

NAO PROGRAMMING (BLOCK-BASED) – Activity 6

NAO Plays rock-paper-scissors

(Time required 60-90 minutes session)

Introduction

In this activity you will be learning how to program the NAO robot to play rock-paper-scissors by using Naomarks. NAO robot has the ability to generate random numbers and able to detect shapes to determine the winner of the game based on NAO's and user choice. Follow the step to complete the activity.

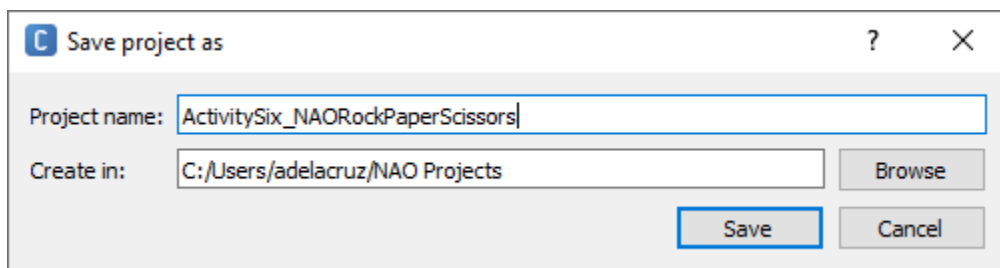
Materials:

Printed Naomark (64 for scissors, 80 for rock and 119 for paper) or

Printed or drawn symbols for rock, paper and scissors

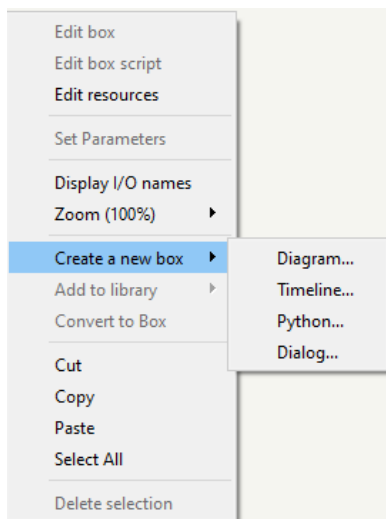
Building the “NAO plays rock-paper-scissors”

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

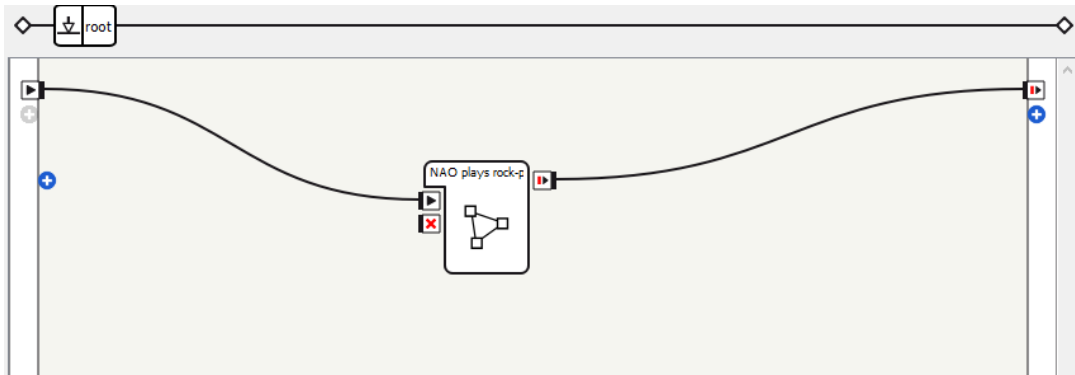


Step 2: click on the **Connection | Connect to virtual robot (top menu)**. At this point the virtual robot should appear on the Robot View.

Step 3: Create a Diagram box in the Flow Diagram Panel by right-clicking in the panel and selecting the **Create a new box | Diagram...** rename it **NAO plays rock-paper-scissors**

