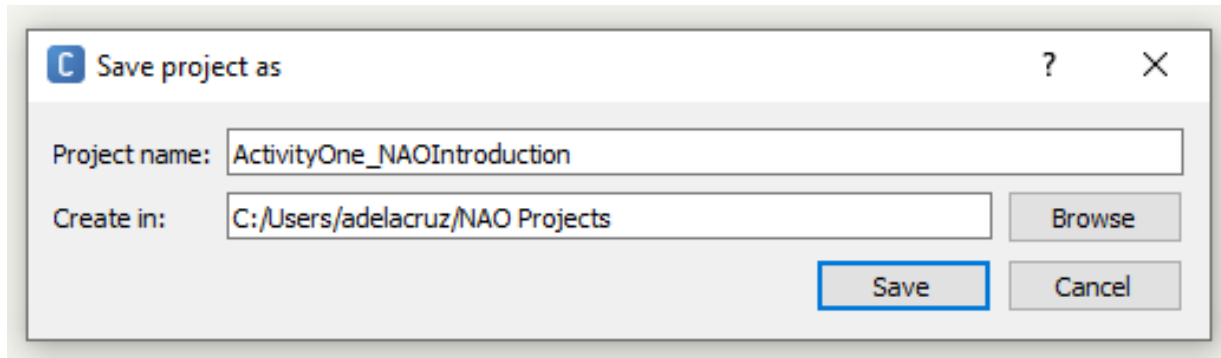


Step 2: Edit Choregraphe's Preferences windows appears select **Virtual Robot** tab and choose **NAO H25 (V6)** click OK. Click **Yes** to restart Choregraphe.



Building the “NAO Introduce himself Activity”

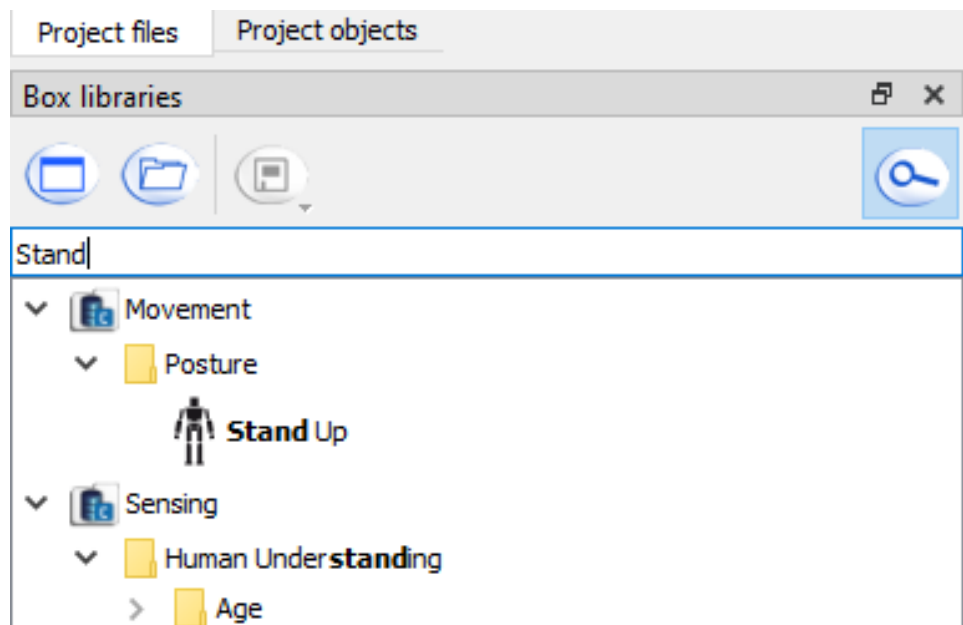
Step 1: Open Choreography, once it opens, click **File | Save Project** and name it as **ActivityOne_NAOIntroduction** then click **Save**



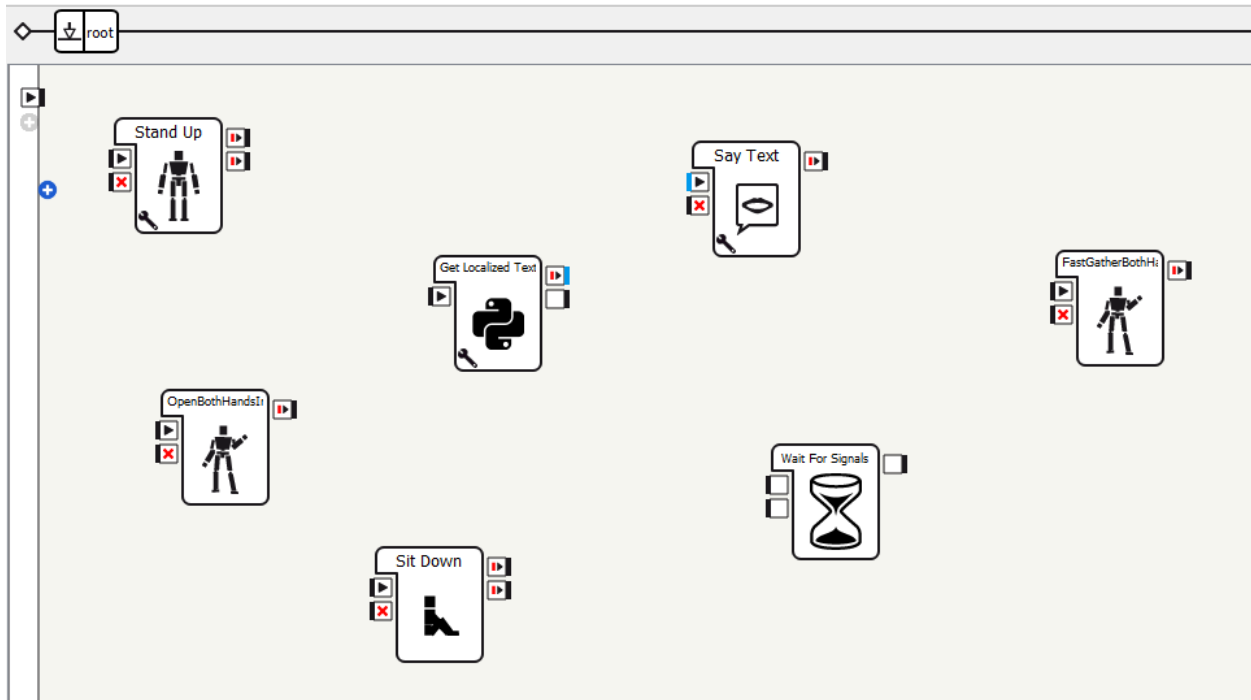
Step 2: Add the following method boxes (behaviors) in the Flow Diagram Panel.

1. Stand Box
2. OpenBothHandsInFrontWithBump
3. Sit Down
4. Get Localized Text
5. Say Text
6. Wait For Signals
7. FastGatherBothHandsOnChest_LeanRight

NOTE: You may find all these behaviors in the Box Libraries

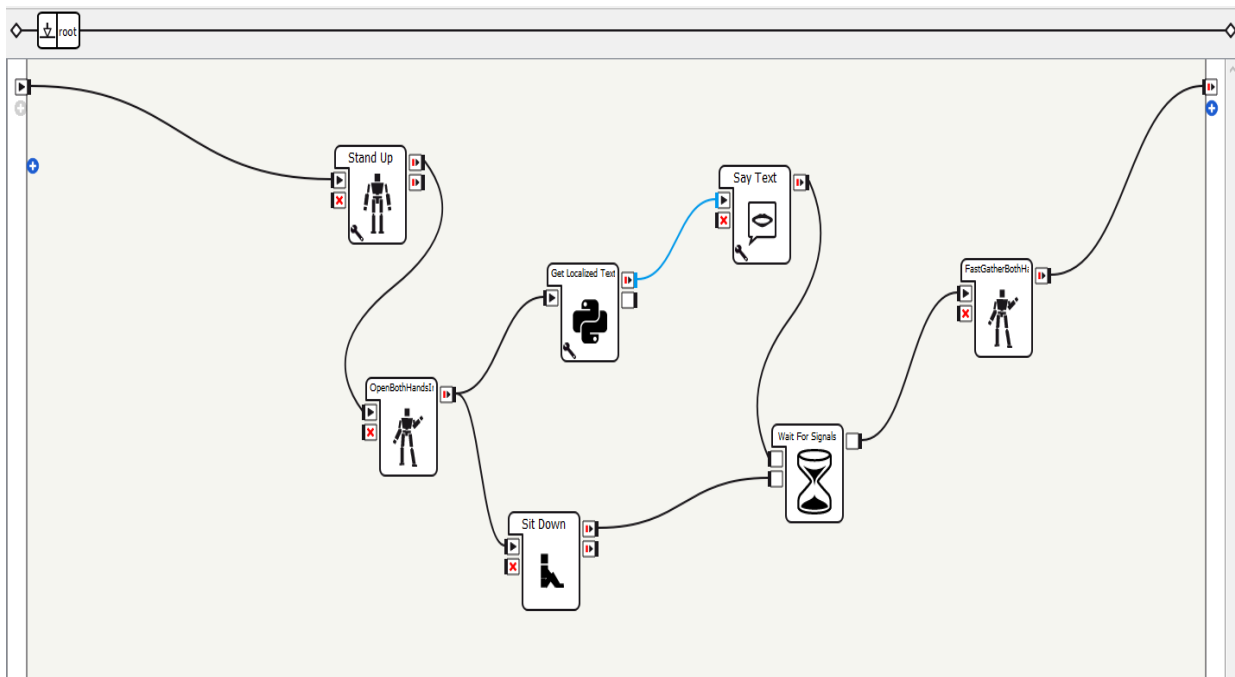


Step 3: Once you have added all the behaviors, the flow diagram panel should resemble the figure below



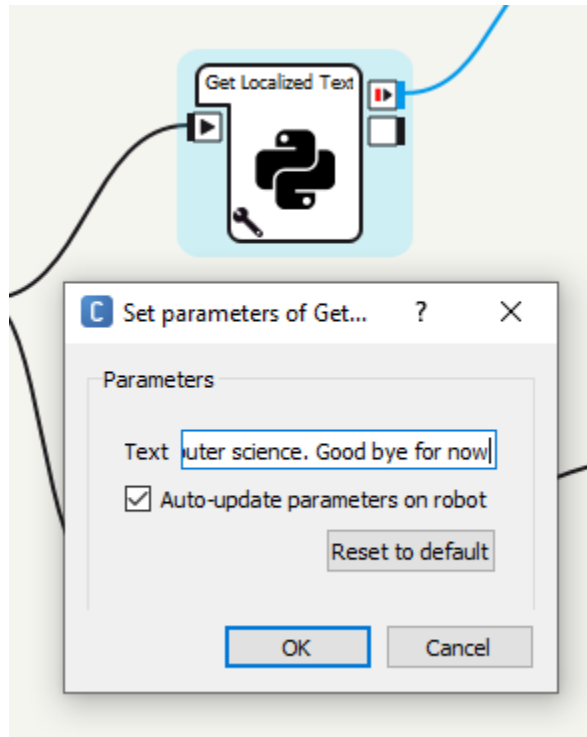
Step 4: Make the following connections to resembles the figure below.

