Energy Skate Park Basics
MS Revision

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SR Published a dev version with many requested features here:
http://www.colorado.edu/physics/phet/dev/energy-skate-park/2.08.01/

Standards

CO Standards:

8th grade, Physical Science 2. There are different forms of energy, and those forms of energy can be changed from one form to another – but total energy is conserved

TEKS

6th grade, Force, motion, and energy. The student knows force and motion are related to potential and kinetic energy. The student is expected to: (A) compare and contrast potential and kinetic energy;

Energy Skate Park Revision Notes

From meeting with Jackie and Barry, spring 2011

First Tab

- have a selection of three different tracks that are capable of illustrating specific things (one has track going to the ground)
- no friction
- roller coaster mode: skater won't ever leave the track, perhaps should change to a different representation other than skater for this one
- have just bar graphs

Second tab:

- introduce friction (thermal energy)
- no track building
- skater can leave track

Last tab (track playground)
- Can build track from scratch

Tools:
- no need for changing potential energy zero point
- little dots need to fade away, Jackie likes the dots, but hadn't used them
- bar graph, show only potential or only kinetic? Jackie not a fan.
- Likes different planets, but on a different tab
- maybe remove rocket, potentially disruptive
- pie chart good
- bar graph good
- energy vs. time good
- energy vs. position hard to understand

issues: students spend a lot of time to make loop and
play with rocket

Comments from KP, 11/28/11
TAB 1:

1) Start the U-shaped track at the ground (so PE=0 at the base) and move track with lump down so that the lower base curve sits at PE = 0.

NP: done. see new tab 1 image below.

2) Consider removing the blue control dots on the first tab (except for the "3 center" control dots on the lump on the track with the lump). I'm not sure what benefit they get from moving these dots on the first tab? We could also interview with and without and see how the interaction changes.

NP: done. I don't think we need any control points on the first tab (including the lump, or "W" track)

3) Right now grass on Tab 1 causes friction which makes the ramp more complex. Maybe make grass frictionless on Tab 1 too??? Or put a layer of ice on the ground?

NP: I think OK to just have zero friction everywhere in tab 1. Probably don't need ice.

4) It seems a bit odd that the Pie Chart is a checkbox while the Bar Graph is a button, both could be a checkbox -- is this to help kids pick bar chart first? Do we know which one we want them to pick first? If we do maybe that should be first in the list.

NP: I agree with both being a check box. And maybe have bar graph on top, since that seems to be what teachers report liking (but keep pie chart since I think it is useful).

5) Maybe make the energy legend non-italic? might be easier for younger children to read?

NP: Agreed. Make energy labels regular (non-italic) text.

6) While I like the clean look of the first tab. There are a few tools that really help investigation that I would consider adding back in:
a) The grid --- this is something that UTeach really wanted this one back in so that students could see how high something came to on each end.
b) Change wording of "Bring back the PhET skater" to "Return Skater". Consider having "Return Skater" button available for experiments as it is in regular energy skate park --- I'm mixed on this one though?

NP: Grid - sounds like a good idea.
NP: Yes, change the pop-up button to “Return Skater”. I’m also not sure about having a “Return Skater” button always present...I like the idea, just need to be cautious of how many controls were adding in.

TAB 2:
- Slider handle on the friction slider suffers from the "small handle" problem we saw in Molecules and Light, can we make the same fix here as we did there? (ask JB)
- I find the black line between the Friction and the Stick to Track controls a bit confusing. Can we drop the line and instead bold "Track Friction" and "Stick to Track" to match the Energy Graphs title?

NP: I agree on both points above.

-Friction tab comes up with skater moving on track - is this what is desired, or should skater be stationary as in tab 1? I can see reasoning for both ways. (OH - I see its only when I hit "Reset All" that he is on the track, so this looks like a bug in "Reset All" in tab 2).

NP: Yes, appears to be a bug.

Other comments:
Speed seems like it might be an important aspect for the MS learning goals and maybe we should help scaffold that connection with a tool that helps them measure speed changes? Should we have a speed meter or some other measure that travels along with him like the pie chart does?

NP: I like this idea. We should check with teachers about how they incorporate speed into teaching about energy (again, because I want to make sure we’re not adding too many things to the sim).

This is just for me to summarize features removed. It seems like using our MS teacher list would be good to check that we've dropped the right stuff. I think we only have input from a couple of teachers on this, correct?
- Choosing own skater (too distracting for this MSs)
- Potential Energy Ref line (too advanced)
- Measuring tape (not quantitative?)
- Show Path (no path shown, no speed measures, not quantitative)
- Only 2 visuals for energy (pie and bar chart -- easiest for MS to digest)
- No changing gravity (not covered in MS?)

- Default is rollercoaster mode (easy of use)
- No changing skater properties (not covered in MS (relation between PE and mass of skater?))