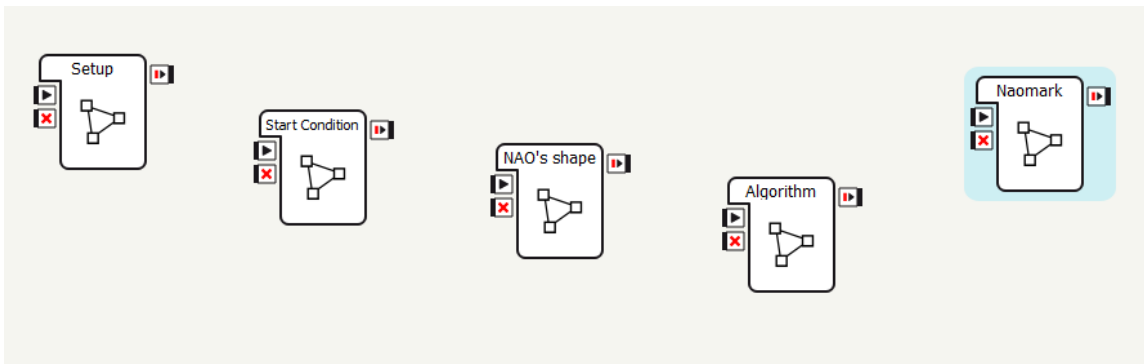


Step 4: Make connections to resemble the figure below:

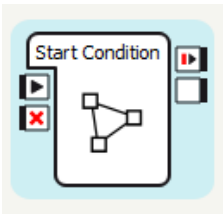


Step 5: Double click in the NAO plays rock-paper-scissors box and add the following behaviors/method boxes

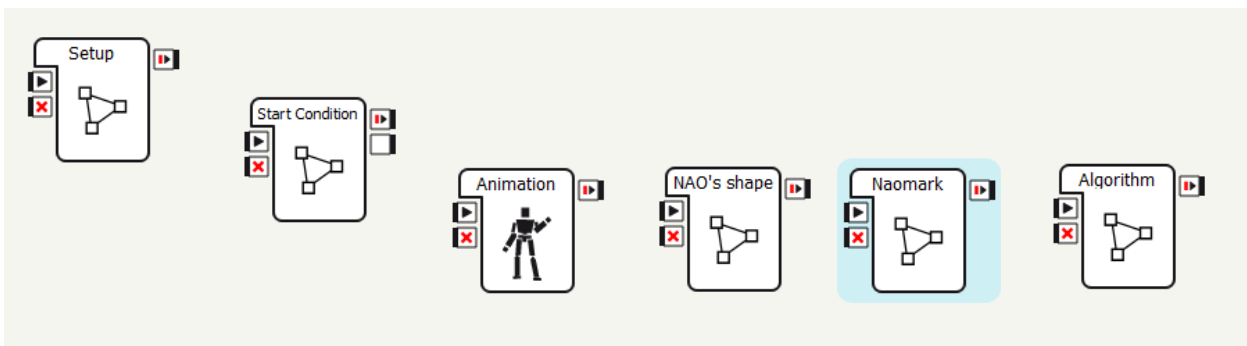
1. Add five Diagram boxes and rename them as Setup, Start Condition, NAO's shape, Algorithm and Naomark



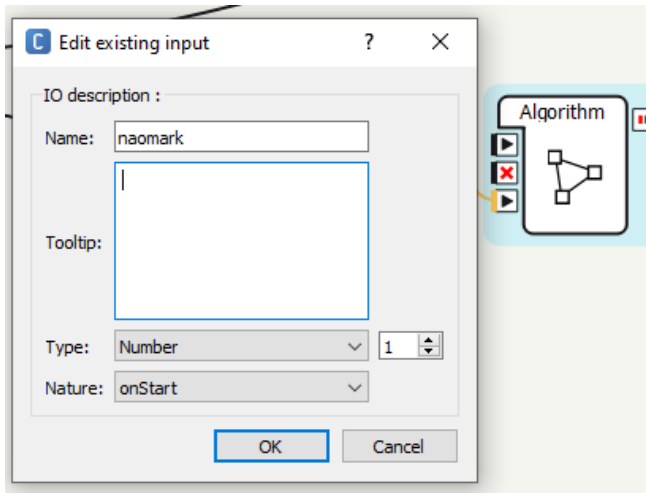
2. Add output with data type "Bang" to the Start Condition diagram box



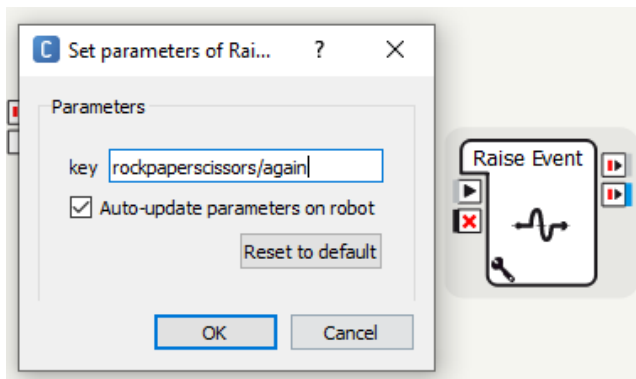
3. Add a Timeline box and set the name as Animation



