# Welcome !

## 2024 Fall CS101 Introduction to Programming

KAIST School of Computing

# Week 3

Last step with Hubo & Introduction to cs1media (Objects)

# A quick review

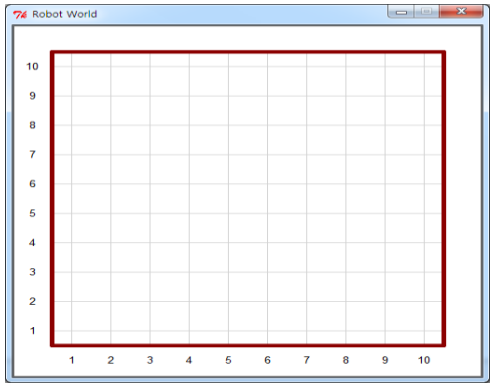
# Functions we've seen

- Creating a new world
  - ✓ Before creating a world, remember to import necessary modules

```
from cs1robots import *
create_world()
```

  - ✓ Then,

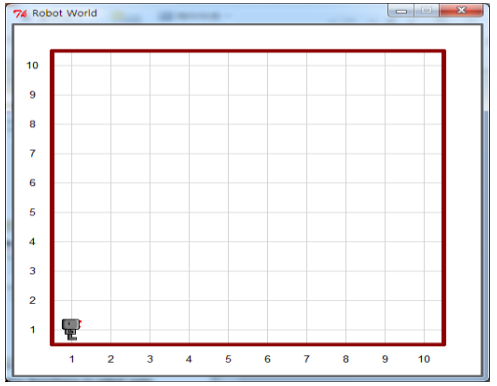
```
hubo = Robot()
```




- Create a robot named 'hubo'
  - ✓ Create a default robot

```
hubo = Robot(beepers = 10)
```

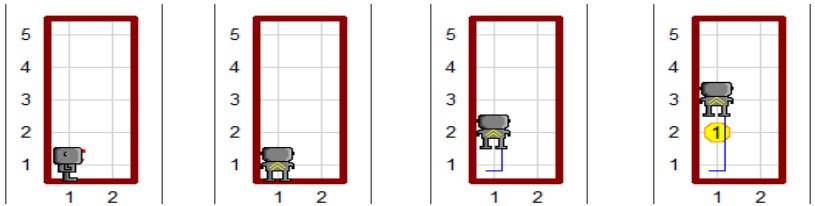
  - ✓ Create a robot with 10 beepers



# Functions we've seen

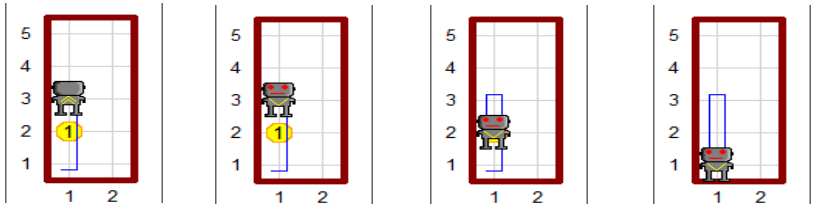
- Drop a beeper

```
hubo.turn_left()
hubo.move()
hubo.drop_beeper()
hubo.move()
```




- Pick a beeper

```
for i in range(2):
    hubo.turn_left()
hubo.move()
hubo.pick_beeper()
hubo.move()
```

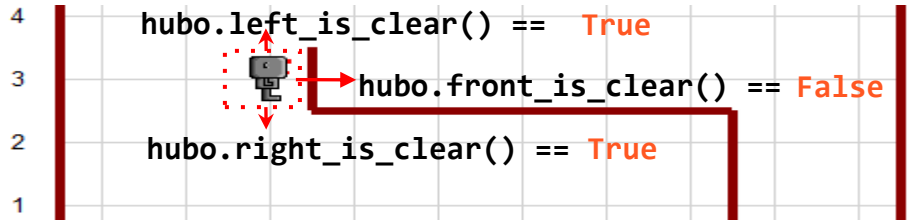



✓ Before picking up a beeper, hubo should be on a beeper!

