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Introduction to Robotics and

CoppeliaSim
from the creators of V-REP

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Research Profile -Dr. Prashant Upadhyaya - Google Scholar

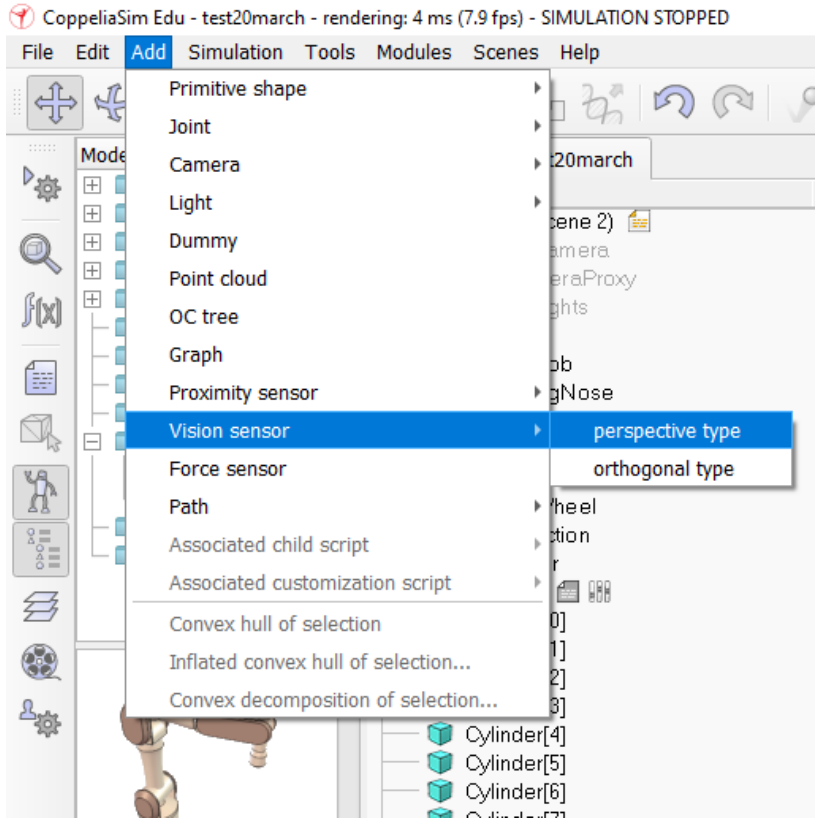
Adding Vision Sensor:

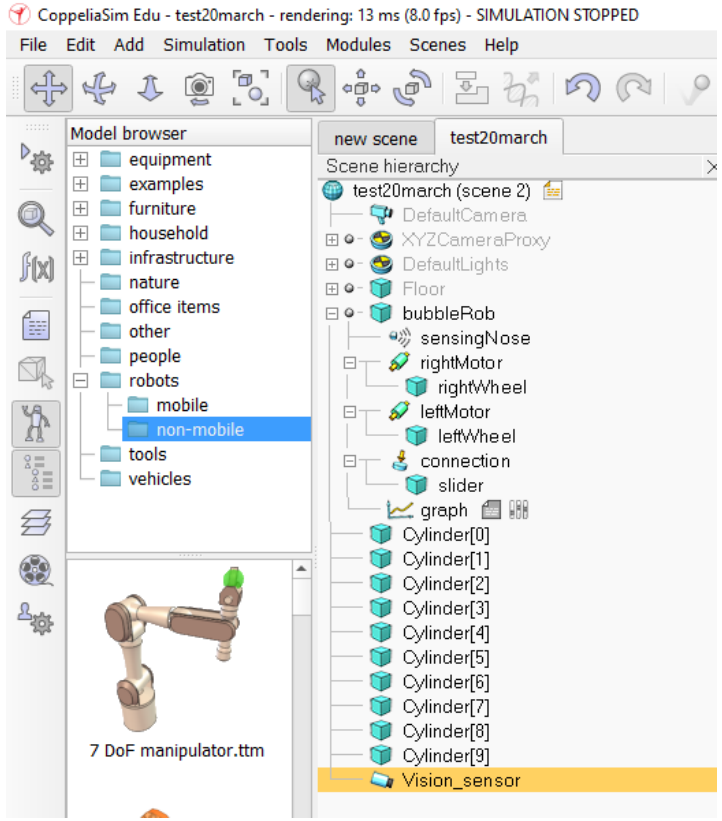
BubbleRob

STEP 30

Add a vision sensor, at the same position and orientation as BubbleRob's proximity sensor. We open the model hierarchy again, then click

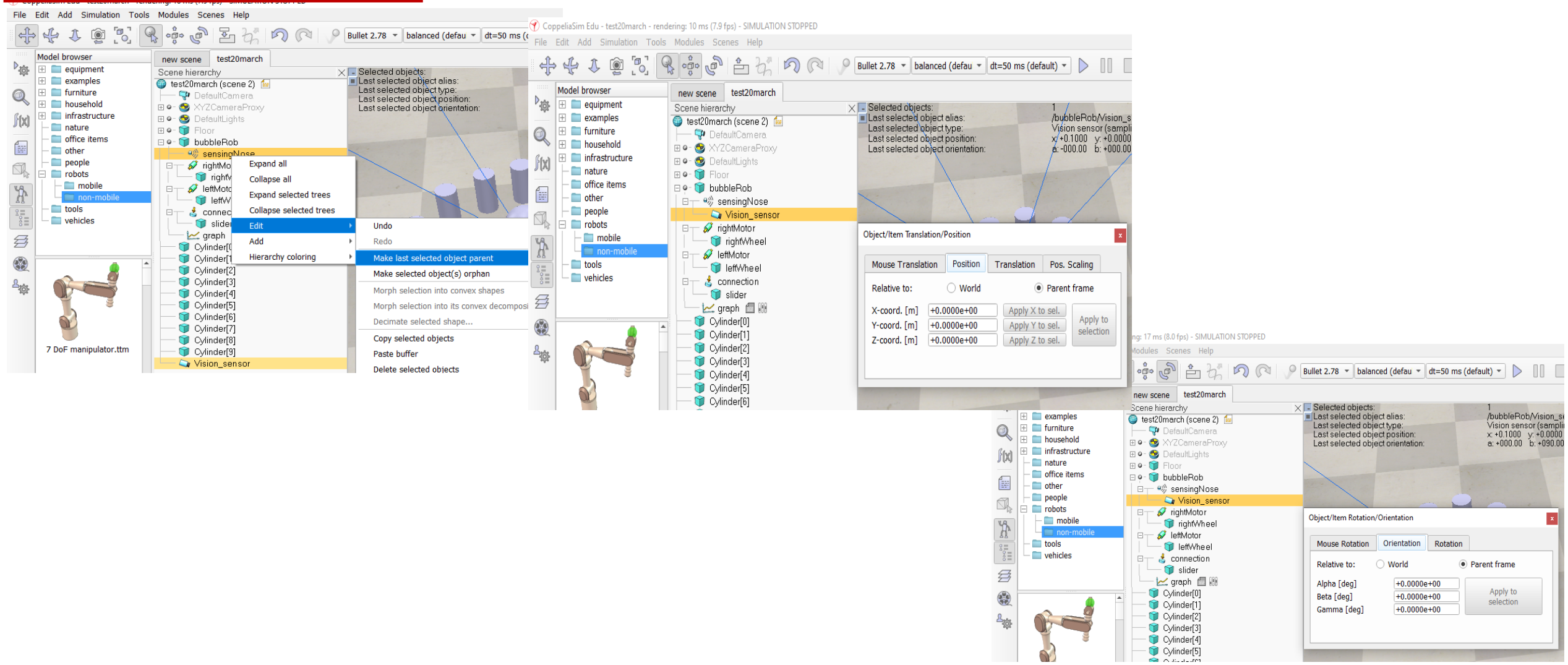
[Menu bar --> Add --> Vision sensor --> Perspective type],