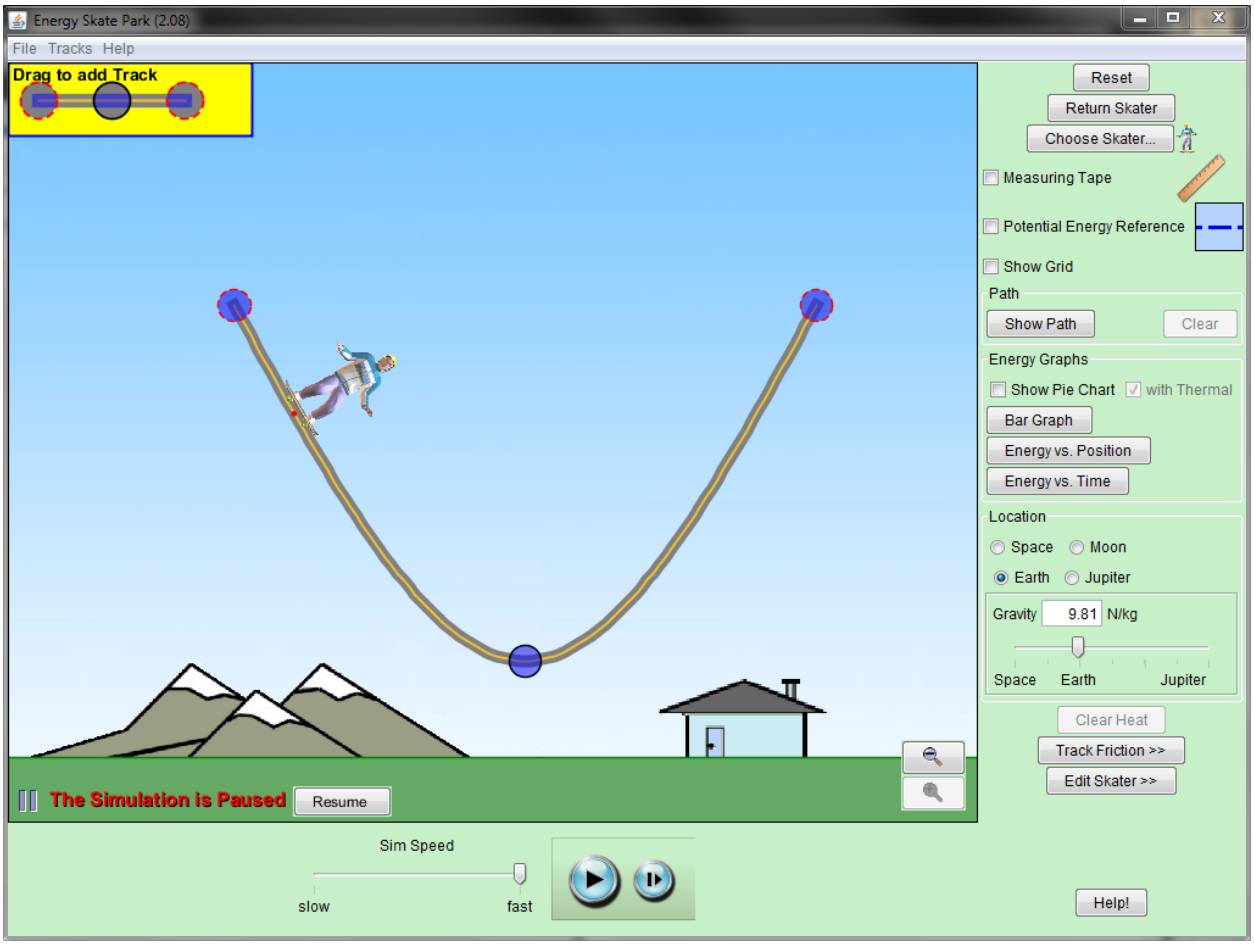
Physics Meeting 12/2/11

- Decided not to include mass or speed, and instead include in work-energy sim
- Not directly in standards for PE / KE, and will add more controls maybe too complex for MS

Current Version

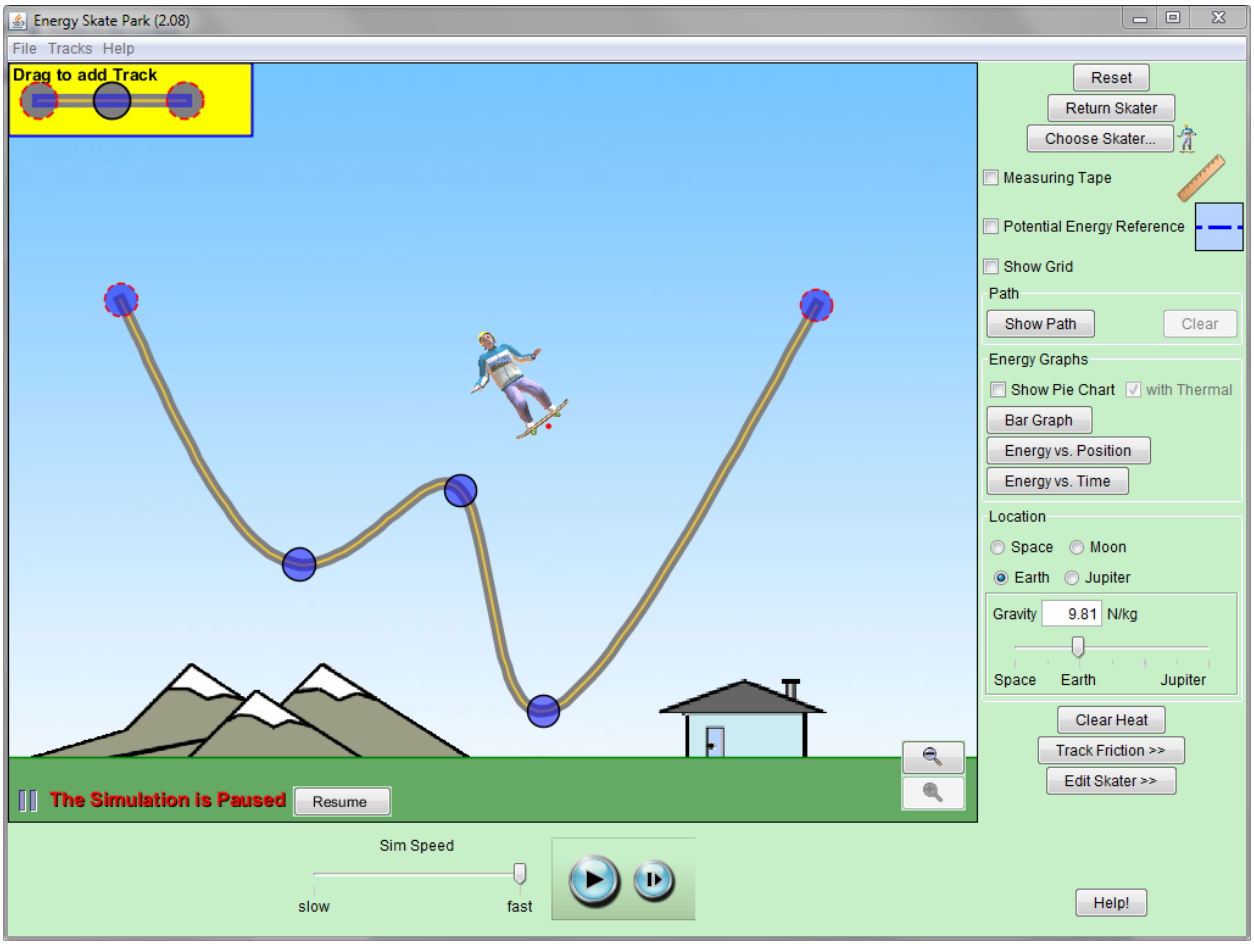
Start State

- Can change Track Friction (default is zero)
- Can change skater mass
- Can show skater path
- Can change gravity
    - Different planets
    - Gravity slider
- Preset tracks in “Tracks” menu
    - Loop
    - Double Well
    - Double Well (roller coaster)
    - Friction Parabola
    - Jump
    - S-curve



