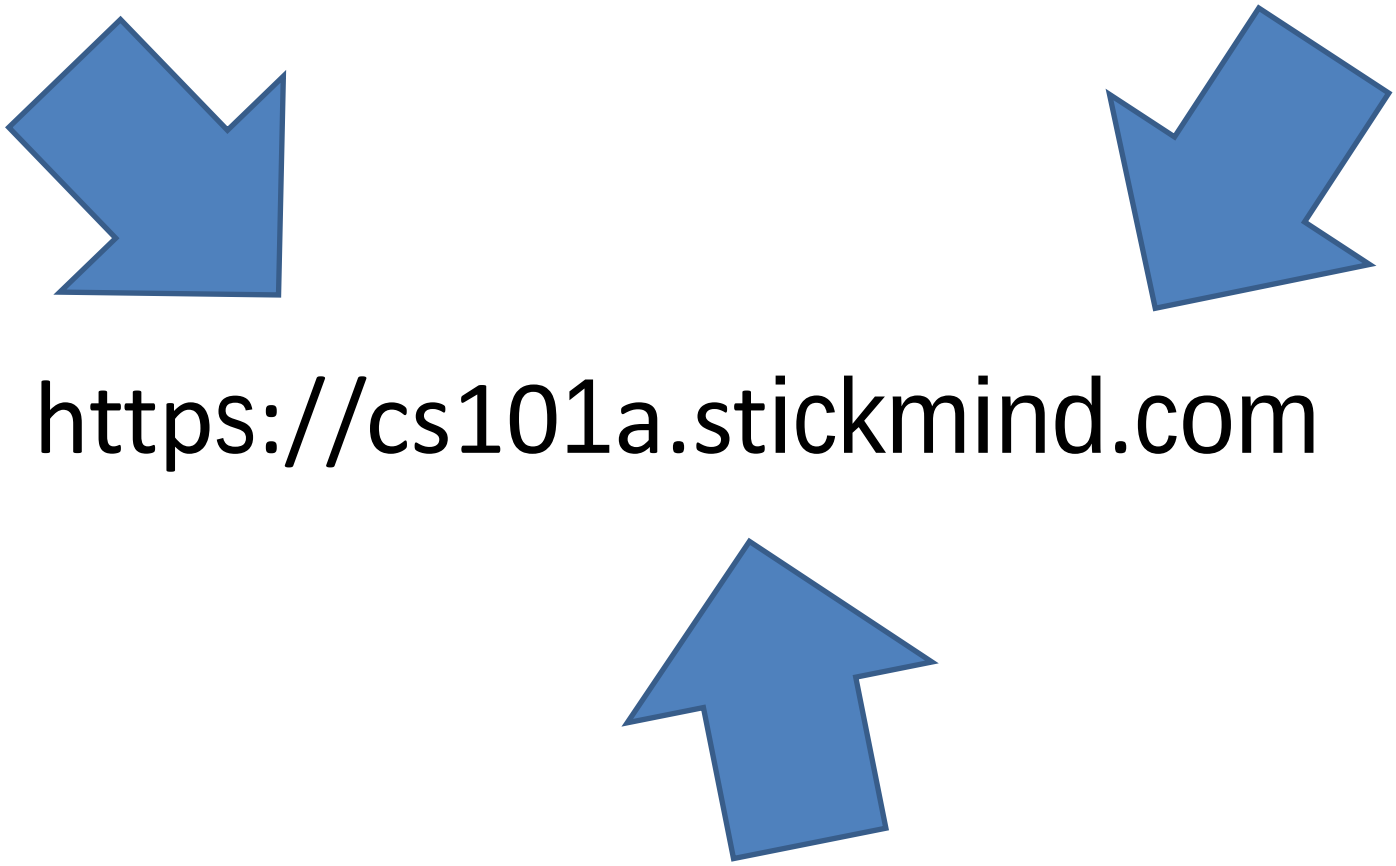
Course mechanics

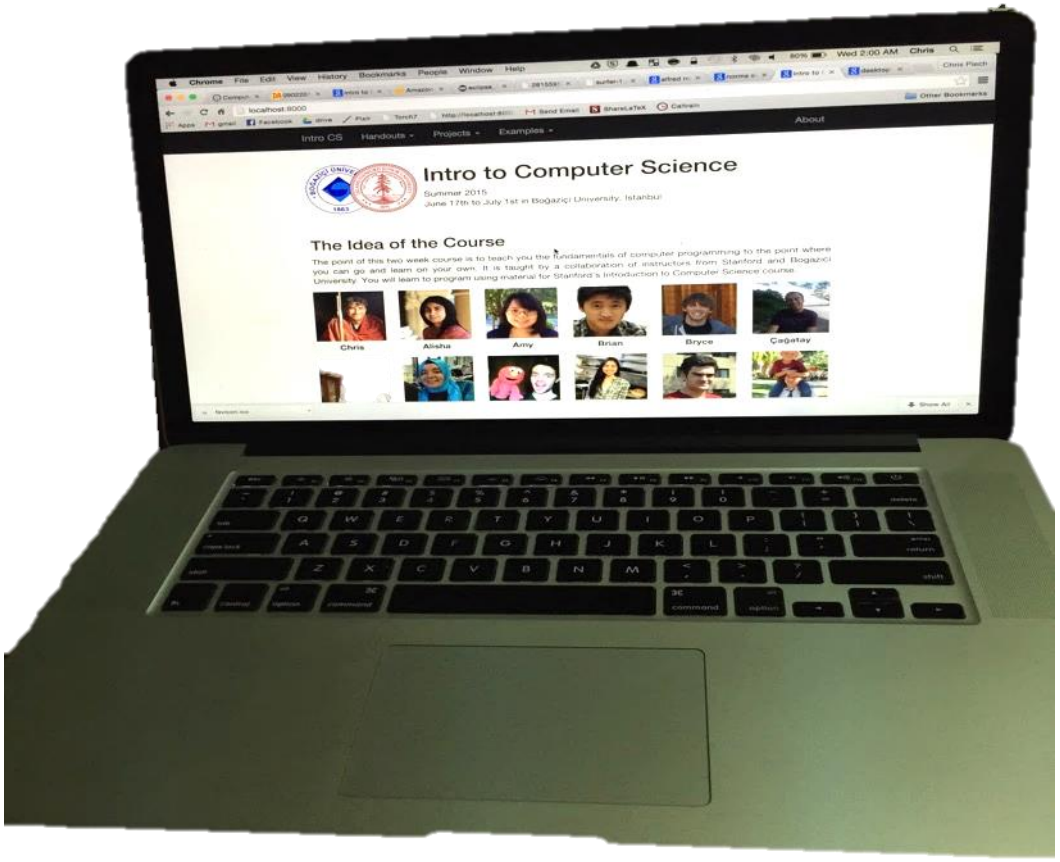
(This is a brief version.
Please read the handout for full details).

Course Website



https://cs101a.stickmind.com

Prerequisite Test



Online Text Books

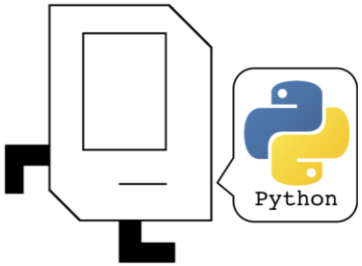
Karel Reader

compedu.stanford.edu/karel-reader/docs/python/en/intro.html

Karel

1 - Meet Karel
2 - Programming
3 - New Functions
4 - Decomposition
5 - For Loops
6 - While Loops
7 - Conditionals
8 - Refinement
9 - SuperKarel
10 - Reference
11 - Code

Karel the Robot

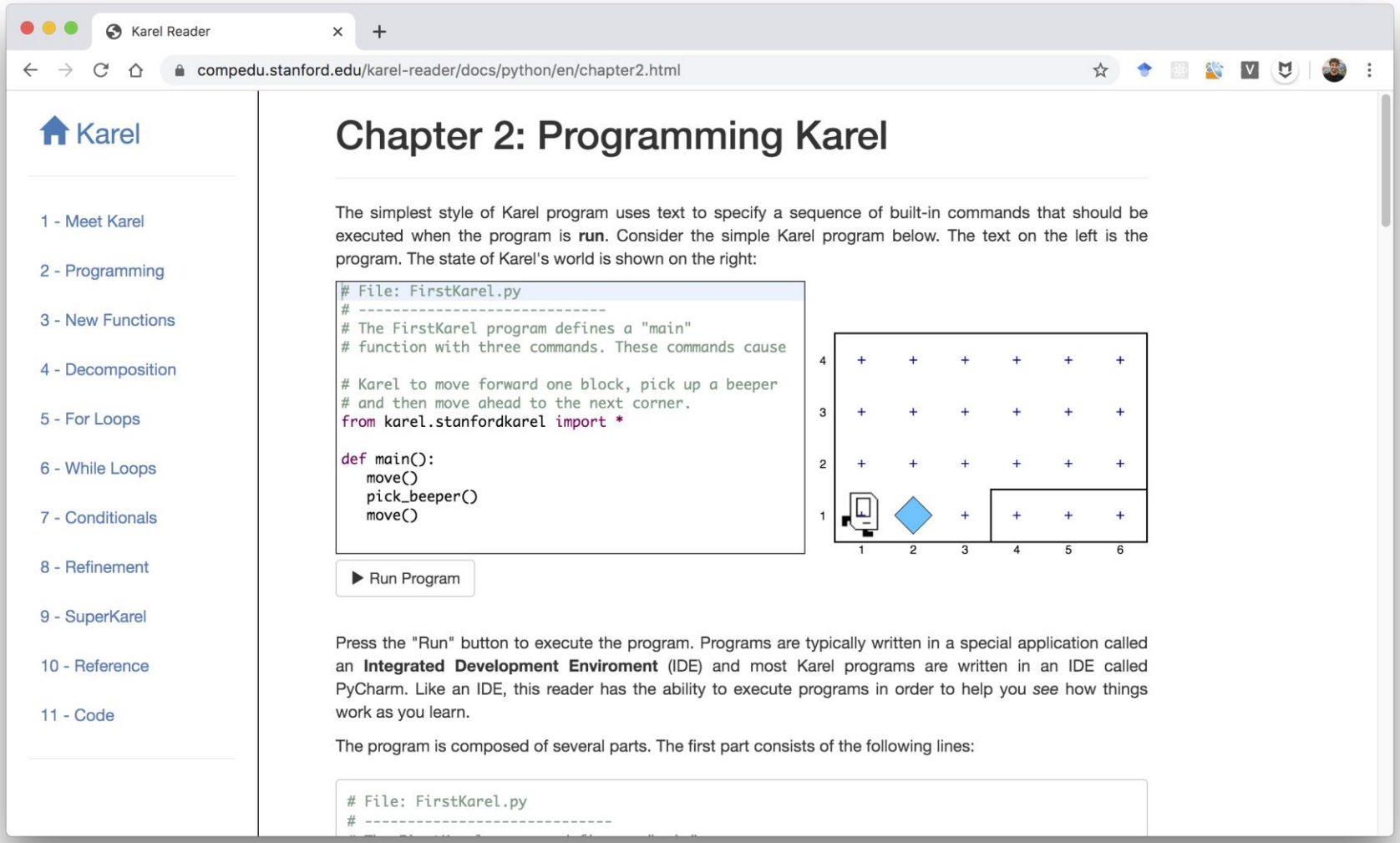


Learns Python

Chris Piech and Eric Roberts
Department of Computer Science
Stanford University
January 2019

▶ Get Started

Online Karel Reader



What is CS101A?

Computer Science

"Computer science is no more about computers than astronomy is about telescopes, biology is about microscopes or chemistry is about beakers and test tubes. Science is not about tools, it is about how we use them and what we find out when we do."

