Lab 2: Modeling in Ptolemy

Originally Prepared by Marten Lohstroh

Deadline: April 1st, 11:59 pm

1 Intro to Ptolemy

Imagine you are a car designer, and you are tasked with designing an automatic windshield wiper. The goal is to build a system that performs well under certain types of loads that you expect the car will be exposed to. Specifically, you need to state some visibility requirement, e.g., a maximum number of drops allowed on the surface of the windshield at any given time. The components you will use, a rain sensor and a windshield wiper, are each supplied separately by third-party manufacturers and expose some functional interface, certain parameters, and perhaps some specifications. Your goal is to assume these properties, model the components accordingly, and simulate them along with a weather model to show that your design meets the stated visibility requirement. You are free to dive into as much detail as you want, but details will complicate your model, perhaps unnecessarily so. The key is to choose abstractions that are faithful enough to draw conclusions from the model and that are sound with respect to reality. Be very explicit about any assumptions that you make during the design process.

2 Questions

1. What is your visibility requirement?
2. Explain your model. What is realistic about it? What is not? Why is it a useful model?
   (a) Describe your weather model.
   (b) Describe your rain sensor model.
   (c) Describe your windshield wiper model.
3. Which models of computation did you use? How well do they match the dynamics of your components?
4. Which (component) parameters did you have to tweak to let the system satisfy the visibility requirement under the given environment assumptions?

3 Logistics

Compile a brief write-up that touches upon all the questions listed here. You are encouraged to work in groups of 3-4 people. The March 30th lab session will be used to let each group briefly explain their design, share their insights, and discuss any difficulties they may have experienced.