NOTE: To make connections you must click either on the input/output of one of behavior boxes to a second input/output behavior box.



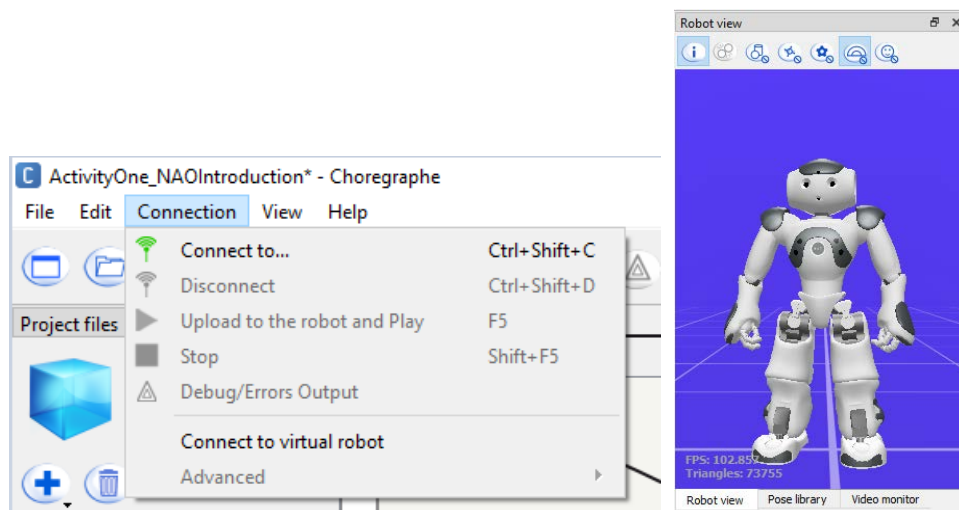
Step 5: Click on the **Parameters** settings (**wrench icon**) of the Get Localized Text box and add the text below in the Text field, then click **OK** to close the window:

Hello My name is NAO and welcome to the Savannah State University GenCyber summer camp 2022.I hope you are having fun and enjoying all the material in Cybersecurity concepts and computer science.Good bye for now.

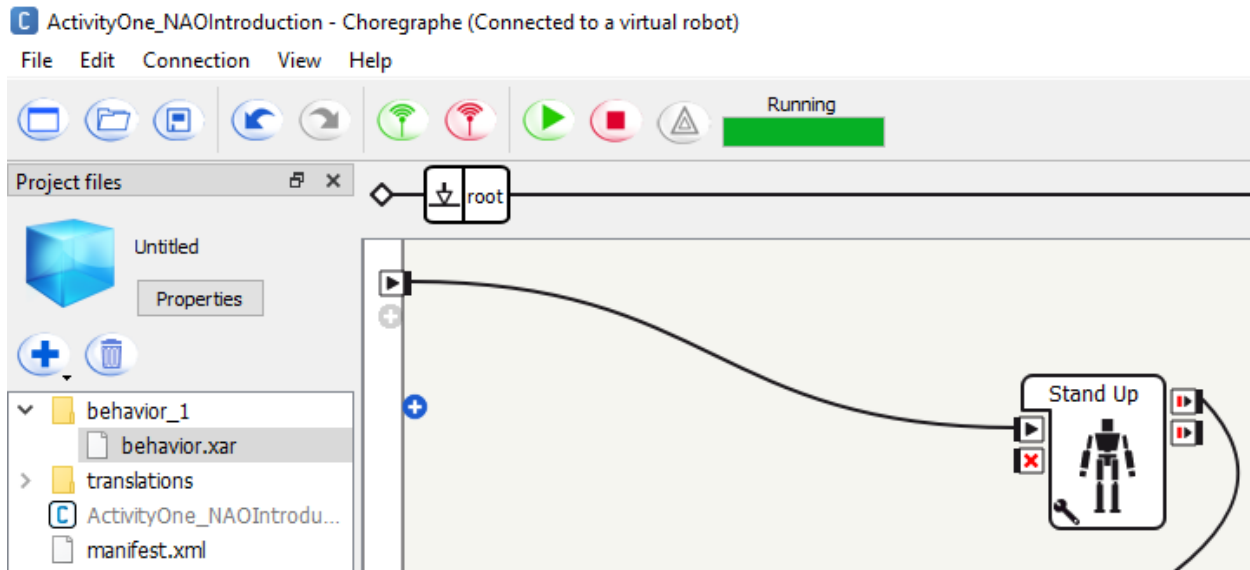


Step 6: click on the **Connection | Connect to virtual robot (top menu)**. At this point the virtual robot should appear on the Robot View.

NOTE: Connectivities issues click on **Connect to** then select ip address/hostname: 127.0.0.1 then reconnect to virtual robot.



Step 7: Once the connection is established click on the **green arrow button** to upload the program to the virtual robot. At this moment you should see the virtual robot executing all the behaviors added to the flow diagram panel.



Congratulations! You have successfully completed this activity.

Reference: NAO6 Creative Projects
<http://doc.aldebaran.com/2-1/nao/index.html>

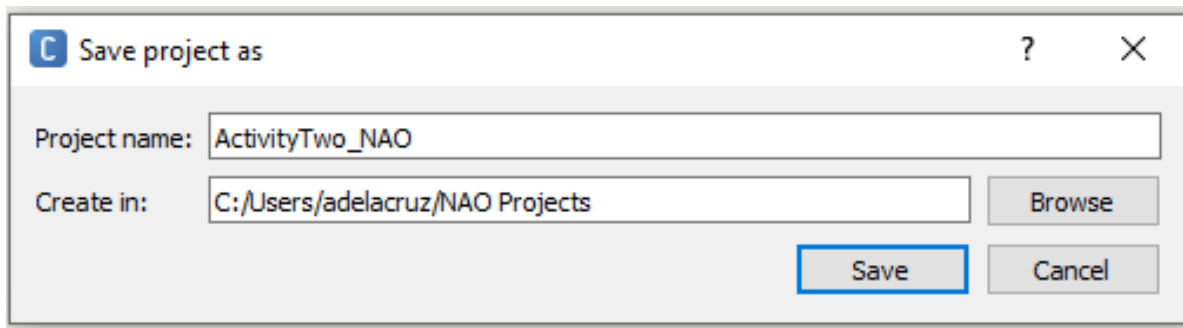
NAO PROGRAMMING (BLOCK-BASED) – Activity 2
NAO WAVE HELLO/GOODBYE
(Time required 30-45 minutes session)

Introduction

In this activity you will be learning how to create a basic animation using Timeline box behavior so the NAO robot can wave hello/goodbye and say a brief message. You will be using the Choregraphe IDE, the message set as parameter will be output through the NAO robot speakers. To complete the activity follow the steps below:

Building the “NAO to wave hello/goodbye”

Step 1: Open Choregraphe, once it opens, click **File | Save Project** and name it as **ActivityTwo_NAO** then click **Save**

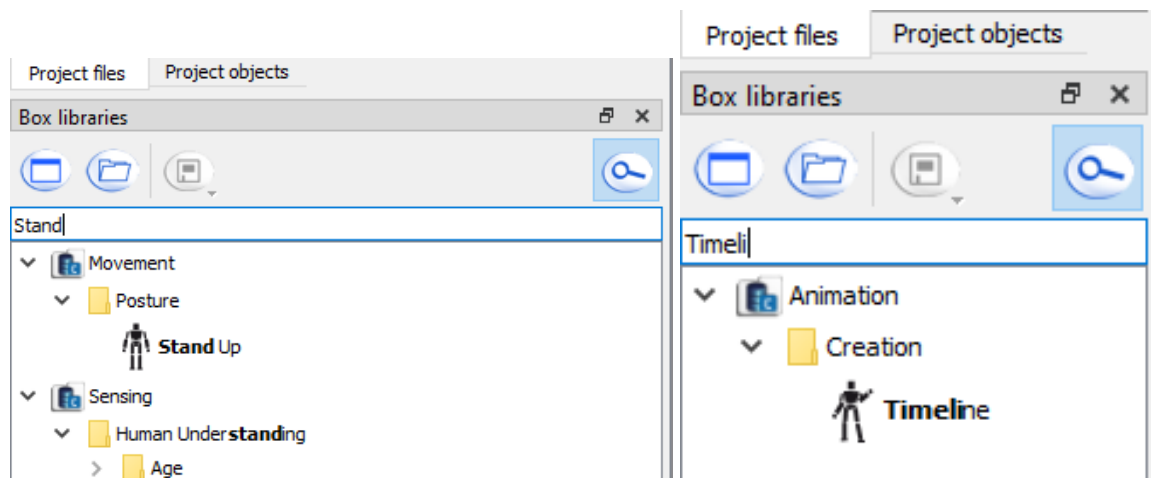


Step 2: click on the **Connection | Connect to virtual robot (top menu)**. At this point the virtual robot should appear on the Robot View.