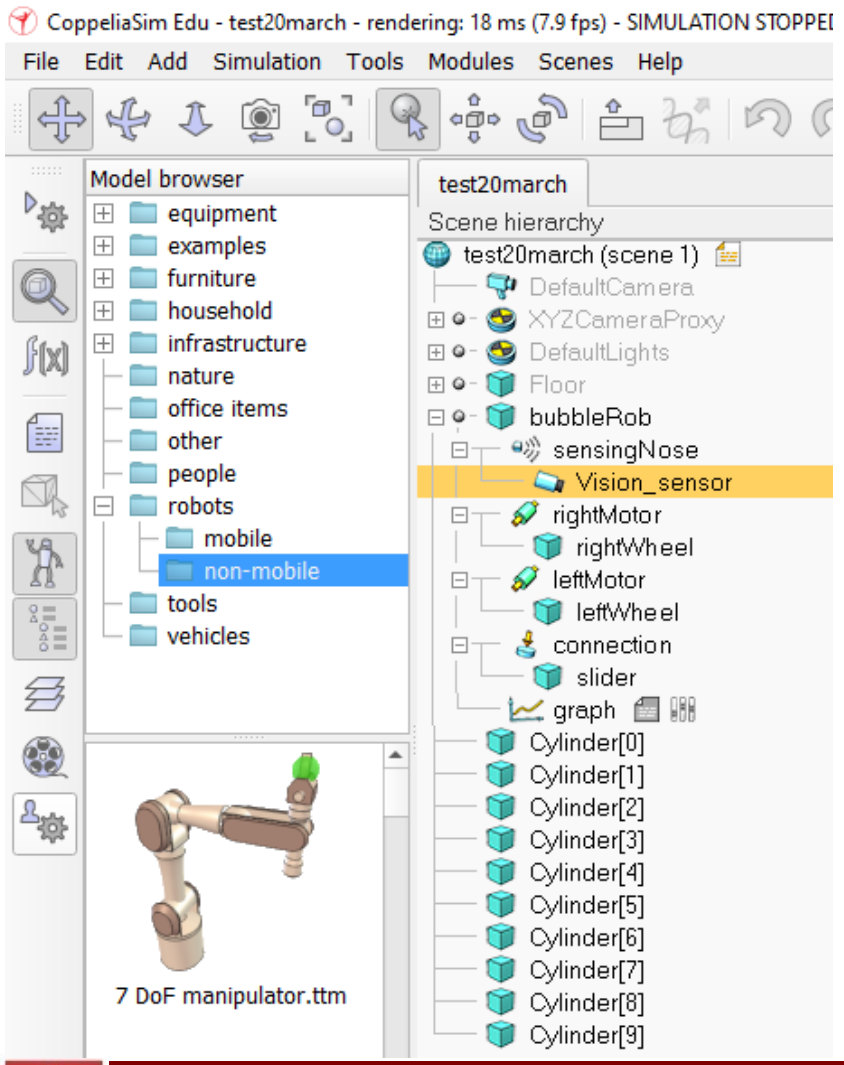
STEP 31

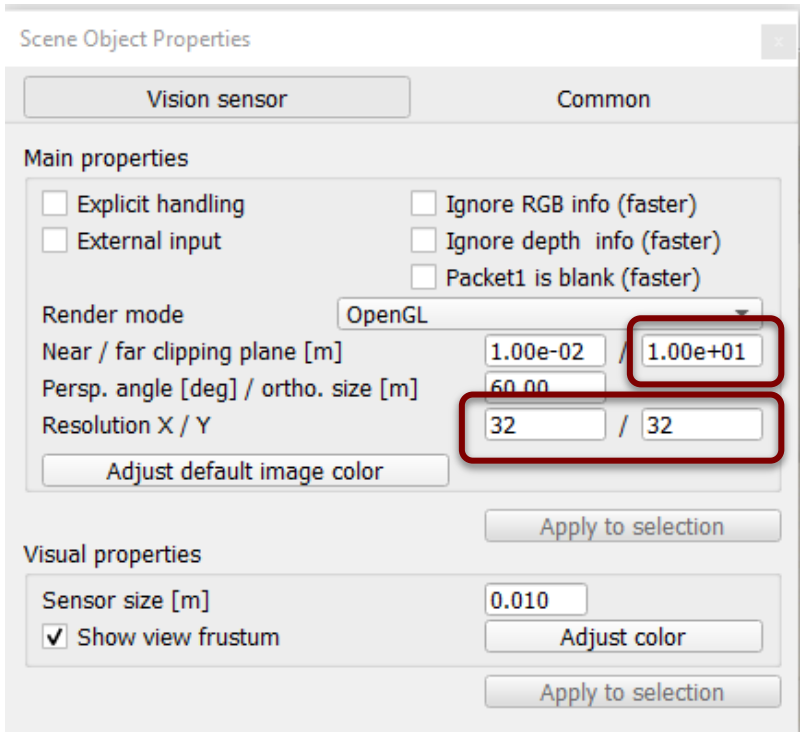
Then attach the vision sensor to the proximity sensor, and set the local position and orientation of the vision sensor to (0,0,0)

