RoboCup Rescue Line

EV3 Workshop

Beginner
Getting Started

• The Robot needs to:-
  • Follow the Line
  • Detect Silver
  • Find the Victim
  • Push the victim out of the Spill

• Building your robot:-
  • Size
  • Centre of gravity
  • Rule limitations?

• Working towards:-
  • Detecting Intersections
    • Need more than one Colour Sensor
  • Detecting Obstacles
    • What’s the best sensor to use?
  • Making your robot autonomous
    • Getting all your code to work together
Robot Design

- Motivation
  - Motors B and C
- Line Following
  - Colour Sensor
- Detecting Silver
  - Colour Sensor
- Finding the Can
  - Ultra Sonic Sensor
Line Following

• Single Colour/Light Sensor
  • This is called Edge Following

• Programming Logic
  IF Sensor = Black THEN
    TurnLeft
  ELSE
    TurnRight
  ENDIF

• To turn the robot we can
  1. One motor ON, the other motor OFF
    • Wriggles a lot
  2. One motor ON, the other motor SLOW
    • Wriggles less
  3. One motor ON, the other motor BACK
    • Wriggles a real lot, but can get around tight corners
  4. Use Maths to control the motors

• Which one to use?
EV3 Code – Simple Line Follower

• The Loop allows the program to repeat infinitely
• The Switch monitors the Colour Sensor changing which motors to turn on or off depending on what colour is underneath it on the Rescue tile
• How do we work out what the comparison value should be
Thresholds

• You need to be able to know what the Colour Sensor is seeing
• Place your robot so that the Colour Sensor is over White
• Right arrow 3 clicks to the right, select Port View
• Use the arrow buttons to see the Colour Sensor port
• Make sure its on Col-Reflect
• Record the reading
• Do the same for Black
• Calculate White + Black / 2
• This value is your White/Black threshold
EV3 Code – Better Line Follower

• We need to reduce the wiggle
• Lets break the edge of the line up into three parts
  • When the sensor is over White
  • When the sensor is over Black
  • When the sensor is half way which we can call Grey
Using maths to smooth the movements

- Build in some smoothness using the Switch block, in Tabbed view
- Adjust the speed of the motors to get the robot following the line
- Try increasing the number of tabs to further smooth out the robot
  - Note: You may need to calibrate the sensor for this to work well

With the Switch Block in Tabbed view (CaseWhere) mode we can have multiple options of the amount of turn we put on the robot which relates to the value of the Colour Sensor and its position over the edge of the line.

Each tab relates to a different amount of turn!
Detecting Silver at the Chemical Spill

• Where can we get this program to look for Silver?
• We can use the Loop to control when the Robot stops following the line.
• Change the infinite to Colour Sensor Reflective Compare
• Change the mode to > and the threshold value to just under the port view value for Silver
Lets Find the Victim