

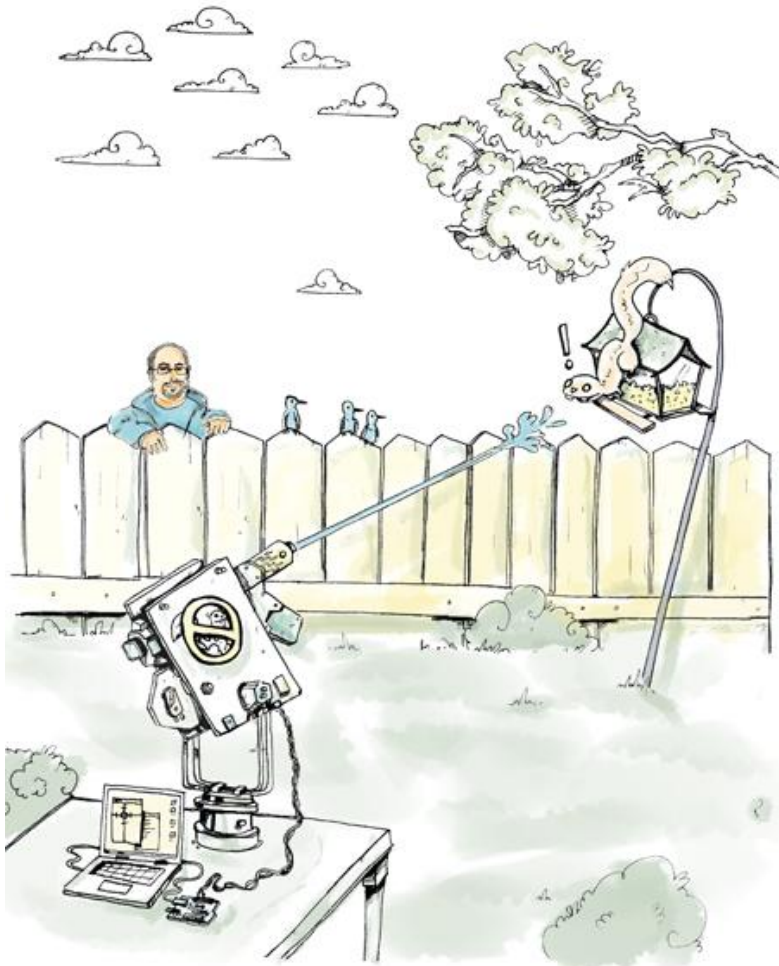
Planning and Tending the Garden

The Future of Early Childhood
Python Education

Kurt Grandis
PyCon 2013

What is this all about?

Militarizing Your Backyard, Oh My!



Popular Mechanics



GIZMODO





Militarizing Your Backyard, Oh My!