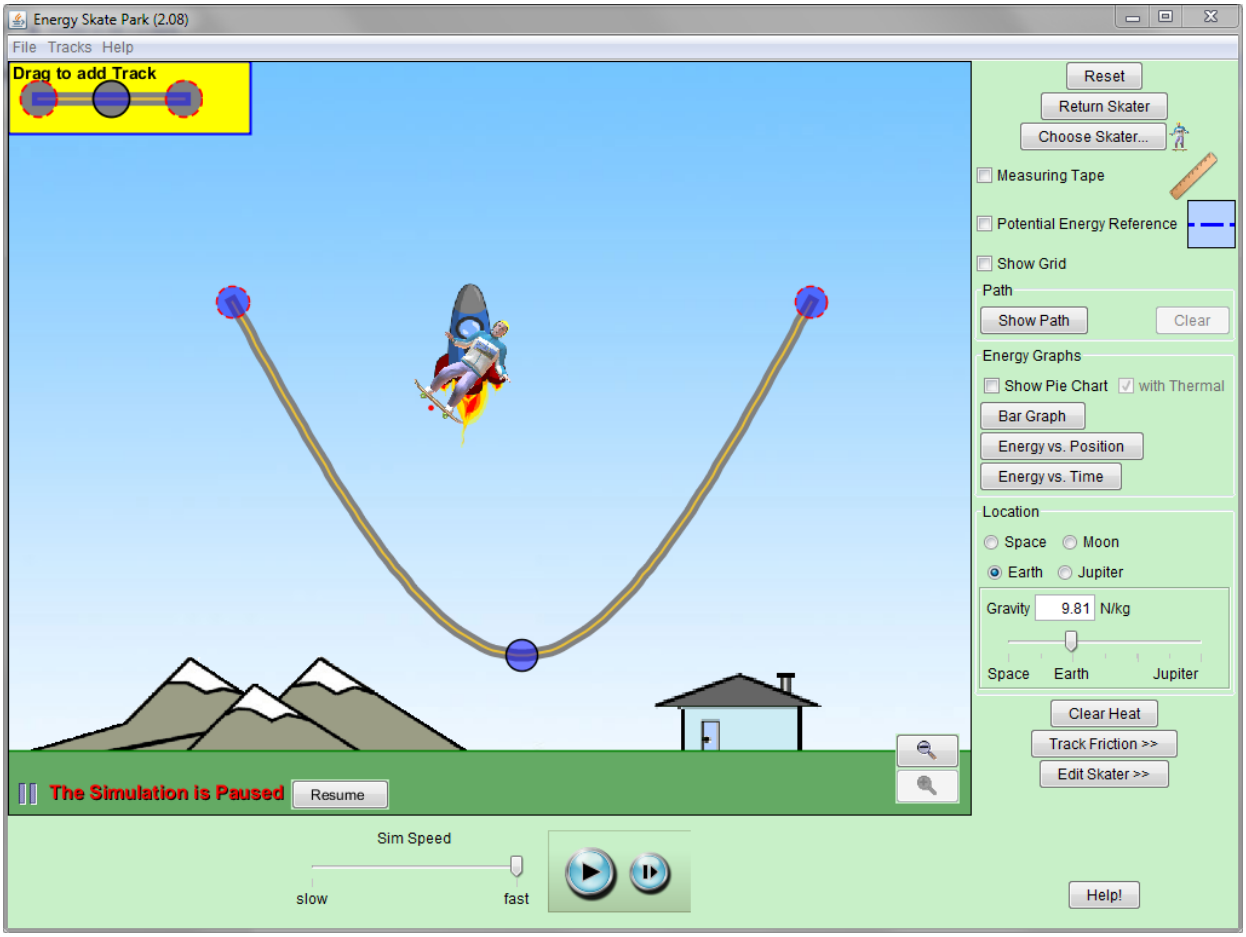
Can make own track

- Skater can fly off of track
- Gains thermal energy on collisions

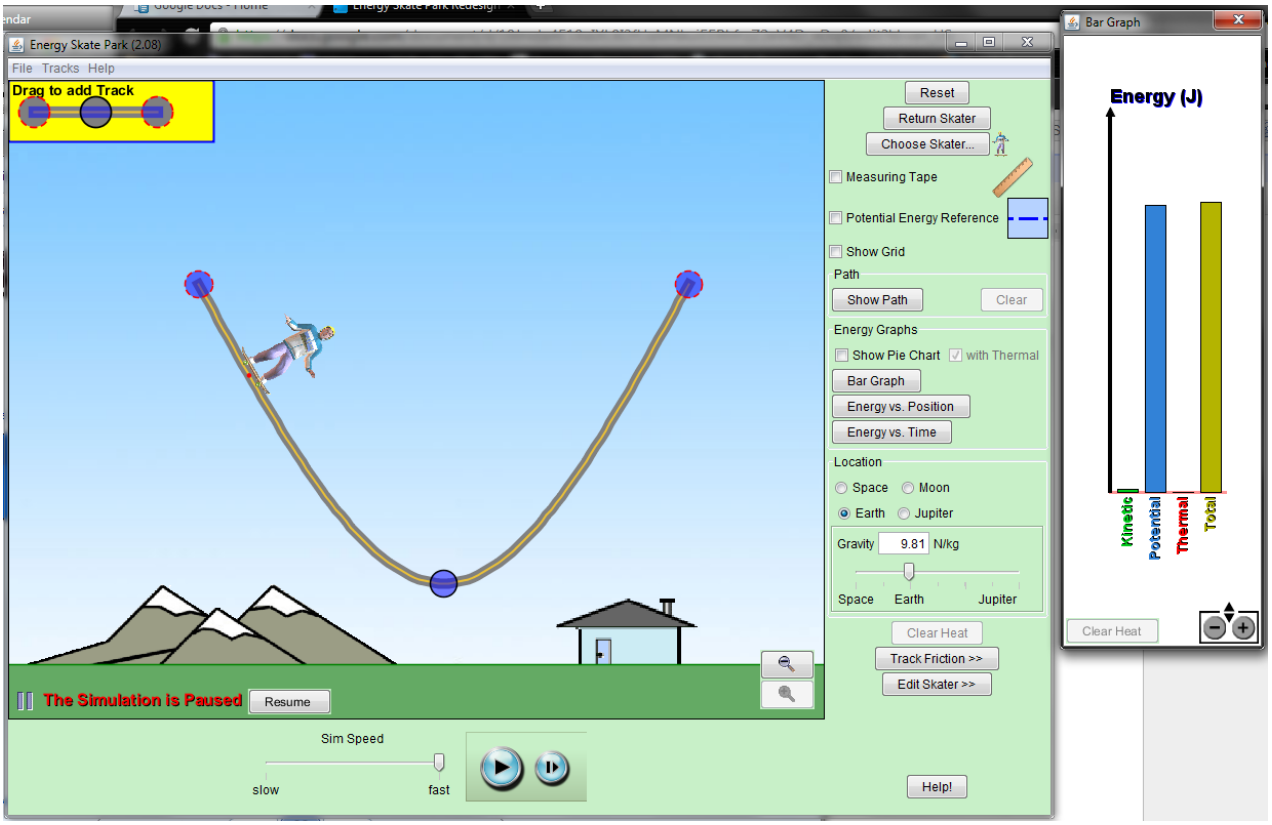


Rocket

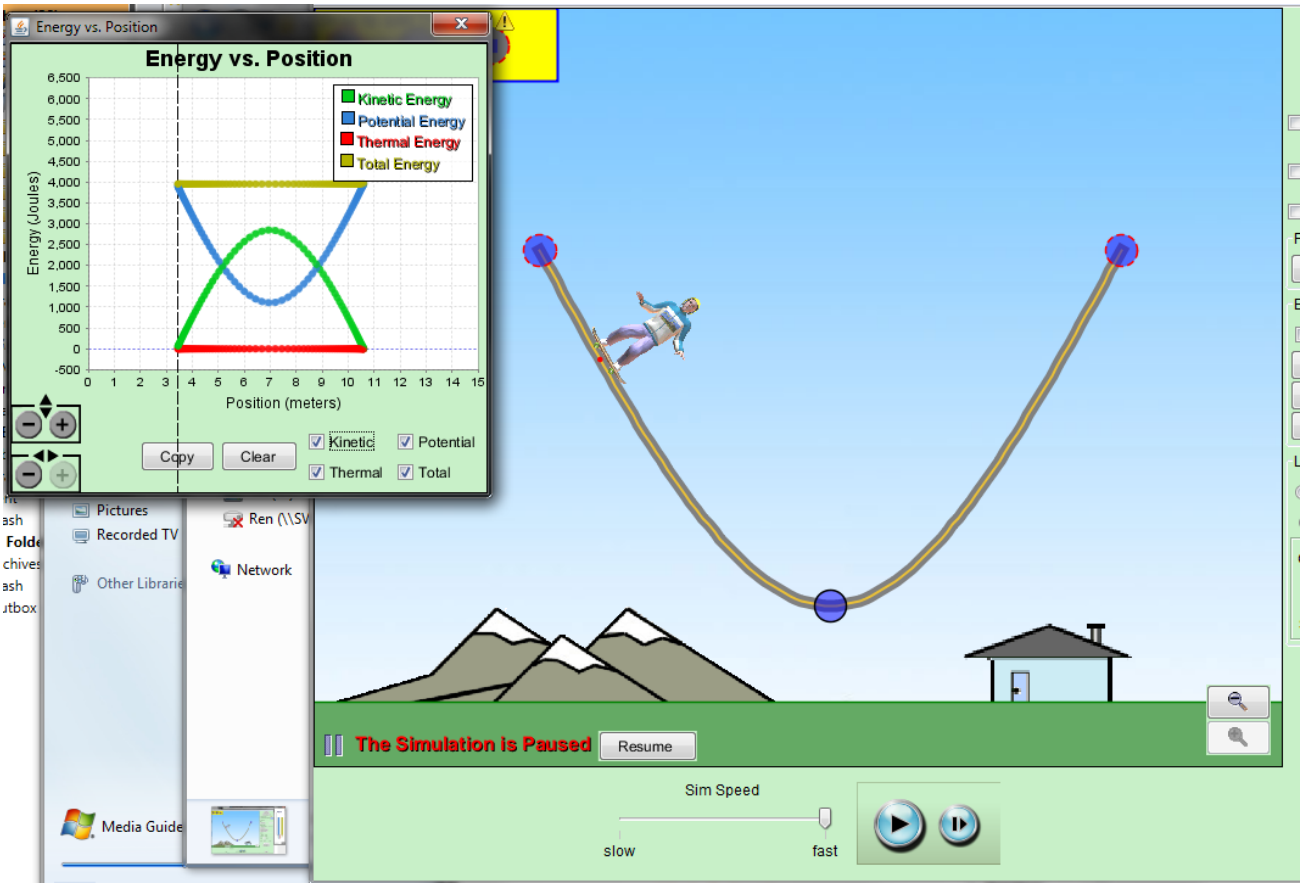
- Operated with arrow keys
- Can fly skater around and even off the play area


Energy Skate Park (2.08)
File Tracks Help
Drag to add Track
Reset
Return Skater
Choose Skater...
Measuring Tape
Potential Energy Reference
Show Grid
Path
Show Path
Clear
Energy Graphs
Show Pie Chart
with Thermal
Bar Graph
Energy vs. Position
Energy vs. Time
Location
Space
Moon
Earth
Jupiter
Gravity
9.81
N/kg
Space
Earth
Jupiter
Clear Heat
Track Friction >>
Edit Skater >>
The Simulation is Paused
Resume
Sim Speed
slow
fast
Help!

