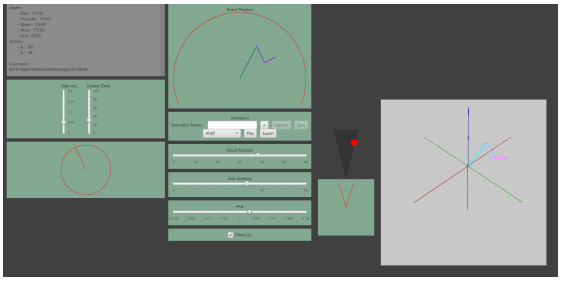
Software : Arm Robot Manipulator (or A.R.M. for short)

Github Repository

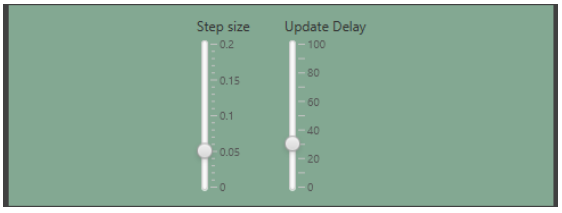
https://github.com/WollfieGitHub/SerialArmCommunication



Simulation

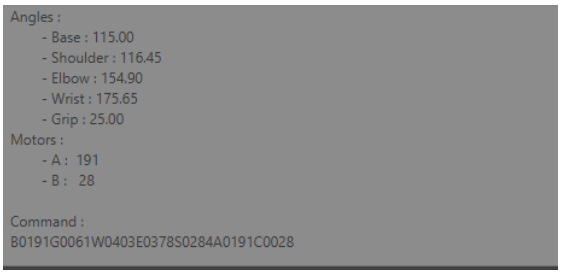
Parameters

These parameters (on the left) can be tweaked to obtain different smoothness levels in the simulation. 30ms for the Delay and 0.05 for the Step Size have been found to be values which work pretty well and are the default values in the software



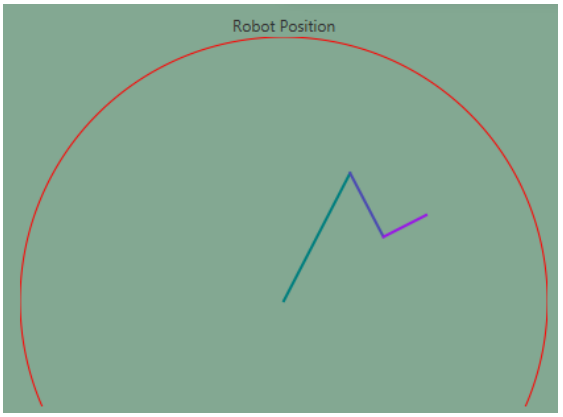
Output

The output of the simulation (values being sent to the arduino card/ robot arm controller) are being displayed live in the top left corner. The “command” field is the string being sent to the controller via the serial port. It captures all of the information given on the state of the robot.



Direct Clamp Position Control

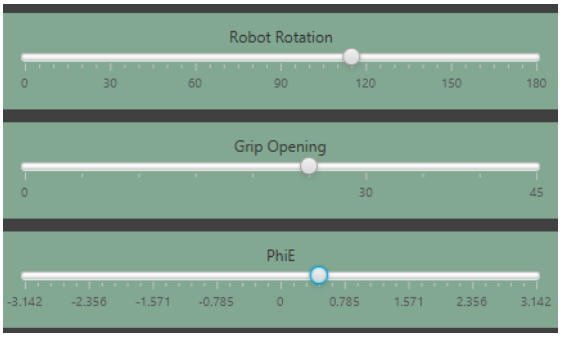
The arm position can be controlled by clicking and dragging in the robotic arm’s reach-zone (red circle on the image). The model will try to position itself such that the clamp is under the mouse or will freeze if the ordered position is not possible.



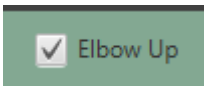
Overall Arm Position Control

Different additional parameters are available to change :

- The robot rotation : from 0 to 180° (left to right)
- The clamp’s opening : from closed to opened (left to right)
- The angle of the clamp relative to the ground (PhiE parameter)

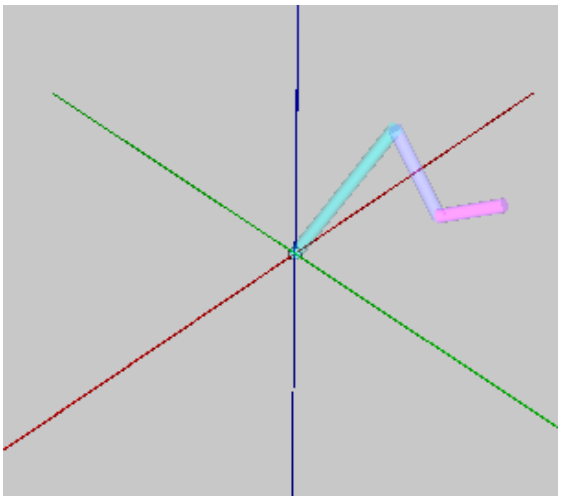


Finally, the “Elbow Up” checkbox allows to choose between the two solutions (elbow up or down) of the inverse kinematics computation model (checked by default)



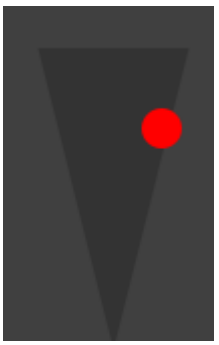
3D Visualization

A 3D visualization of the overall position and rotation of the arm is available on the right of the screen in the application.



DC Motor Control

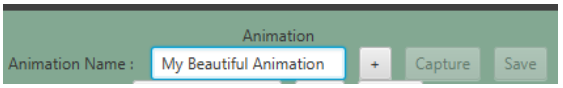
The triangular zone below is used to control the motors’ speed : Dragging the red dot all the way to the bottom will set the engines’ speed to 0 while dragging it to the right (respectively left) corner will make the robot turn right (left).



Animation

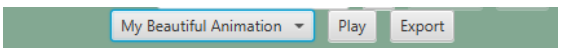
Recording An Animation

It is possible to record positions and rotations of the arm (only, not the car) to replay the same sequence of movements later using the animation tab in the center of the screen.



1. Name your animation to find it back later.
2. Press the “+” button to start recording
3. Set the arm to the desired position using the previously mentioned controls
4. Press the “Capture” button to record this position
5. When every position have been recorded, press the “Save” button to save the animation as a .json file under “C:/Users/<username>/Documents/MakingIntelligentThings/Animation/<animation_name”>.json” on Windows.

Replaying An Animation



1. In the same, previously mentioned, tab “Animation”, select, in the dropdown menu, your animation.
2. Press the “Play” Button

3. If you want to stop the animation before it has ended, press the “Pause button”

Exporting An Animation

You can export an animation as a C-formatted array to use in your arduino program.

1. In the same tab mentioned in “Replaying An Animation”, press the “Export” button. The animation will be saved under “C:/Users/<username>/Document/MakingIntelligentThings/Animation/arduinoready_<animation_name>_interpolated.txt”

If you want to edit the animation, either record a new one or edit the “.json” file as the “arduinoready” file contains a lot of new positions used to make the animation smoother.