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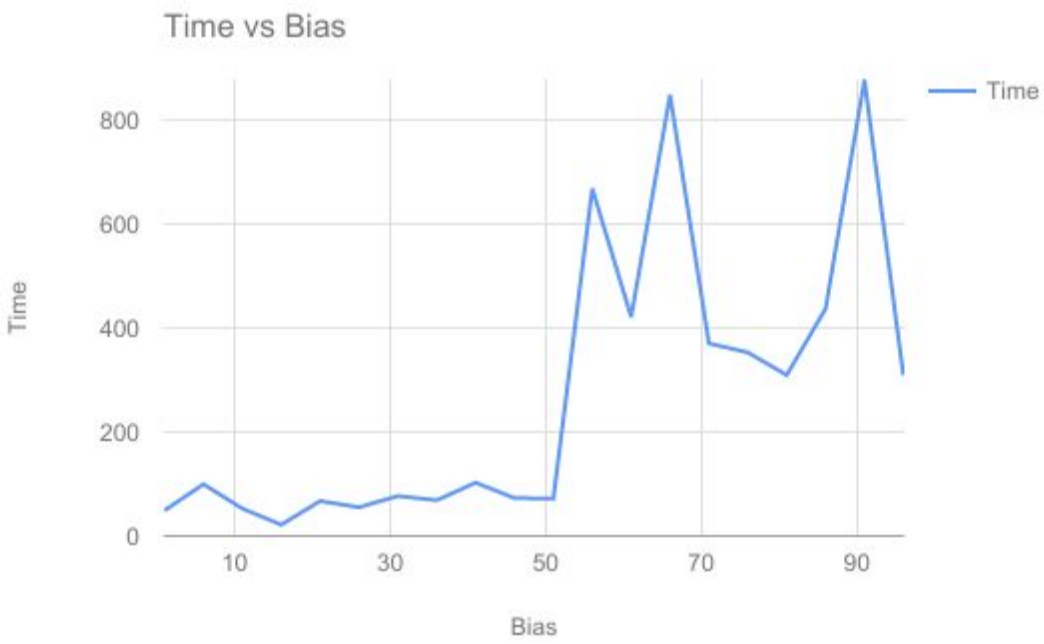
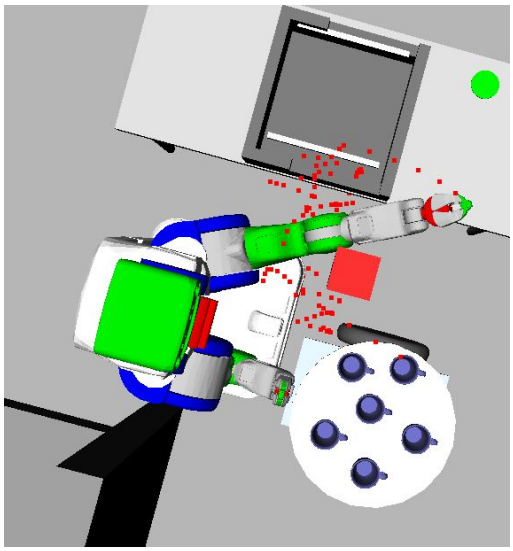
RBE 550