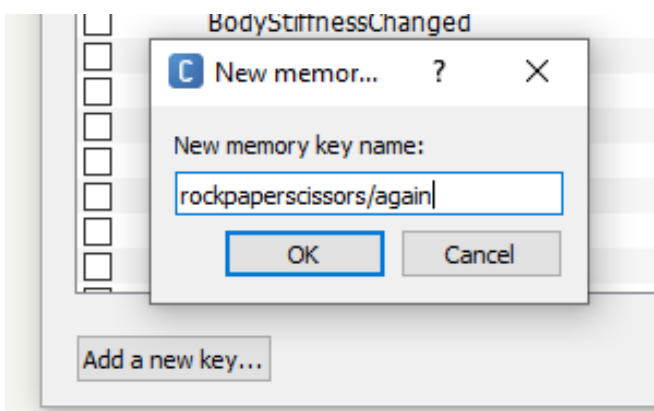
4. Add an output with data type "Number" to the Naomark diagram
5. Add an input with data type "Number" and nature "Start" to the Algorithm box diagram name it as: **naomark** then click **OK**



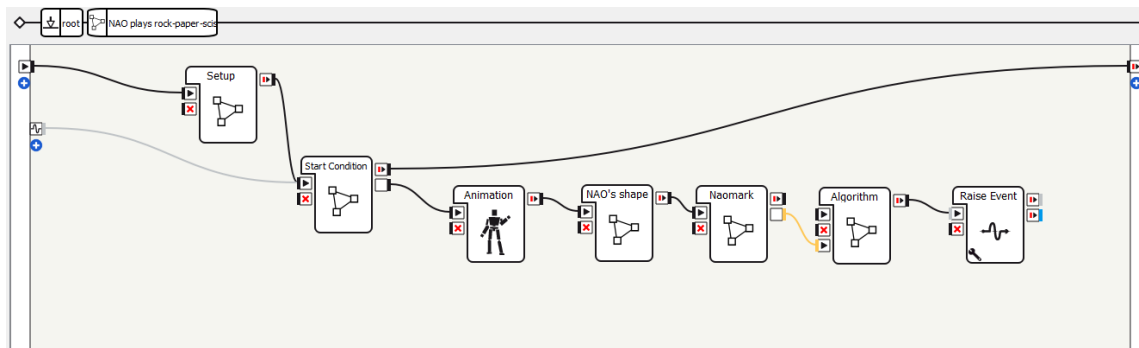
6. Add a Raise Event box and set the parameter to **rockpaperscissors/again** then click **OK**



7. Add an output from ALMemory on the left and name it as **rockpaperscissors/again** then click OK to close the New memory key window, finally click OK to close the ALMemory window

