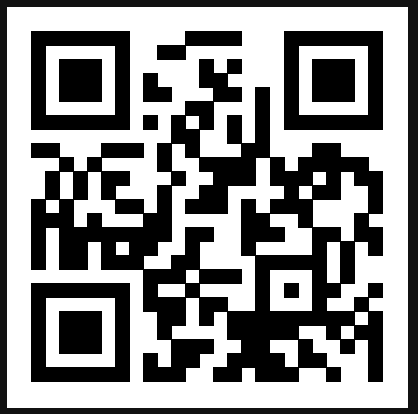
How I built a Ray Tracer in Pure Python

by: Arun Ravindran

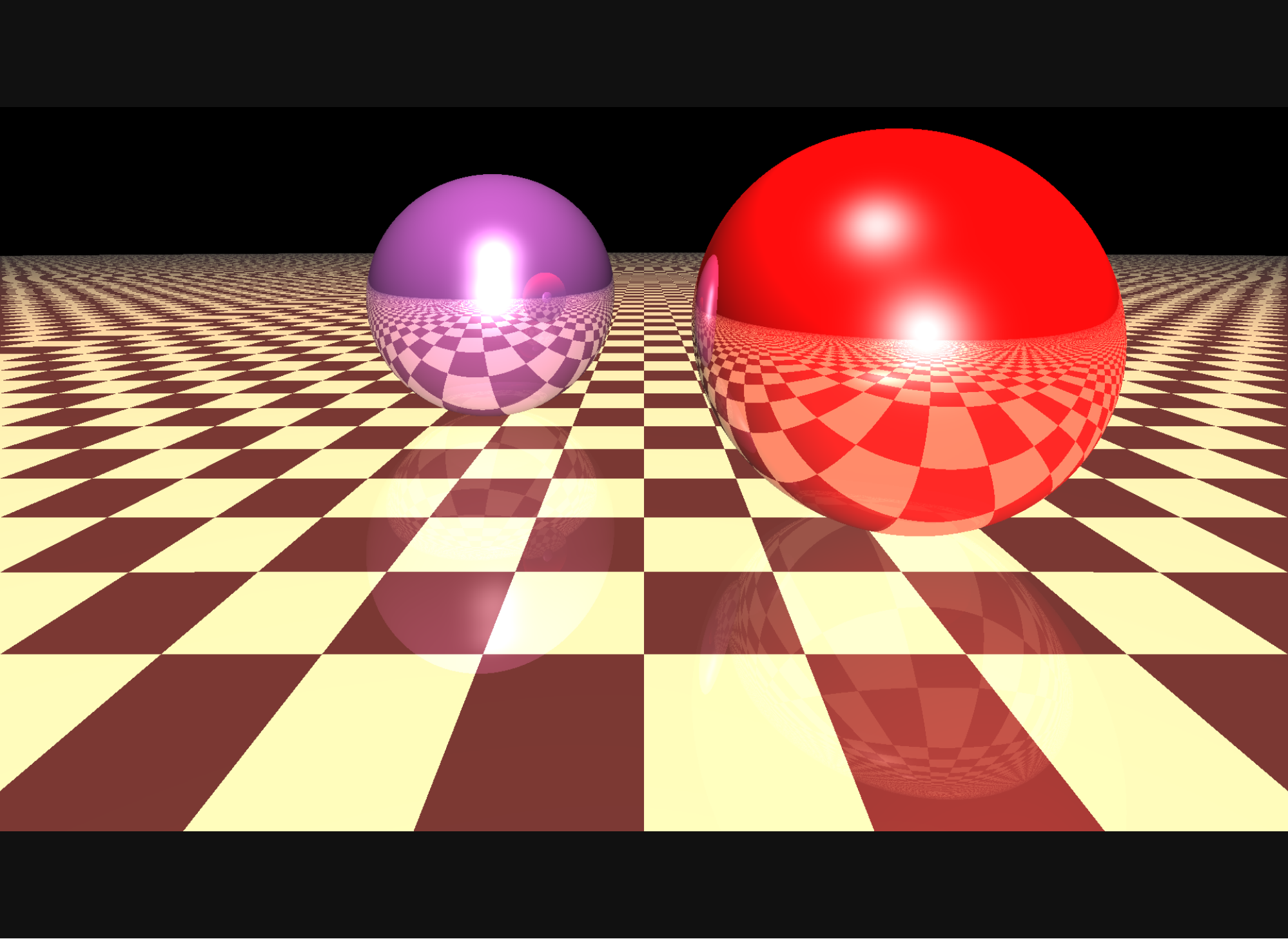
Background

Puray

6 parts, 12 months, 17K views



http://bit.ly/puray



always wanted to do something like this
but never had the guide to get me started
It is one of the best turtorial I have ever seen
love the opening jokes.
This is mindblowing! Really like the way you teach
like that you demonstrate the whole development process
beginner should learn this type of concept
I've been programming in python for 10 years, but never worked wit
vectors and images so this is a fun little weekend project for me .