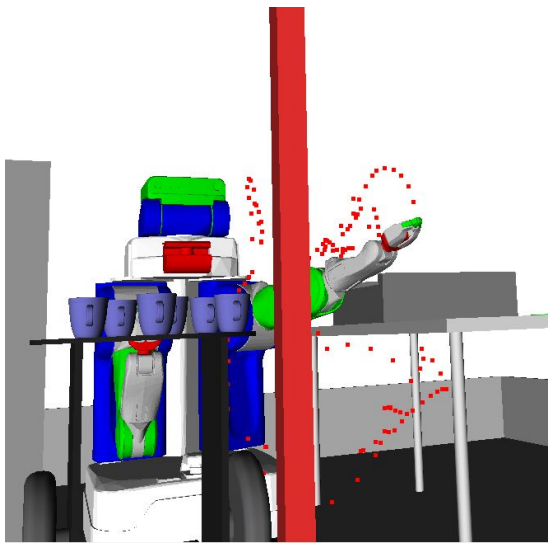
3. 1

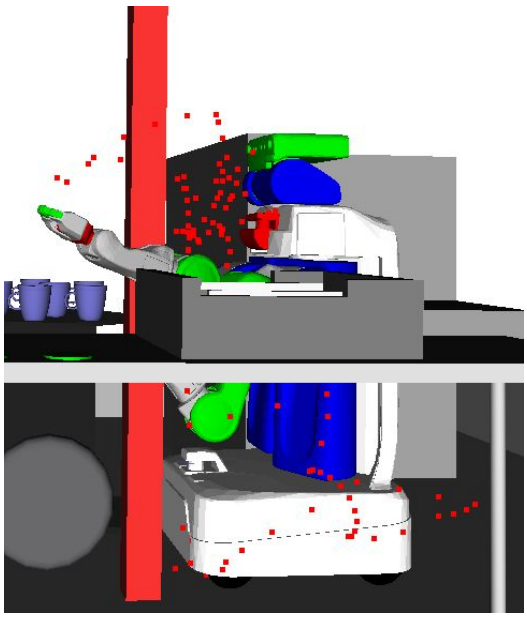
Step size == 0.4
Below is the time vs bias graph. I got the best result at bias == 16%

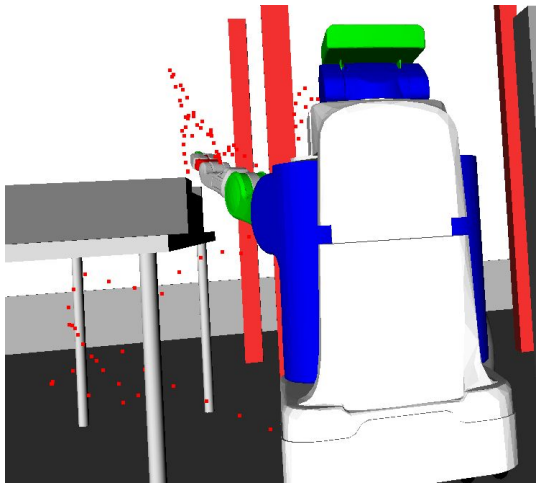


3. 2
Below are various screenshots of trajectory from various angles.









3. 3

4. I was not able to complete this part, I have attached the code for completed part.
DONE::It randomly selects 2 points and generate step size in the direction ig generated nodes.
TO DO::Move into that direction and change the existing path.

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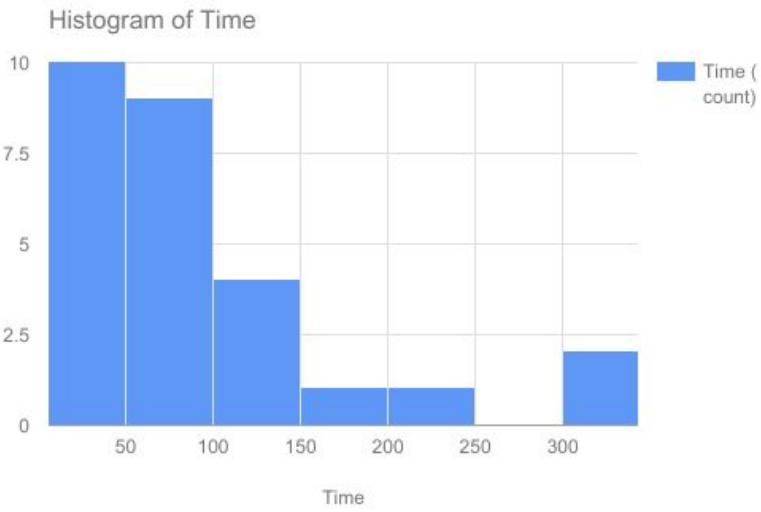
5. I did the part related to RRT without smoothing.