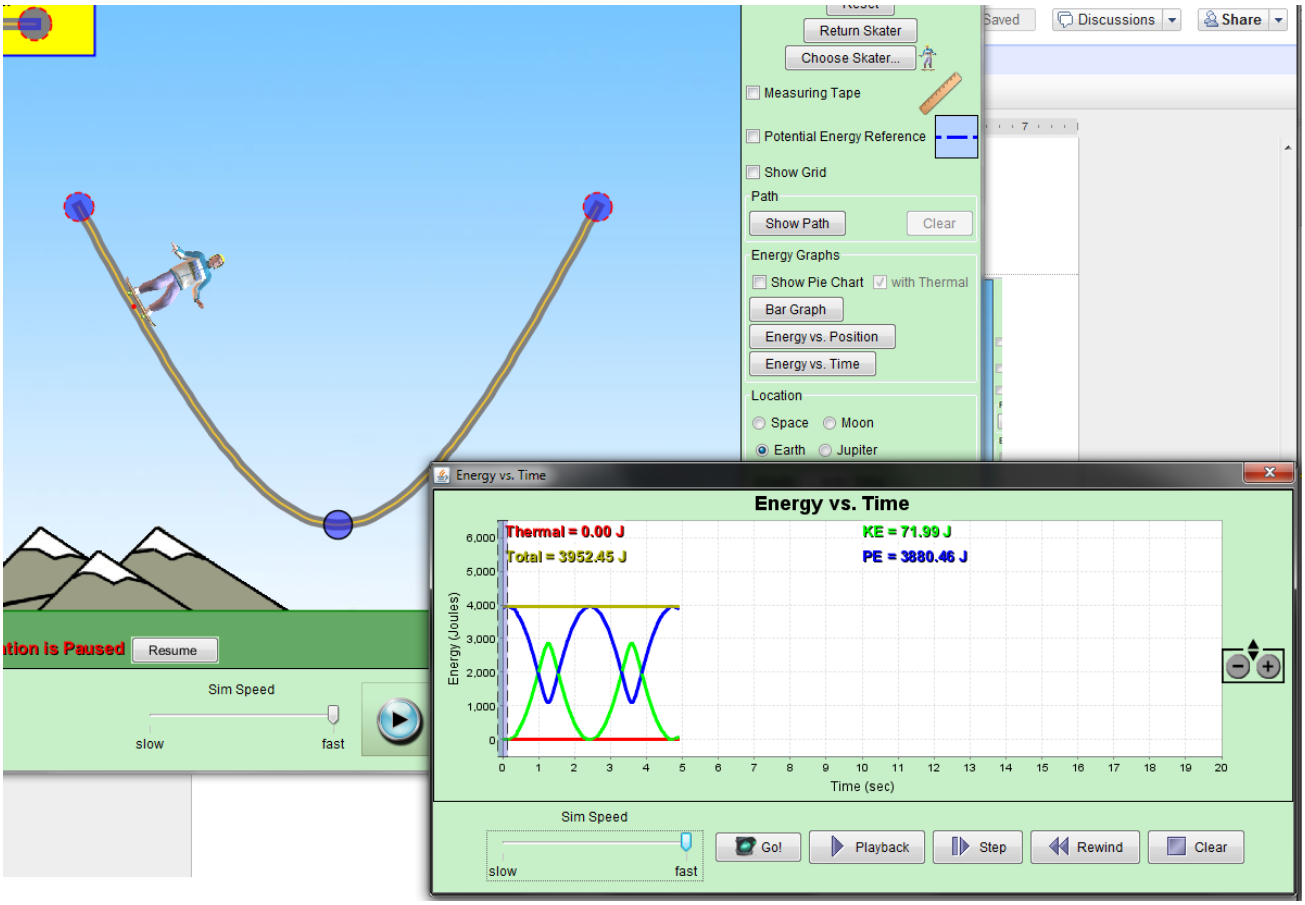
Bar Graph



Energy vs Position Chart

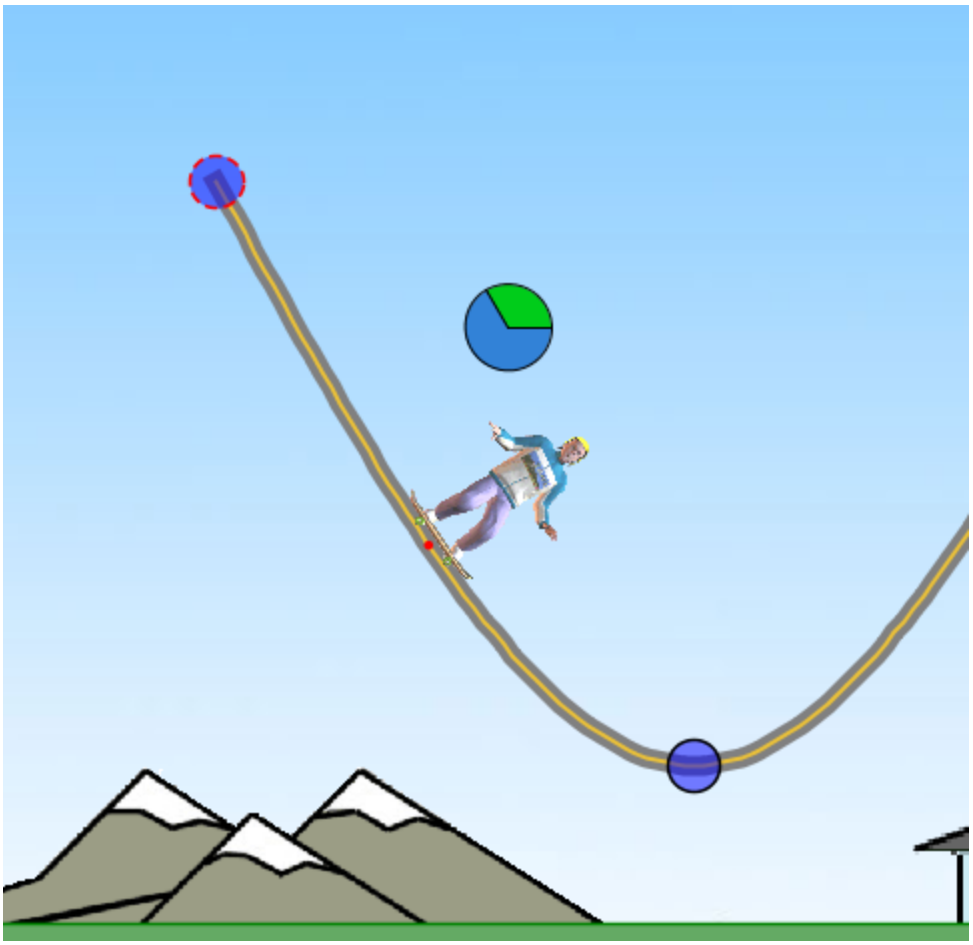


Energy vs Time Chart



Pie Chart

- Shows KE (green), PE (blue), and Thermal (red)
- Size of circle = total energy



Revised Version

Tab 1

Revision notes

- have a selection of three different tracks that are capable of illustrating specific things (one has track going to the ground)
- no friction
- roller coaster mode: skater won't ever leave the track, perhaps should change to a different representation other than skater for this one
- have just bar graphs

Outstanding questions:

- Remove:
    - measuring tape?
    - potential energy reference?
    - grid?
    - path?