— Michael Fellows and Ian Parberry

"You must unlearn what you have learned"

— Yoda

Learning Goals

- ***Learn how to harness computing power to solve problems.***
- To that end:
  - Explore fundamental techniques in computer programming.
  - Develop good software engineering style.
  - Gain familiarity with the Python programming language.

There are a lot of cool programs you may one day write

Computer Graphics

Pat Hanrahan, one of the founders of Pixar is a professor here.
He recently won the Turing Award – the Nobel Prize of Computer Science.

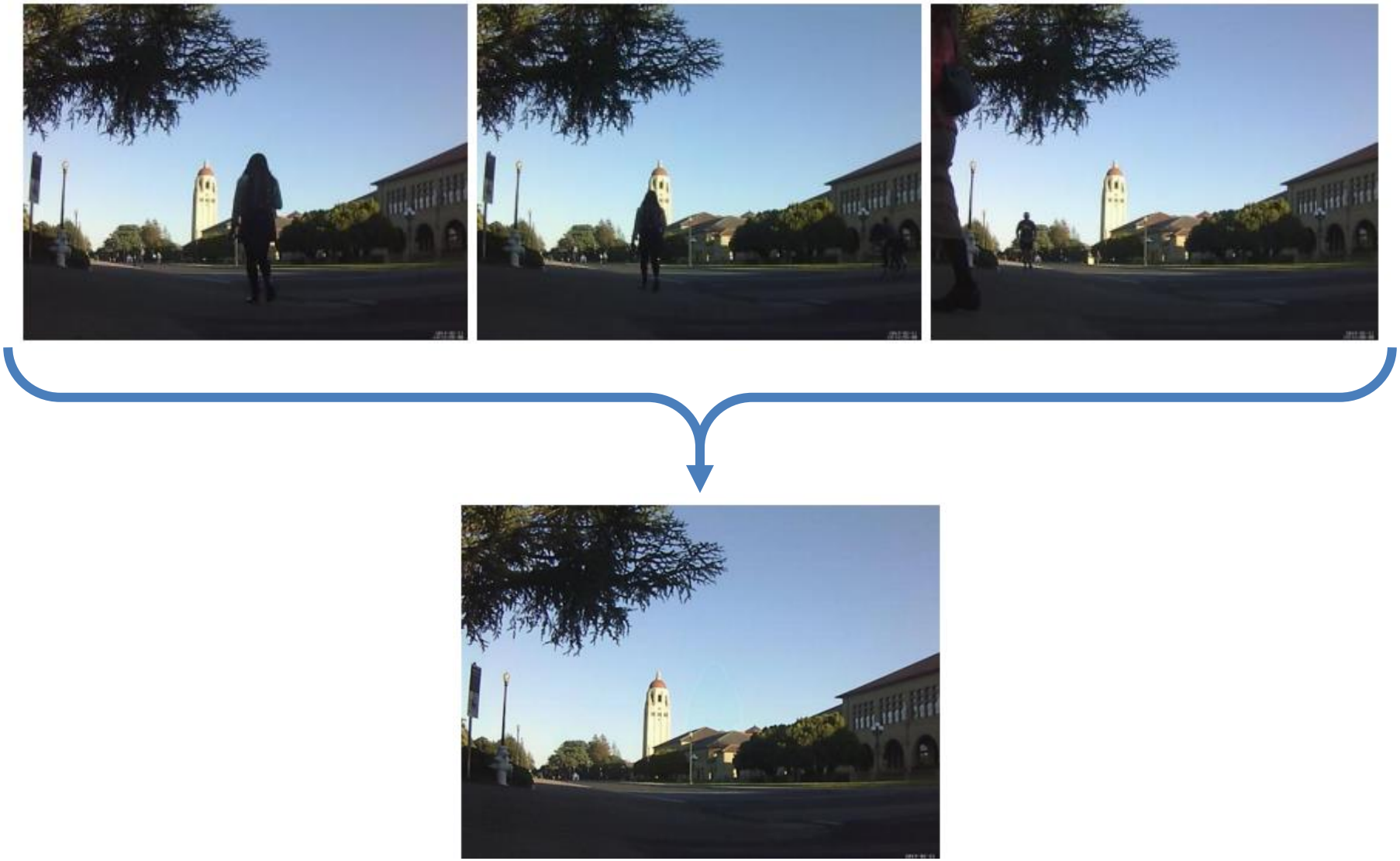
Consumer Applications

Computing in Medicine

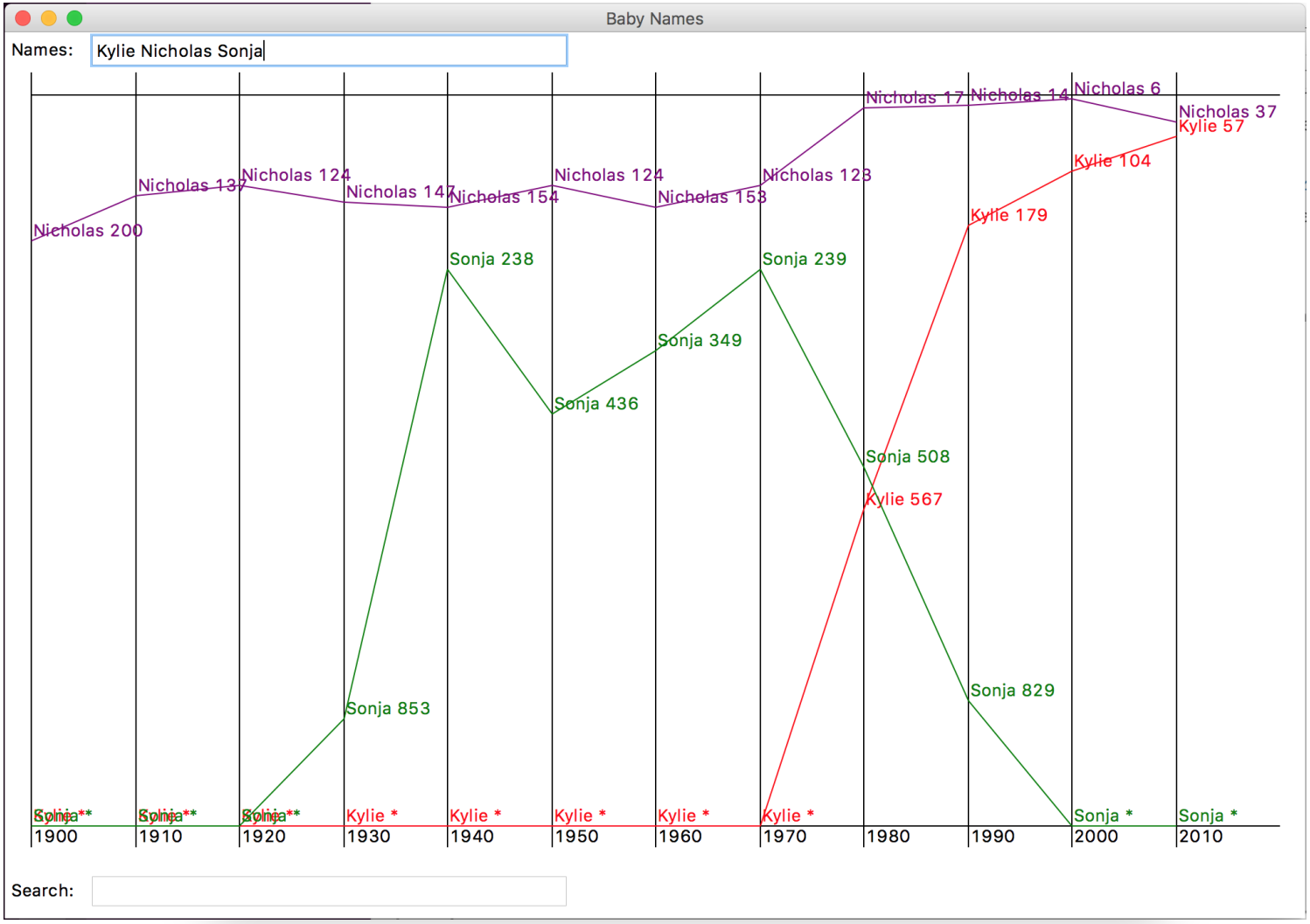
Self-Driving Car

If only we could program self-driving cars…

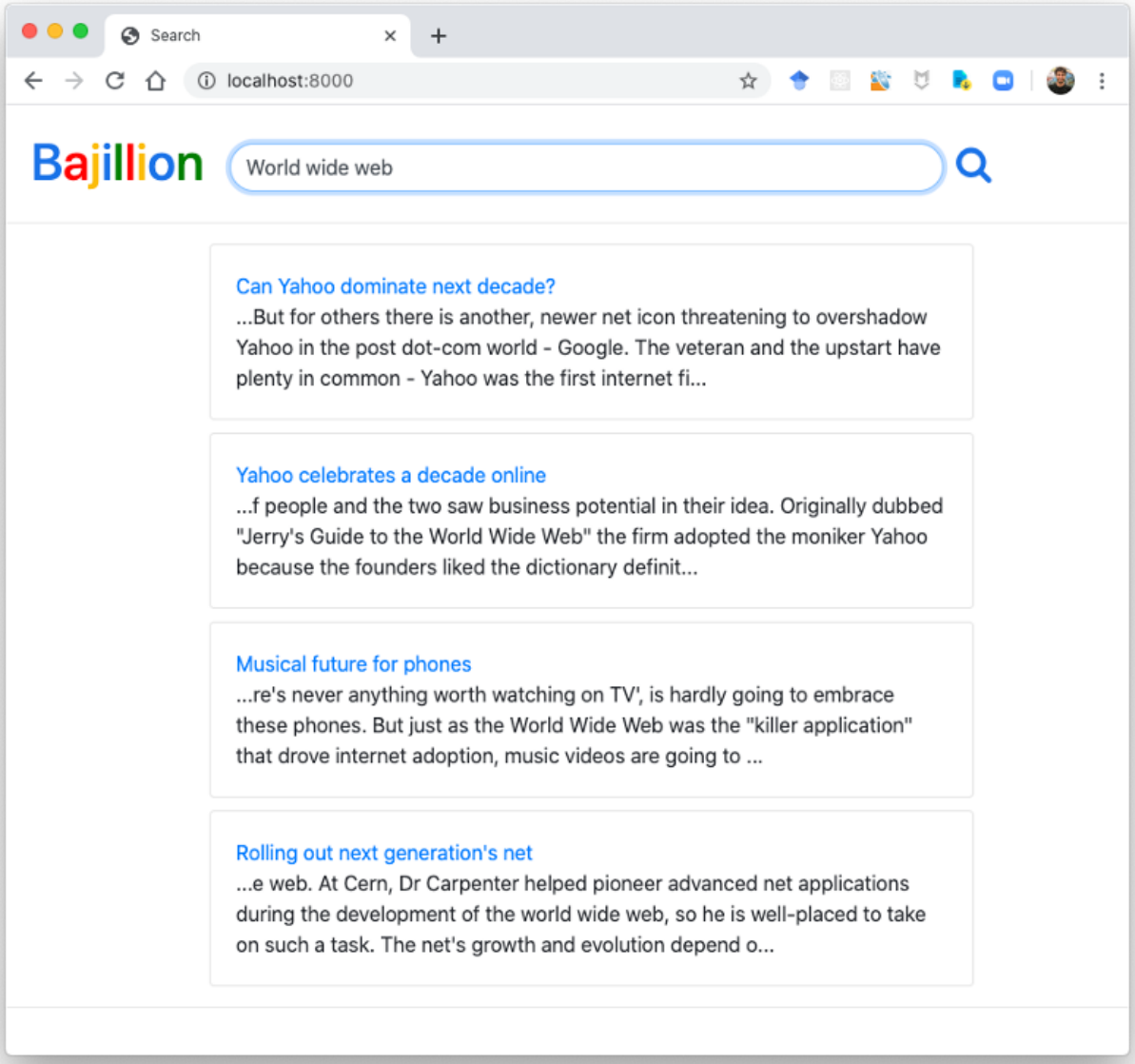
Image Transformation



Data Science



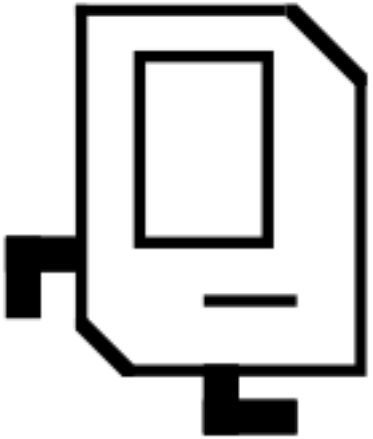
Internet Applications



Strive for Everyone to Succeed

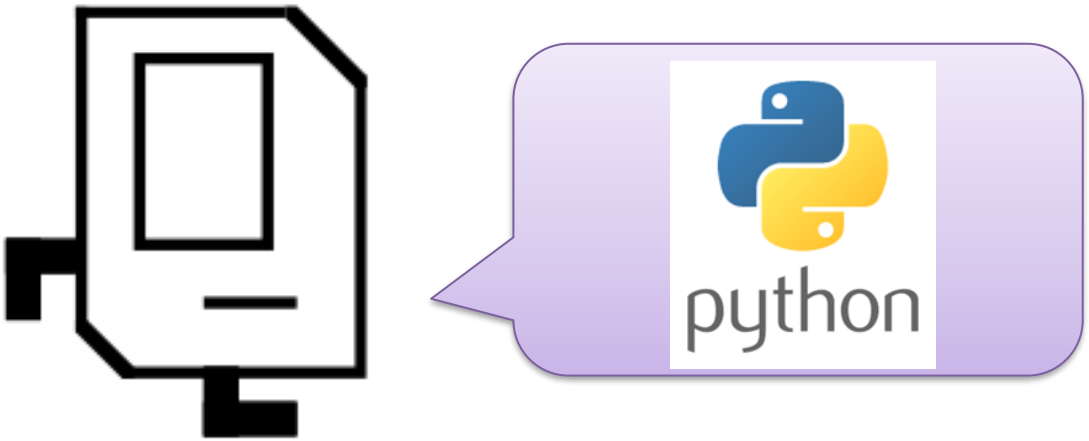
Lets Get Started

Meet Karel the Robot

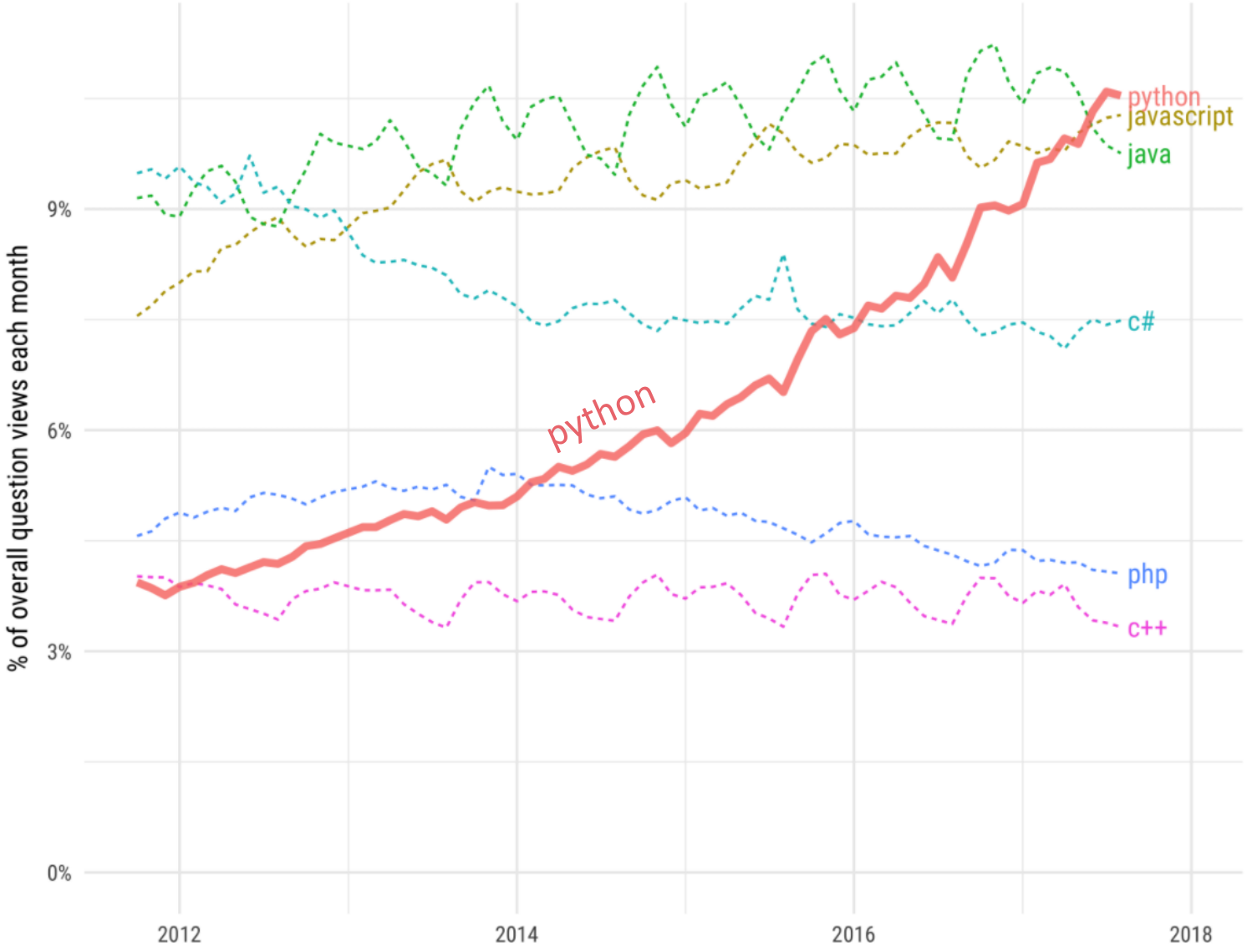


Good morning

Karel Speaks Python



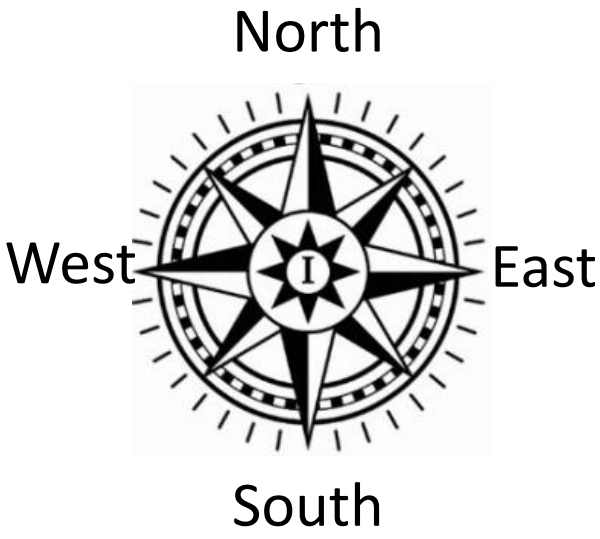
Why Python?