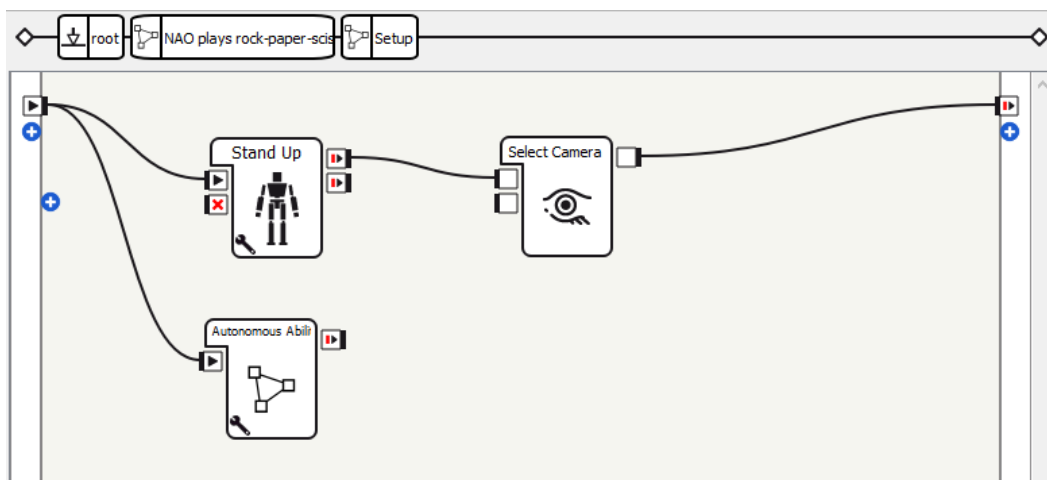


8. Make connections to resemble the figure below:



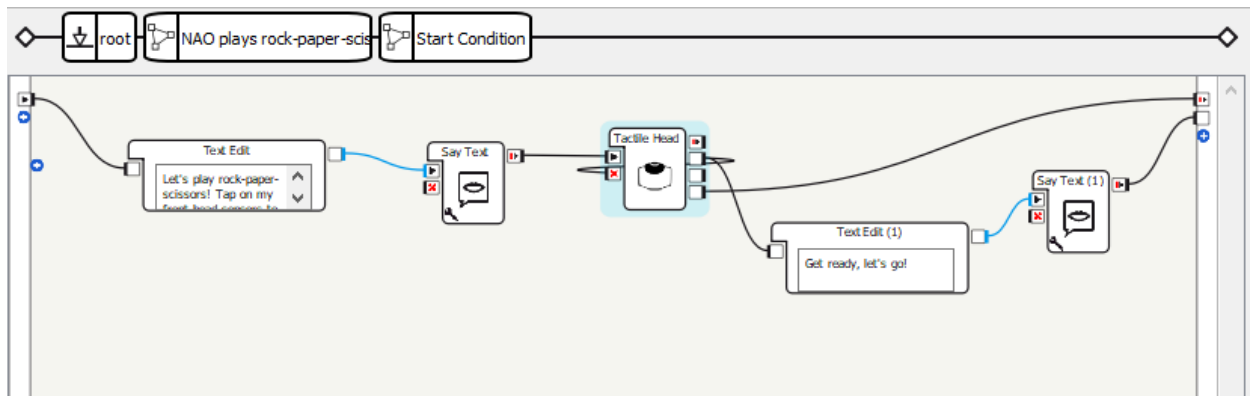
Step 6: Double click on the Setup box diagram and add the following behaviors/methods

1. Add Stand Up box
2. Add Autonomous Ability box and check Autonomous Blinking and Background Movement parameters, uncheck the other parameters
3. Add Select Camera box
4. Make connections to resemble the figure below:



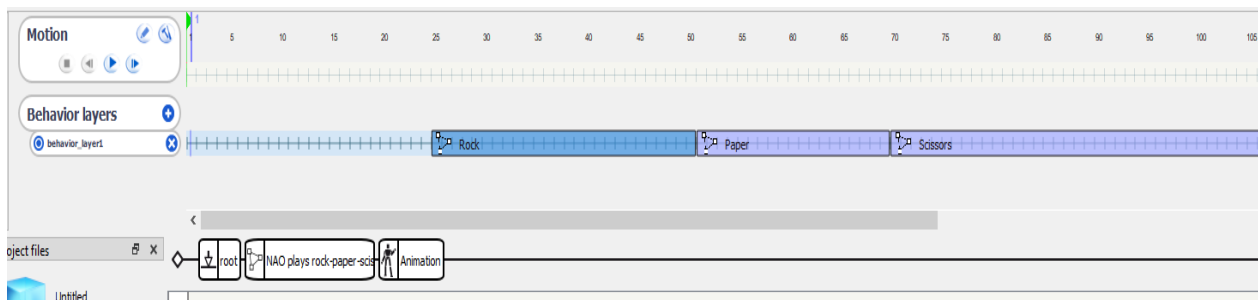
Step 7: Click on **NAO plays rock-paper-scissors** and double click on the Start Condition box diagram and add the following behaviors/methods

1. Add two Text Edit boxes set the text to:
 - a. Set Text Edit to: Let's play rock-paper-scissors! Tap on my front head sensors to play.
 - b. Set Text Edit (1) to: Get ready, let's go!
2. Add two Say Text boxes
3. Add a Tactile Head box
4. Make the connections to resemble the figure below:

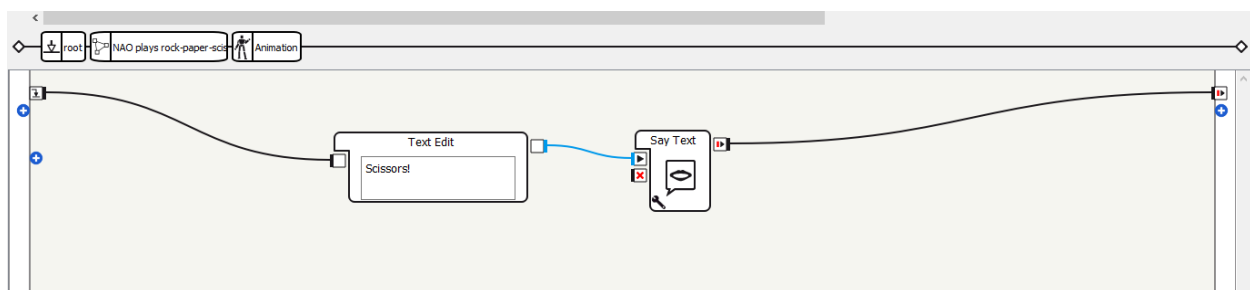


Step 8: Click on **NAO plays rock-paper-scissors** and double click on the **Animation** box and do the following:

