

Programming Fundamentals

Lecture 3

COEN 10

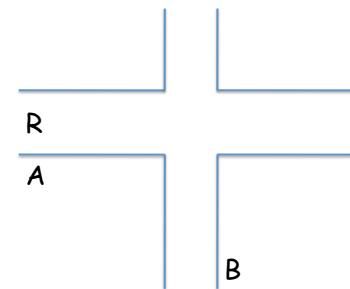
Programming Fundamentals

- ★ Programming is about telling the computer what to do.
- ★ The computer can execute a limited set of actions
 - ◎ The actions need to be combined to enable it to accomplish sophisticated tasks.
 - ◎ A program is simply a combination of these actions.

Programming Fundamentals

- ★ Imagine that you are programming robot R to move from point A to point B
- ★ Robot R has very limited actions
 - ◎ walk one step ahead
 - ◎ turn left
 - ◎ turn right
- ★ Assume it takes robot R 20 steps to complete each segment of the path

Programming Fundamentals



Programming Fundamentals

★Program

repeat 20 times: ahead
right
repeat 20 times: ahead

Programming Fundamentals

★Programming concepts

◎Sequential steps
◎Counting loops

Programming Fundamentals

★Imagine that you are programming robot R to move from point A to point B

★Robot R has limited actions

◎walk one step ahead

◎turn left

◎turn right

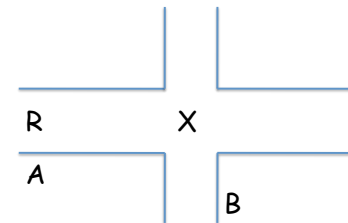
◎sense locations

✧Condition turning point

✧Condition final destination

★Assume no knowledge of the length of each segment

Programming Fundamentals



Programming Fundamentals

★Program

repeat

if at turning point X, right

if at final destination, stop

otherwise, ahead

Programming Fundamentals

★Program

repeat if not at final destination

if at turning point X, right

otherwise, ahead

Programming Fundamentals

★Programming concepts

©Conditionals

©Conditional loops

Programming Fundamentals

★Examples

©Write a program to move robot R
from A to B and from A to C

✧Robot R knows the distances

✧Robot R can sense turning points
and final destination

from A to C

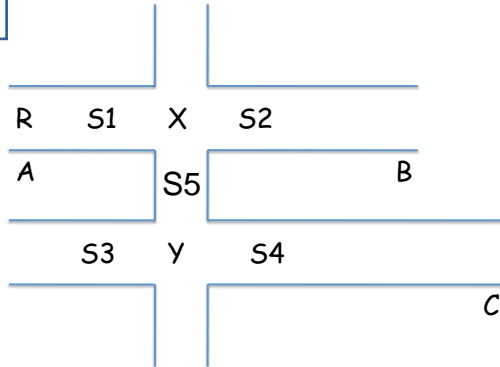
```
1) repeat s1 times: ahead
   right
   repeat s5 times: ahead
   left
   repeat s4 times: ahead

2) while not at X
   ahead
   right
   while not at Y
   ahead
   left
   while not at destination
   ahead
```

from A to B

```
repeat s1+s2 times: ahead
while not at destination
  ahead
```

Programming Fundamentals



Programming Fundamentals

★Extra concept

©Concurrency

- ✧ Enables the computer to execute tasks in parallel
- ✧ Enables the robot to do more than one thing at the same time

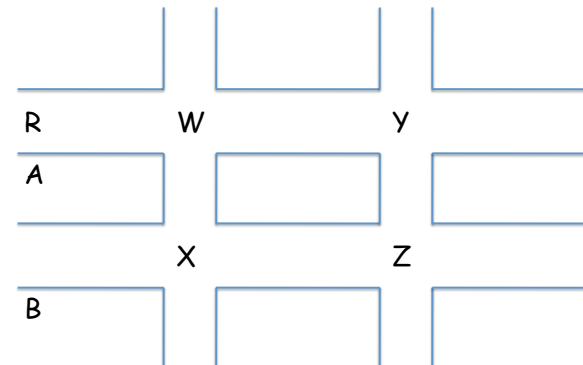
Programming Fundamentals

★There are always several options

©Write a program to move robot R from A to B

- ✧ Robot R can sense turning points and final destination

Programming Fundamentals



Programming Fundamentals

★Program 1

repeat if not at final
destination

if at turning point
W or X

right
otherwise, ahead

★Program 2

repeat if not at final
destination

if at turning point
Y or Z

right
otherwise, ahead

Programming Fundamentals

★Important programming goals

◎Correctness

◎Effectiveness

Programming Fundamentals

★Summary

◎Fundamental Concepts

✧Sequential steps

✧Conditionals

✧Loops

–Counting

–Conditional

✧Concurrency