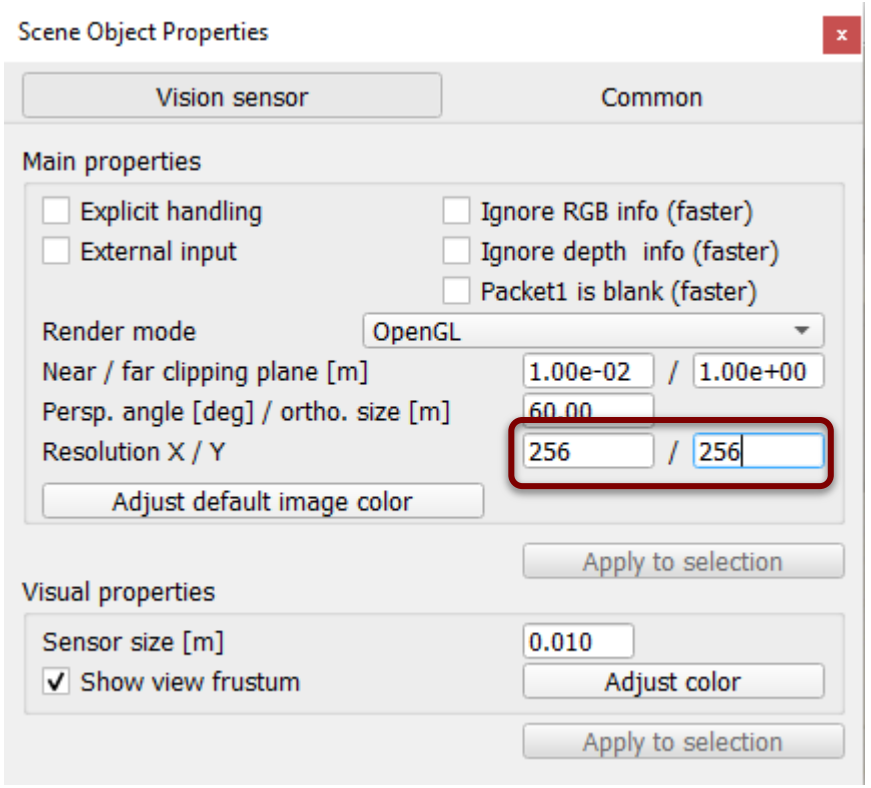


STEP 32

We set the Far clipping plane item to 1, and the Resolution x and Resolution y items to 256 and 256.



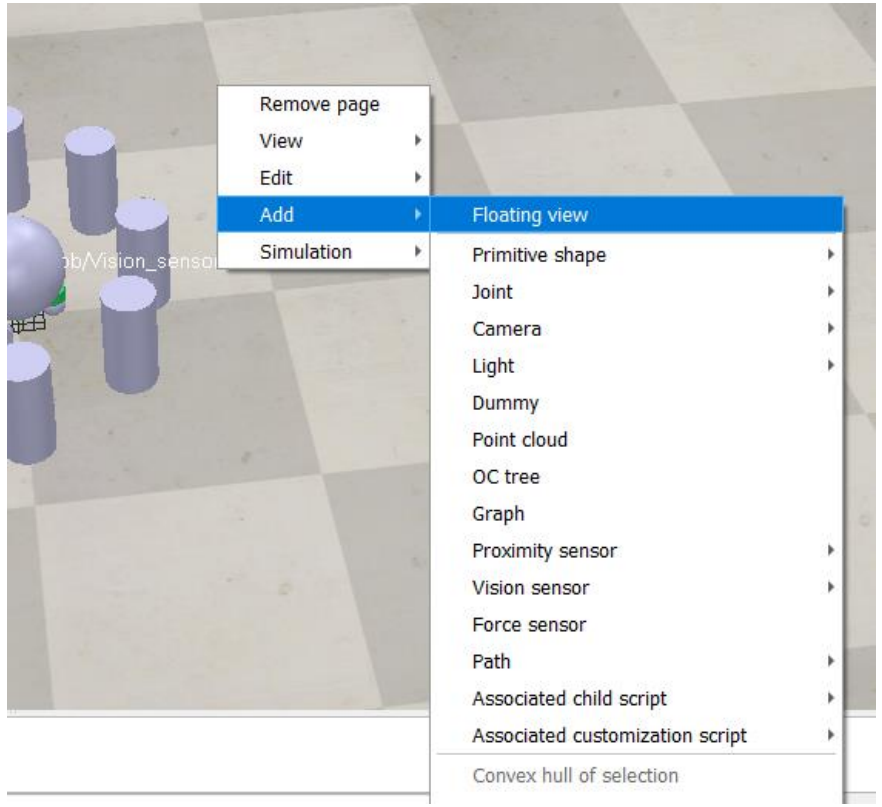


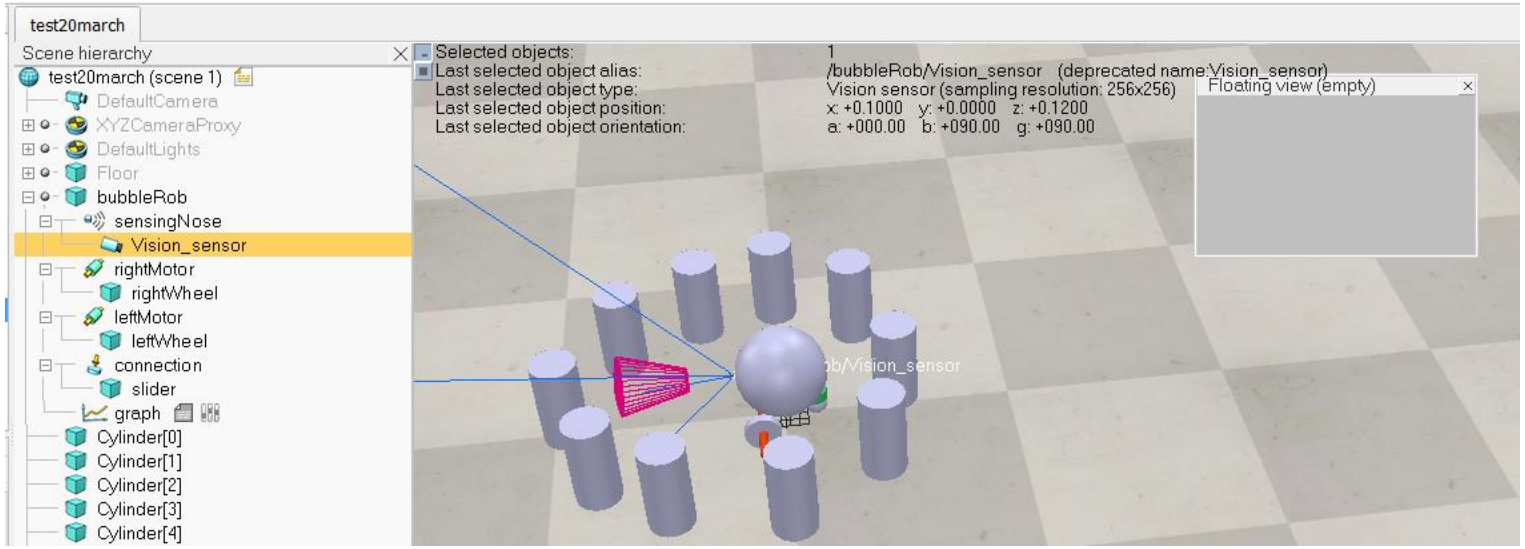


STEP 33

We add a floating view to the scene, and over the newly added floating view right-click [Popup menu --> View --> Associate view with selected vision sensor]

(we make sure the vision sensor is selected during that process).