https://stackoverflow.blog/2017/09/06/incredible-growth-python/

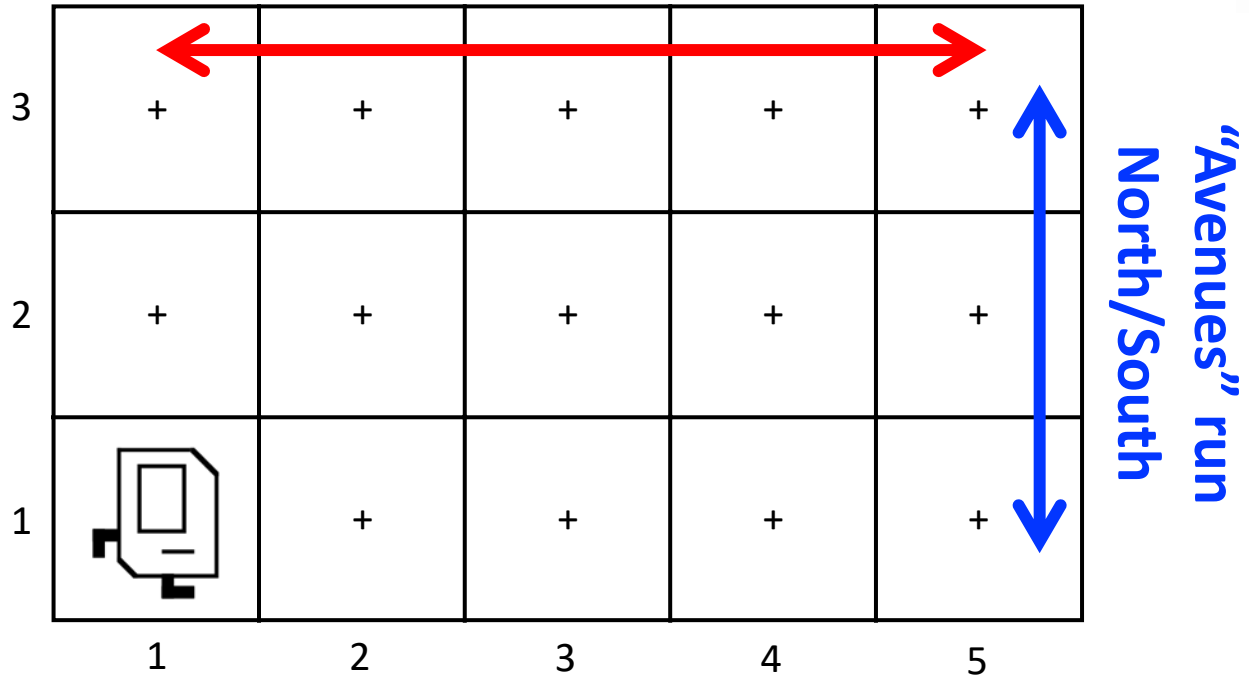
Guido van Rossum

Karel's World

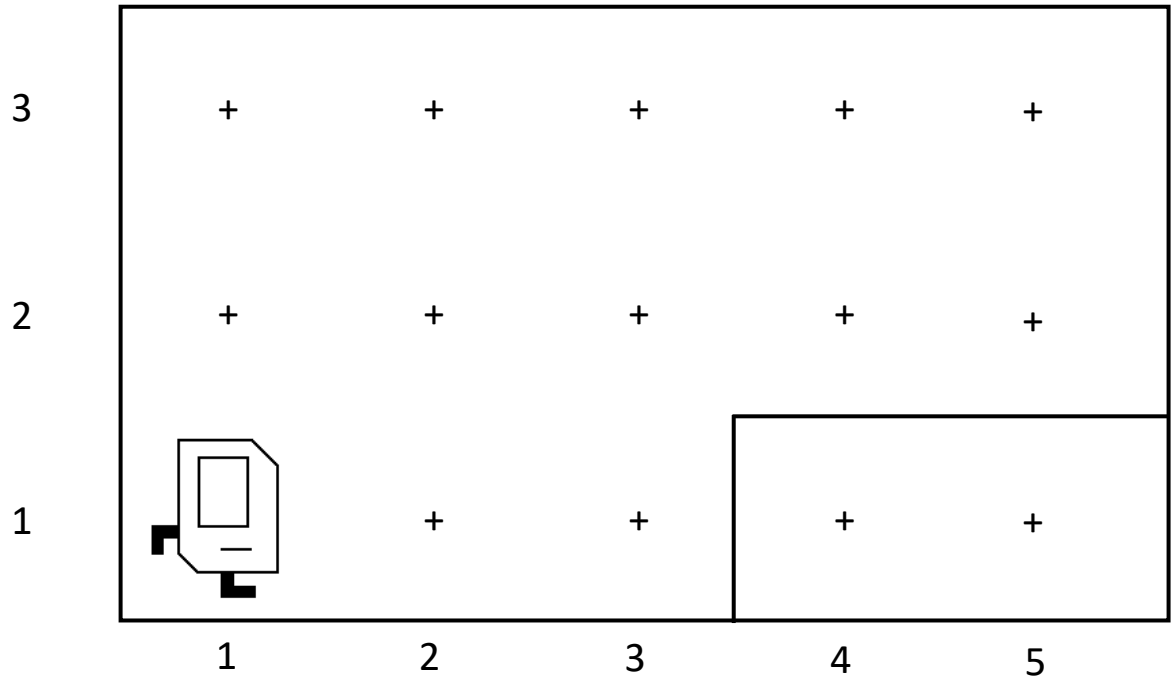


"Streets" run East/West

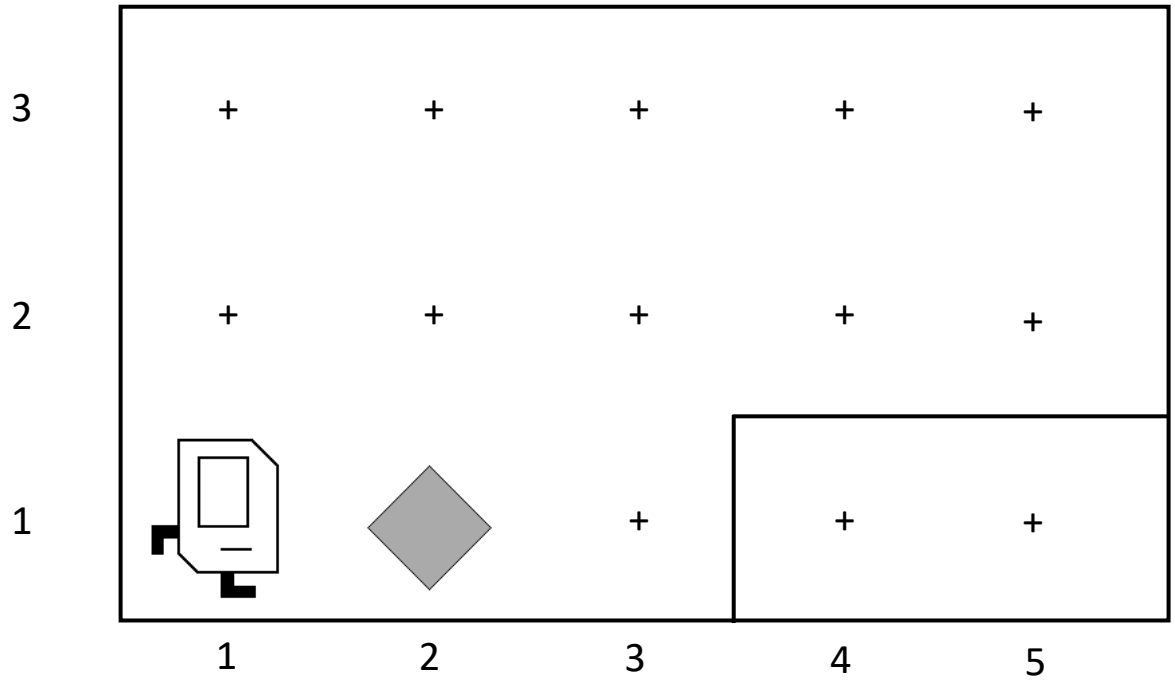
"Avenues" run North/South



Walls



Beepers



Knows Four Commands

```
move()

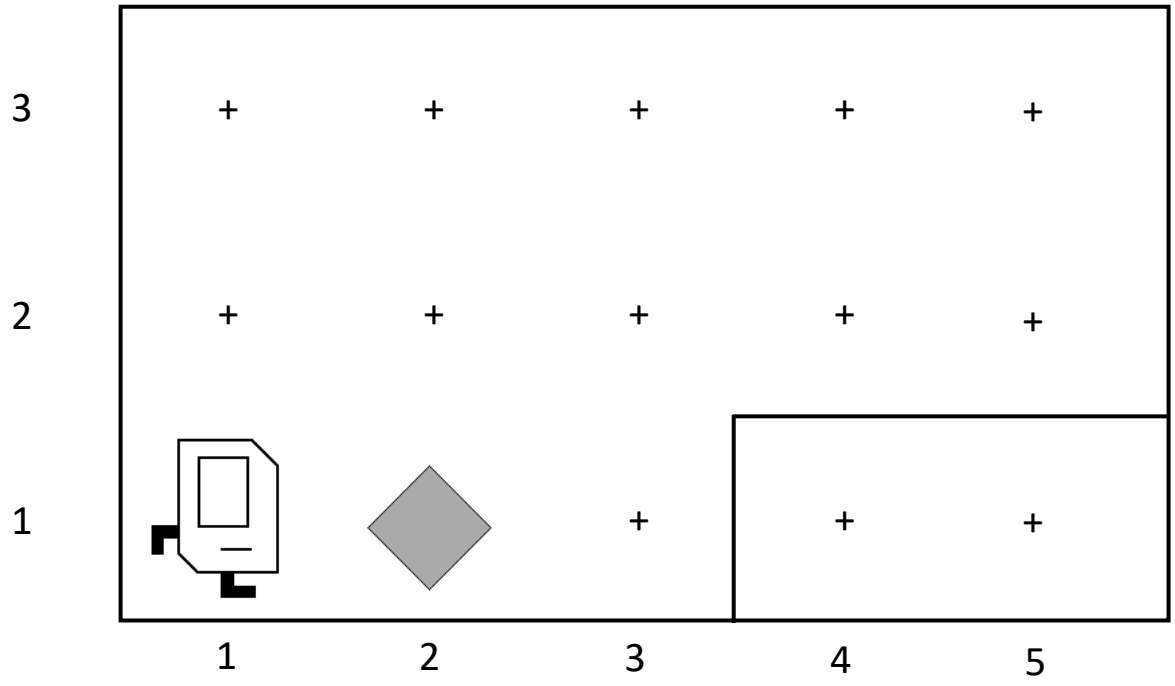
turn_left()

put_beeper()

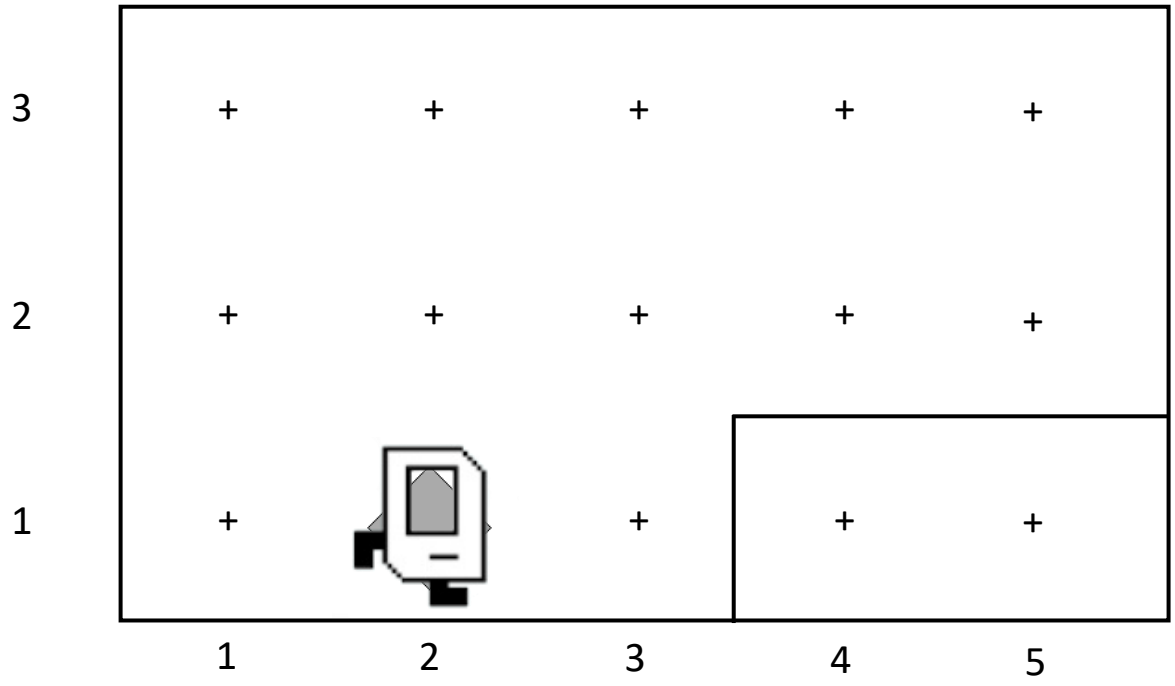
pick_beeper()
```

move()

move()

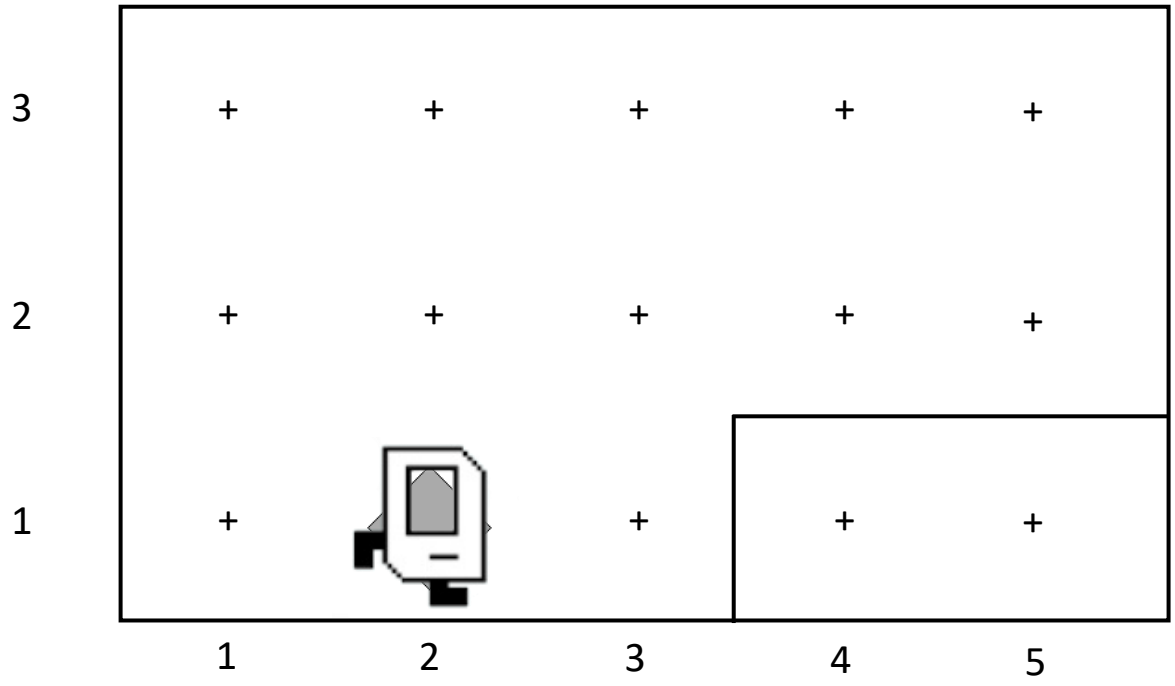


move()