Lesson Learned:
People Don't Care For:
Squirrels

Deer

Raccoons

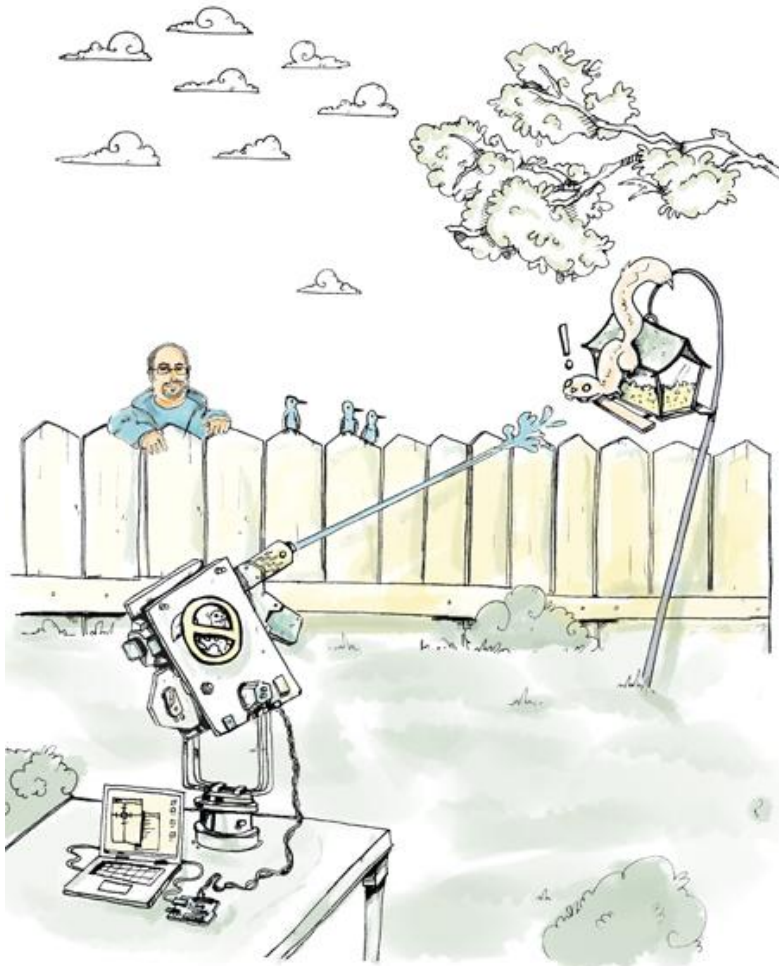
Bears

Heron

Kids

Rabbits

...



How Can I Get My Child Involved?

Me...

- I shoot squirrels
- Educational technology
- Neurobiologist
- Active community outreach
- 2 young kids = home laboratory
(lax ethical review board)
- I like to build things and teach others to....



Let's Start...

Robots...

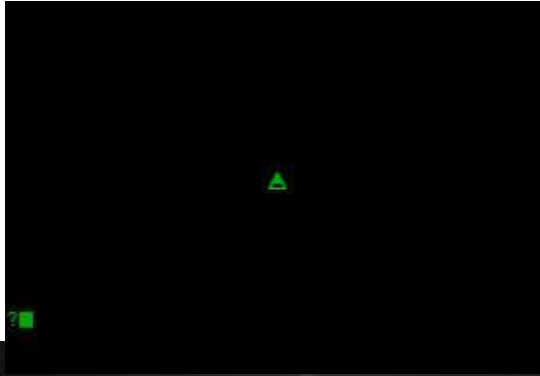


Sweet. Let's Build a Robot

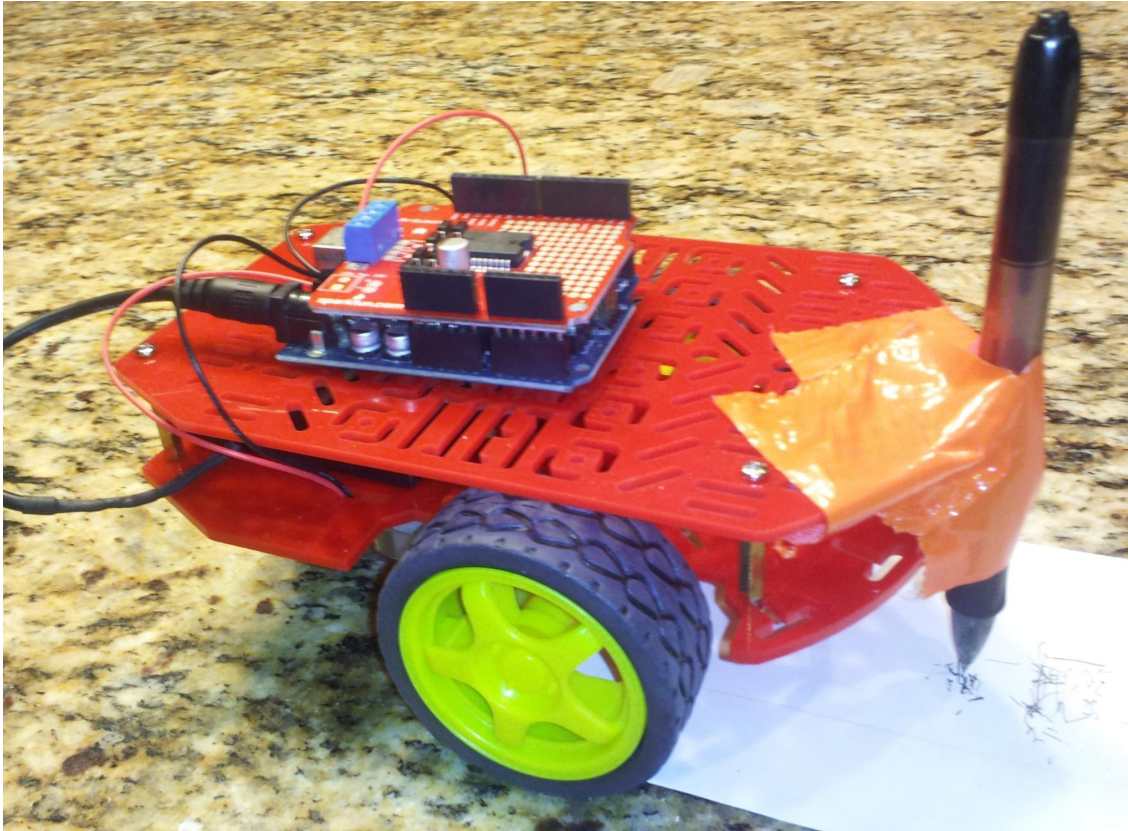
- Give kids the ability to directly control the robot
 - type and issue commands
 - immediate feedback and execution
- Ability to manipulate or alter the environment