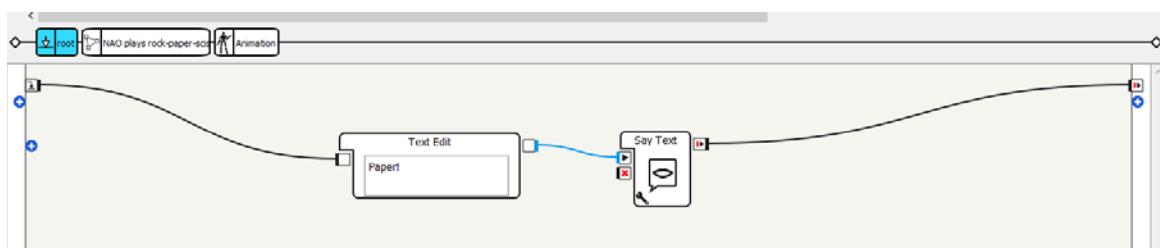
1. Add a Behavior layer
2. Insert a keyframe as name it as **Rock**
3. Set the start of the first keyframe to frame 25
4. Create two more keyframes: **Paper** at frame 50 and **Scissors** at frame 75
5. The keyframes created should resemble the figure below:



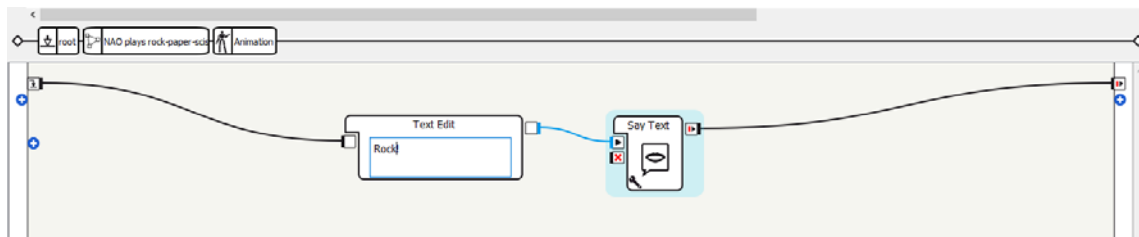
6. Select the Scissors keyframe and add the following behaviors to resemble the figure below:



7. Select the Paper keyframe and add the following behaviors to resemble the figure below:



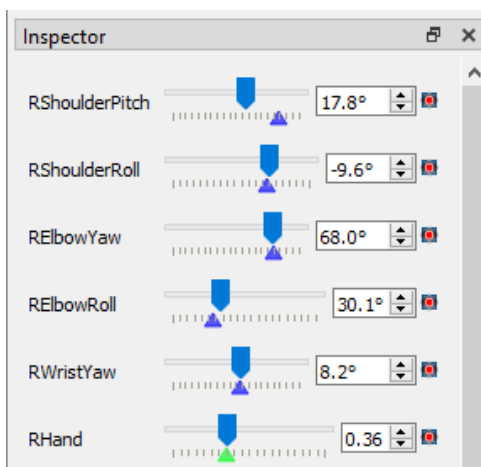
8. Select the Rock keyframe and add the following behaviors to resemble the figure below:



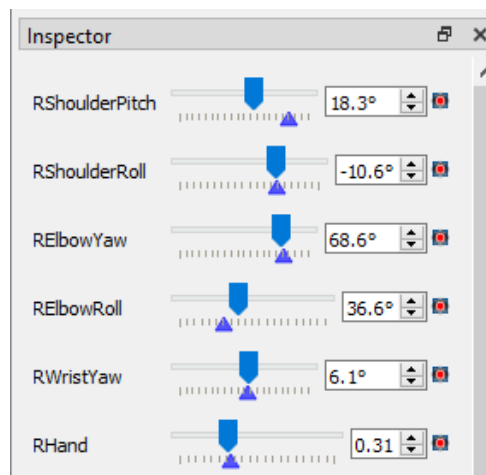
Step 9: Create the animation by completing the following (Review Activity 2 to complete animation):