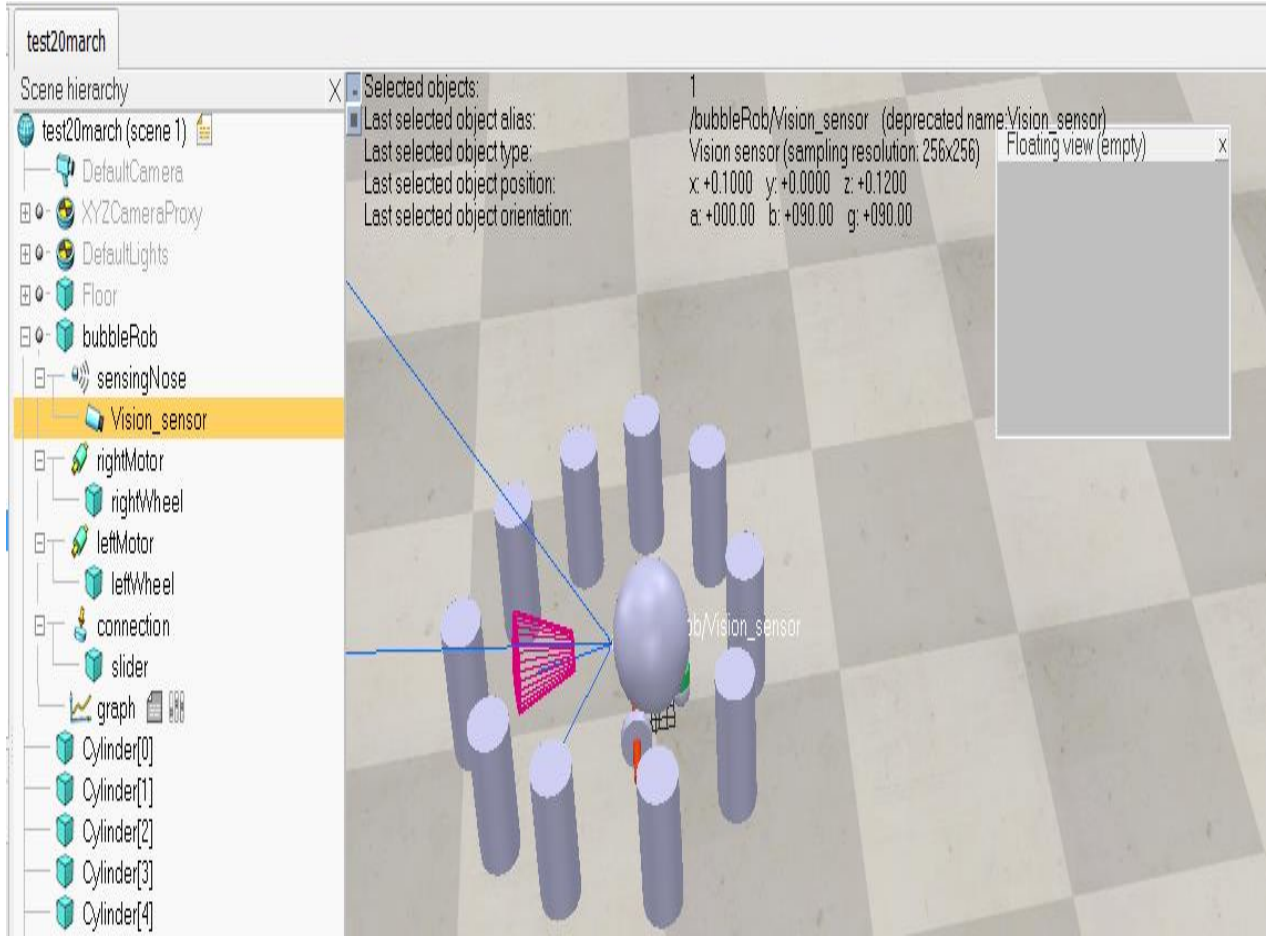


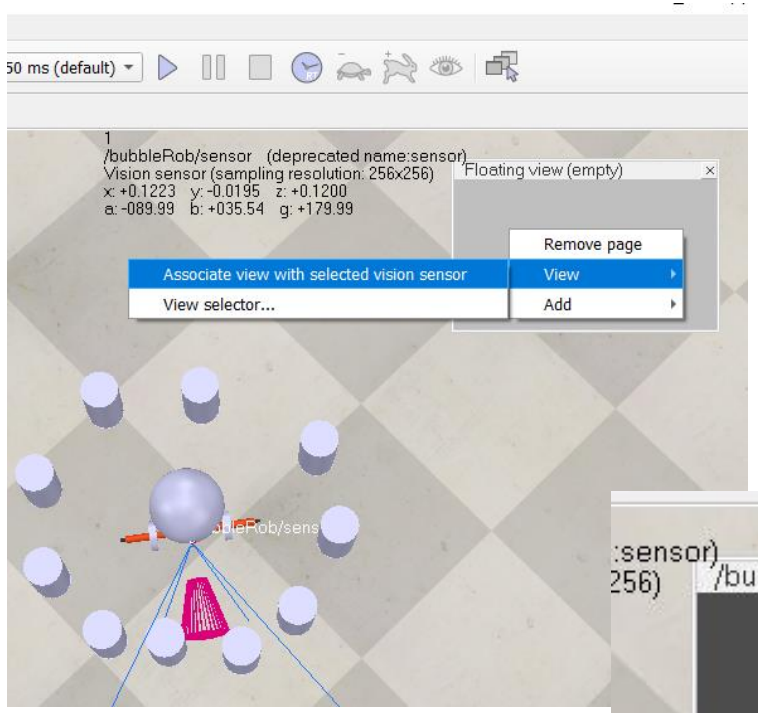


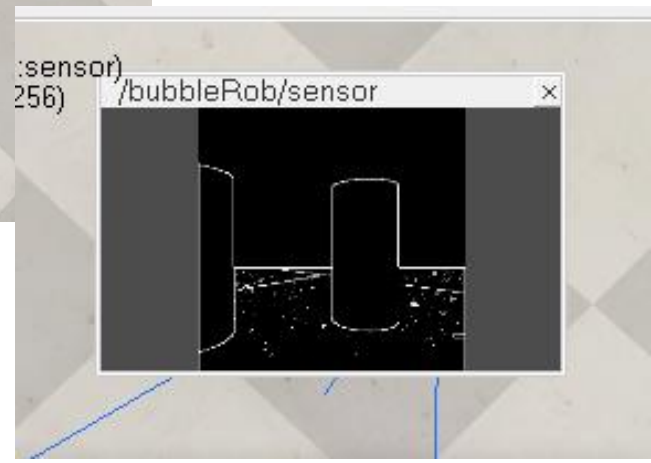
STEP 34

Right-click

[Popup menu --> View --> Associate view with selected vision sensor]