Let's build it...

1969 Called...



Build a Turtle Today



> car.forward(10)

> car.right(45)

> forward(10)

> right(45)

> circle(10)

Lego Mindstorms

nxt-python

pynxc

- Mobility
- Sensors
- Graspers
- Cooool

EV3...



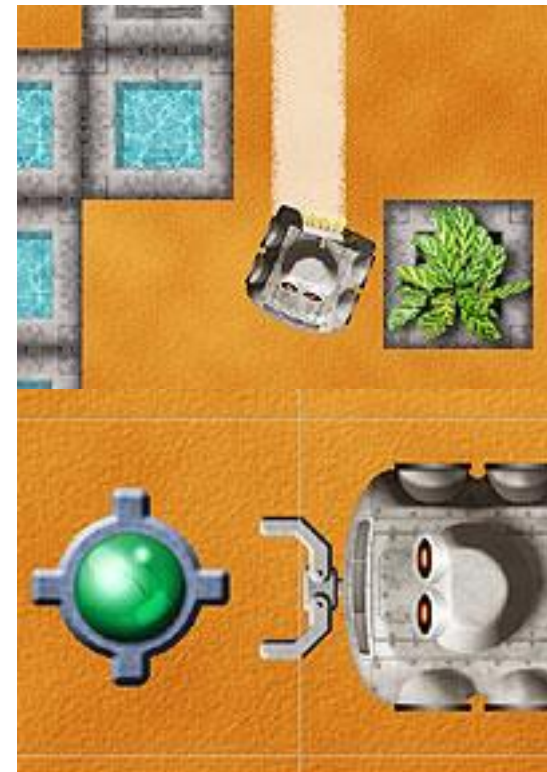
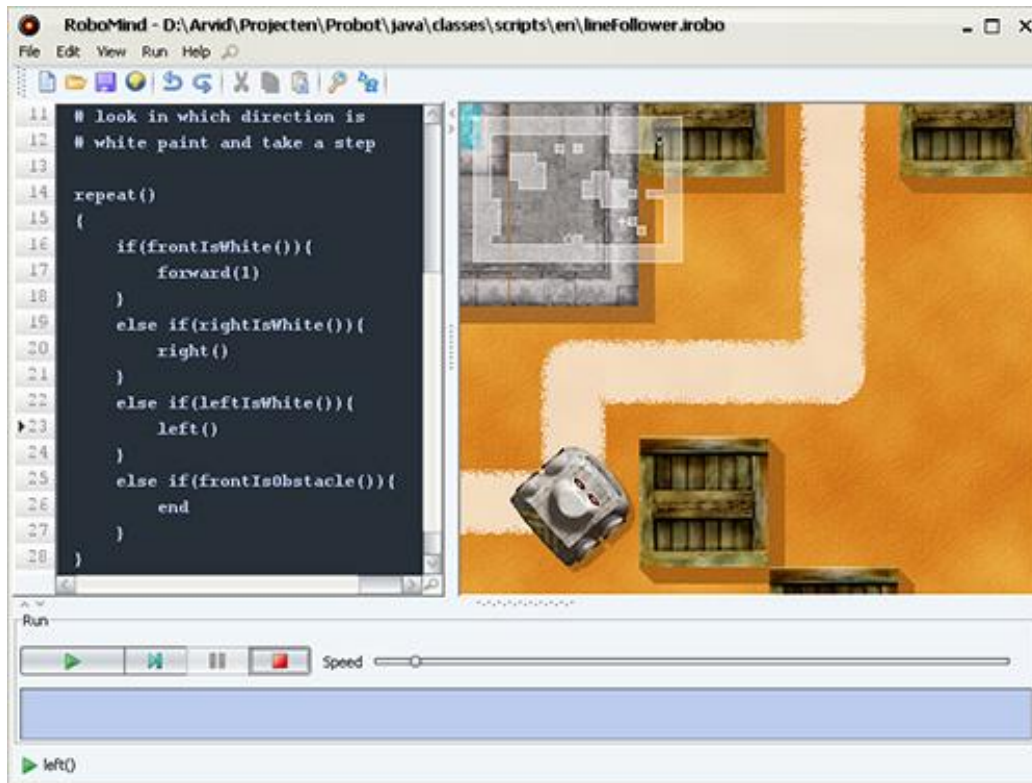
Robot Simulator?