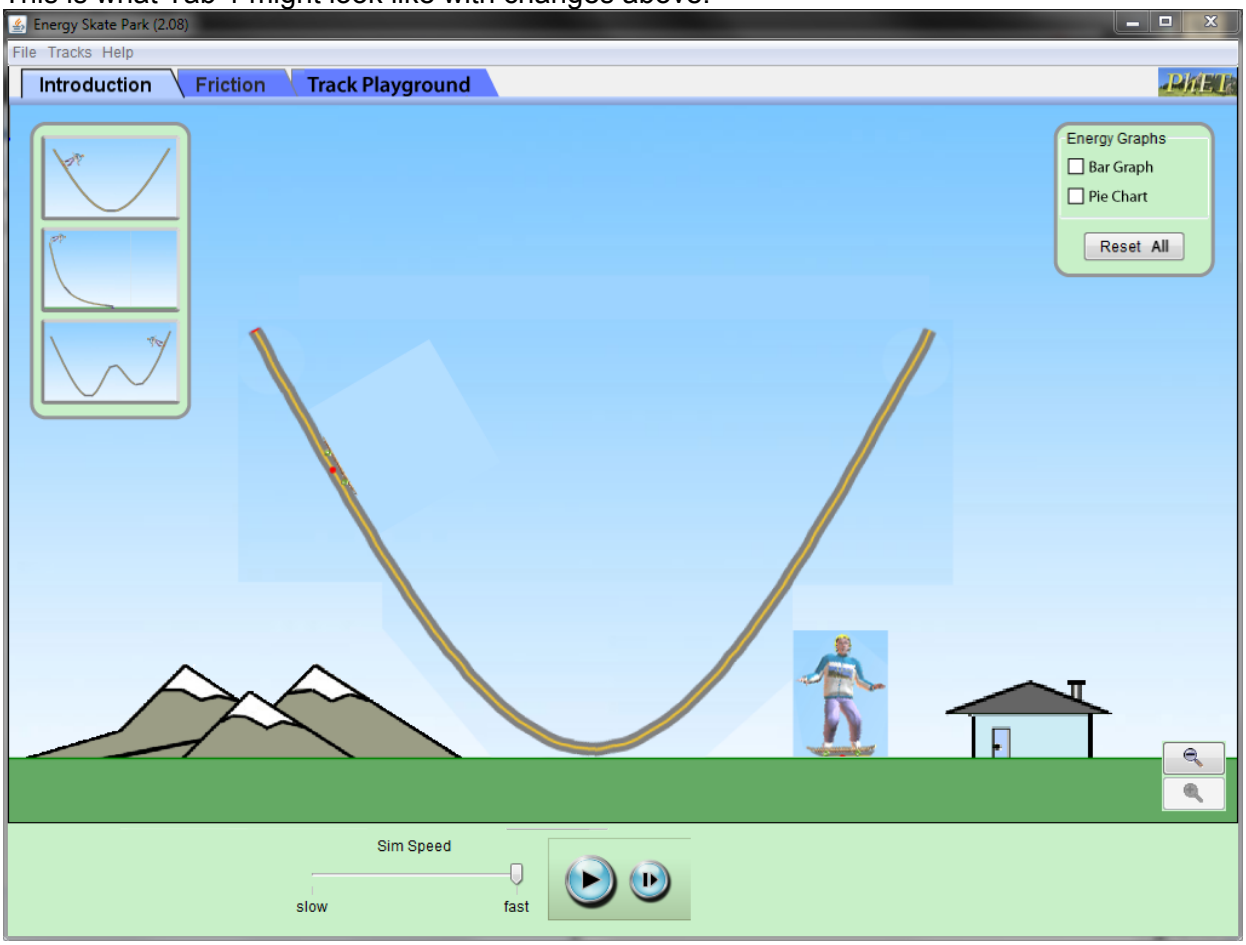
- choose skater? (different images for skater)
- edit skater? (change skater mass)
- return skater in control panel (maybe redundant?)

- Any of these could be moved to a 2nd tab, I'm (somewhat) in favor of removing them all in 1st tab.

Revisions to make

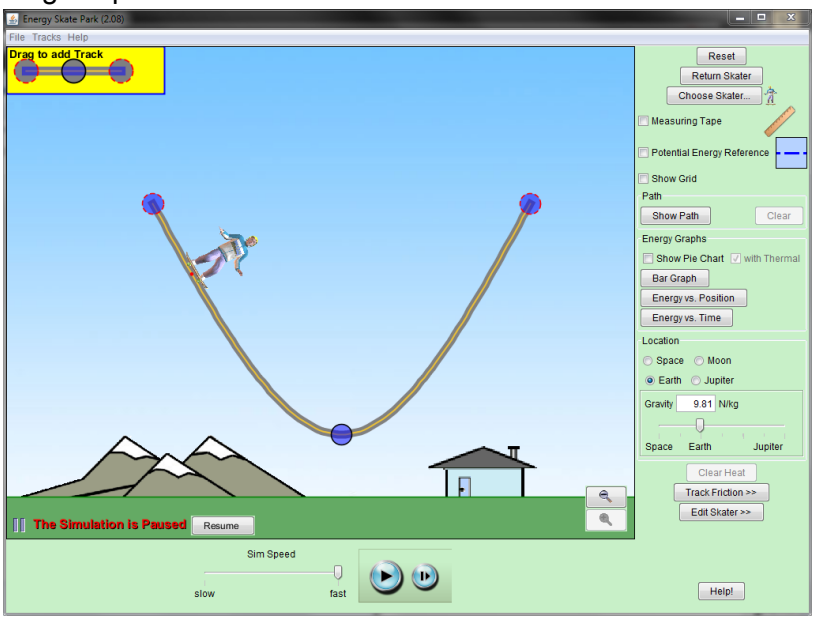
- Move controls to floating control panel
- Extend play area across window
    - Move house to right
    - Move mountains to left
- Zero friction
    - Remove friction control
- Bar graphs only
    - Remove energy vs position and energy vs time buttons
- Roller coaster mode (always)
- Remove "help"
- Remove rocket mode
- 3 pre-made tracks to choose
    - Remove track building controls

