

Math 2250 Lab: Robot Practical

Here are some general notes and ideas which will help you with the robot practical. The robot practical is fun, but not easy— you really need to use everything you've learned doing the three labs in order to make it work. You'll get as many test runs as you like during your practical period; don't waste the opportunity to understand what's happening!

Here are some general principles and observations which may help:

1. Math does work. If your analysis is correct, the ball will land where it is supposed to. If it doesn't, then one of your assumptions, or measurements, or calculations is at fault. You need to work out which of them is the problem.
2. The general principle in these calculations is to suspect everything that goes into your procedure and try to come up with tests to verify each part of your calculation. You need to work step-by-step to eliminate various sources of error.
3. Error analysis matters. The robot is not perfect, either at setting release angles or rotation speeds. Use what you've learned in Lab 3 to set up the throw so that these (inevitable) errors have as little impact as possible on where the projectile lands.
4. Units and coordinates! Where (in the real world) is the origin of your coordinate system. What are the x and y coordinates of the cup in those coordinates?
5. Measure where the ball lands and take notes. If you don't record the data about what's actually happening, you can't see patterns in the data (are you always landing short of where you expected? long?).
6. Running the same parameters more than once and measuring where the projectile lands each time is a good way to get a handle on how error is affecting the landing position.
7. The most basic tool available to you is the tape measure. More advanced tools are available on request. In addition, you are free to use your phones as cameras. Taking a slow-motion video of a throw is a really good way to check whether the robot is doing what you think it is.