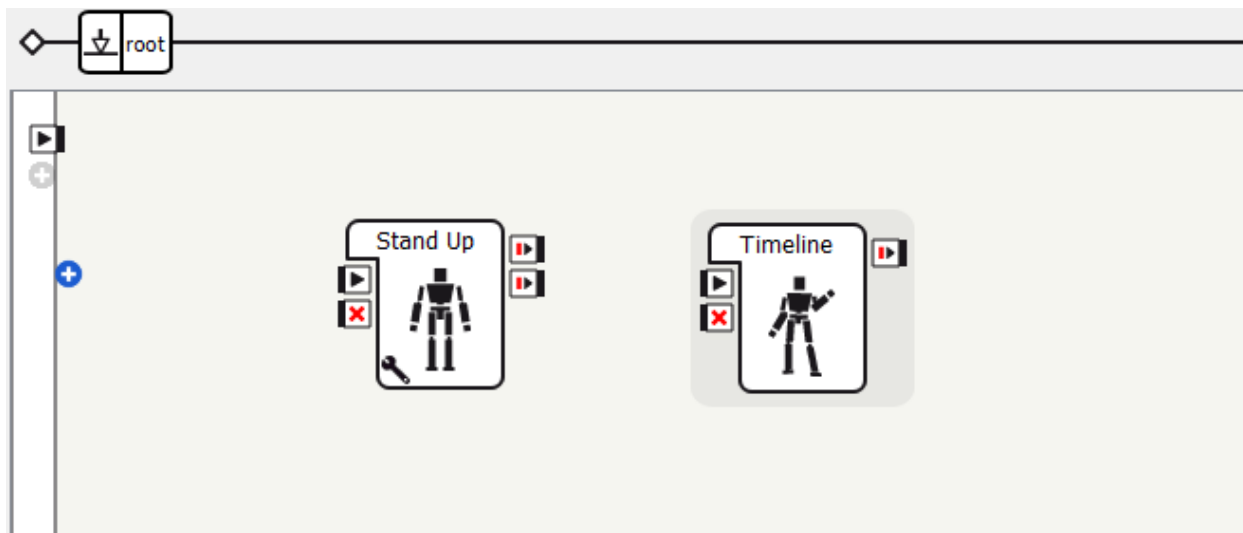
Step 3: Add the following method boxes (behaviors) in the Flow Diagram Panel.

1. Stand Box
2. Timeline

NOTE: You may find all these behaviors in the Box Libraries

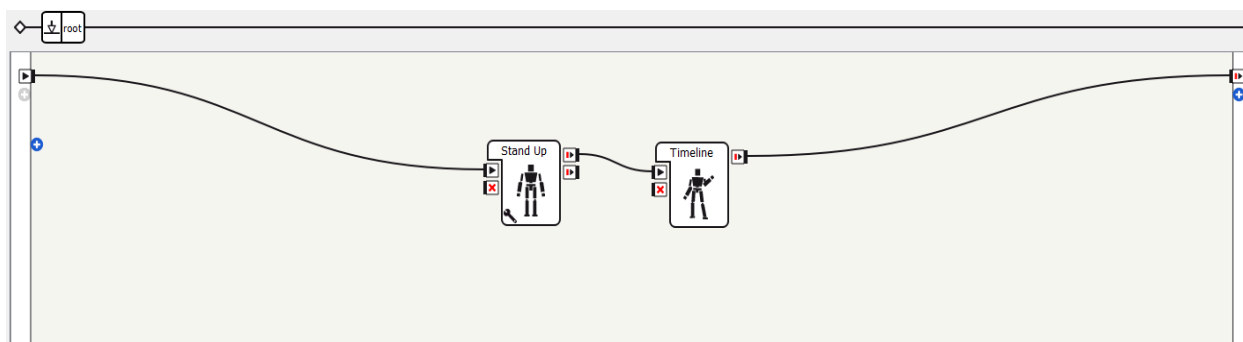


Step 4: Once you have added all the behaviors, the flow diagram panel should resemble the figure below

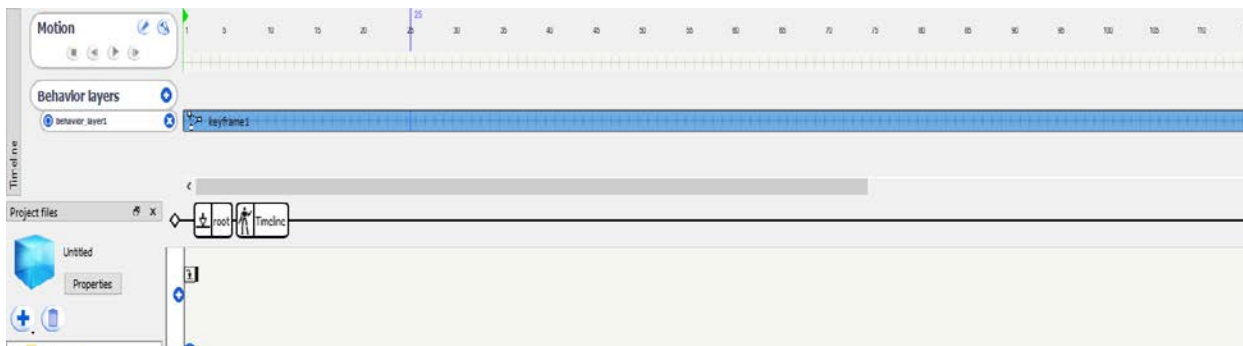


Step 5: Make the following connections to resembles the figure below.

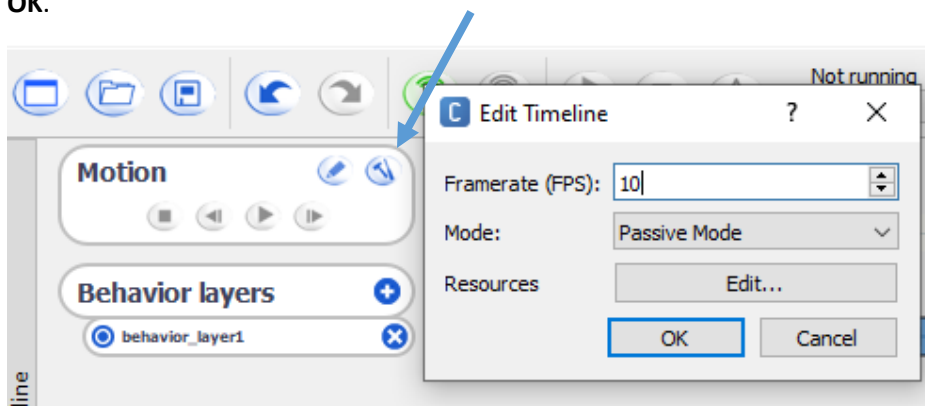
NOTE: To make connections you must click either on the input/output of one of behavior boxes to a second input/output behavior box.



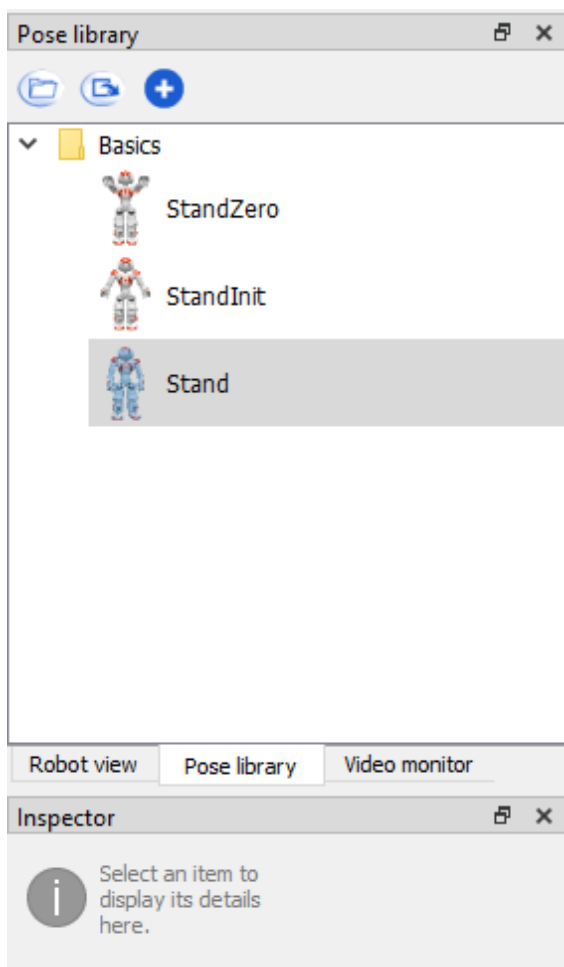
Step 6: Double Click on the **Timeline** behavior box to create the waving hello/goodbye animation.



Step 7: click on the **Motion properties setting** to change the framerate per second(FPS) to **10**, then click **OK**.

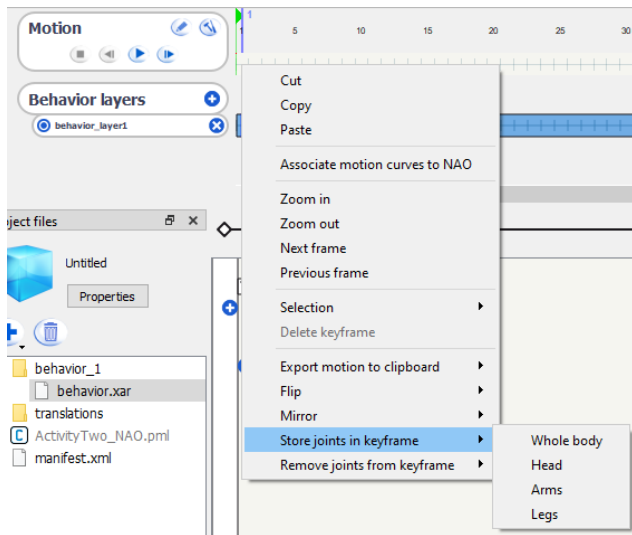


Step 8: click on the **Pose library** and select by double clicking the **Stand pose**. At this point the virtual robot should pose the Stand Position on the Robot View. (If Pose library is not available click on the top menu **View** and check Pose library)