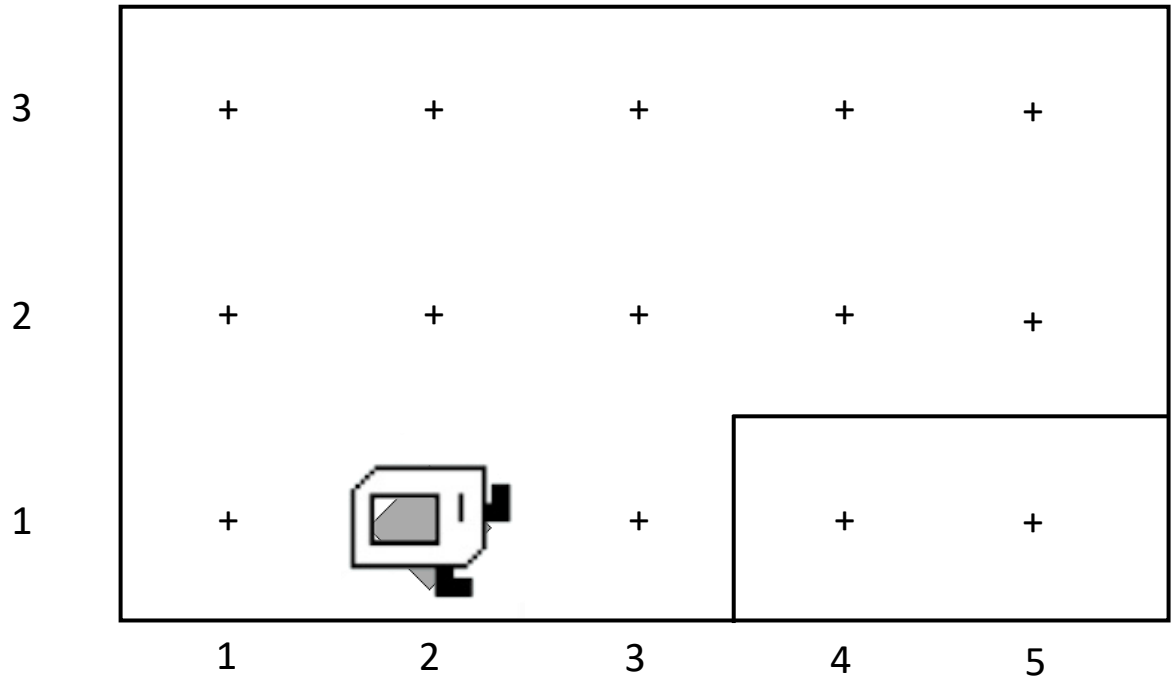


```
turn_left()
```

turn_left()

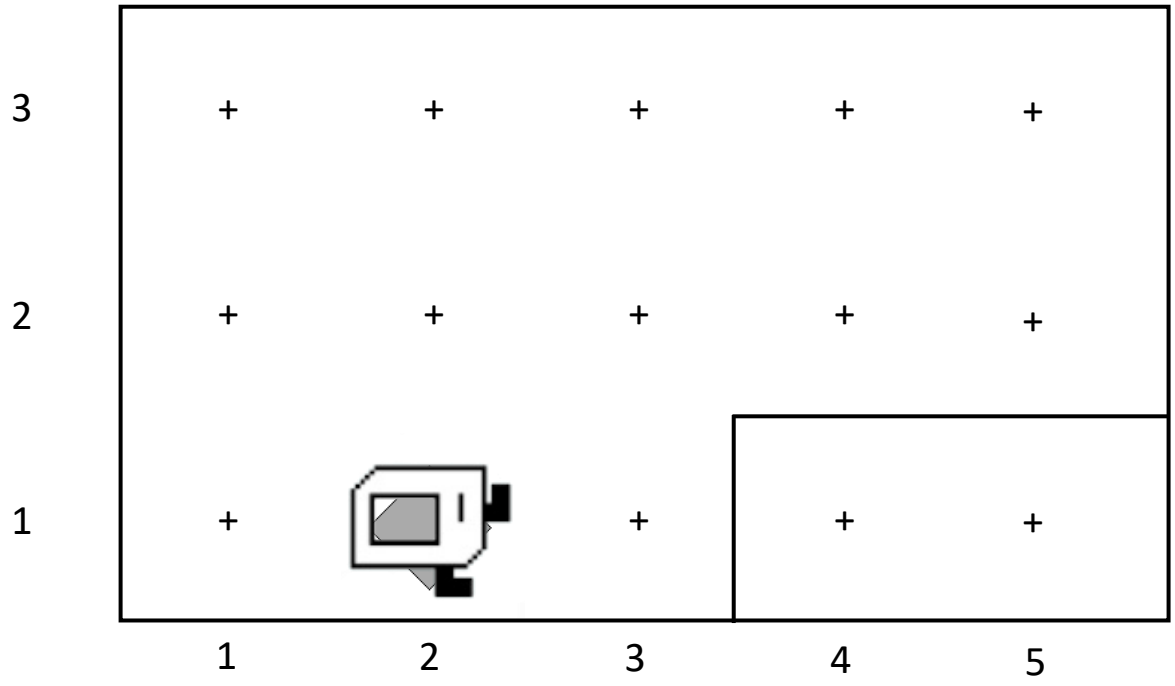


turn_left()

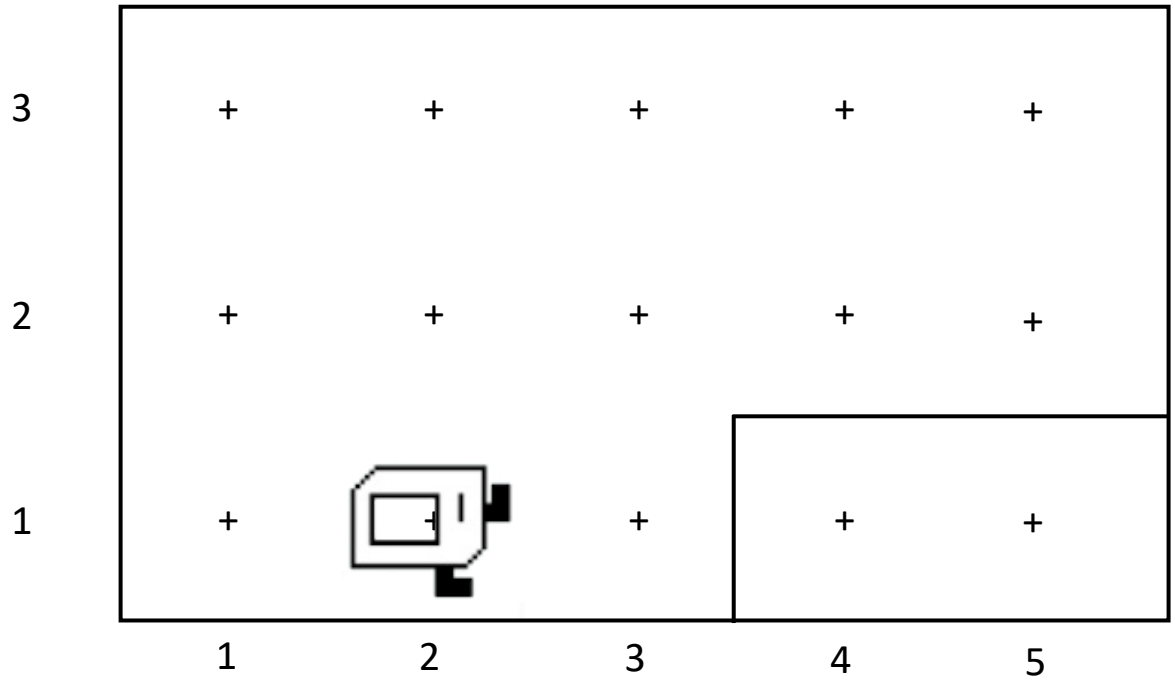


```
pick_beeper()
```

turn_left()

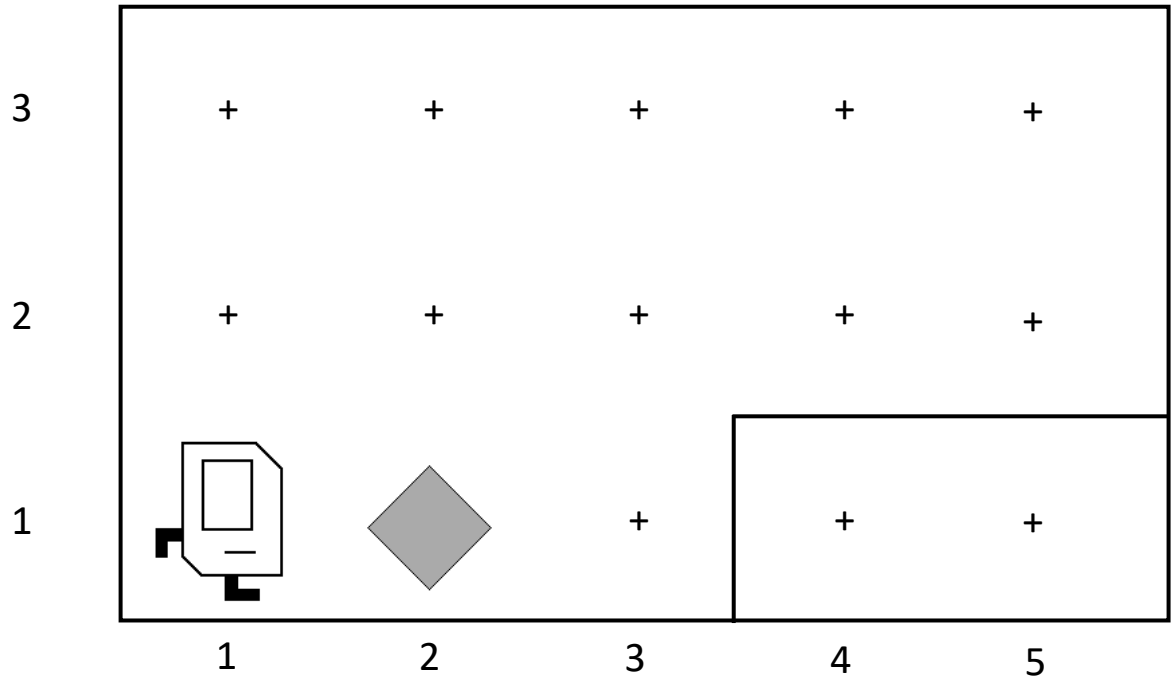


turn_left()

