Snap! (by Berkeley)



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Evolution of Scratch

"Scratch for the Computer Scientist"

Object orientation

Many extensions/libraries

Support for code documentation

Support for debugging

Concurrency

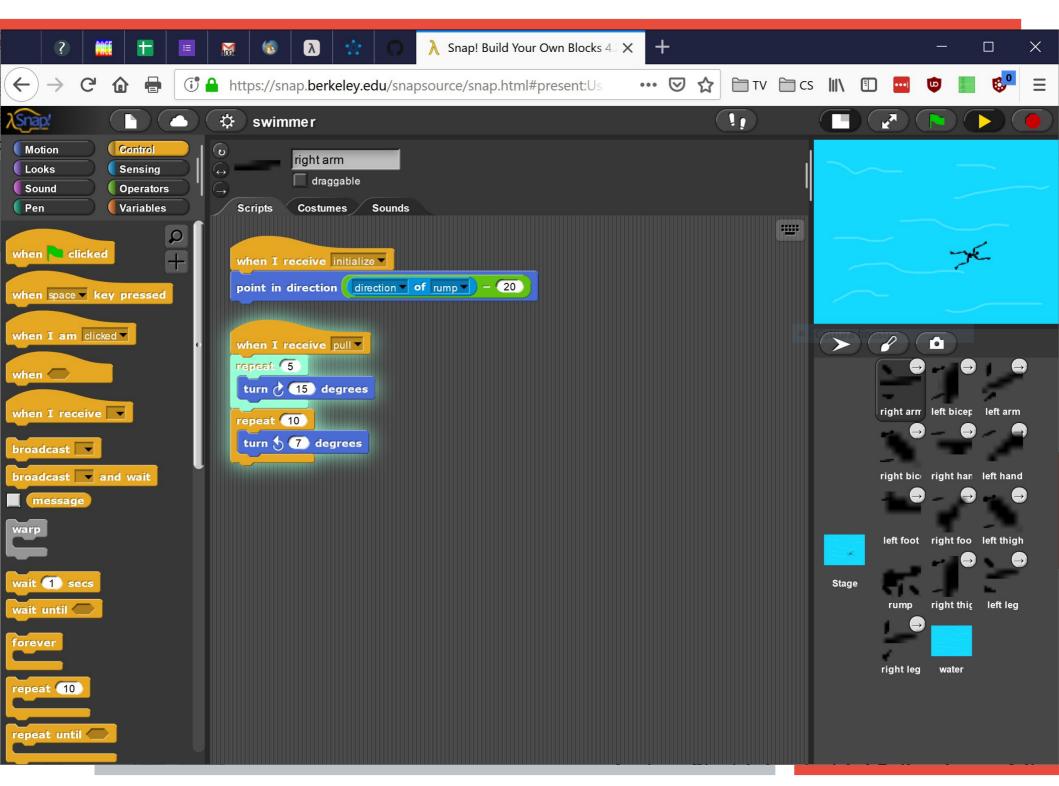
Coroutines

...

Music

Relative motion of sprites

HTML5 web app Easy local install (just unzip)



Snap! improves many Scratch language constructs

Scratch

- NO complex data
- NO functions (only procedures)
- NO local variables
- NO references to clones
- NO call methods
- NO libraries

<u>Snap!</u>

- Objects, Lists, Lists of Objects Functions (return) Local variables (easy recursion) References to clones a new clone of myself Call methods tell Sprite to valk a steps Global blocks (library of functions)
- Inheritance of clone properties
- "Lambda" functions



Relative motion of Sprites/Agents

Relatively easy to build: <u>collective motion</u> of many clones (fireworks, snow, birds, ...) <u>coordinated motion</u> of agent with many parts (man walking)



Example: Swimmer

- Main motion: body trunk and head (**bumping** to the walls)
- Attached to body: thighs and biceps (**rotating** w.r.t. the body)
- Attached to thighs and biceps: arms and legs (kept in the body direction)
- Attached to arms and legs: hands and feet (**rotating** w.r.t. the arm and leg)

Easy recursion



Standard Libraries/Extensions

Loops and compositions

List operations

Generators (lazy lists)

Multiple args operators

Web access

Words manipulation

Switch/case

RGB/HSV colors

Handle big lists

Frequency distribution analysis

Try/catch **Multiline input GUI** settings Bignum, rational, complex Text to speech Animations Image manipulation Audio generation Json Parallelization and more

Other extensions

SOFTWARE:

Cellular automata (Cellular) Graphs (Edgy) NLP (NLTK wrapper)

HARDWARE: Orbotix Sphero Lego NXT (but not EV3 yet) Wiimote Arduino **Raspberry Pi Speech synthesis LEAP** Finch, Hummingbird

Many programming styles!

Functional

Lists, filters, map, coroutines

Procedural

Concurrent

Concurrent execution

Message events

Object-oriented/Agent based

Agent properties, Agent methods

Clones: references to created clones, inherited properties