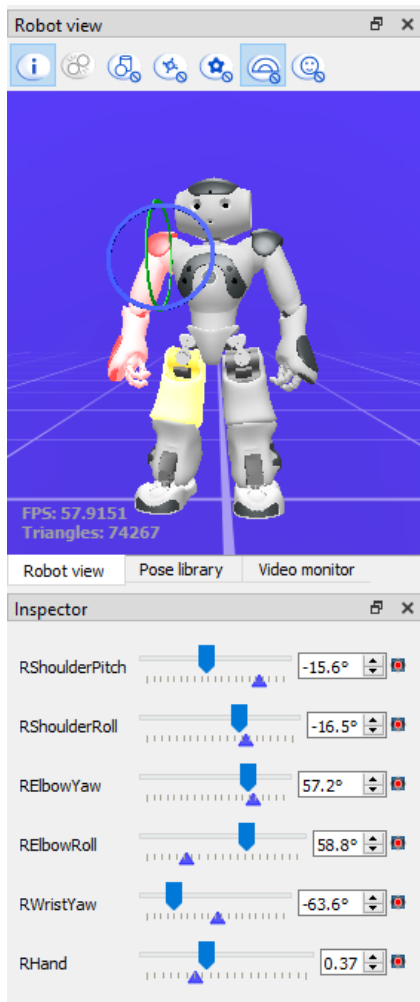


Step 9: Click on the Robot view to start the animation process

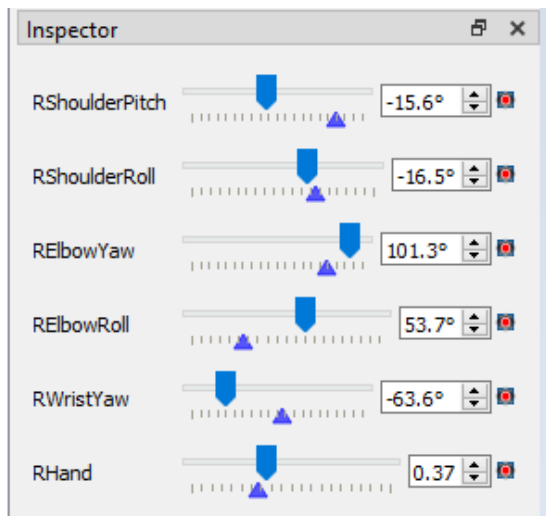
Step 10: Right-click on Frame 1 then select **Store joints in keyframe | Whole body**



Step 11: repeat step 10 in Frame 10. In the Robot view select the right arm and adjust values to match the values in the figure below by using the blue sliders



Step 12: Copy Frame 10 and paste in Frame 20. Make sure in the Robot view the right arm is still selected and adjust values to match the values in the figure below by using the blue sliders



Step 13: Copy Frame 10 and Paste in Frames 29, 48,

Step 14: Copy Frame 20 and Paste in Frames 39, 58 and 70

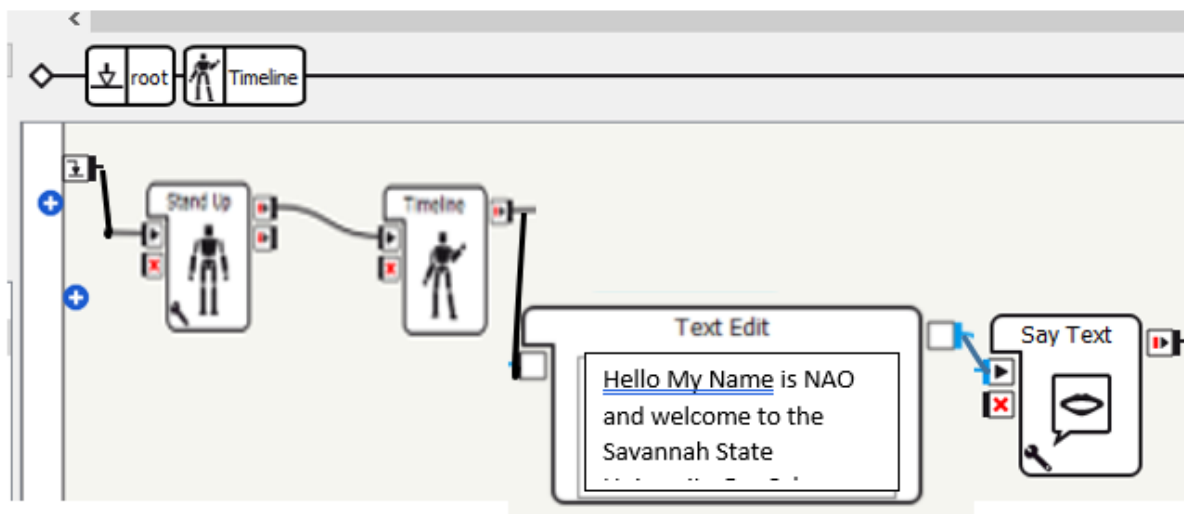
Step 15: Add Text edit box

1. Type the following text in the box

Hello My name is NAO and welcome to the Savannah State University GenCyber summer camp 2022. I hope you are having fun and enjoying all the material in Cybersecurity concepts and computer science. Good bye for now.

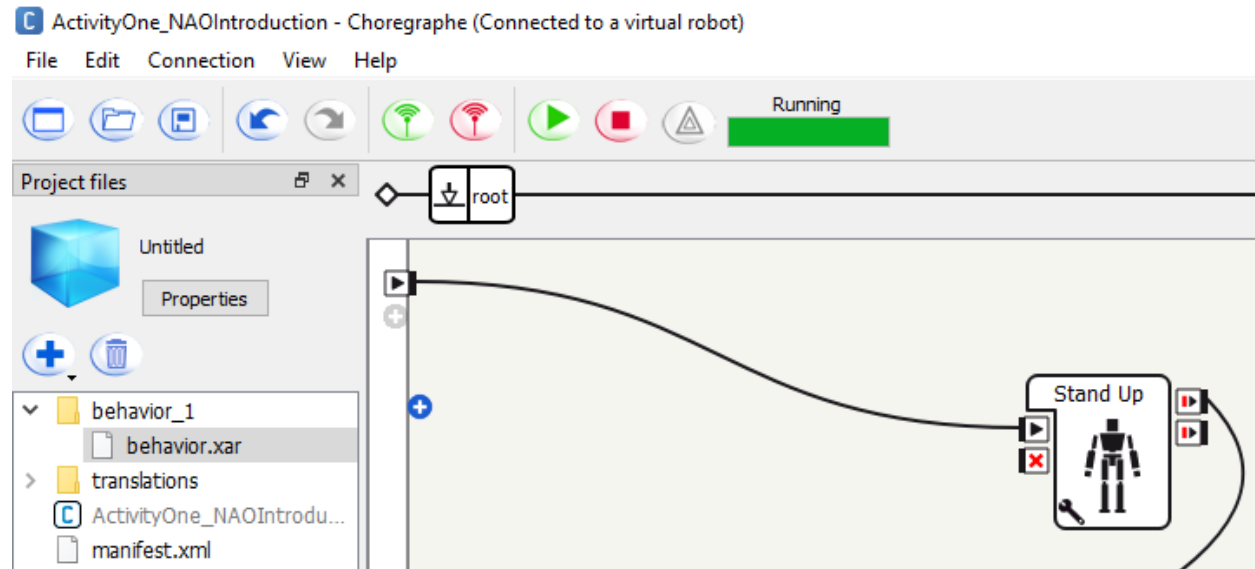
2. Say Text

Step 16: Make the following connections to resembles the figure below



Step 17: Click on **root** to get out of the Timeline behavior

Step 18: Click on the **green arrow button** to upload the program to the virtual robot. At this moment you should see the virtual robot executing all the behaviors added to the flow diagram panel.



Congratulations! You have successfully completed this activity.

Reference: NAO6 Creative Projects

<http://doc.aldebaran.com/2-1/nao/index.html>

NAO PROGRAMMING (BLOCK-BASED) – Activity 3**NAO Sales Assistant**

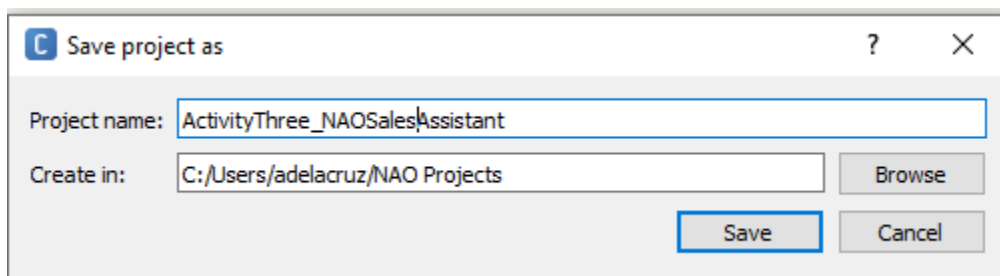
(Time required 60-90 minutes session)

Introduction

In this activity you will be learning how to program the NAO robot can behave as a sales assistant. The activity consist of a simple question-and-answer repetition game between the NAO and a customer. After few responses, the customer has found the product they are looking for. Follow the step to complete the activity.

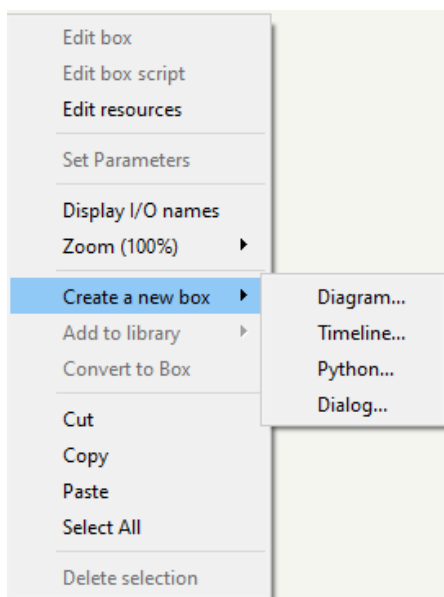
Building the “NAO as sales assistant”

Step 1: Open Choregraphe, once it opens, click **File | Save Project** and name it as **ActivityThree_NAOSalesAssistant** then click **Save**

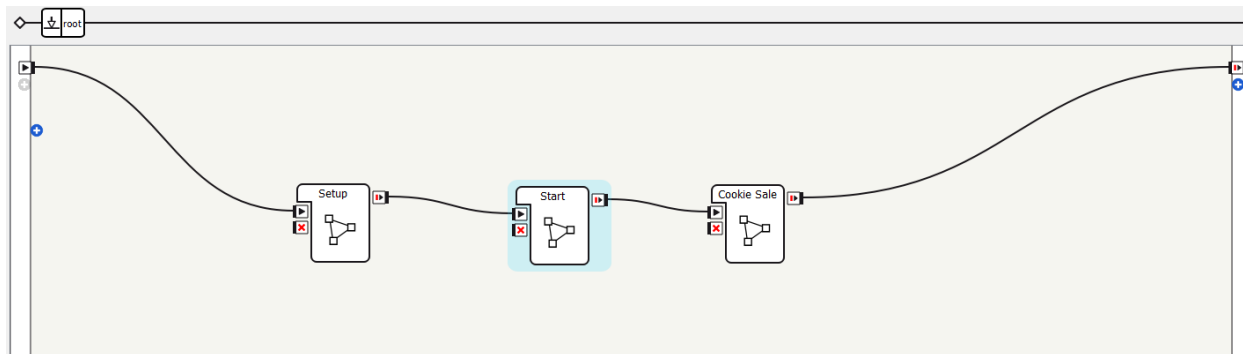


Step 2: click on the **Connection | Connect to virtual robot (top menu)**. At this point the virtual robot should appear on the Robot View.