1. Raised hand at frame 25, 50, and 75
2. Lower hand at frames 35, 60, and 85

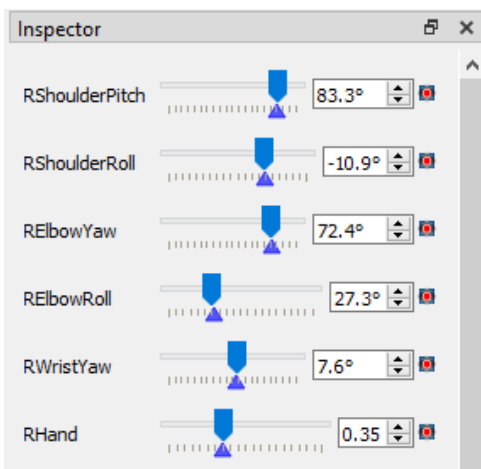
Values for Frame 1:



Values for frames 25, 50, 75

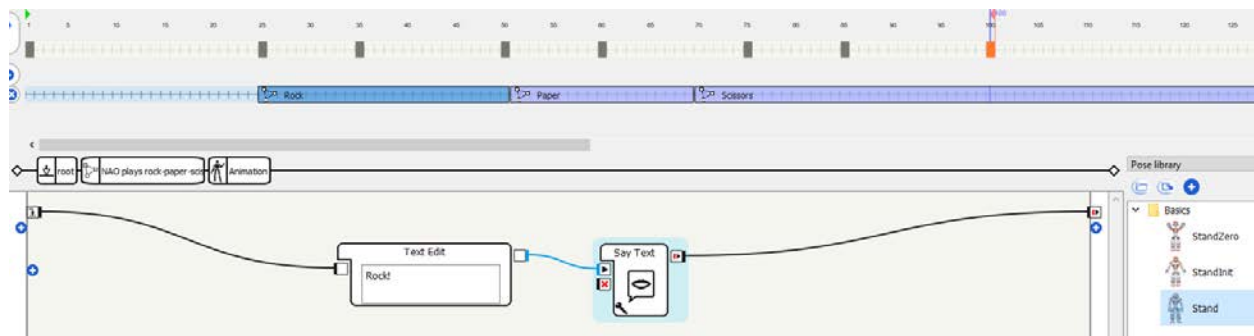


Values for frame 35, 60, and 85



Set frame 100 to Stand Pose.

3. Final keyframes should resemble the figure below:



Step 10: Click on **NAO plays rock-paper-scissors** and double click on the **NAO's shape box** and do the following:

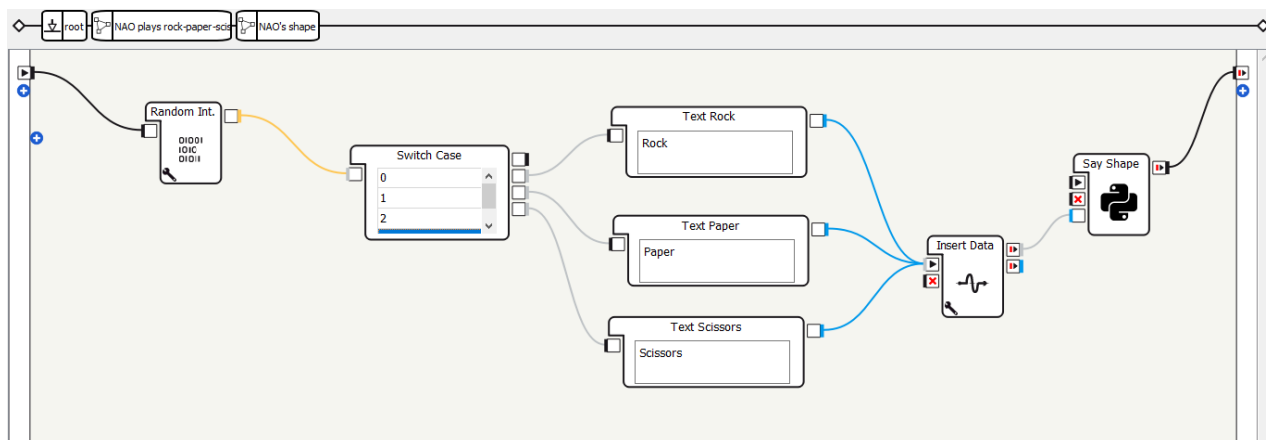
1. Add a Random Int box
2. Set the parameter of the Random Int box: Min value to 0 and Max value to 2
3. Add a Switch Case box and create three cases: 0; 1; 2
4. Add three Text Edit boxes to match each case (0 = Rock; 1 = Paper and 2 = Scissor)
5. Add an Insert Data box and set the key parameter (click wrench icon) to **rockpaperscissors/naomark**
6. Create a Python Script box name it as: **Say Shape**
7. Add an input to the **Say Shape** box with data type "String", name it as: **Naomark**
8. Double click on the **Say Shape** python script and add the following method (make sure you type exactly as is below):

```
def onInput_Naomark(self, p):
    self.tts = self.session().service("ALTextToSpeech")
    self.tts.say("I have " + p + ".")
    self.onUnload()
    self.onStopped()
```