Overview

- Motivation
- Implementation Challenges
- Art of Video
- Tools
- Post-mortem

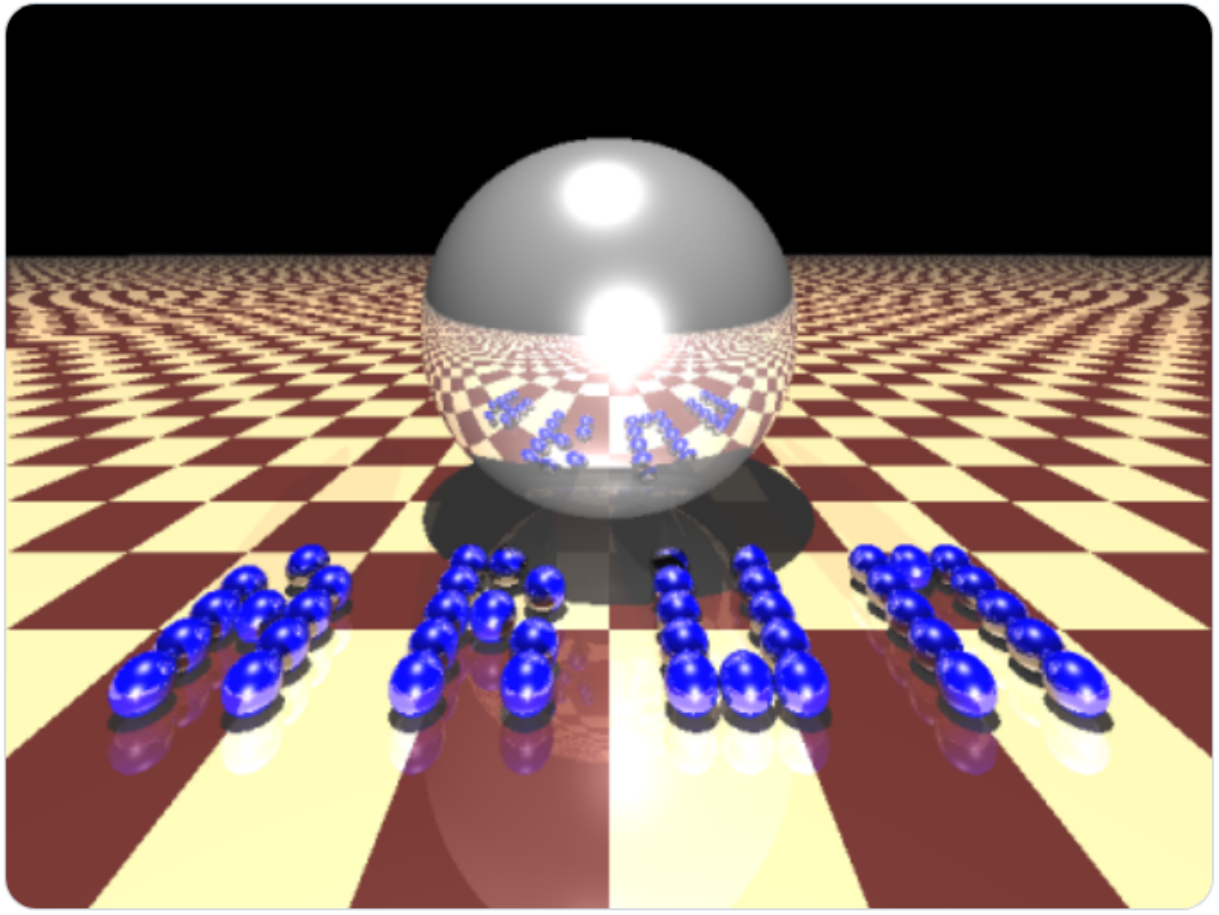
About me

Author, Speaker, Engineer, Products Person, Dad

Project Motivation

Arun 'Rocks' Ravindran
@arocks

Wrote a toy raytracer over the weekend in Python and Numpy. ~200 lines. Render time about 10 mins. Shiny ✨😆



