Learning VPython / Glowscript

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Outline

1. What are VPython and Glowscript?
2. Using them in the classroom
3. Learning Resources
   - VPython
   - Glowscript
Abstract

VPython and Glowscript are programming languages intended for first-year physics student use in modeling physical systems. But how does one get started? Brief answers to the following questions will be presented. Which language? How should it be introduced to students? Where and how can a teacher learn enough to be ahead of the students?
written by physics teachers and students for learning introductory physics

- physics-focussed interactive, 3D animation
- If you can make a realistic simulation of something, then you understand how it works.
- Display of simulation can always be zoomed and rotated by default.
- focus on describing physical interactions; 3D eye-candy should be realistic enough to be gratifying and require minimal effort from student programmer
What are VPython and Glowscript?

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Differences

**VPython**
- python based
- mature; lots of useful modules
- on your computer
- user needs VPython
- won't run in a web page

**Glowscript**
- javascript and the WebGL based
- newer; user-made modules aren’t possible
- in the cloud
- web only; some tablet access
Which to start with

- doesn’t matter for beginner stuff
- Glowscript is a lot easier to use in class
Both are freeware

- free as in beer
- free as in speech

assuming you don’t want to rewrite the software:

- VPython: http://vpython.org/index.html then on left choose your operating system and follow directions
- Glowscriipt: http://www.glowscript.org sign in (accounts are free as in beer)
Matter and Interactions textbook
numerical model-building as core part of learning
A taste

- a couple of 80-minute periods
- don’t try to teach programming; give syntax and example lines of code; learning is in the values for variables
- make a ball bounce - with many variations
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http://www.vpython.org

- Documentation
- Examples
- Help
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VPython

Glowscript

VPython is the Python programming language plus a 3D graphics module called “visual” originated by Dave Scherer in 2000. VPython makes it easy to create navigable 3D displays and animations, even for those with limited programming experience. Because it is based on Python, it also has much to offer for experienced programmers and researchers.

For a quick introduction, see youtube.com/vpythonvideos

Descriptions of the options available in the left margin:

Documentation: Overview, tutorials, and detailed documentation
Download: Free downloads for Windows, Macintosh, and Linux
What’s new in VPython 6: New mouse/keyboard handling; native buttons, sliders, etc.
Recent developments: News and history
VPython wiki: FAQ, questions and answers, contributions from users
User forum: (There are archives of a mailing list that was used until Feb. 2013.)
Contributed programs: Interesting and useful programs contributed by users
For developers: For those interested in contributing to further development of Python
Python web site: The Python programming language, on which VPython is based
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VPython

Glowscript

http://vpython.org/contents/docs/index.html

VPython

Version 6.05
based on wxPython

Changes from VPython 5

VPython 6 will run almost all old VPython programs correctly without change. The following details about changes may be important in a few unusual cases.

An animation loop must contain a rate or sleep statement, which limits the number of loop iterations per second as before but also when appropriate (about 30 times per second) updates the 3D scene and handles mouse and keyboard events. Without a rate or sleep statement, the scene will not be updated until and unless the loop is completed. Most animation loops already contain a rate statement anyway, to make the animation not run too fast.

You should use the new function sleep rather than time.sleep. The new function periodically renders the scene and processes mouse events, making it possible to continue using zoom and rotation whereas time.sleep does not do this. Programs that use time.sleep will work, but you won’t be able to zoom or rotate during the sleep period.

You must import visual or vis before importing graph or controls or filedialog, which most users have always done anyway.

Be sure to read what’s new in VPython 6.

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How to learn about VPython
Strategy

- start with bouncing ball example and change it
- skim through the help files
- see www.SOSAAPT.weebly.com for an example beginning exercise (used with students with and without programming experience)
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http://www.glowscript.org

- Examples
- Help
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GlowScript is an easy-to-use, powerful environment for creating 3D animations and publishing them on the web. Here at glowscript.org, you can write and run GlowScript programs right in your browser, store them in the cloud for free, and easily share them with others.

**New in GlowScript 1.0: print, file operations**

The Help explains which browsers support GlowScript and provides full documentation.

See the **Example programs**.
To get started writing your own programs you need to Sign in.
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**GlowScript**

**3D animations in a browser**

Version 1.0

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GlowScript ("Graphics Library on Web") makes it easy to write real-time navigable 3D animations that run in a browser. It is based on the JavaScript language plus the WebGL 3D graphics library, both of which are included in most modern browsers.

The design of GlowScript is based on that of VPython. Development of GlowScript was initiated by David Scherer and Bruce Sherwood.
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