

Activity 8 – Line Follow



Aim:

To run the robot to follow a black curved line.

Materials:

- Working robots (switch controller disconnected)
- Three sheets with printed track (photocopy one set per team)
- Sellotape to tape track sections together
- Two small strips of black tape to cover the gaps (2 centimetres long)
- Activity 8 video
- Activity worksheet

Location:

Floor area

Background:

- Activity 7 introduced the robot's 'eyes', sensors that could detect infra-red. This activity will use them to follow a black line.
- The tape can define a path from a start point to a destination. Quite a few robot vehicles in factory floor applications either follow taped lines on the floor or wires embedded in the factory floor. In the future, robot cars will follow lane markings and the edge of the road through the use of cameras as their sensors.
- The flowchart shows the robot's plan for following the line. The method is quite simple but it is possible for the robot to lose the line; examples include: curve of line becomes too great, line is too narrow or robot is moving too fast.
- Through the experiments, the children will be able to tune the robot's plan to make it better.

Running Experiment 1:

1. Form teams (suggest three pupils per team) and show Activity 8 video (approx. 7.5 mins). The video demonstrates the background and activity step-by-step.
 - https://www.youtube.com/watch?v=YSMkC_Wv1RM
2. Teams make the path for the robot to follow using the three supplied sheets of paper. Just line up A to A, B to B and sellotape together. You may need to lightly tape the sheets to the floor to stop it slipping when the robot runs. Use a small piece of black tape to fill the gap where the sheets touch (black felt-tip pen doesn't work as the infra-red sensors don't see it as black).
3. Set the robot into mode 'F0' (switch sequence 'A_3D_2A').
4. Place the robot at the beginning of the line with the two sensors on either side. Then press SW-A to start.
5. If it wanders off the line or reaches the end, pick up the robot and press SW-A to stop the motors.

Running Experiment 2:

- Experiment 1 can be extended by allowing changes to be made to the way the robot tries to track the line. POT1, POT2 and POT3 can change the robot's characteristic.
 - POT1 changes the speed of the robot. Generally, the faster the robot moves the more likely it will be to wander from the line.
 - POT2 changes the speed difference between the two wheels when it needs to turn. By default, it stops one wheel to force the robot to drive in an arc. POT2 allows this to be a slowing down rather than a stop. This experiment shows that this can lead to a smoother track.
 - POT3 is not required and MUST be set to its 12 o'clock position.
- Adjusting POTs 1 and 2 will give different effects. The worksheet gives details of the tests.

- Remind the children to press switch-B to get the robot to read the POT values.

Running Experiment 3:

- Teams experiment to find the best settings for the track.

Other possible experiments:

- Test the robot's ability to go round tighter curves using the additional track sheets (a range of curves are included), or make your own with tape and ordinary white sheets of paper, or create them on a computer (use lines with a size of 54pt, giving a width of about 19mm).
- Create an oval track and get groups to chase each other round the loop (starting on opposite sides). The team with the best POT settings will eventually catch the other robot and win.
- If Activity 7 showed that black poster paint was as good as black tape, then teams could paint a track through a set of obstacles (make sure the paint is dry before running the robot).