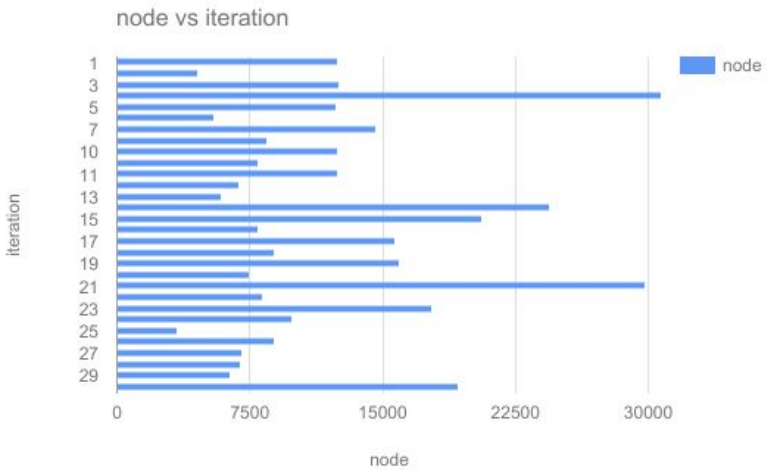
a)Histogram of Time



Discussion :

The graph shows, variation in time consumption as expected and in general solves it in less than 100 sec, because of random seed we see sometime it even takes ~300 sec, which shows clearly that optimality is not guaranteed. And that how much the results can vary on the basis of the selection of random nodes.

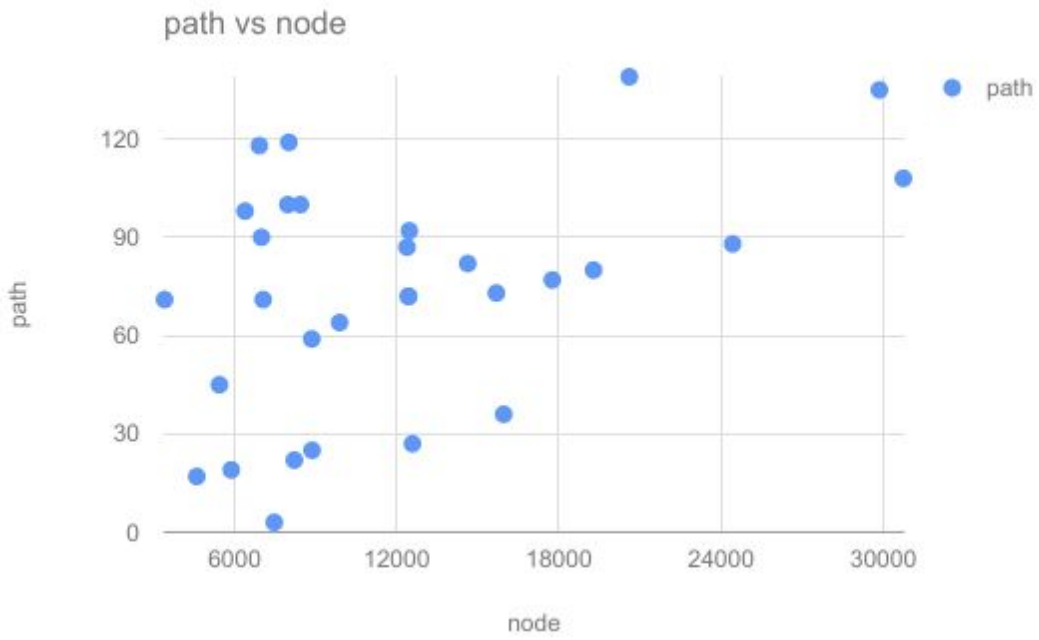
b)Node vs Iterations



Discussion :