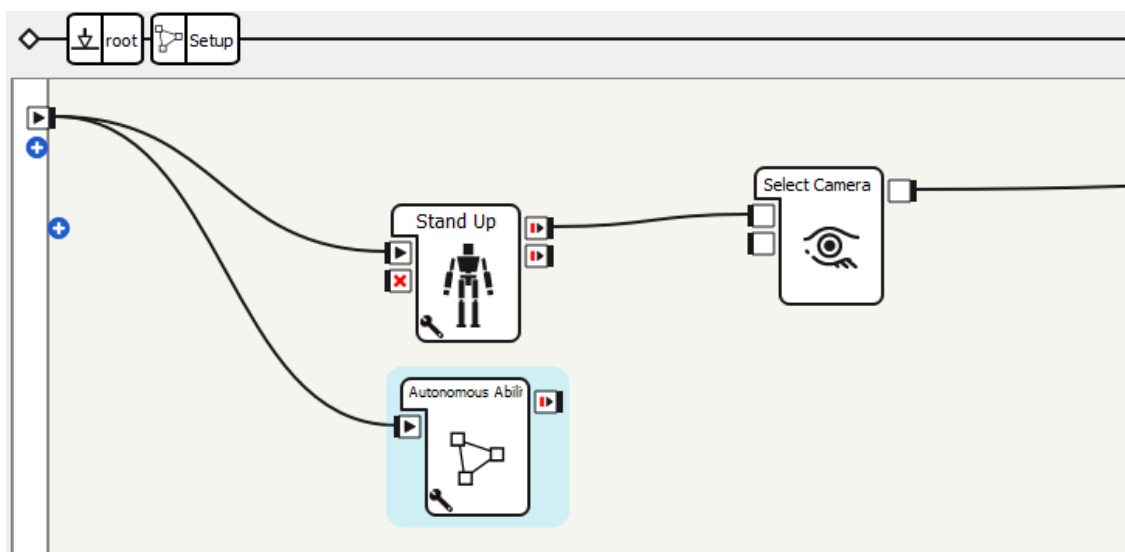
Step 3: Create three Diagram boxes in the Flow Diagram Panel by right-clicking in the panel and selecting the **Create a new box | Diagram...** rename them as Setup, Start and Cookie Sale



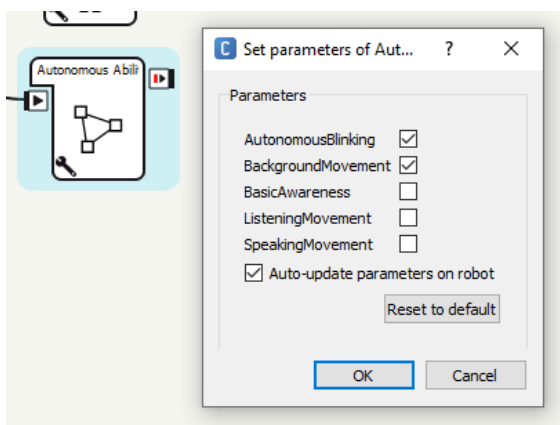
Step 4: Once you have created all Diagrams and make connections, the flow diagram panel should resembles the figure below



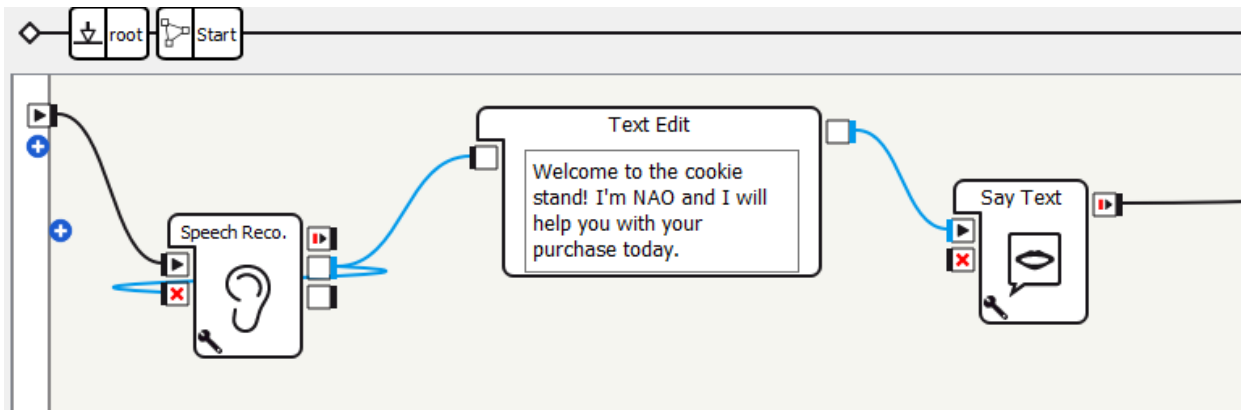
Step 5: Double click on the **Setup** box to add the following behaviors: **Stand Up, Select Camera, Autonomous and Set Language** boxes. Make connections and the flow diagram panel should resembles the figure below:



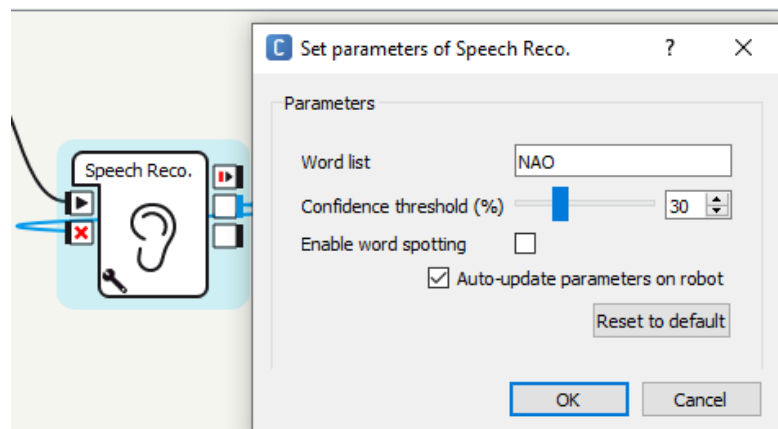
Step 6: Change the settings (click on the wrench icon) of the Autonomous Abilities to **Autonomous Blinking** and **Background Movement** parameters



Step 7: Click on **root** then double click on the **Start** box to add the following behaviors: **Speech Recognition, Text Edit and Say Text** boxes. Make connections and the flow diagram panel should resemble the figure below:

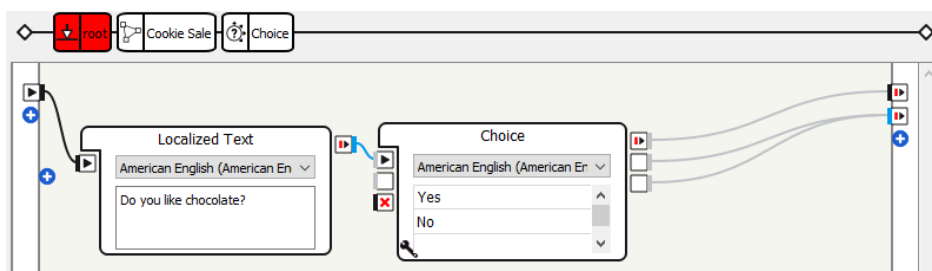


Step 8: click on the **Speech Recognition (wrench icon)** to set the Word List parameter to NAO then click **OK**.

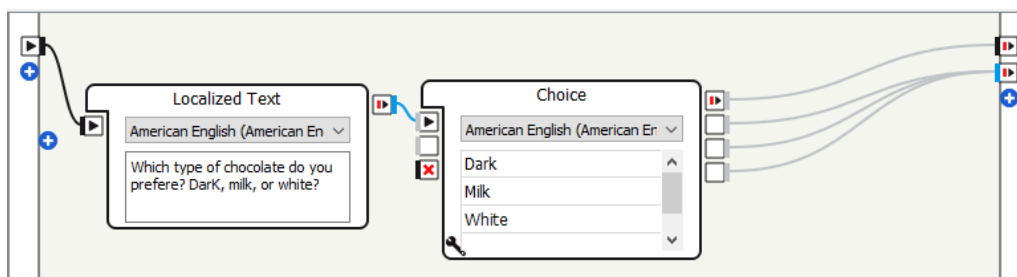


Step 9: Click on **root** then double click on the **Cookie Sale** box and create/add the following behaviors/methods:

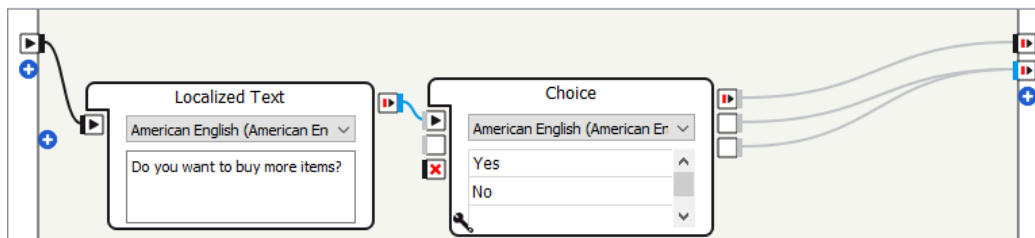
- 1) Add a Choice box and double click on choice box. Do the following:
 - a. Under Localized Text, select the language you want and enter the question here: "Do you like chocolate"
 - b. Under Choice, select the language you want and enter possible answers: "Yes" and "No"