10:53 PM · Apr 12, 2015 · Twitter Web Client

Python Learning Materials are of two kinds

Python Learning Materials are of two kinds

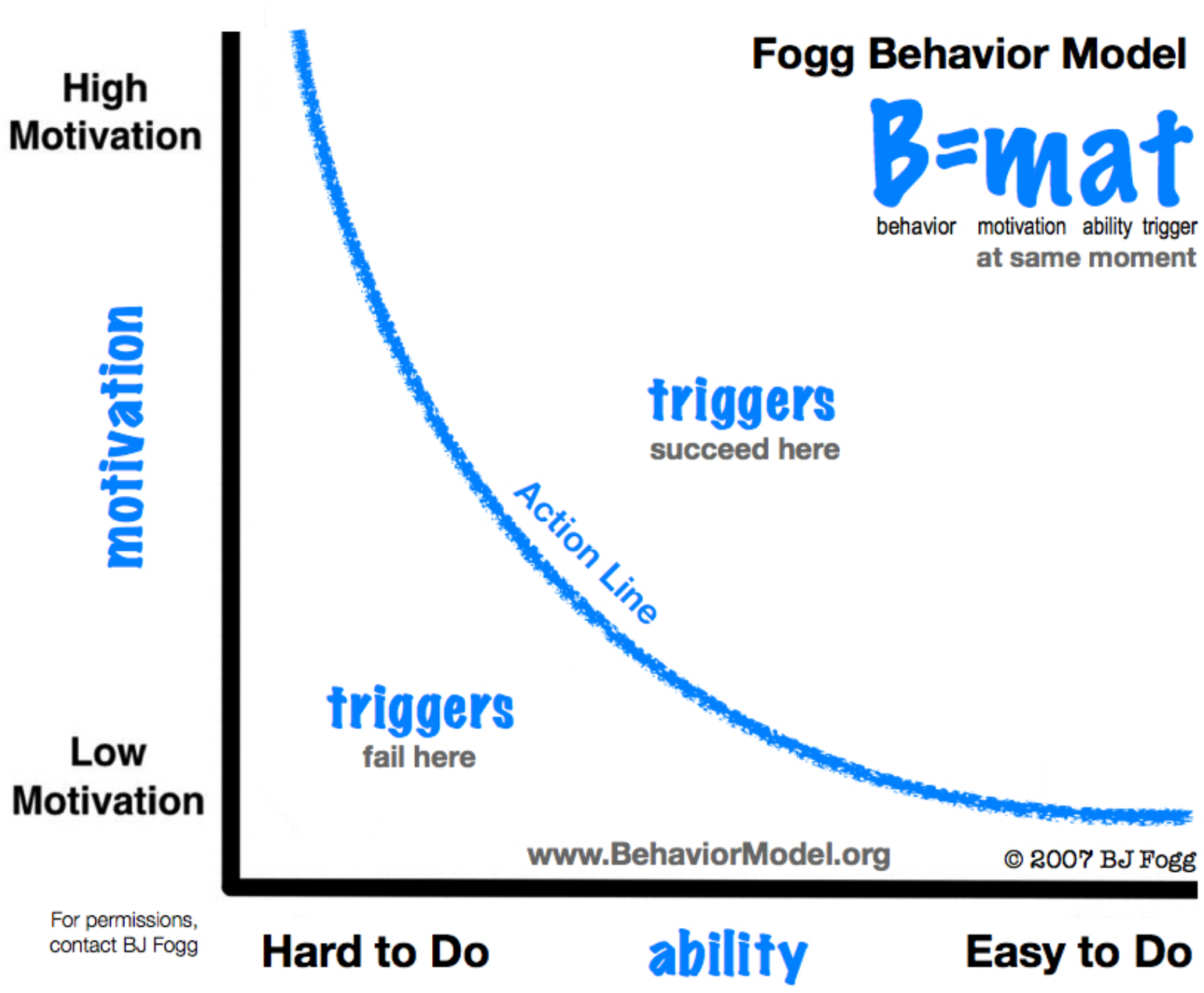
- Elementary level

Python Learning Materials are of two kinds

- Elementary level
- Advanced level

Intermediate?

What's the problem with most learning content?


Fogg Behavior Model
B=mat
behavior motivation ability trigger
at same moment
High Motivation
motivation
Low Motivation
triggers
succeed here
Action Line
triggers
fail here
www.BehaviorModel.org
© 2007 BJ Fogg
For permissions, contact BJ Fogg
Hard to Do
ability
Easy to Do

Is it Easy? Cool?

Existing Ray Tracer Implementations

Water, water, everywhere...

- https://github.com/benc-uk/rayscale
- https://github.com/ssloy/tinyraytracer
- https://github.com/NMVHS/PyTracer

Challenges in Python

Challenges in Python

- Plenty of Data structures - dicts, classes, slots

Challenges in Python

- Plenty of Data structures - dicts, classes, slots
- Need to use shallow OOP

Challenges in Python

- Plenty of Data structures - dicts, classes, slots
- Need to use shallow OOP
- Automatic int to float conversions

Challenges in Python

- Plenty of Data structures - dicts, classes, slots
- Need to use shallow OOP
- Automatic int to float conversions
- 🤧 Slow when it is CPU intensive

Art of Video Presentations

Process

Process

- Coding

Process

- Coding
- Script

Process

- Coding
- Script
- Screen Recording

Process

- Coding
- Script
- Screen Recording
- Face Recording

Process

- Coding
- Script