9. The **Say Shape** python script should resemble the figure below:

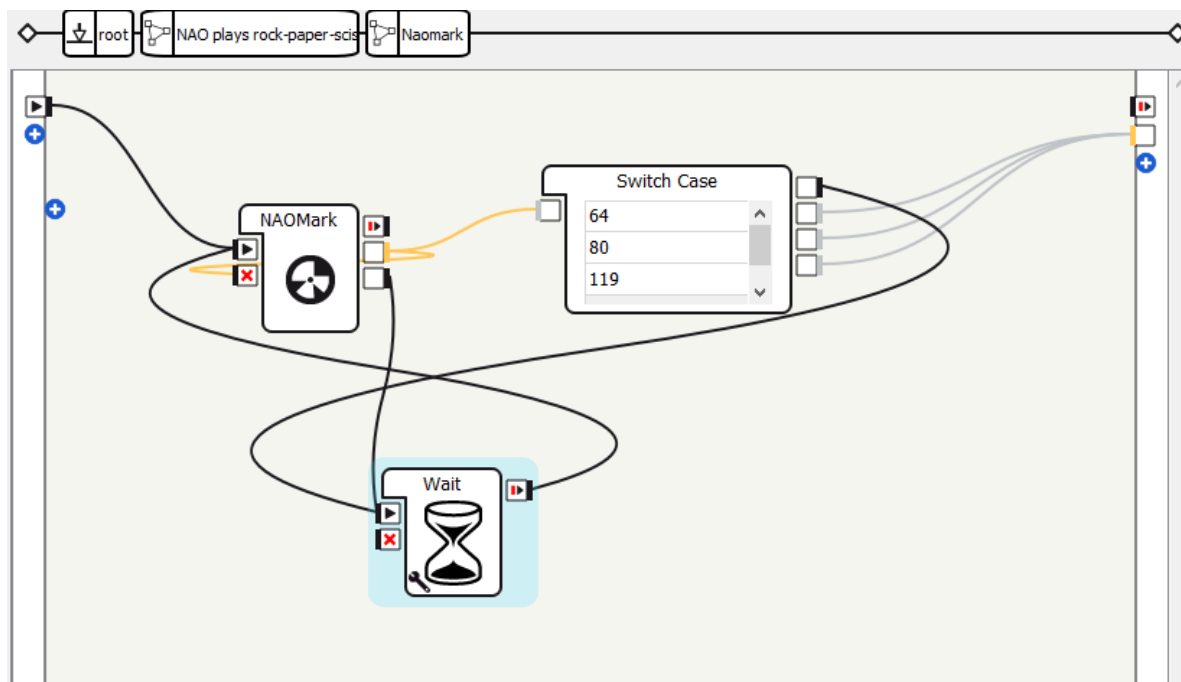
```
Script editor
Say Shape x
1 class MyClass(GeneratedClass):
2     def __init__(self):
3         GeneratedClass.__init__(self)
4
5     def onLoad(self):
6         #put initialization code here
7         pass
8
9     def onUnload(self):
10        #put clean-up code here
11        pass
12
13    def onInput_onStart(self):
14        #self.onStopped() #activate the output of the box
15        pass
16
17    def onInput_onStop(self):
18        self.onUnload() #it is recommended to reuse the clean-up as the box is stopped
19        self.onStopped() #activate the output of the box
20
21    def onInput_Naomark(self, p):
22        pass
23
24    def onInput_Naomark(self, p):
25        self.tts = self.session().service("ALTextToSpeech")
26        self.tts.say("I have " + p + ".")
27        self.onUnload()
28        self.onStopped()
```