- That's still pretty expensive
- I have to build something? with my hands?!

Programming/Logic Simulator Games

- Robot Odyssey
- Rocky's Boots
- Omega
- RobotWar

RoboMind



<http://robomind.net>

Enough with the Robots...

SCRATCH



Pong- Scratch

SCRATCH File Edit Share Help

Motion Control Looks Sensing Sound Operators Pen Variables

Ball x: 60 y: -45 direction: 23

Scripts Costumes Sounds

when clicked
forever
change x by del_x * Speed
change y by del_y * Speed
if x position of Ball < -225
change RightScore by 1
broadcast Start
if x position of Ball > 225
change LeftScore by 1
broadcast Start
if y position of Ball < -165
set del_y to del_y * -1
if y position of Ball > 165
set del_y to del_y * -1

Pong
Left Score Speed Right Score
x: -1310 y: -658

Ball Left Right
Stage

The image shows the Scratch IDE interface for a Pong game. The main workspace displays a soccer ball sprite named 'Ball' at coordinates (60, -45) with a direction of 23. The script area contains a 'when clicked' event followed by a 'forever' loop. The loop includes blocks for changing the ball's x and y positions based on its direction and speed, and conditional logic to update scores and broadcast a 'Start' message when the ball hits the boundaries. The stage area shows a white background with a soccer ball sprite and two empty rectangular areas labeled 'Left' and 'Right' for score indicators. The top right corner of the stage shows the current coordinates of the ball as x: -1310 y: -658.

TurtleBlocks

The screenshot displays the TurtleBlocks programming environment. The script on the left includes the following blocks: start, clean, back (200), set pen size (50), repeat (10) loop containing forward (50), set color (color + 10), pen up, read pixel, show heap, right (90), repeat (3) loop containing forward (30) and show (pop), forward (-90), left (90), and pen down. A vertical bar chart on the right shows a color gradient from red at the bottom to purple at the top, with a small turtle icon at the top. To the right of the bar chart is a 10x3 grid of binary digits (0s and 1s). A yellow tooltip at the bottom shows the coordinates [0, 1, 0].

0	1	0
0	1	0
1	1	0
1	0	0
1	0	0
1	0	0
1	0	1
0	0	1
0	0	1
0	1	1

[0, 1, 0]