- Screen Recording
- Face Recording
- Editing

Process

- Coding
- Script
- Screen Recording
- Face Recording
- Editing
- Post-production

Process

- Coding
- Script
- Screen Recording
- Face Recording
- Editing
- Post-production
- Marketing

Getting Skilled

Structuring and Scripting

Keeping them engaged

Each Episode...

- Each part solves a problem.
- Start with problem statement
- Give clues (and tease output)
- Allow them to solve themselves
- Show coding
- Exercises: Something extra to do

Visual Storytelling

Make use of the medium

Video is not a narrated blog post.

Find novelty

Tools and Technologies

Gone are the days of a simple screen recording or screencasts.

Start Simple

Hardware I used

- SLR Camera
- Tripod
- Webcam
- USB Mic
- Lavalier mic
- Lighting

Software I used

- OBS Studio
- KDEnlive
- Inkscape
- GIMP
- Blender
- IP Cam
- ...Python

Reaching the Audience

- Reddit
- Hacker News
- Twitter

Project Post-mortem

Project Post-mortem

- ✓ Showing Mistakes

Project Post-mortem

- ✓ Showing Mistakes
- ✓ Finding a Niche / Timing

Project Post-mortem

- ✓ Showing Mistakes
- ✓ Finding a Niche / Timing
- ✕ Delay between episodes

Project Post-mortem

- ✓ Showing Mistakes
- ✓ Finding a Niche / Timing
- ✕ Delay between episodes
- ✕ Bonus content

Takeaway

"If you can't explain something to a first year student, then you haven't really understood."

– Richard P. Feynman

Questions?

Connect with Me

- Web: arunrocks.com
- Twitter: twitter.com/arocks
- YouTube:
  - youtube.com/c/ArunRavindranRocks/