This is what Tab 1 might look like with changes above:

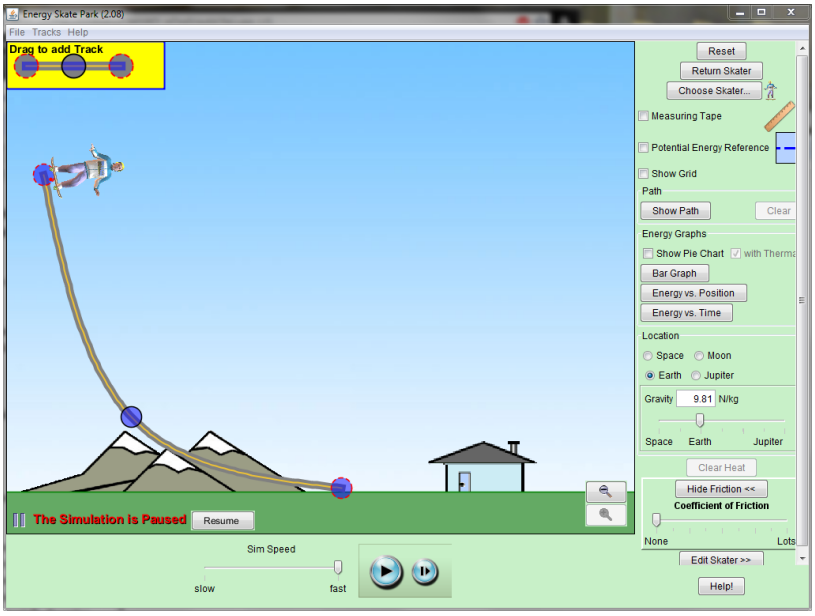


Three Selectable Tracks
-These are screenshots from original sim, most of these controls will be removed.
-Control points should be removed from tracks.
-U-track should have bottom on the ground (so PE=0 at ground level)
-W-track should also have bottom of lower dip on the ground