Games

"Game First" Development

Compelling example to modify

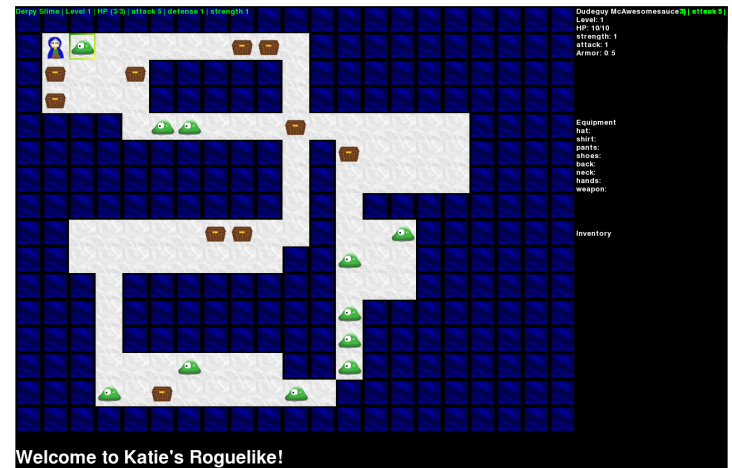
Games with PyGame

Katie Cunningham's Rogue Series

<https://github.com/kcunning/Katie-s-Rougish-PyGame>

<http://therealkatie.net/blog/tags/pygame/>

Al Sweigart's Pygame Book



Traditional Programming Tutorials

```
>>> while True:
...     print "Hello World!"
...
Hello World!
Hello World!
Hello World!
Hello World!
Hello World!
Hello World!
```

Traditional Programming Tutorials

```
>>> while True:
...     print "stinky butt"
...
stinky butt
stinky butt
stinky butt
stinky butt
stinky butt
stinky butt
```

Python Programming Books

Invent Your Own Computer Games with Python

2nd Edition

A beginner's guide to computer programming in Python



Al Sweigart

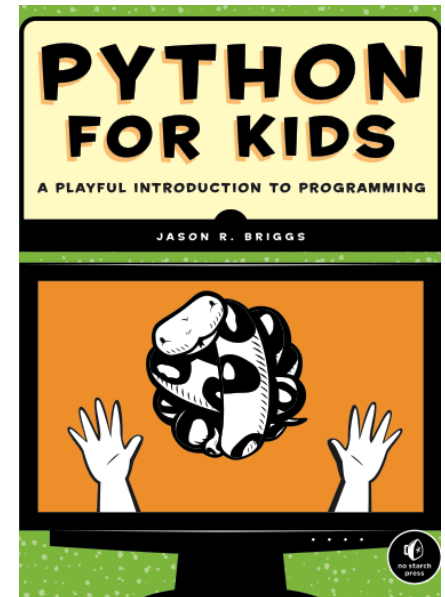
Invent Your Own Computer Games With Python

- *Al Sweigart*

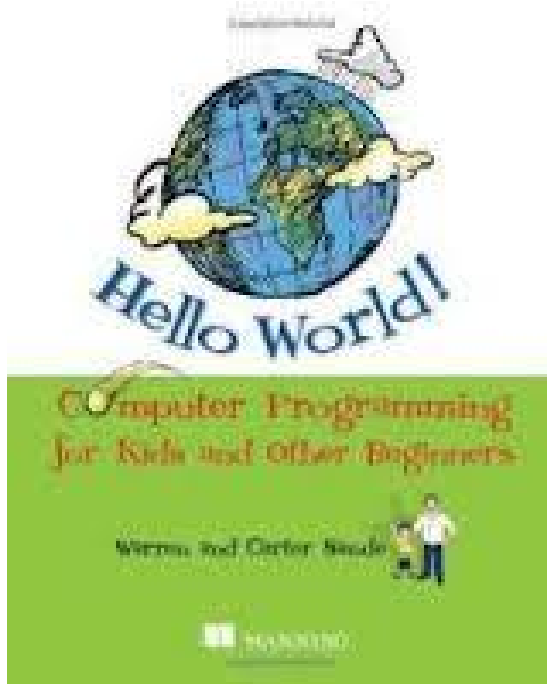
Python For Kids

A Playful Introduction to Programming

- *Jason R Briggs*



Python Programming Books



Hello World! Computer Programming for Kids and Other Beginners

- *Warren and Carter Sande*

Computational Thinking

Computer Independent Problem-Solving Skills

- Decomposition
- Pattern Recognition
- Abstractions
- Algorithm Design

<http://www.google.com/edu/computational-thinking/>

How Young?

Ideas? What Can We Do?

Python-Based Scratch-Like Environment

Python-based RoboMind-like Simulator

Questions? Ideas

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