# Functions we've seen

- Can check if there is a wall on each of the three sides

```
hubo.front_is_clear()
hubo.left_is_clear()
hubo.right_is_clear()
```



# If statements

- **If** statements **sequentially** checks the conditionals

```
if conditional_expression_1:
   works to do when conditional_expression_1 evaluates to True

elif conditional_expression_2:
   works to do when conditional_expression_1 evaluates to False &
                    conditional_expression_2 evaluates to True

elif conditional_expression_3:
   works to do when conditional_expression_1 evaluates to False &
                   conditional_expression_2 evaluates to False &
                    conditional_expression_3 evaluates to True
...
else:
   works to do when all the above conditions are False
```

# While loops

- **while** statement loops until the **conditional** evaluates to true

```
while conditional_expression:
   works to do while conditional_expression evaluates to True
```

- Be careful!

```
Iamlying = False

while (Iamlying == False) :
   print ("cs101 is so much fun")
   Iamlying = True
```

# New functions !!

# New functions

- Load an image file
  - ✓ Before loading an image file, remember to import necessary modules

```
from cs1media import *
img = load_picture("img/a.png")
```

  - ✓ Then,

```
img.show()
```

  to see the image.

# Convert image to be Black & White

- Use img.get(x, y) and img.set(x, y, color) to retrieve and assign pixel color

```
from cs1media import *

threshold = 100
white = (255, 255, 255)
black = (0, 0, 0)

img = load_picture('./images/image.png')
w, h = img.size()
for y in range(h):
  for x in range(w):
    r, g, b = img.get(x, y)
    v = (r + g + b) // 3 # average of r, g, b
    if v > threshold:
      img.set(x, y, white)
    else:
      img.set(x, y, black)
img.show()
```

# Week 3
# Today's Tasks

# Tasks for Today!

- Read sections 18~20 in the robot notes

Three relatively hard tasks

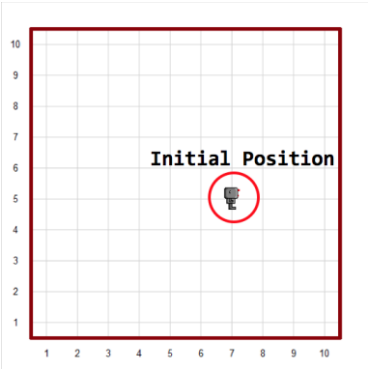
- Return
- Trash1
- Trash2
- Color Poster

And a hidden task

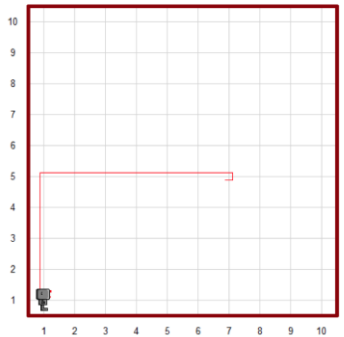
- When you have completed all the tasks, let a TA mark you off

# Task 1 | Conditionals, While-loop - Return

- Write a program that moves Hubo to his usual starting position (Avenue 1, Street 1, facing East)
  - Initialized position : any position and orientation in an empty world
    - (e.g.) hubo = Robot(orientation ='W', avenue  = 7, street = 5)
  - Use hubo.facing_north() to check direction of Hubo's face




Before



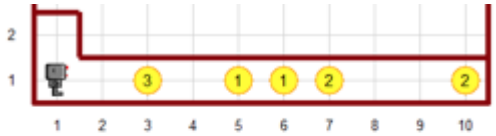
After

# Task 2 | Conditionals, While-loop – Trash 1

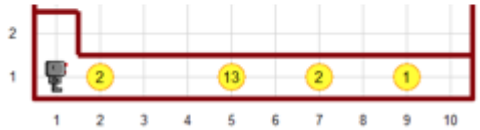
- Hubo wants to collect all the litter, and put it in the garbage can
  - Use hubo.carries_beepers()  to put litter to trash

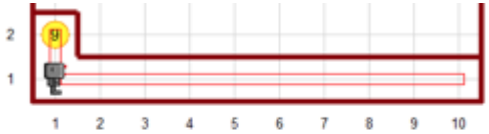
**NOTE:** Your program must work for both **trash1.wld** and **trash2.wld**