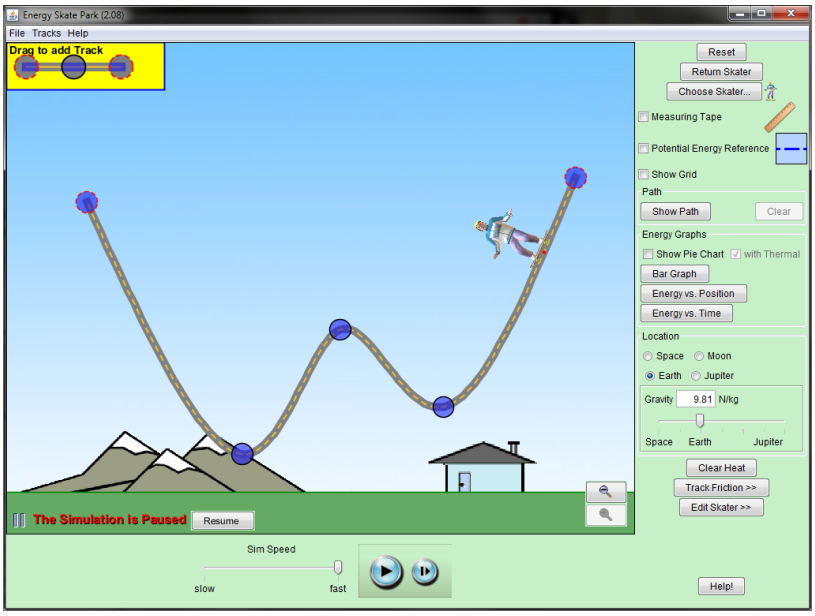
- Original parabola



- Track to ground

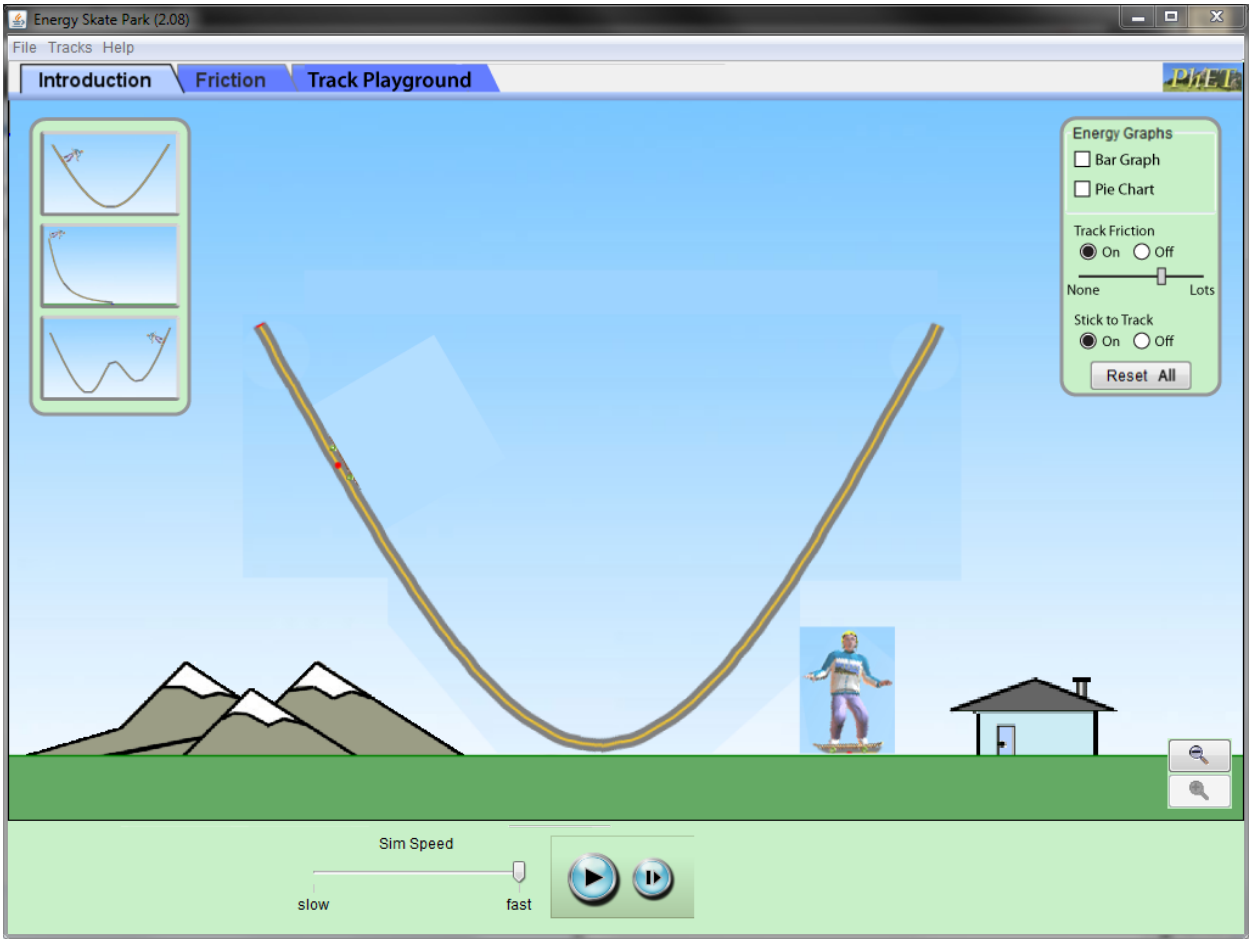


- Double well (roller coaster mode)



Tab 2

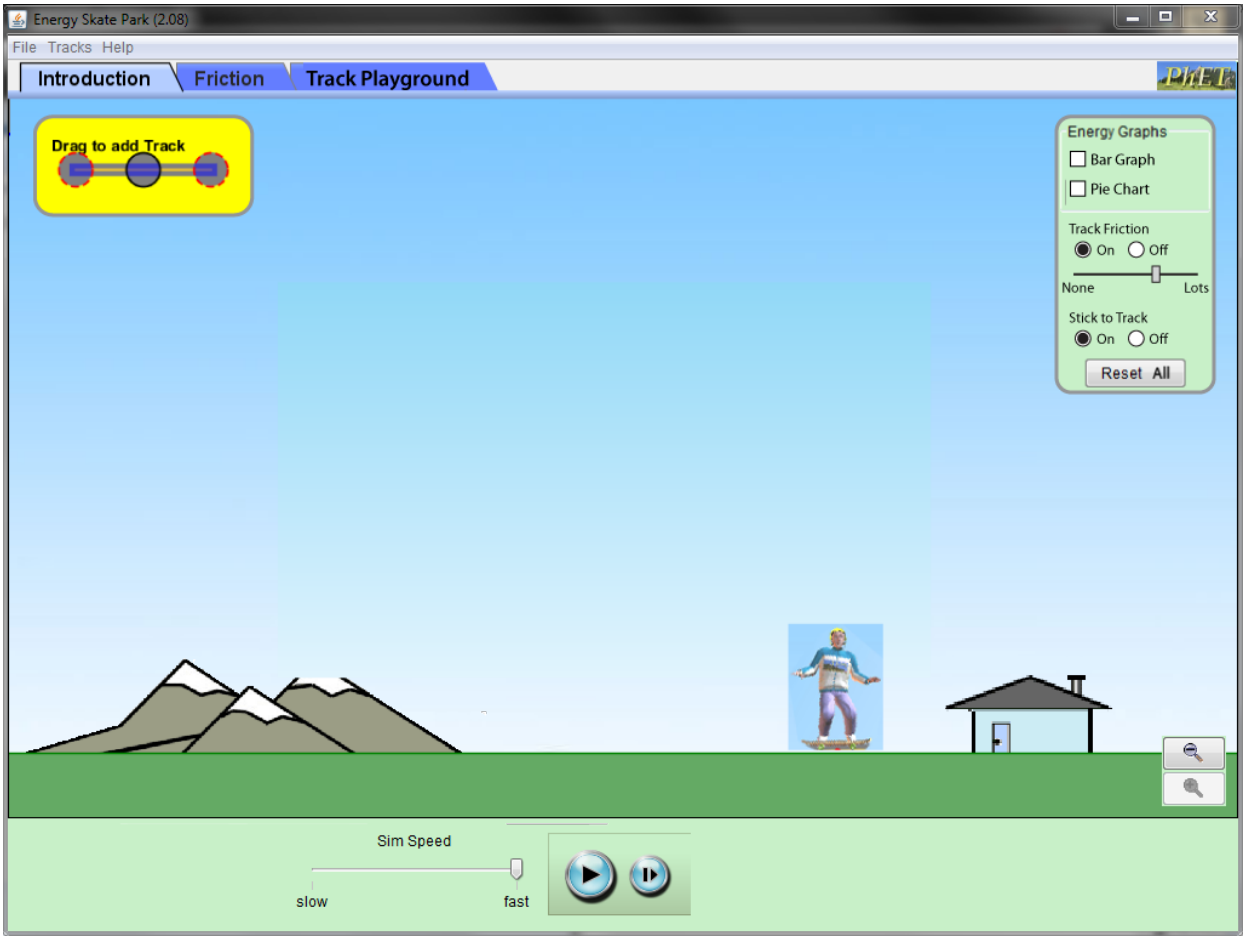
- introduce friction (thermal energy)
- no track building
- skater can leave track



Tab 3

Last tab (track playground)

- Can build track from scratch
- Replace pre-set track buttons with draggable track pieces box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Introduction
Friction
Track Playground
PhET
Drag to add Track
Energy Graphs
Bar Graph
Pie Chart
Track Friction
On
Off
None
Lots
Stick to Track
On
Off
Reset All
Sim Speed
slow
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