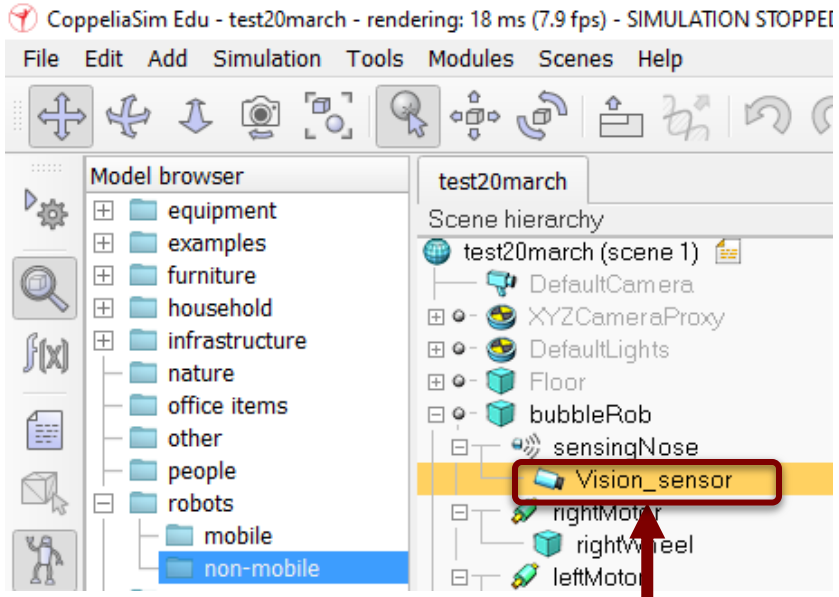


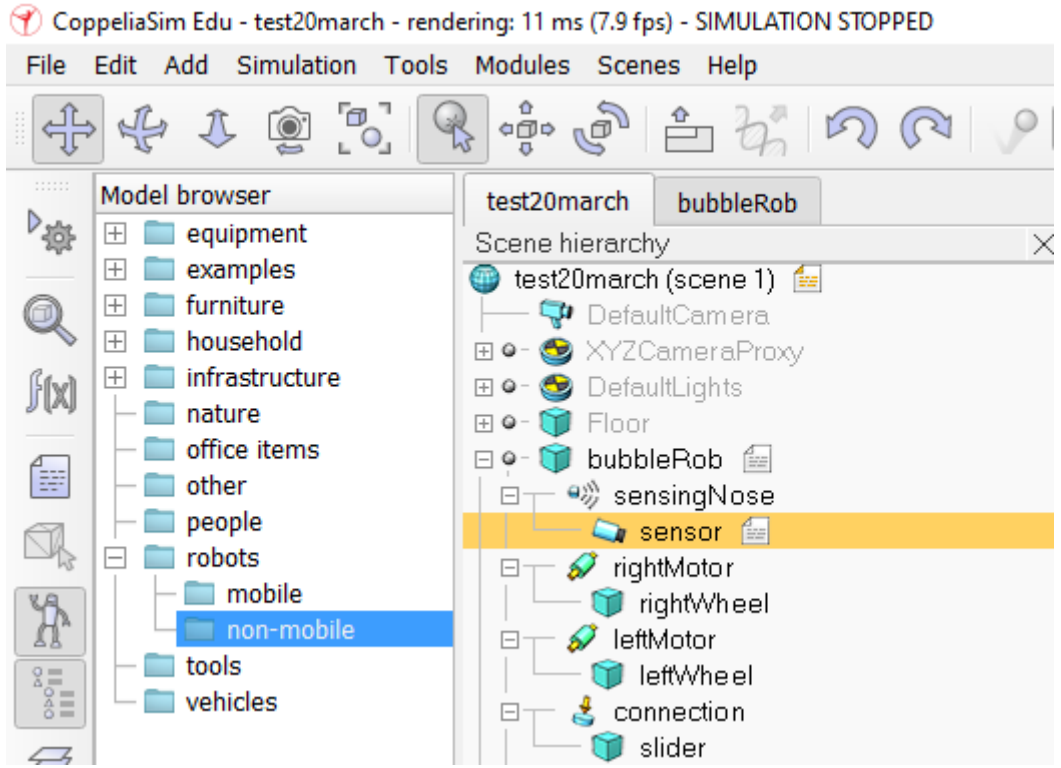




STEP 35

Rename it to sensor





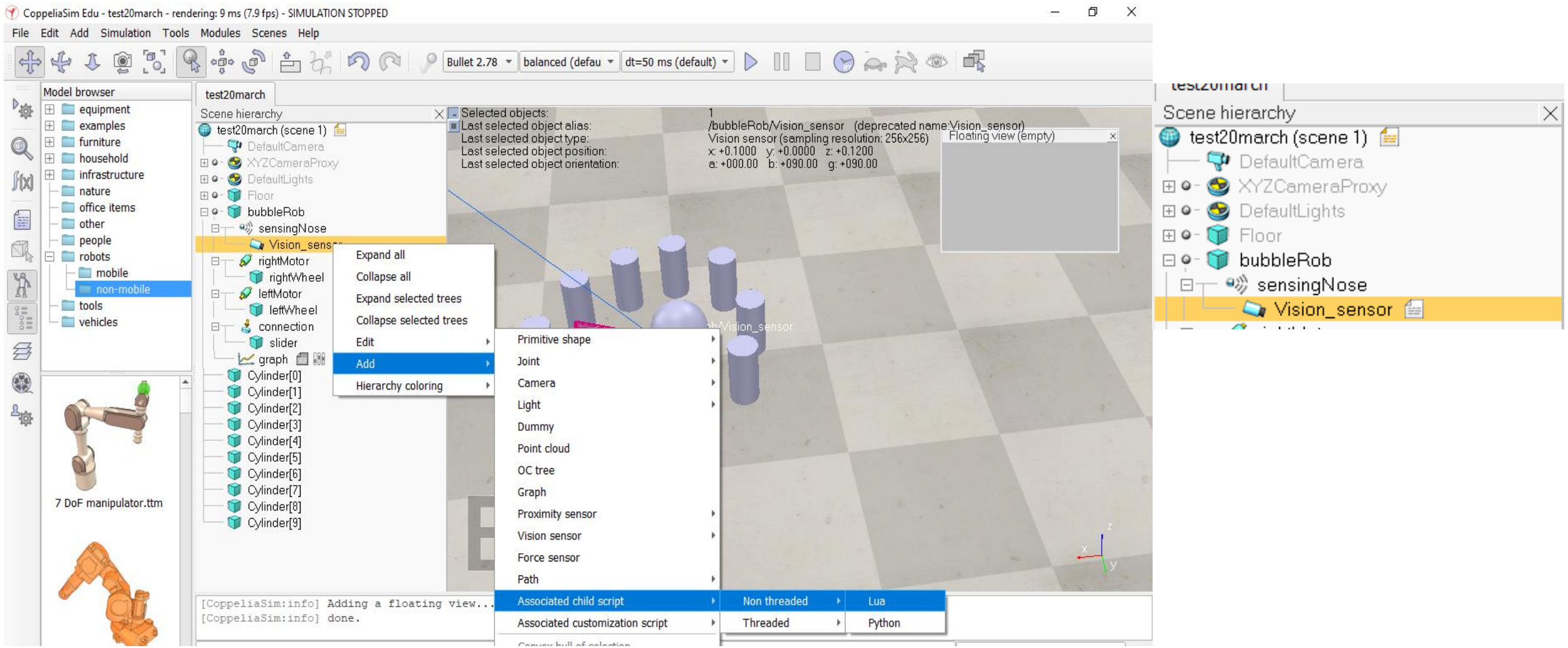
Double Click on this and rename it to sensor and Press ENTER

Adding child script:

Vision Sensor

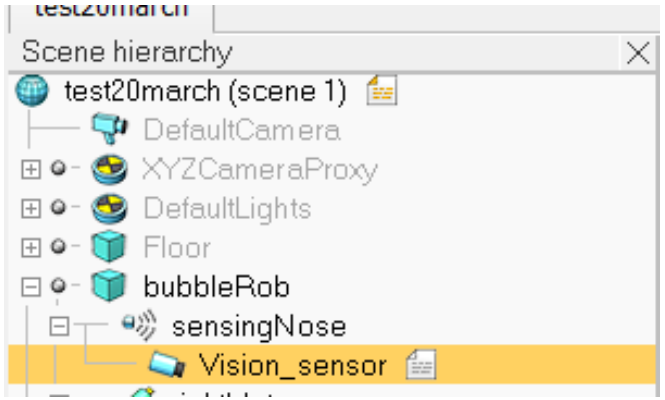
STEP 36

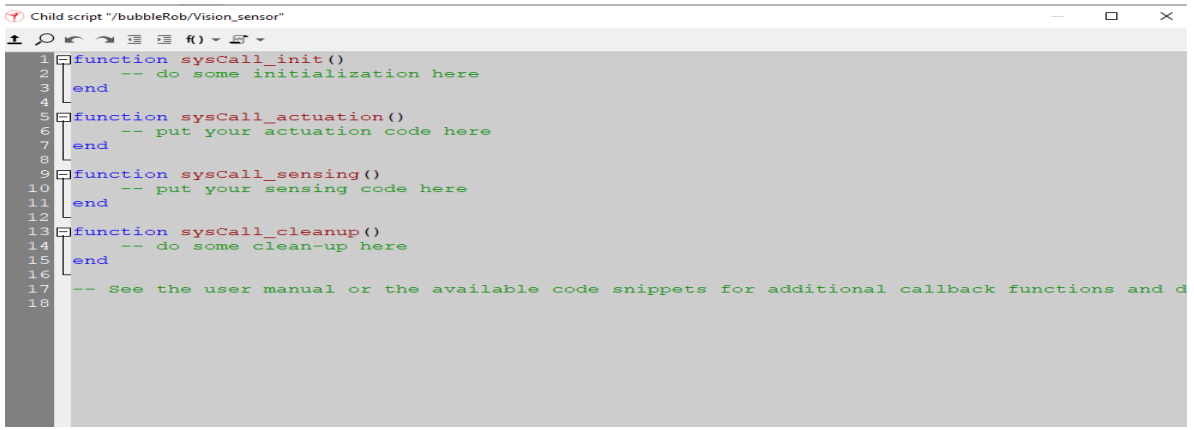
Adding child script vision sensor by clicking [Menu bar --> Add --> Associated child script --> Non threaded].



STEP 37

Double-click the icon that appeared next to the vision sensor in the scene hierarchy: this opens the child script that we just added. We copy and paste following code into the script editor, then close it:





Child script "/bubbleRob/Vision_sensor"

