

# Worksheet 14

## Harry: Paths

Learning Outcome 4

Book Chapter 1.24 – 1.26

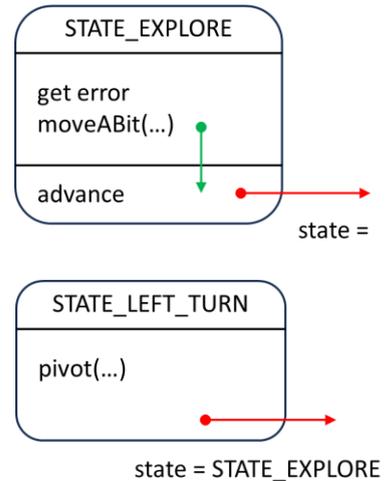
### Finite State Machine

Here we shall explore how to get Harry, the Stepper robot, to follow a path made from line segments and junctions. We shall use a finite state machine (FSM) with the following 4 states:

STATE_EXPLORE
STATE_LEFT_TURN
STATE_RIGHT_TURN
STATE_ABOUT_FACE

Two states are shown on the right. In the state EXPLORE the robot moves along a line using **moveABit(...)** after getting the error. When it detects a junction (green arrow) then it advances onto the junction. Then it transits to the next state (red arrow) based on the **junctionID** it has found.

The state LEFT\_TURN involves a **pivot(...)**, with the appropriate angle, and then the next state will be EXPLORE. The other two states will be similar.



### 1. Coding the FSM

Base your code on the previous worksheets, you have seen everything you will need (I think). A template is provided in **CBP\_2403\_Junction\_React\_1**.

(a) First code STATE\_EXPLORE. You will need to

- get the error,
- then call **moveABit(...)**

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- then get the **junctionID**
  - if this is a valid junction then
    - advance Harry onto the junction
    - transit to the next state, **state = ...**
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## 2. Try it out

An example track is available, but you might like to create your own.

Since Harry is a *real* robot, you might experience problems. Most can be solved by tweaking parameters such as the advance distance, the pivot angle, and the error correction gain value.

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## 3. Portfolio Pointers

This is a great activity to put into your portfolio. Photos, and links to movie-clips will be great.

I would encourage you to include a full annotated code listing (the sketch, **not** library functions).

Also include a complete FSM diagram, with states linked by arrows. If I remember, I shall put some graphics on the web pages.

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