10. Make connection to resemble the figure below:



Step 11: Click on **NAO plays rock-paper-scissors** and double click on the **Naomark** box and do the following:

1. Add a NAOMark box
2. Add a Switch Case box and insert the three Naomark symbols (64 for scissors, 80 for rock and 119 for paper)
3. Add a Wait box and set the **Timeout** parameter (click wrench icon) to 0.5
4. Make connections to resemble the figure below:



Step 12: Click on **NAO plays rock-paper-scissors** and double click on the **Naomark** box and do the following:

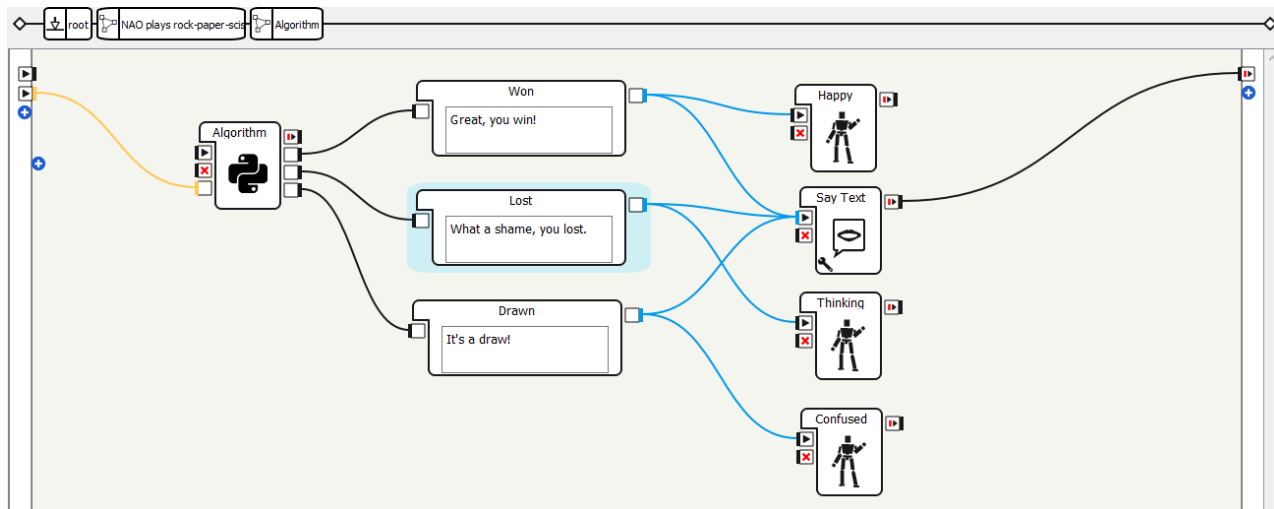
1. Add three Text Edit boxes set the text to:
 - a. Set Text Edit Won to: Great, you Win
 - b. Set Text Edit Lost to: What a shame, you lost.
 - c. Set Text Edit Drawn to: It's a draw
2. Add the Say Text
3. Add Happy, Confused and Thinking boxes
4. Create a Python Script name it as **Algorithm**
5. Add an input to the **Algorithm** script box with data type "Number" and name it as: Naomark
6. Add three outputs to the **Algorithm** script box: won, lost, drawn with data type "Bang"
7. Double click on the **Algorithm** script box and add the following method (make sure you type exactly as the figure below):

```

23
24  def onInput_Naomark(self, p):
25     self.memory = self.session().service("ALMemory")
26     self.naomarkshape = self.memory.getData("rockpaperscissors/naomark")
27
28     #compara Naomark input with NAO's shape
29     self.naomark = p
30  if self.naomark == 64: # Naomark number for scissors
31      if self.naomarkshape == "Scissors":
32         self.drawn()
33
34      elif self.naomarkshape == "Rock":
35         self.lost()
36
37      elif self.naomarkshape == "Paper":
38         self.won()
39
40  elif self.naomark == 80: # Naomark number for rock
41      if self.naomarkshape == "Scissors":
42         self.won()
43
44      elif self.naomarkshape == "Rock":
45         self.drawn()
46
47      elif self.naomarkshape == "Paper":
48         self.lost()
49
50  elif self.naomark == 119: # Naomark number for paper
51      if self.naomarkshape == "Scissors":
52         self.lost()
53
54      elif self.naomarkshape == "Rock":
55         self.won()
56
57      elif self.naomarkshape == "Paper":
58         self.drawn()
59
60     self.onStopped()
61

```

8. Make connections to resemble the figure below:



Step 13: 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>