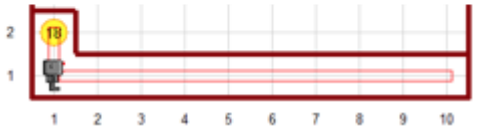
**trash1.wld**




**trash2.wld**




**Before**

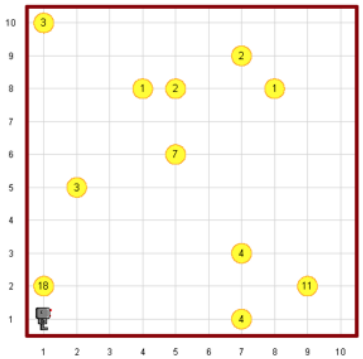
**After**

# Task 3 | Conditionals, While-loop – Trash 2

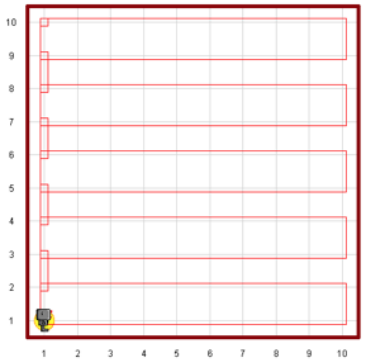
- Hubo wants to collect all the litter in the backyard of his house and bring it back to his starting position
  - Your solution should **not depend on the exact location** of the garbage, **nor should it depend on the size** of the yard

**NOTE:** Your program must work for **trash3.wld** and **trash4.wld**

**HINT:** Zigzag2 + Return




Before



After

# Task 4 | cs1media - 3 Color Poster

- Write a program that converts an image file into a three-color poster
  - Convert pixels with **very bright color** to **yellow**
  - Convert pixels with **very dark color** to **blue**
  - Convert all other pixels to be **green**


**NOTE:** Start with black & white photo generating code.
Modify the code to convert image files into three-color posters.

**Before**

**After**

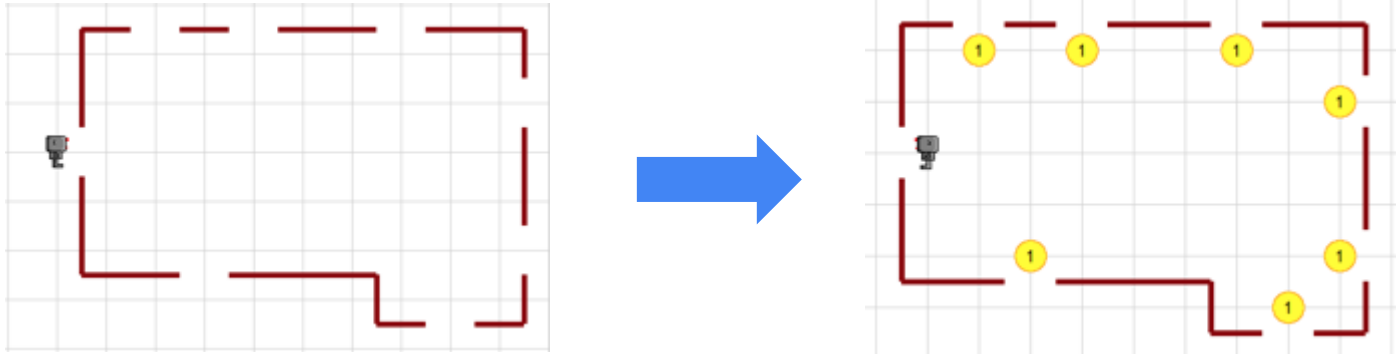
# Hidden Task

- Today we have a hidden task which is not revealed until the lab starts
- The hidden tasks are different for each section
- Complete the hidden task corresponding to your section

# Optional Task | Rain

- **You don't have to do this task**. This task is optional.
- Help Hubo close all the windows in Ami's house
  - Drop a beeper in front of each window
  - Let Hubo start at (2,6) with sufficient beepers.
    - e.g., hubo = Robot(beepers = 10, avenue = 2, street = 6, orientation = "E")

**NOTE:** Your program must work for both **rain1.wld** and **rain2.wld**



**Before** **After**

# questions?