

Report PS8

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Result: 3.245seconds

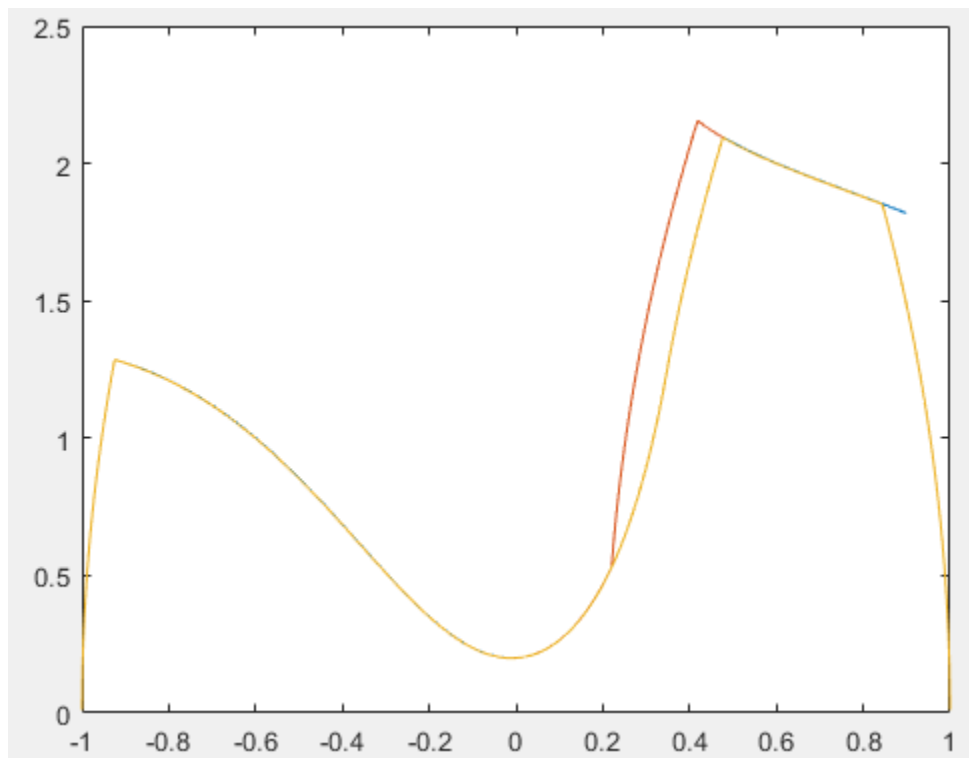
Method:

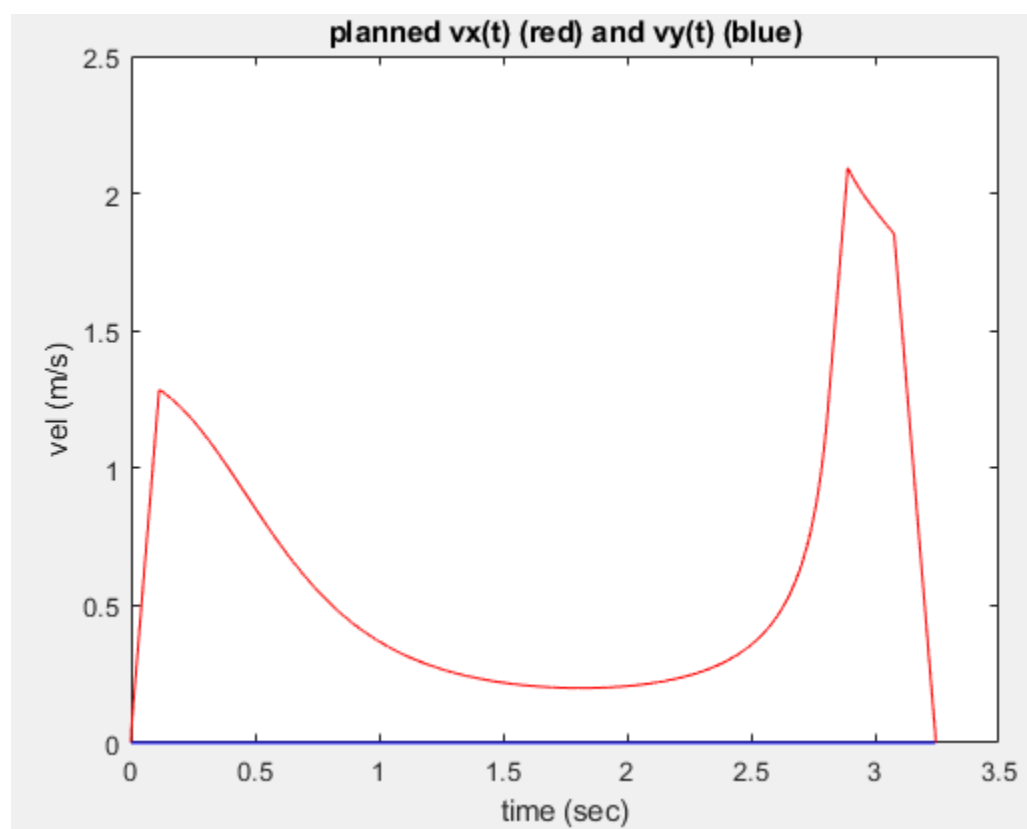
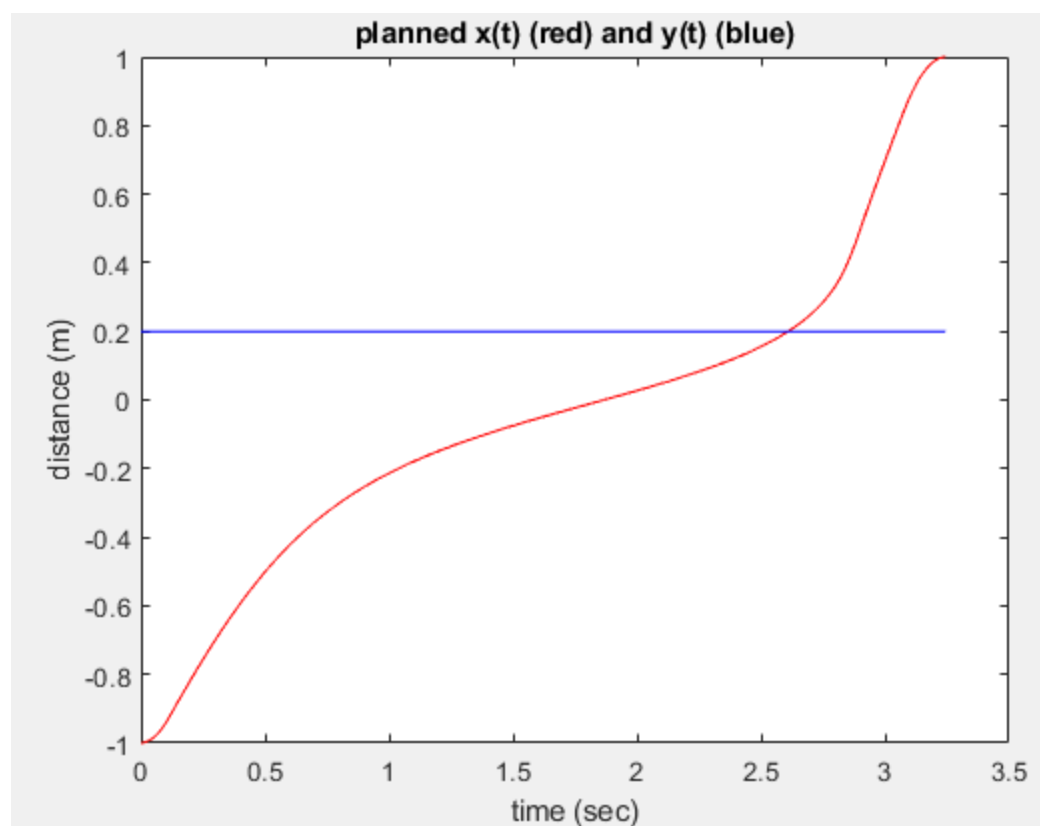
<https://github.com/jdc183/ECSE-489-PS8>

We iterated forward and backward in time, and set the velocity at each time equal to the maximum allowed by torque/acceleration or joint velocity constraints. We then transformed the resulting velocities into functions of x , superimposed them, and took the minimum of the two trajectories at every point.