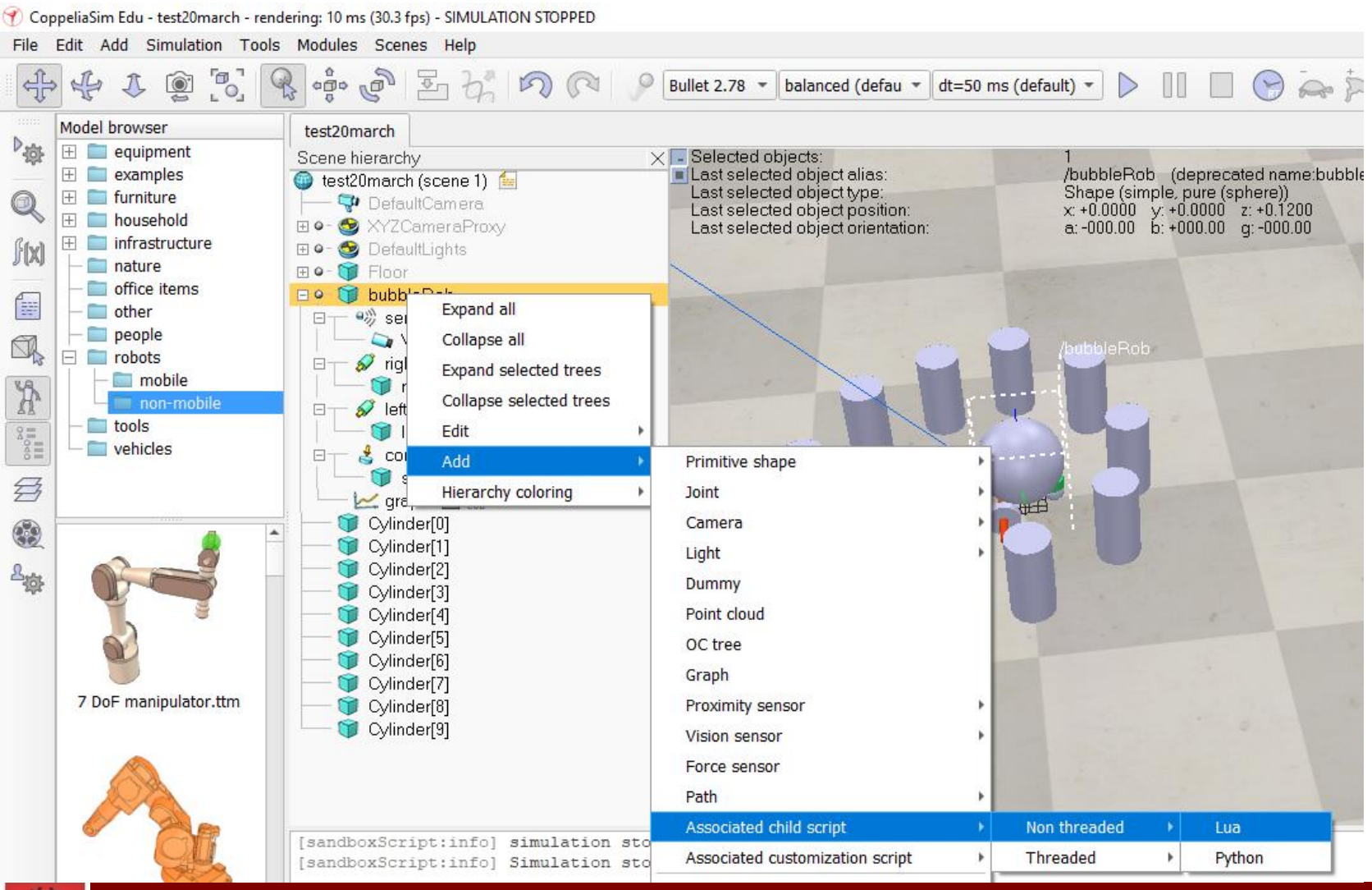
```lua
function sysCall_vision(inData)
    simVision.sensorImgToWorkImg(inData.handle) -- copy the vision sensor image to the work image
    simVision.edgeDetectionOnWorkImg(inData.handle,0.2) -- perform edge detection on the work image
    simVision.workImgToSensorImg(inData.handle) -- copy the work image to the vision sensor image buffer
end

function sysCall_init()
end
```

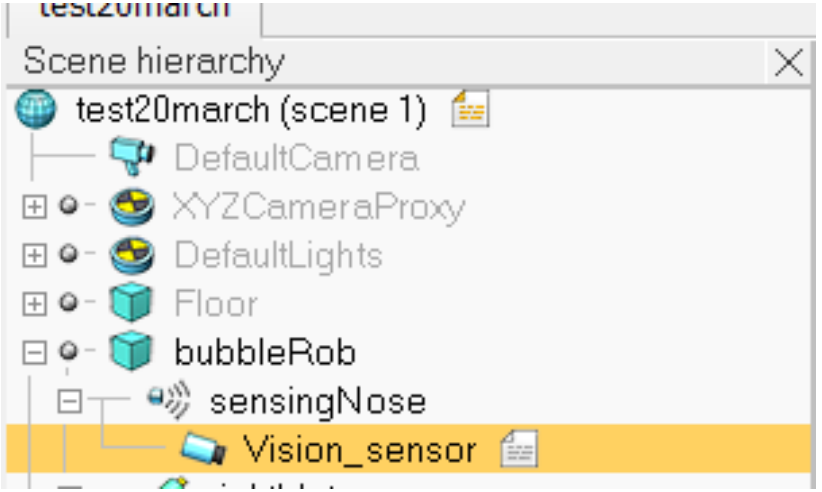
Adding child script:

Control BubbleRob's behavior

STEP 38

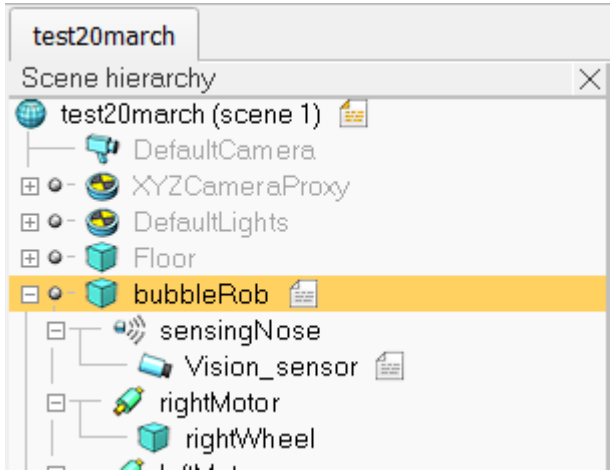
Adding child script bubbleRob by clicking [Menu bar --> Add --> Associated child script --> Non threaded].





STEP 39

Double-click the icon that appeared next to the vision sensor in the scene hierarchy: this opens the child script that we just added. We copy and paste following code into the script editor, then close it:



Child script "/bubbleRob"

```
1  function sysCall_init()
2      -- do some initialization here
3  end
4
5  function sysCall_actuation()
6      -- put your actuation code here
7  end
8
9  function sysCall_sensing()
10     -- put your sensing code here
11 end
12
13 function sysCall_cleanup()
14     -- do some clean-up here
15 end
16
17 -- See the user manual or the available code snippets for additional callback functions and d
18
```

Child script "/bubbleRob"

```
function speedChange_callback(ui,id,newVal)
    speed=minMaxSpeed[1]+(minMaxSpeed[2]-minMaxSpeed[1])*newVal/100
end

function sysCall_init()
    -- This is executed exactly once, the first time this script is executed
    bubbleRobBase=sim.getObject('.') -- this is bubbleRob's handle
    leftMotor=sim.getObject("./leftMotor") -- Handle of the left motor
    rightMotor=sim.getObject("./rightMotor") -- Handle of the right motor
    noseSensor=sim.getObject("./sensingNose") -- Handle of the proximity sensor
    minMaxSpeed={50*math.pi/180,300*math.pi/180} -- Min and max speeds for each motor
    backUntilTime=-1 -- Tells whether bubbleRob is in forward or backward mode
    robotCollection=sim.createCollection(0)
    sim.addItemToCollection(robotCollection,sim.handle_tree,bubbleRobBase,0)
    distanceSegment=sim.addDrawingObject(sim.drawing_lines,4,0,-1,1,{0,1,0})
    robotTrace=sim.addDrawingObject(sim.drawing_linestrip+sim.drawing_cyclic,2,0,-1,200,{1,1
    graph=sim.getObject('./graph')
    distStream=sim.addGraphStream(graph,'bubbleRob clearance','m',0,{1,0,0})
    -- Create the custom UI:
        xml = '<ui title="'..sim.getObjectAlias(bubbleRobBase,1)..' speed" closeable="false"
        <hslider minimum="0" maximum="100" onchange="speedChange_callback" id="1"/>
        <label text="" style="* {margin-left: 300px;}"/>
        </ui>
        ]]
    ui=simUI.create(xml)
    speed=(minMaxSpeed[1]+minMaxSpeed[2])*0.5
    simUI.setSliderValue(ui,1,100*(speed-minMaxSpeed[1])/(minMaxSpeed[2]-minMaxSpeed[1]))
```