- c. Go back to the “Cookie Sale” tab at the top
 - d. You can change text title/name by right clicking on the box and select “edit box” and type in the name.
- 2) Add a Switch Case box and enter the cases “Yes” and “No” (use the quotation marks)
 - 3) Connect the Switch Case box to the Choice Box for chocolate yes/no using the answer output
 - 4) Add a Text Edit box and connect it to the “No” vase of the Switch Case box
 - 5) Set the text to: “How about the spiced cookies?”
 - 6) Add a Say Text box – do not connect box yet
 - 7) Add another Choice box, connect it to the output case of the Switch Case box and do the following:
 - a. Under Localized Text, select the language you want and enter the question here: “Which type of chocolate do you prefer? Dark, milk, or white?”
 - b. Under Choice, select the language you want and enter possible answers: “Dark”, “Milk” and “White”



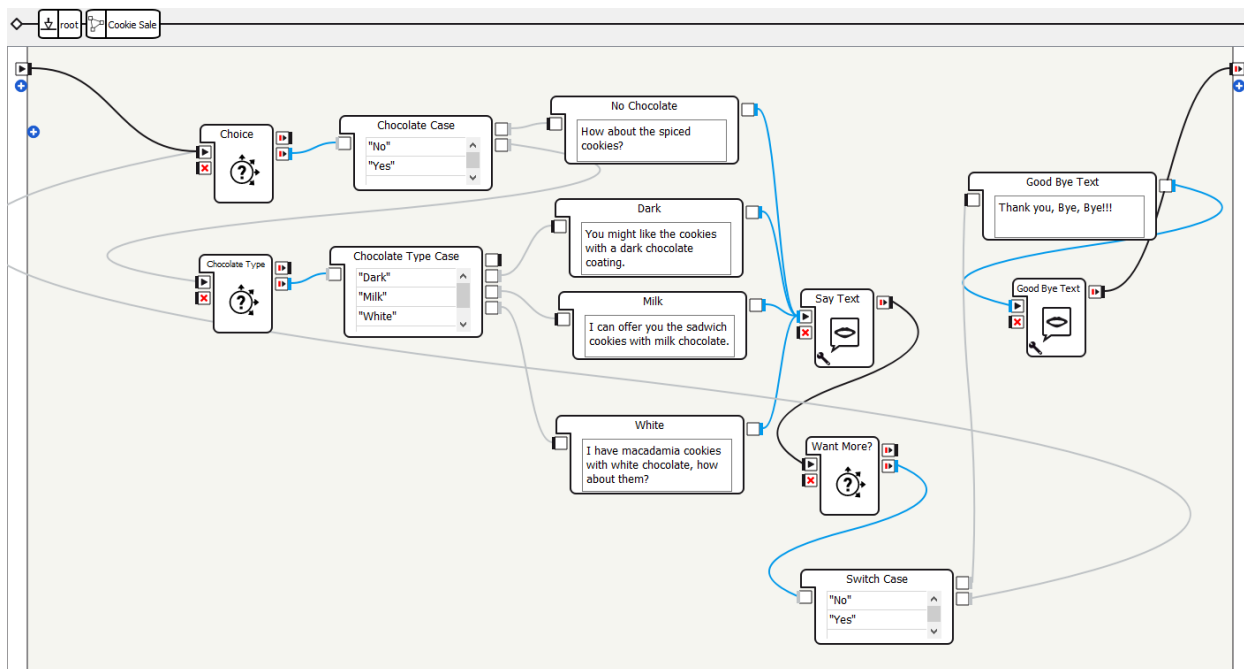
- c. Go back to the “Cookie Sale” tab at the top
- 8) Add a Switch Case box and enter the cases “Dark”, “Milk”, and “White” (use quotation marks)
 - 9) Connect the Switch Case box to the Choice box for the type of chocolate using the answer output
 - 10) Add three Text Edit boxes and connect them to the three cases of the Switch Case box for the type of chocolate
 - 11) Set the texts to:
 - a. Dark: “You might like the cookies with a dark chocolate coating.”
 - b. Milk: “I can offer you the sandwich cookies with milk chocolate.”
 - c. White: “I have macadamia cookies with white chocolate, how about them?”
 - 12) Now connect the Say Text box added earlier to all the choice boxes
 - 13) Add another Choice box and do the following:
 - a. Under Localized Text, select the language you want and enter the question here: “Do you want to buy more items?”
 - b. Under Choice, select the language you want and enter possible answers: “Yes” and “No”



c. Go back to the “Cookie Sale” tab at the top

- 14) Create a Switch Case box and enter the cases “No” and “Yes”
- 15) Create a Text Edit box and connect it to the Switch Case box
- 16) Set the text to: “Thank you, Bye, Bye!!!”
- 17) Add a Say Text box

Step 10: Connections should resembles the figure below



Step 11: Click on the **green arrow button** to upload the program to the virtual robot, what happens?. Is the virtual robot executing all the behaviors added to the flow diagram panel? Explain:

Congratulations! You have successfully completed this activity.

Reference: NAO6 Creative Projects
<http://doc.aldebaran.com/2-1/nao/index.html>

NAO PROGRAMMING (BLOCK-BASED) – Activity 4

NAO Learns Faces

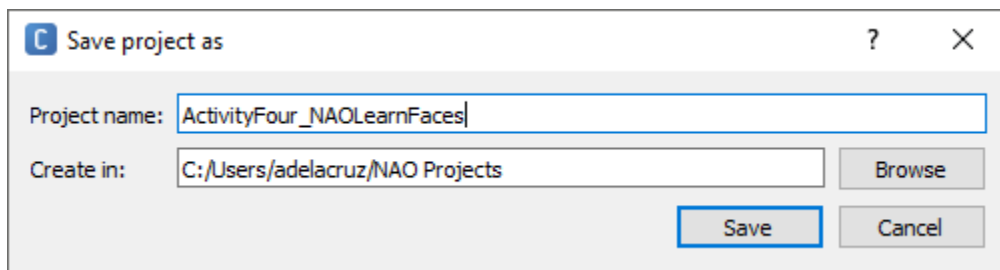
(Time required 15-30 minutes session)

Introduction

In this activity you will be learning how to program the NAO robot to do face recognition and save face in its memory. Follow the step to complete the activity.

Building the “NAO Learn Faces”

Step 1: Open Choregraphe, once it opens, click **File | Save Project** and name it as **ActivityFour_NAOLearnFaces** then click **Save**

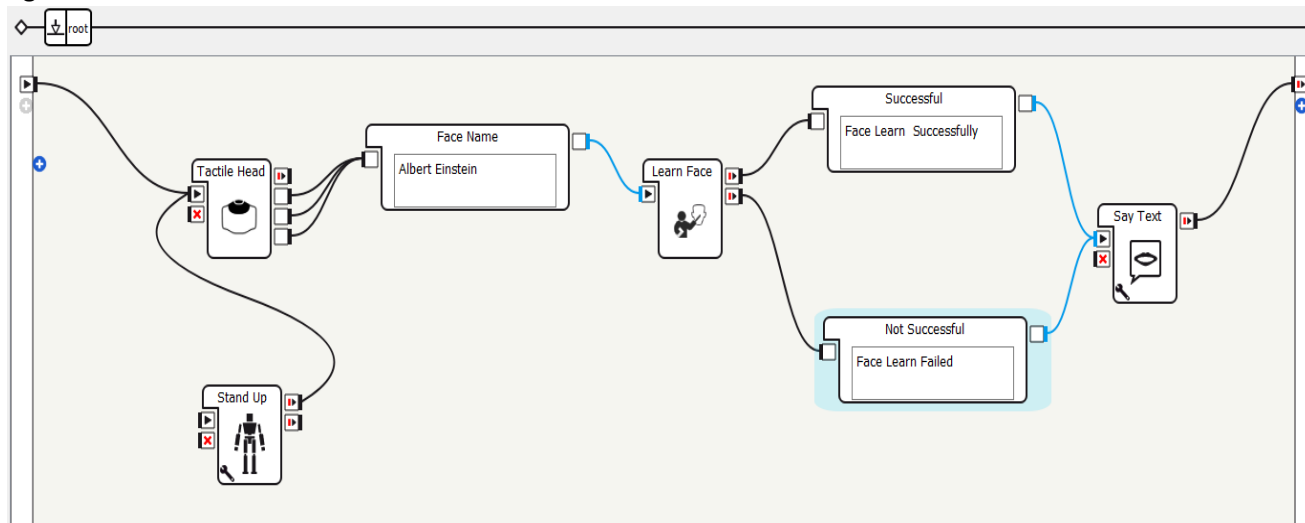


Step 2: click on the **Connection | Connect to virtual robot (top menu)**. At this point the virtual robot should appear on the Robot View.

Step 3: Add the following behaviors/method boxes from the Box library to the Flow Diagram panel:

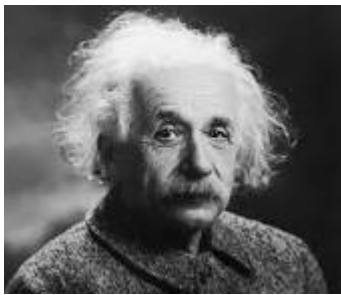
1. Tactile Head
2. Stand Up
3. Three Text Edit (rename them as: Face Name, Successful and Not Successful)
4. Learn Face
5. Say Text

Step 4: Once you have added all boxes, make connections, the flow diagram panel should resembles the figure below:



Step 5: Click on the **green arrow button** to upload the program to the virtual robot, what happens?. Is the virtual robot executing all the behaviors added to the flow diagram panel? Explain:

Note: When uploading the program into the physical NAO robot Face Name text must match the person's name. In this activity NAO will be recognizing: Albert Einstein, Bertha von Suttner and Stephen Hawking



Congratulations! You have successfully completed this activity.

Reference: NAO6 Creative Projects

<http://doc.aldebaran.com/2-1/nao/index.html>

NAO PROGRAMMING (BLOCK-BASED) – Activity 5

NAO Recognizing Famous Faces

(Time required 60-90 minutes session)

Introduction

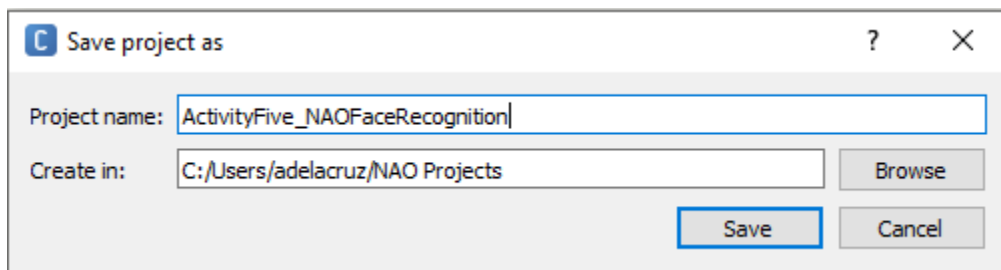
In this activity you will be learning how to program the NAO robot to do face recognition. Face recognition is the process of identifying/comparing an individual's face to a digital image of the same individual previously save in a image database. NAO robot has the ability to perform face recognition by comparing its digital faceprint of a famous person that it was previously stored in its database. Follow the step to complete the activity.