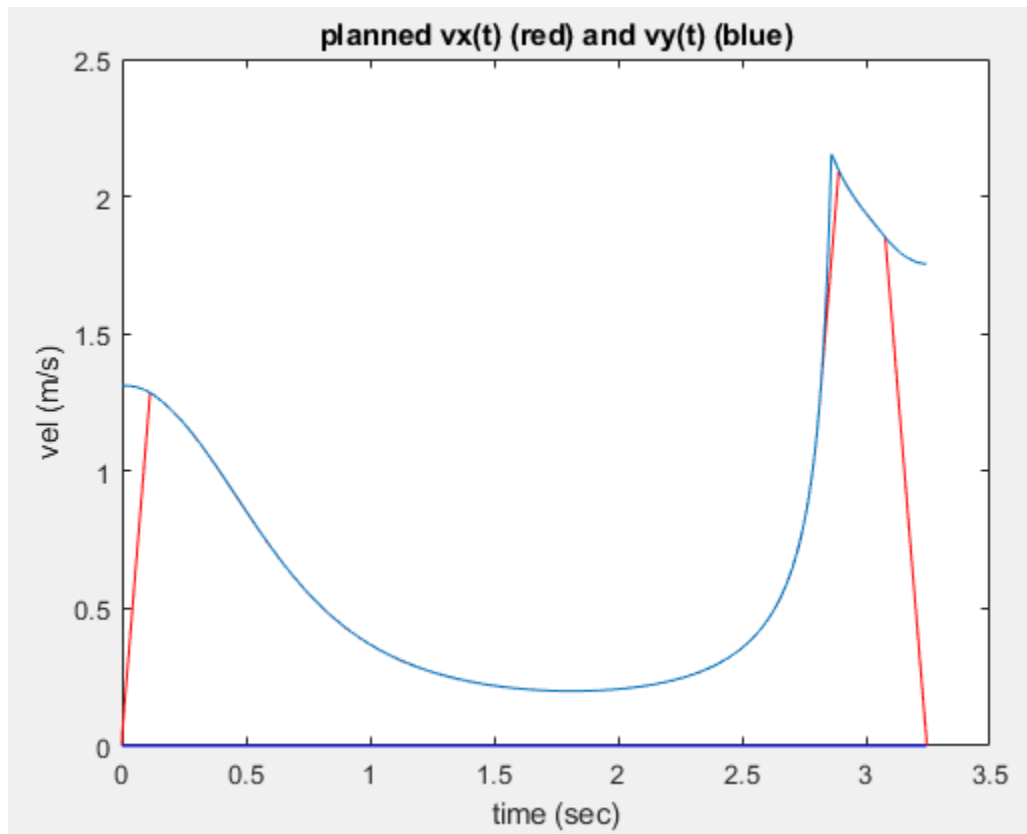
We then transformed the velocity to be a function of time again. This step introduced some discrepancies, since this conversion is impossible when $v=0$ ($\text{time} \rightarrow \text{inf}$). For this reason, there are some spuriously high torques at startup and stop.

Here is a plot of the velocities versus x . Orange is starting from $x=1$ and moving left, blue is starting from $x=-1$ moving right, and yellow is the minimum.

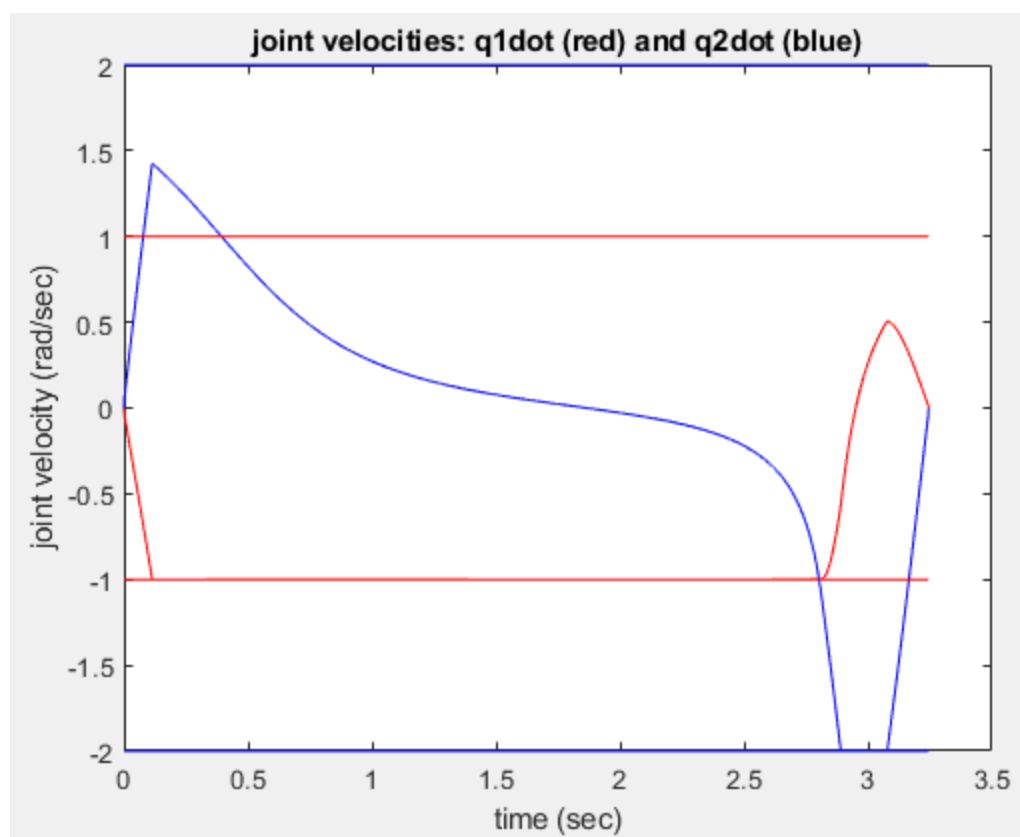




As shown below, the velocity is always equal to or below the constraints



As expected, the beginning and end of the trajectory was limited by the torque constraint and the middle was limited by the velocity constraint.



We had trouble reliably determining the maximum and minimum task-space acceleration, so we compromised and set the maximum acceleration to the minimum of our calculated constraint, and 11m/s/s. This is why our joint torques never quite max out.

