There are a variety of tools from the Open Source Physics project in amusement park physics activities. The Tracker Video Analysis tool can be used to extract data from video clips that can be taken with almost any modern digital camera. We present some examples of the use of Tracker to analyze motion of amusement park rides and discuss some of the issues with camera set up and video calibration. We also present some simple simulations created with the Easy Java Simulations tool.

First Stage of Calibration with Photo

Second Stage Calibration

Simple Circular Motion Rides
- Exploration of the physics of the simplest type of ride
- Experimental "lagged" controls to prevent unrealistic thrashing of virtual riders
- Worksheet Questions:
  - How does the rotational speed \( \omega \) affect the force felt by the riders?
  - How does the radius \( R \) affect the force felt by the riders?
- List some rides that are at least approximately simple circular motion. Which, if any, of these rides would be "extreme"?
- Similar Merry Mixer/Scrambler Simulation

Free Fall of Fear
- Elevator Rides as an introduction to kinematics
- Students design ride experience
- Contrast acceleration and apparent weight
- Worksheet Questions:
  - For more dramatic rides that stay within our ride requirements of starting and ending velocity, what is the greatest g-force you can get out of the simulation? Is this a safe ride? Include a sketch of your height versus time and g-force versus t graphs.
- What is the greatest time you can get the rider to be at or near zero g's? Include a sketch of your height versus time and g-force versus t graphs.

Swing Rides
- Students "drive" the ride controls, physically reasonable parameters
- Torque only while ride is in contact with driver
- Drive on in either direction or off
- Physical parameters in simulation estimated, not researched
- Exploration of physical pendulum
  - Period
  - Amplitude dependence of period
  - Work/energy concepts
- Does the rider's seat affect the rider's experience?

Log Flume
- Motion on a ramp, but ...

Bungee Jumping
- Multiple types of potential energy
- Safety (impact and G forces)
- More sophisticated physics coming soon (friction, more realistic elastic model)

Free Fall of Fear with Photo

Parting Comments
- Open Source Physics has tools appropriate for Amusement Park Physics:
  - Tracker Video Analysis
  - Applets (OSP repository)
  - Tools to make your own (EJS)
  - Curricular materials (OSP repository)
- The EJS applets created for this project available at http://phys23p.sl.psu.edu/amuse/