Materials:

Printed pictures of famous faces

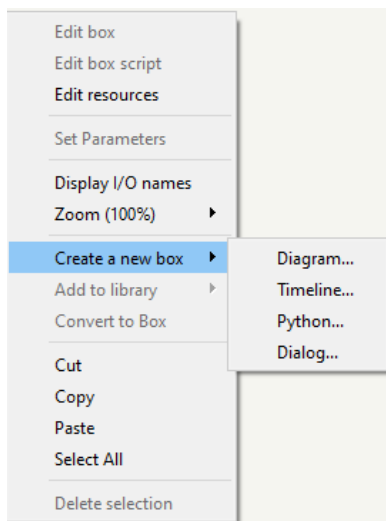
Building the “NAO Recognized Famous Faces”

Step 1: Open Choregraphe, once it opens, click **File | Save Project** and name it as **ActivityFive_NAOFaceRecognition** then click **Save**

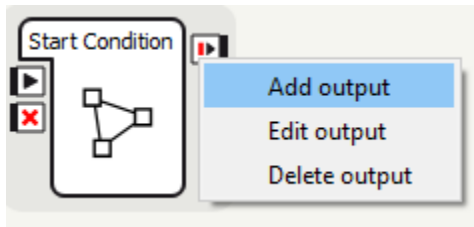


Step 2: click on the **Connection | Connect to virtual robot (top menu)**. At this point the virtual robot should appear on the Robot View.

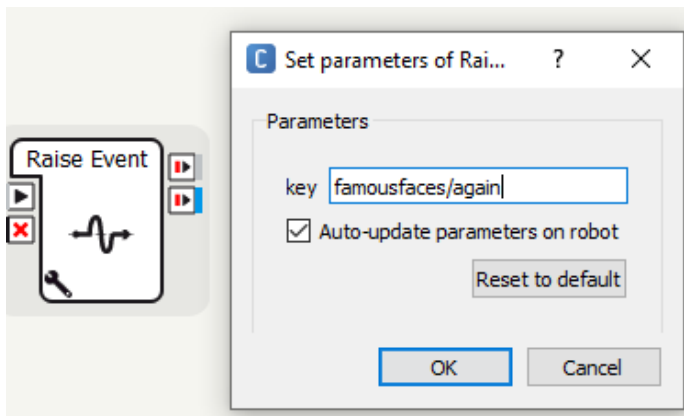
Step 3: Create three Diagram boxes in the Flow Diagram Panel by right-clicking in the panel and selecting the **Create a new box | Diagram...** rename them as Setup, Start and Facial Recognition



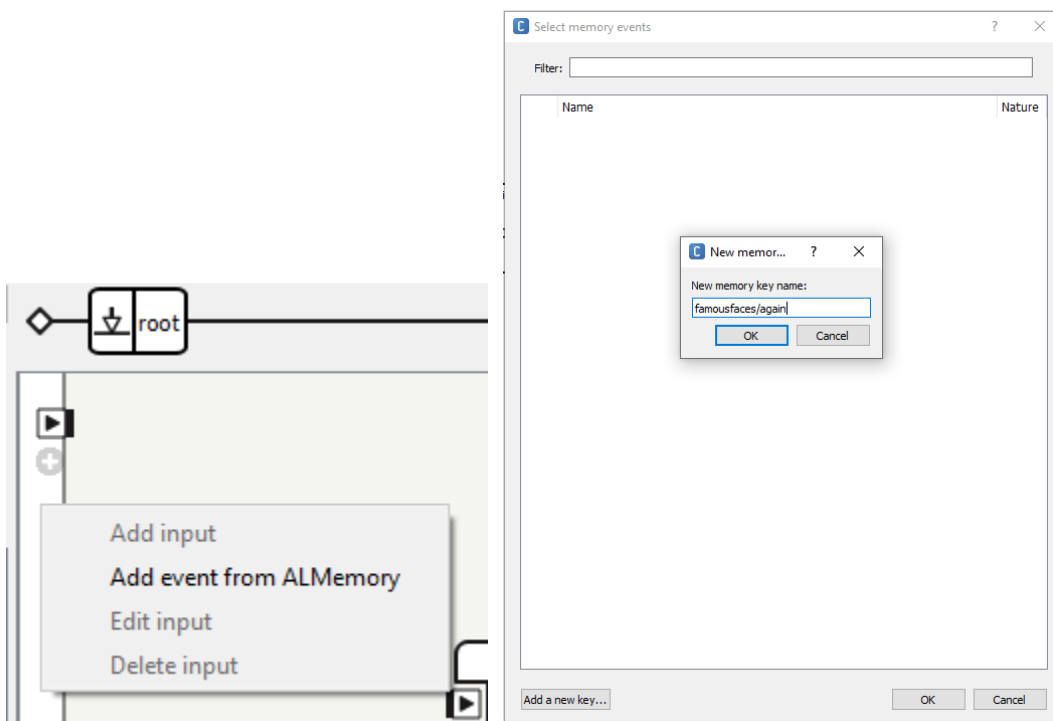
Step 4: Add an output with data type “Bang” to the Start Condition diagram



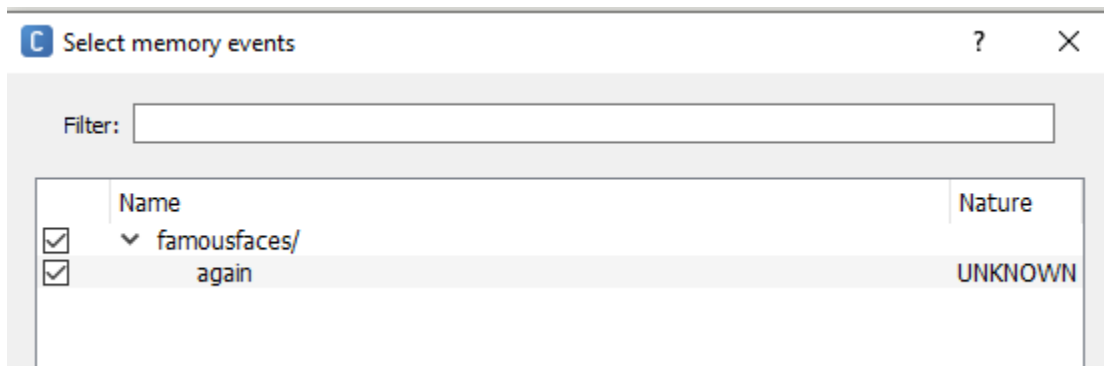
Step 5: Add a Raise Event box and set the key parameter to “famousfaces/again”. Click on the wrench icon to set the key



Step 6: Add an output from ALMemory on the left of the Flow diagram panel, and name the event “famousfaces/again” by clicking on the Add new key... then OK.

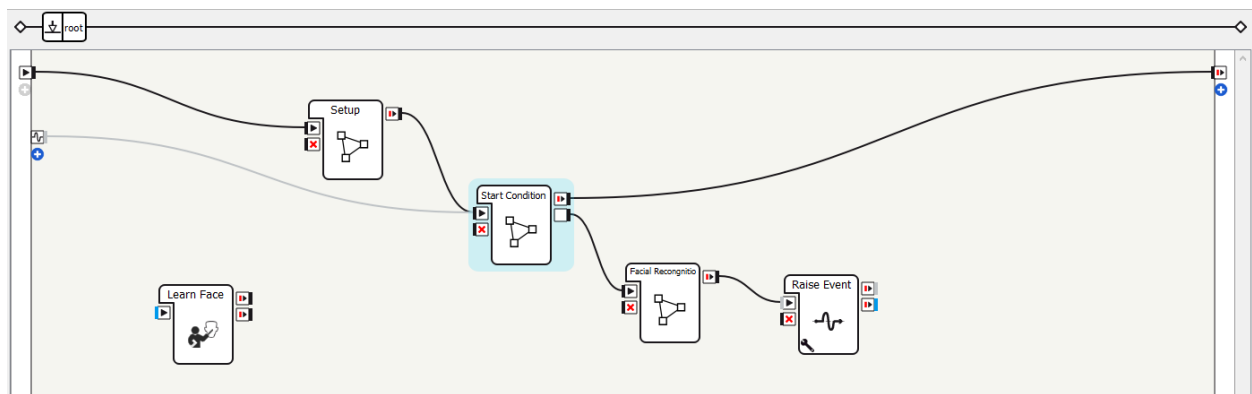


Step 7: Once the key event is created, it should resembles the figure below:

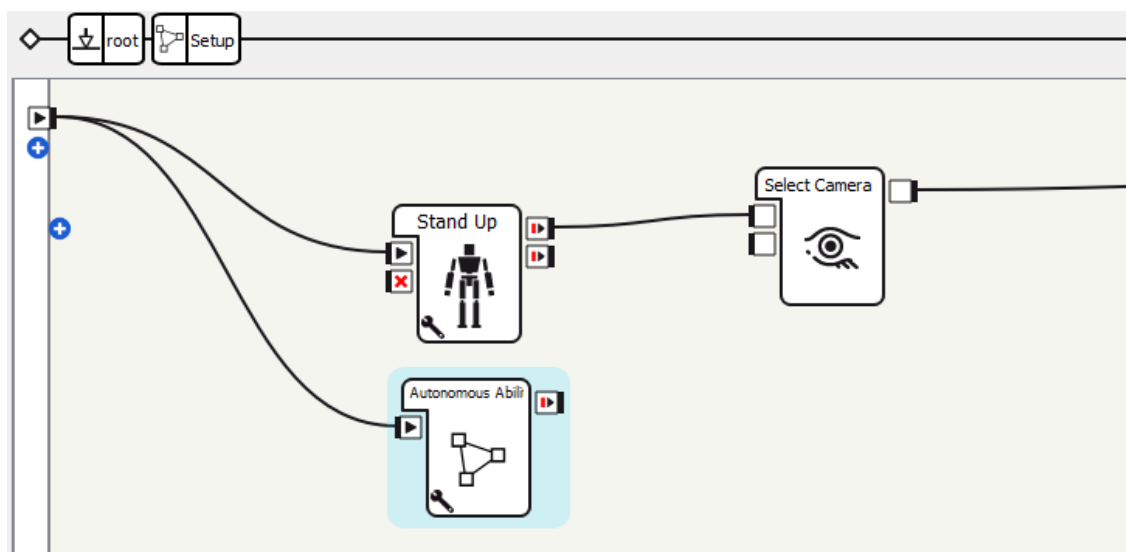


Click OK to create the event

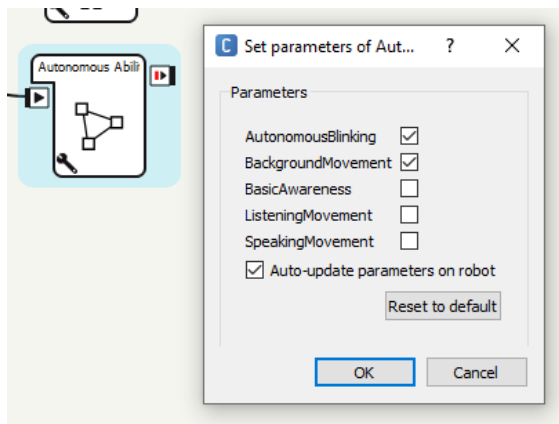
Step 8: Make connections to resemble the figure below:



Step 9: Double click on the **Setup** box to add the following behaviors: **Stand Up**, **Select Camera**, **Autonomous** and **Set Language** boxes. Make connections and the flow diagram panel should resembles the figure below:



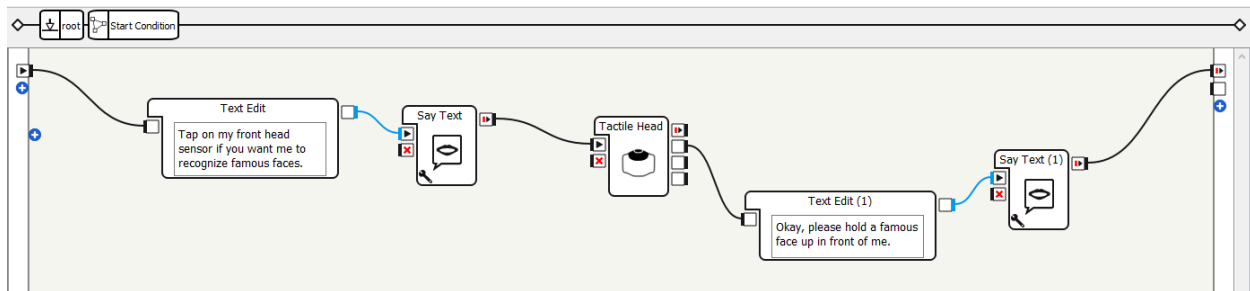
Step 10: Change the settings (click on the wrench icon) of the Autonomous Abilities to **Autonomous Blinking** and **Background Movement** parameters



Step 11: Click on **root** then double click on the **Start** box to add the following behaviors: **two Text Edit**, **two Say Text**, **Tactile Head** boxes. Make connections and the flow diagram panel should resembles the figure below:

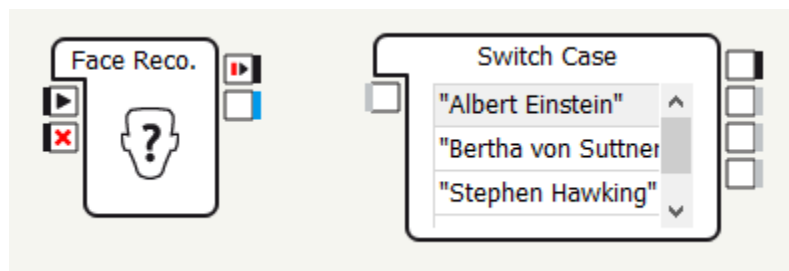
Set Text Edit to: Tap on my front head sensor if you want to recognize famous faces.

Set Text Edit (1) to: Okay, please hold a famous face up in front of me.



Step 12: Click on **root** then double click on the **Facial Recognition** box to add the following behaviors:

- 1) Add a Face Reco box
- 2) Add a Switch Case box and do the following:
 - a. Add the famous faces: "Albert Einstein", "Bertha von Suttner" and "Stephen Hawking"



- 3) Add a three Text Edit boxes, name them as Alberto Einstein, Bertha von Suttner and Stephen Hawking.

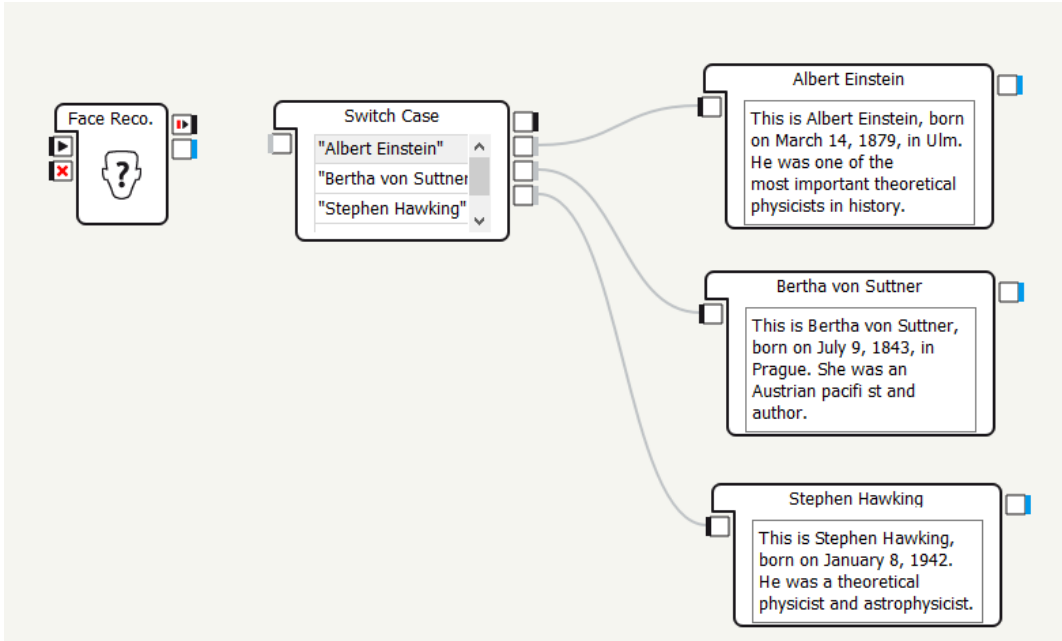
- a. Set each text with the following information:

Einstein: This is Albert Einstein, born on March 14, 1879, in Ulm. He was one of the most important theoretical physicists in history.

Von Suttner: This is Bertha von Suttner, born on July 9, 1843, in Prague. She was an Austrian pacifist and author.

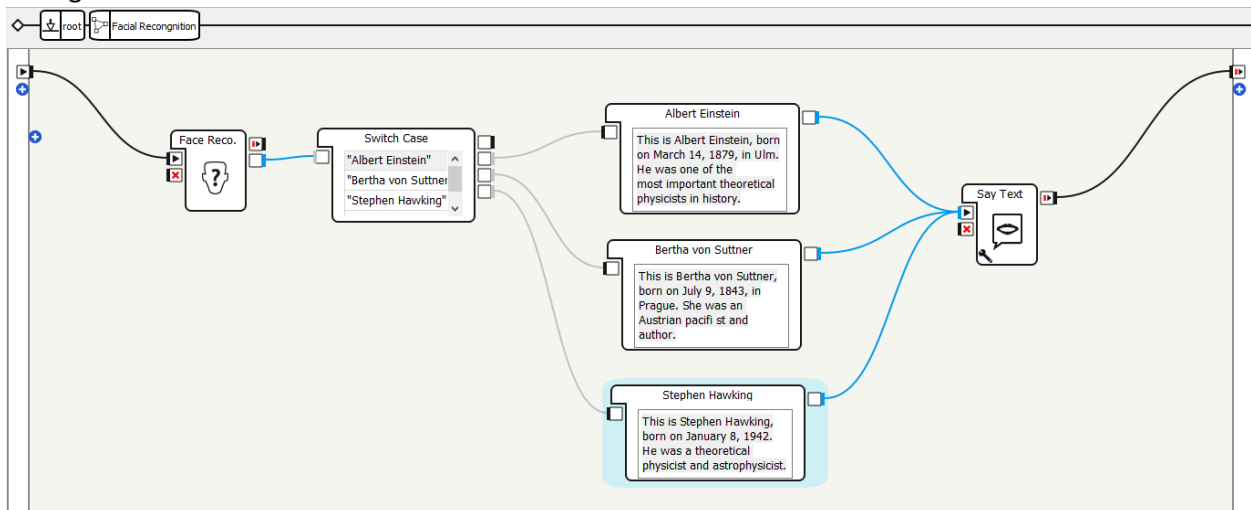
Stephen Hawking: This is Stephen Hawking, born on January 8, 1942. He was a theoretical physicist and astrophysicist.

- b. Connect it to the appropriate case of the Switch Case box



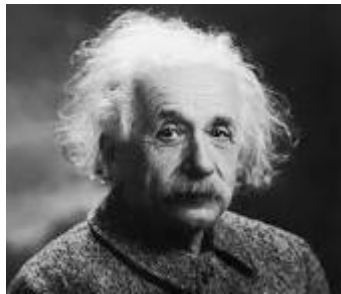
- 4) Add a Say Text box

Step 13: Once you have added all boxes, make connections, the flow diagram panel should resemble the figure below:



Step 14: Click on the **green arrow button** to upload the program to the virtual robot, what happens?. Is the virtual robot executing all the behaviors added to the flow diagram panel? Explain:

Note: When uploading the program into the physical NAO robot once the face has been recognized by the Face Reco box, the Swith Case box determines which famous person it is, then the proper Text Edit box is executed with the information about the person. NAO will speak out the famous person information.



Congratulations! You have successfully completed this activity.

Reference: NAO6 Creative Projects
<http://doc.aldebaran.com/2-1/nao/index.html>