

Worksheet 12

Harry: Lines

Purpose and API

Here we shall explore how to get Harry, the Stepper robot, to keep itself moving along a straight line. That's the first step in designing a maze-follower.

The PixyCam will be put into "line" mode and will return a vector pointing along the line as shown on the right, where the coordinates are labelled.

The API coordinate system is shown on the right together with details of the results of angle calculations.

1. Getting to know the line API

(a) Create a test line, say 5cm long and orient your page under the camera so the line is vertical. Do not connect the motor power jack.

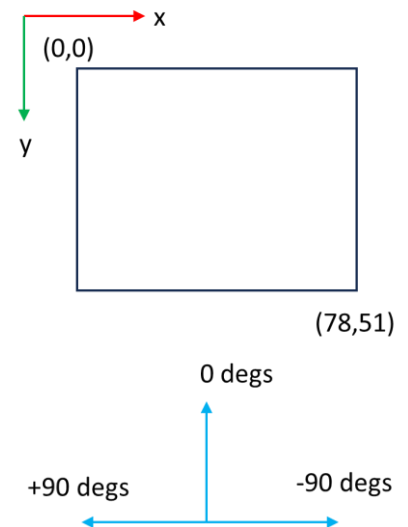
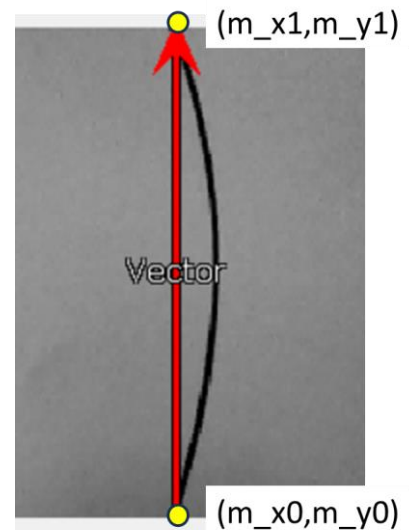
(b) Connect Pixymon to the camera and run the sketch **CBP_2403_R_LineFollower_1**. You will see the vector and the head and tail coordinates are printed out and also the angle.

(c) Move the line from side to side, keeping it vertical. Note the values of **x0, y0** (vector start) and **x1, y1** (vector end). Make sure you understand that these values are related to the coordinate system shown on the right.

(d) Center the line in the camera image and orient it vertically. Now rotate the line and look at the calculated angles. Make sure they agree with the axes shown on the right.

Learning Outcome 1,3

Book Chapter 11.24 – 1.26



2. Following a straight line.

Here we shall use the library **CBPFBO_StepperA**. Do not connect the motor power jack until instructed.

(a) Open the sketch **CBP_2403_R_LineFollower_2** which is extended from the previous sketch. You will see that:

- an error value is calculated.
- if this is within range then pass the error to **moveABit()** library function which will correct the move towards the line.
- If the error is too big, then there's probably no straight line, so move on a **straightLine()**.

(b) The **getErrorX()** function returns the error, but you have to write this in the function template provided. You've done this before for the vision-based object detection, so think back to that. The error should be +ve if the line is to the right of image centre and -ve if it is to the left.

(c) Now draw a long straight line and connect the motor power jack. Remove Pixymon. Check that the robot corrects itself onto the line.

(d) You may want to experiment with the value of **gain** (which multiplies the error before it is used) to make Harry more responsive.