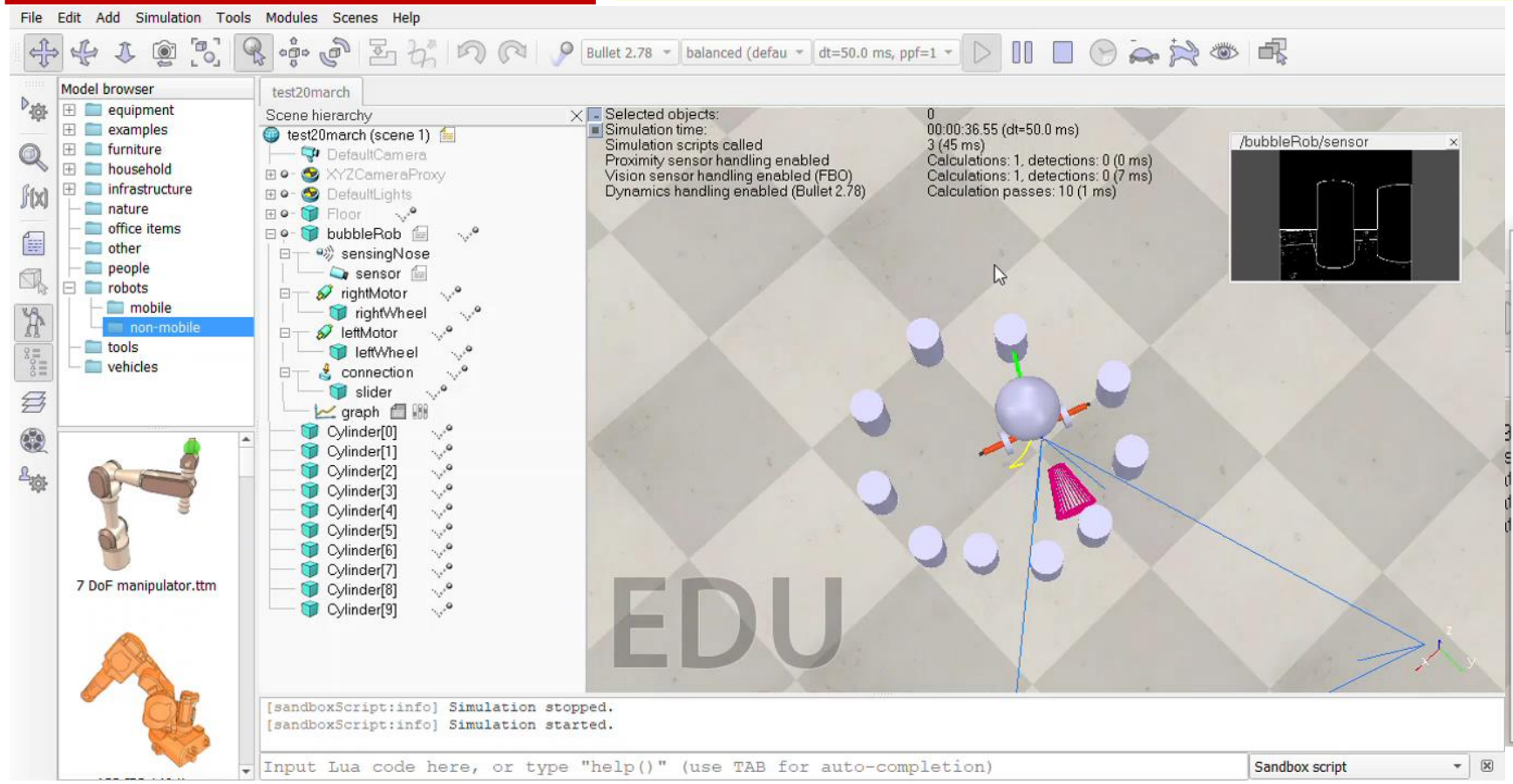
Completed BubbleRob's:

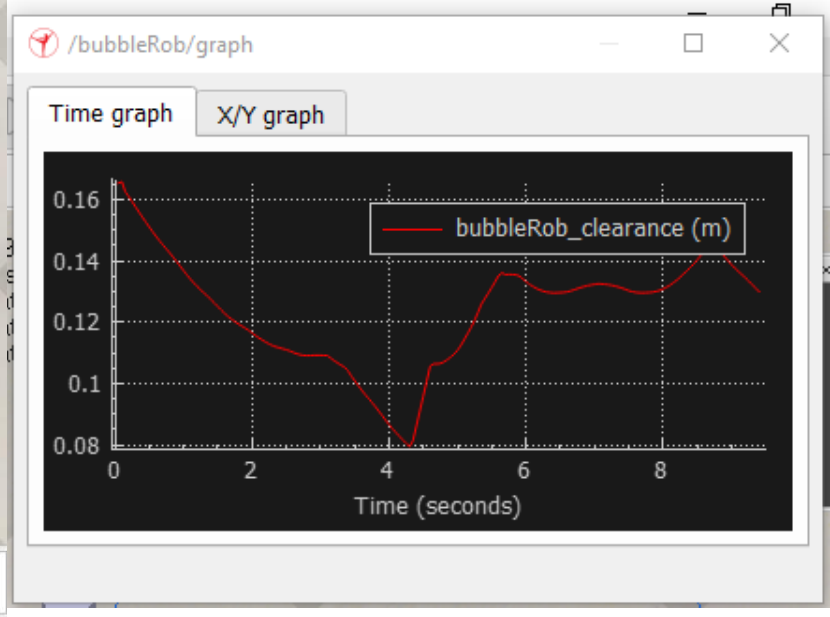
Obstacles Avoidance Robot

STEP 40

Run the simulation.

BubbleRob now moves forward while trying to avoid obstacles





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