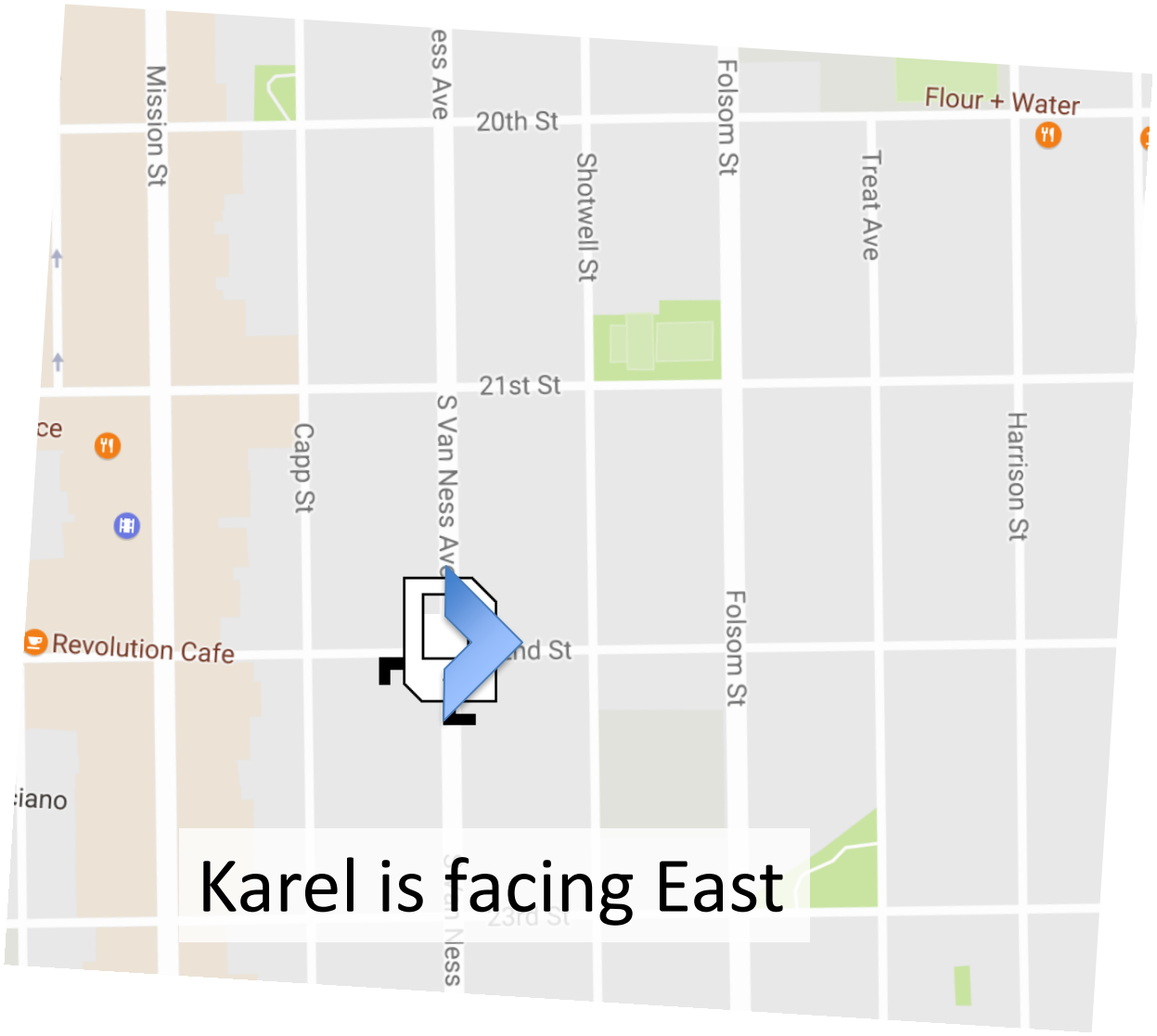


Make Sense?

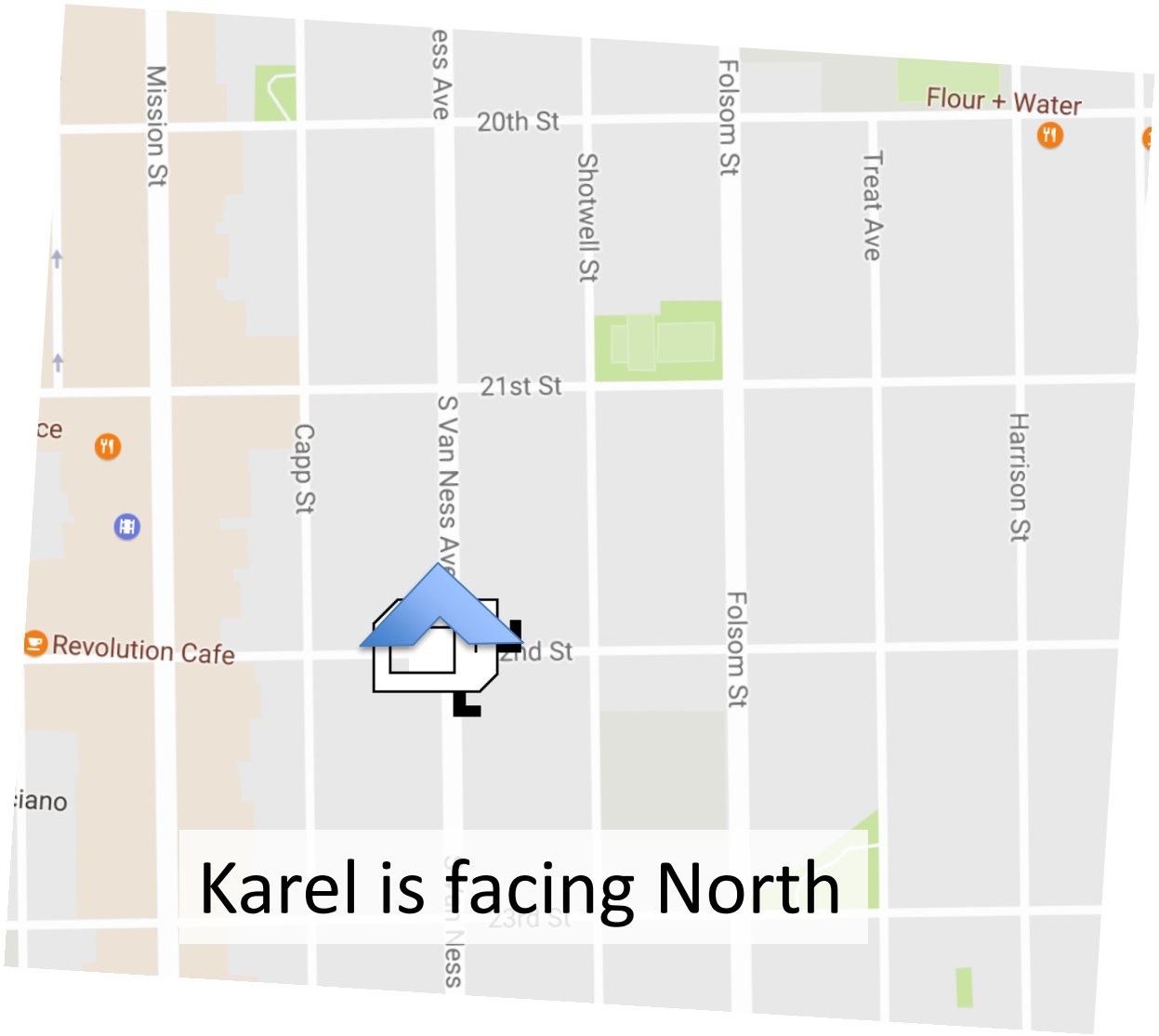
Bird's Eye View



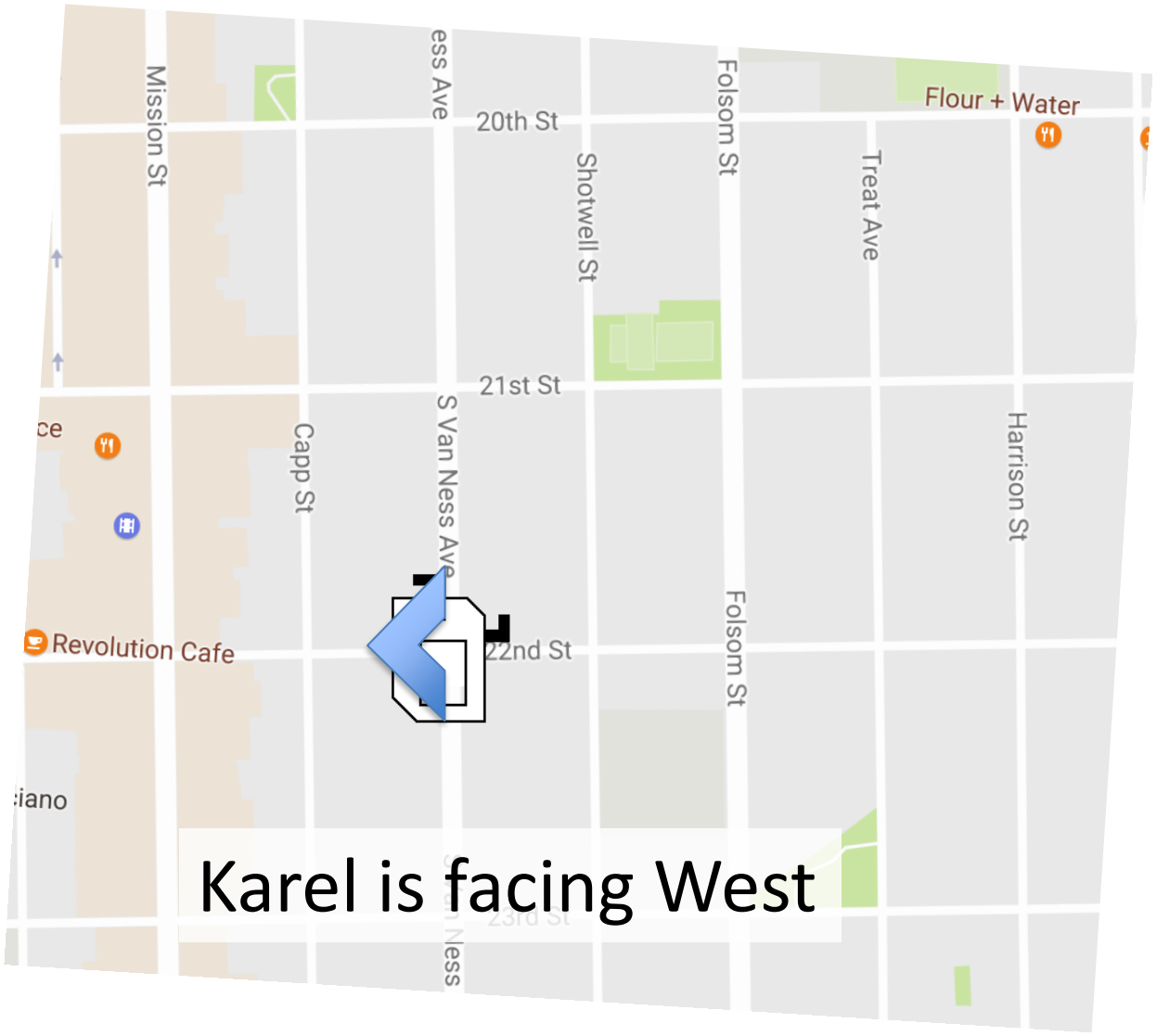
Bird's Eye View



Turn Left


Mission St
ess Ave
20th St
Shotwell St
Folsom St
Treat Ave
Flour + Water
21st St
Capp St
S Van Ness Ave
Harrison St
Revolution Cafe
Folsom St
Karel is facing North

