Visualizing Model Predictive Control

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Model Predictive Control

In MPC, we use a model of a system to plan inputs that make predicted states meet some objective(s).

For this project, let’s consider trying to plan steering inputs to a car to make it follow some desired path while also keeping the steering smooth.

Existing Visualizations


A lot of similar, static, figures in academic papers

Youtube video from KTH Smart Mobility Lab
Not aware of other videos like this, but doesn’t show much data

Lab’s in-house MATLAB GUI for debugging
Not well-suited to allow the public to explore the data

I haven’t found any visualization of the cost/objective function
Proposal

I want to use bokeh (a python library) to create something interactive and public.

Users should be able to view actual states/inputs for all time, and predicted states/inputs calculated at a certain time.

Users should be able to view how much each term in the cost function contributes to the total, to help build intuition for why the optimization calculates the results it does.
Feedback: how to integrate data with explanation of states/model/objective function
Milestones

- decide which states and inputs should be shown
- learn how to use bokeh
- how to store and structure MPC data
- decide how to layout plots
- update plots according to slider bar
- add other interactions?