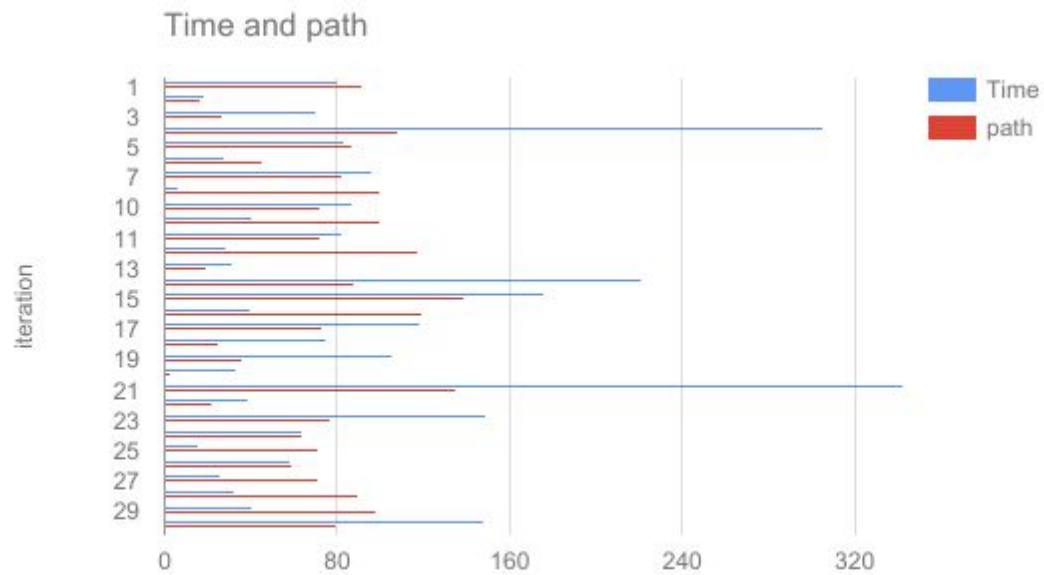
As we see in case of number of nodes explored, there is no order and it literally depends on seed (in our case, the i'th iteration out of 30 cases) which is result of random behaviour of openRave random float generator.

c) Path vs Node



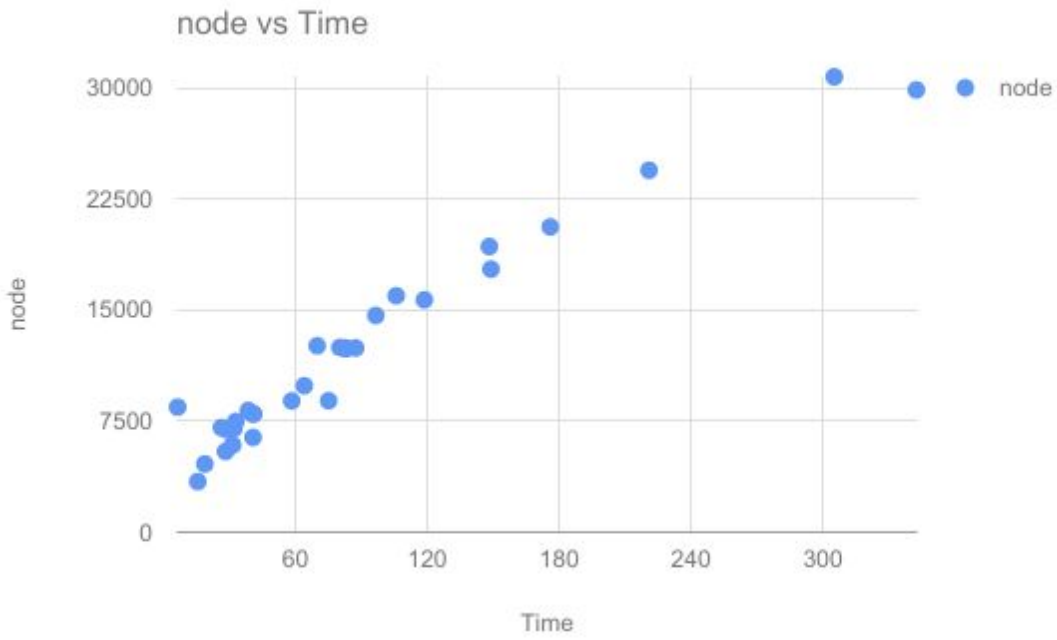
Discussion:
Same reason as above.

d)Time vs Path



Discussion:
Same reason as above.

e) Node vs Time



Discussion:
Same reason as above.

In all these findings we see that the randomness is seen in each case and comparison.

	Time	**Node**	**Path**
Mean	*88.17*	*12192*	*73*
Variance	*6266.5*	*46473293.7*	*1178.9*

Discussion over Mean and Variance:

I could not get the exact reason behind so much variation in Variance, as although generated by same random function they vary so much. Even out of their range. Although their mean value is as expected, that is average of their observed values.

Bonus Question:

Not Done