Turn Left


Mission St
ess Ave
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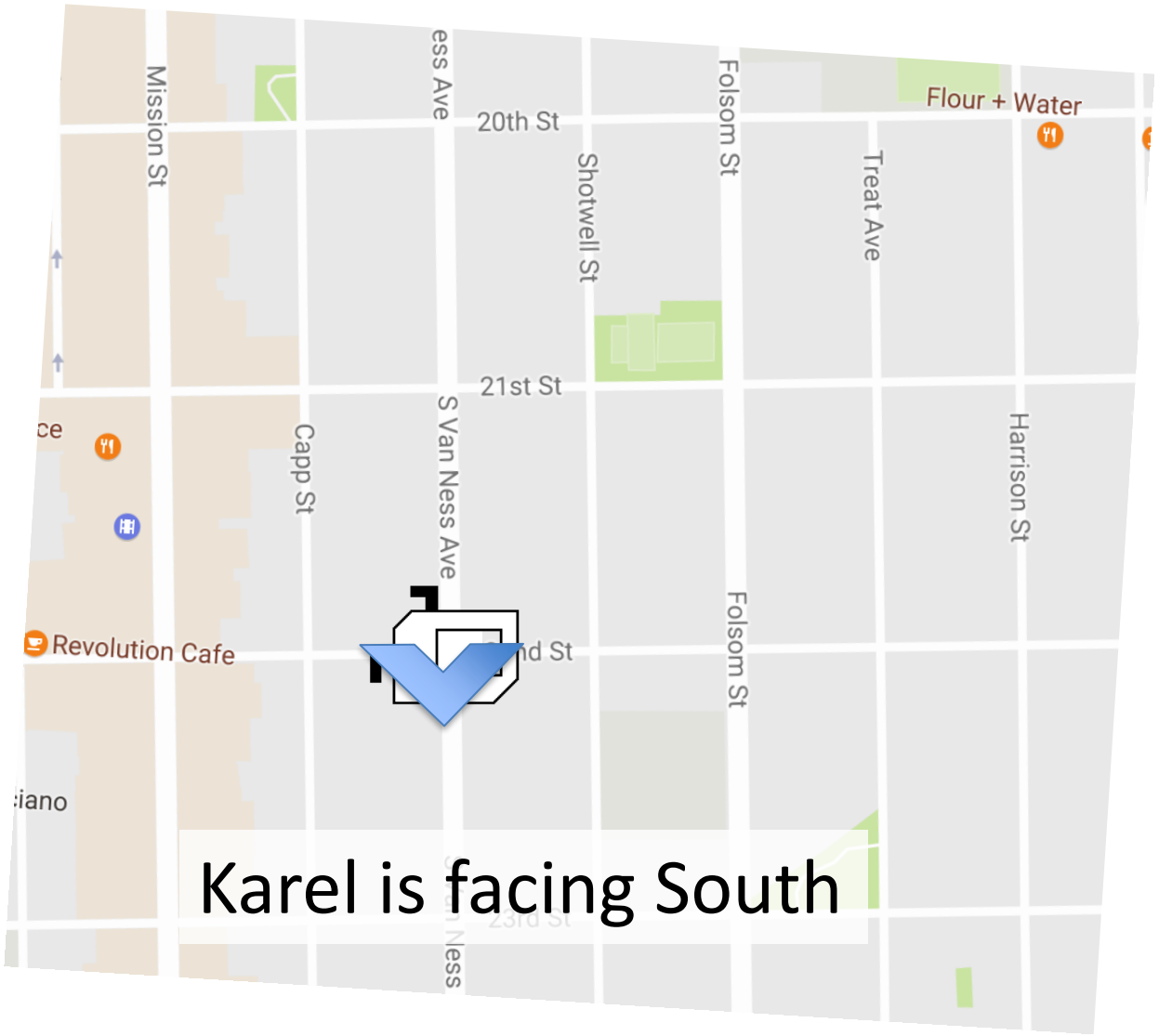
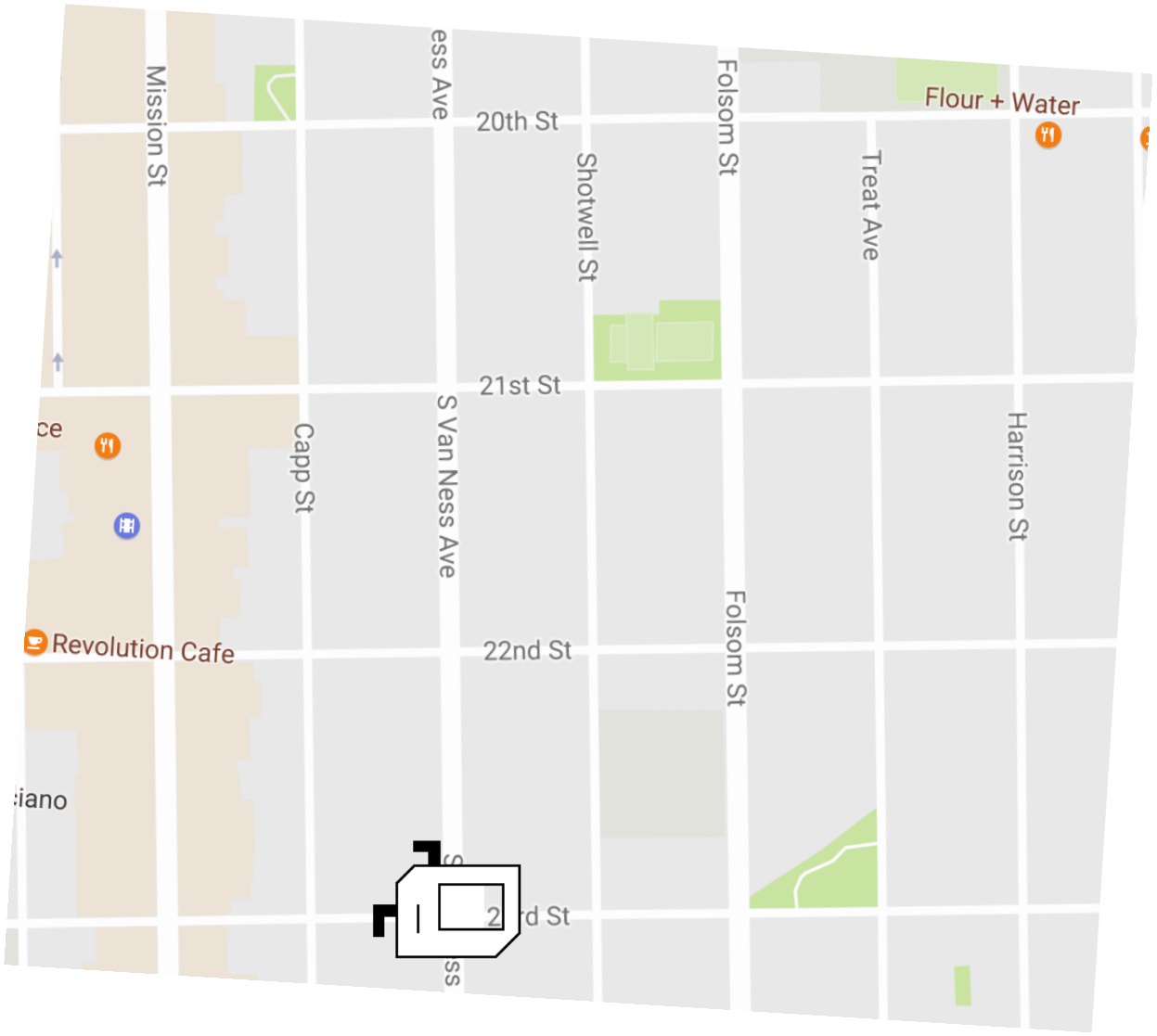
Shotwell St
Folsom St
Treat Ave
Flour + Water
21st St
Capp St
S Van Ness Ave
Harrison St
Revolution Cafe
22nd St
Folsom St
Karel is facing West

Turn Left


Mission St
ess Ave
20th St
Shotwell St
Folsom St
Treat Ave
Flour + Water
21st St
Capp St
S Van Ness Ave
Harrison St
Revolution Cafe
Folsom St
Karel is facing South

Move


Mission St
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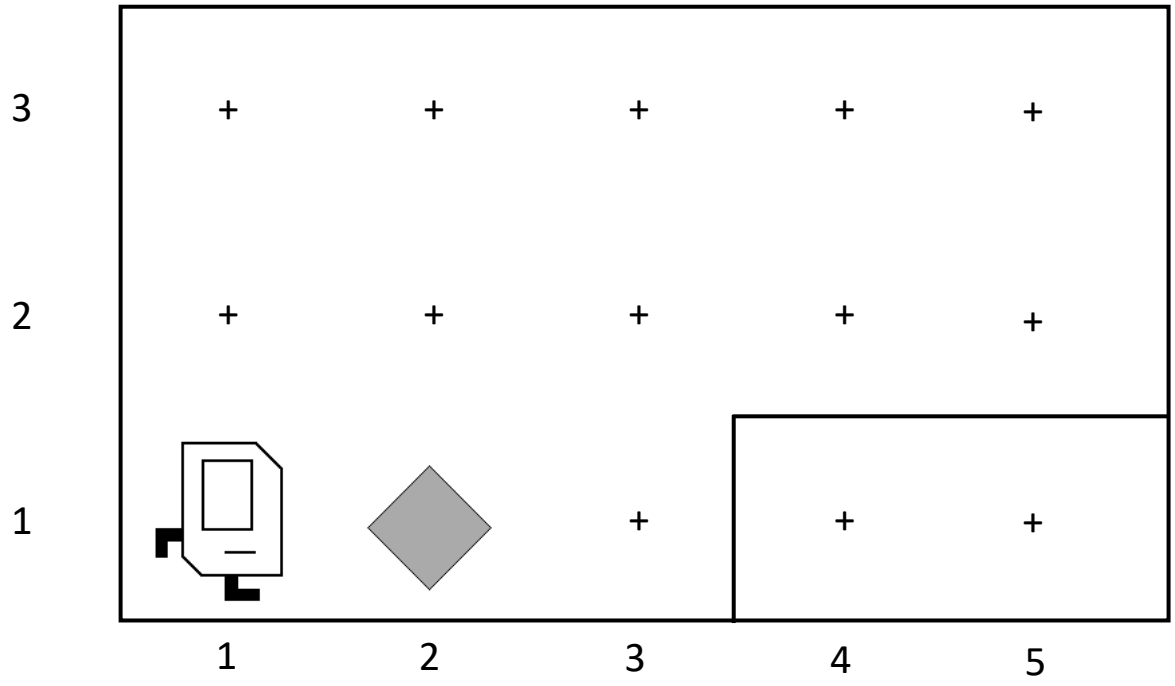
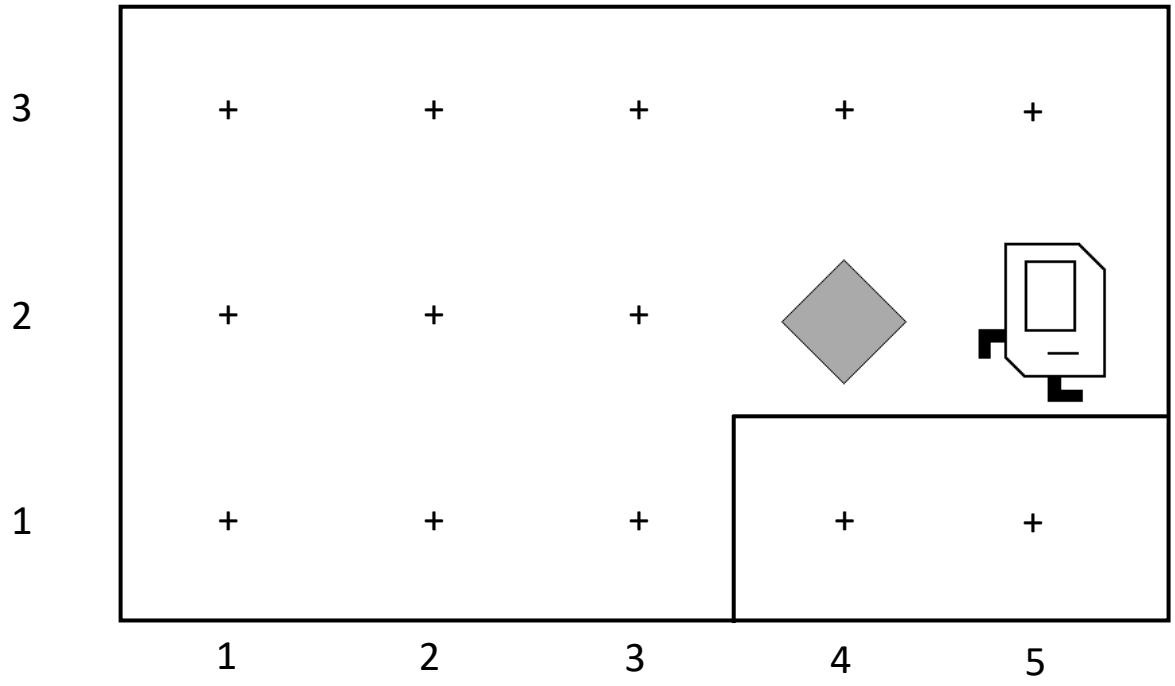
Folsom St

Learn By Doing

First Challenge



First Challenge



Function Definition

```
def name():
    function statements
```

This adds a new command to Karel's vocabulary

Anatomy of a Program

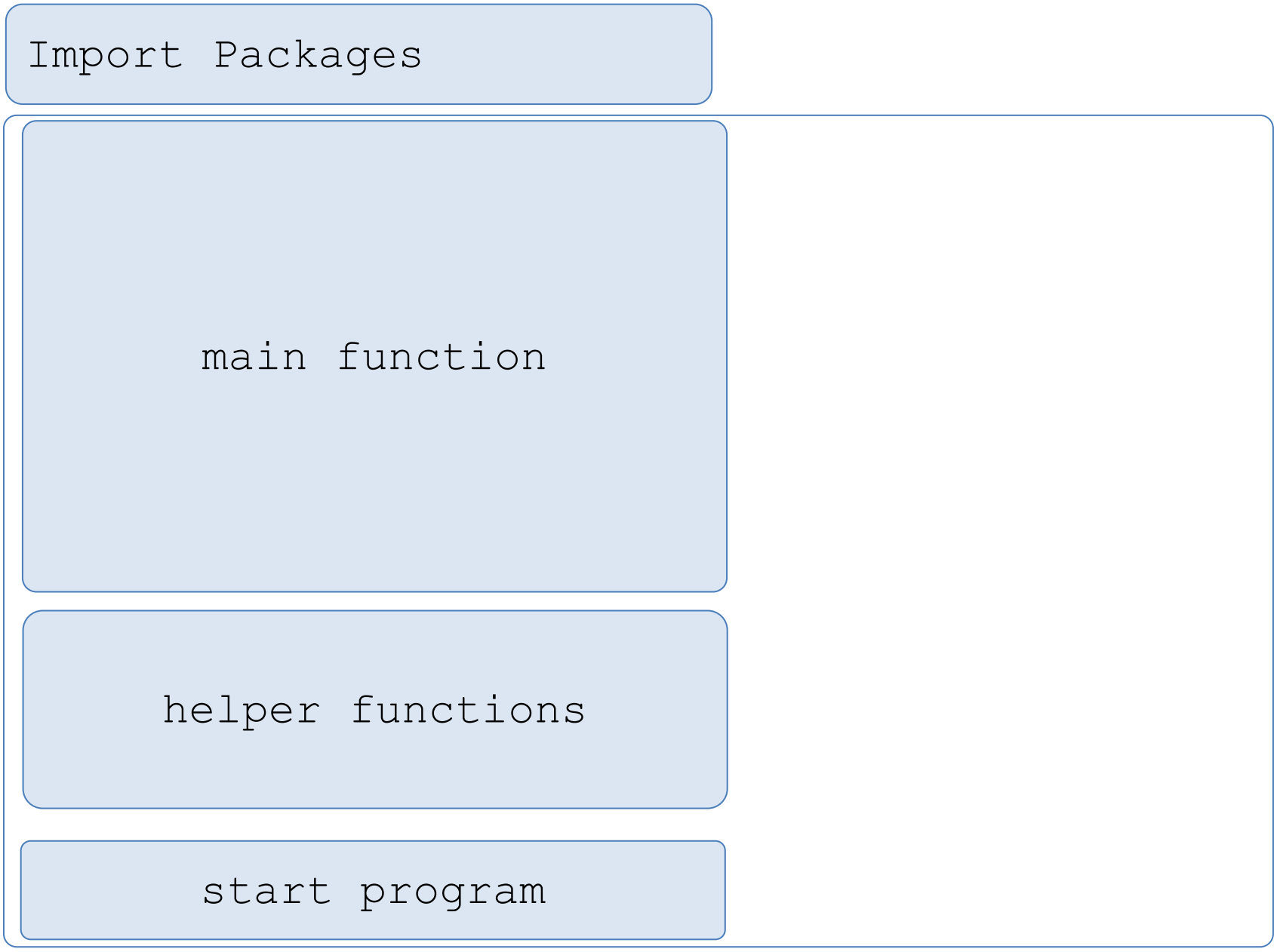
Import Packages

Program

Anatomy of a Program

```
Import Packages
```

Anatomy of a Program



Anatomy of a Program

Import Packages

```
def main():
    move()
    pick_beeper()
    move()
    turn_left()
    move()
    turn_right()
    move()
    put_beeper()
    move()
```

helper functions

start program

Anatomy of a Program

Import Packages

```
def main():
    move()
    pick_beeper()
    move()
    turn_left()
    move()
    turn_right()
    move()
    put_beeper()
    move()

def turn_right():
    turn_left()
    turn_left()
    turn_left()
```

start program

Anatomy of a Program

```
Import Packages
```

```
def main():
    move()
    pick_beeper()
    move()
    turn_left()
    move()
    turn_right()
    move()
    put_beeper()
    move()

def turn_right():
    turn_left()
    turn_left()
    turn_left()

if __name__ == "__main__":
    run_karel_program()
```

Anatomy of a Program

```
from karel.stanfordkarel import *
```

```
def main():
    move()
    pick_beeper()
    move()
    turn_left()
    move()
    turn_right()
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    move()

def turn_right():
    turn_left()
    turn_left()
    turn_left()

if __name__ == "__main__":
    run_karel_program()
```

This piece of the program's ***source code*** is called a ***function***.

Anatomy of a Program

```
from karel.stanfordkarel import *

def main():
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    pick_beeper()
    move()
    turn_left()
    move()
    turn_right()
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def turn_right():
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if __name__ == "__main__":
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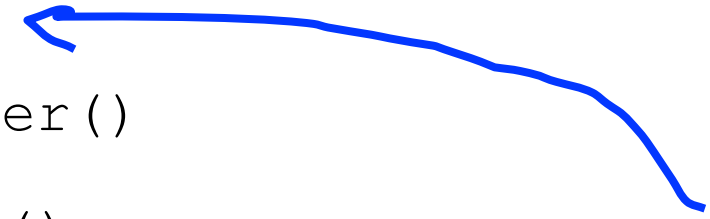
```



This line of code gives the ***name*** of the function (here, the name is: **main**)

Anatomy of a Program

```
from karel.stanfordkarel import *

def main():
    move()
    pick_beeper()
    move()
    turn_left()
    move()
    turn_right()
    move()
    put_beeper()
    move()

def turn_right():
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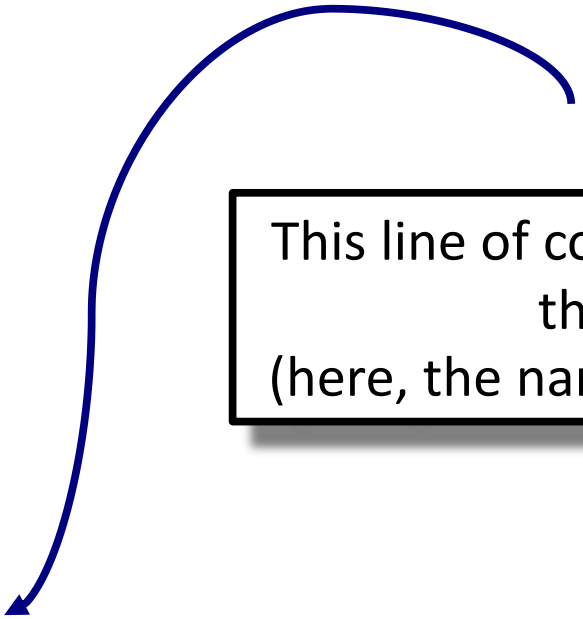
    turn_left()
    turn_left()

if __name__ == "__main__":
    run_karel_program()
```



This line of code gives the ***name*** of the function
(here, the name is: **turn_right**)

Anatomy of a Program

```
from karel.stanfordkarel import *

def main():
    move()
    pick_beeper()
    move()
    turn_left()
    move()
    turn_right()
    move()
    put_beeper()
    move()

def turn_right():
    turn_left()
    turn_left()
    turn_left()

if __name__ == "__main__":
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```

This is called a ***code block***
(Note the indenting)

Anatomy of a Program

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    turn_left()
    turn_left()
    turn_left()

if __name__ == "__main__":
    run_karel_program()
```

This is called a ***code block***
(Note the indenting)

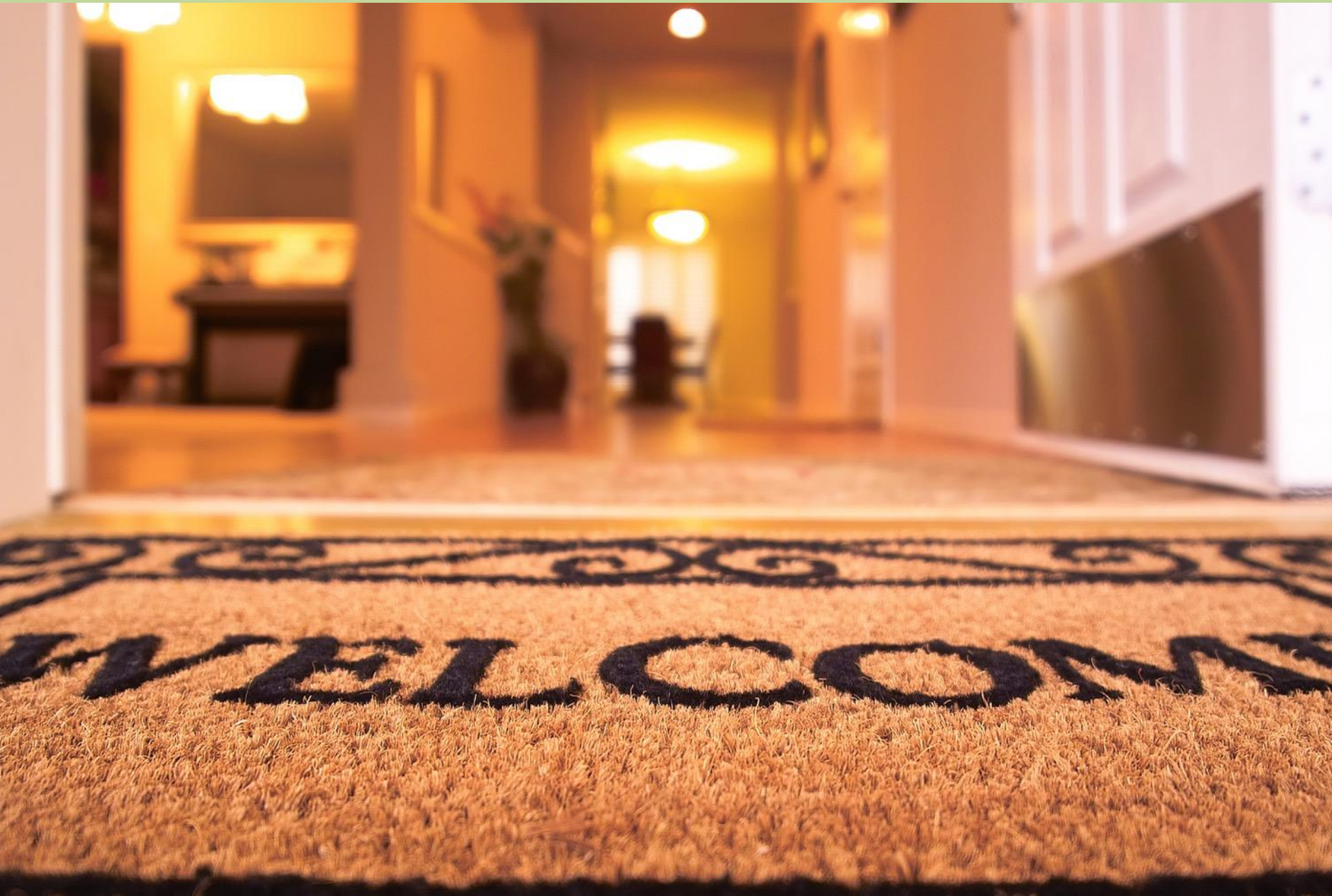
Why Study CS?

Joy of Building

Interdisciplinary

Closest Thing To Magic

Everyone is Welcome



The End