Neurones and robots

Scott Turner

University of Northampton

Single neuron

Aim

- On the line go forward (output=1)
- Off the line go left (output =0)

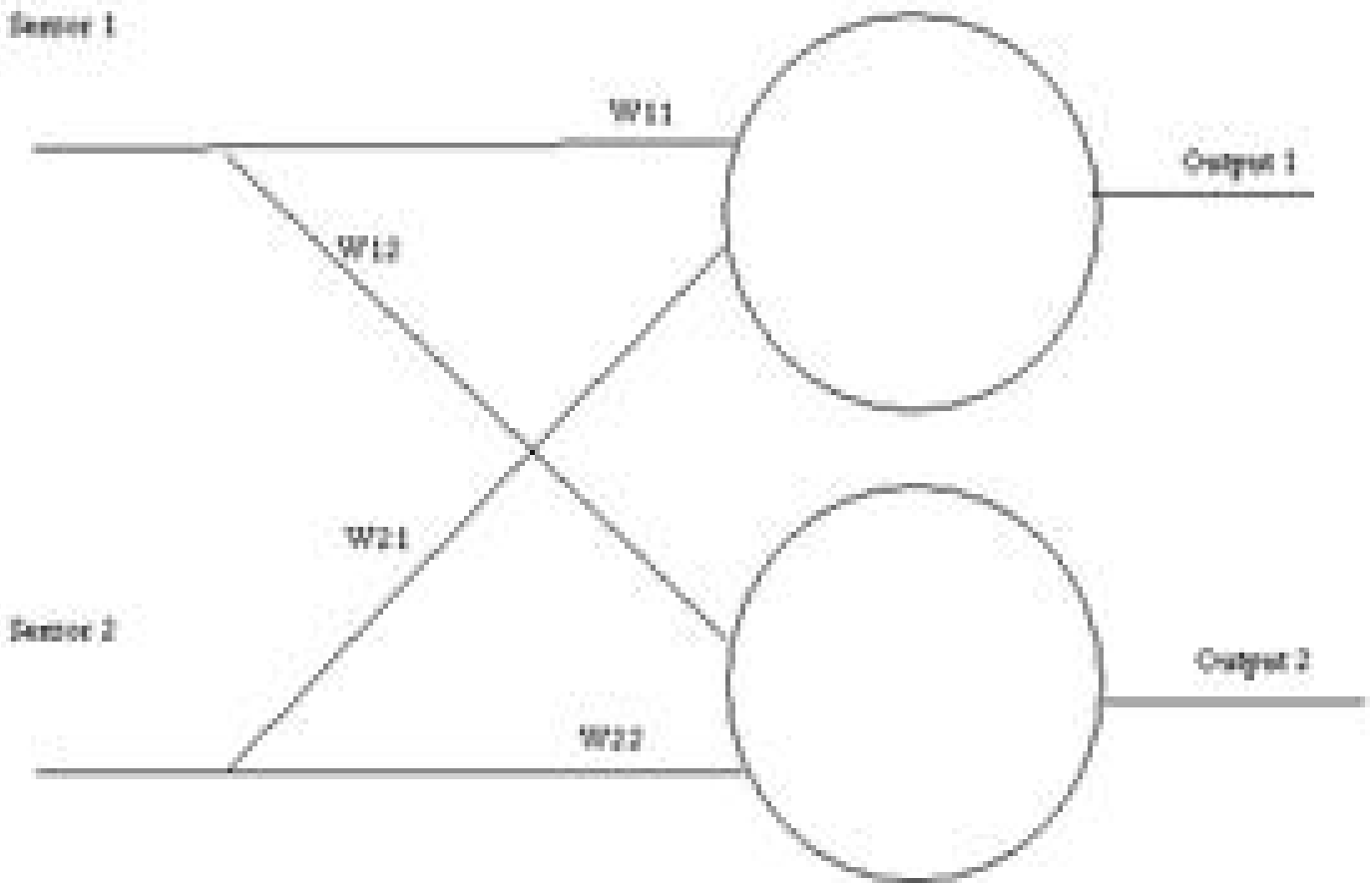
```
int w[] ={-1,1};
  int o=1;
  int s1,res1;
  for(;;){
   if (robbie.checkLight1()==true)
    s1=1;
   else
    s1=0;
   res1=w[1]*s1+w[0];
   if (res1>=0)
    o=1;
   else
    o=0;
   if ((o==1))
    robbie.forward1(10);
   if (o==0)
    robbie.tlturn(10);
```

- Aim: To develop a line-following robot based on the two neurones controlling the robot.

- The robot has two light sensors on the left and right and aims to follow the left-hand side of a thick line. The sensor produce a ‘1’ when on the sensor is on the line and ‘0’ when off the line.

Left Sensor	Right Sensor		Output 1	Output 2
0	0		0	0
0	1		0	1
1	0		1	0
1	1		1	1

Left Sensor	Right Sensor		Output 1	Output 2
0	0		1	0
0	1		0	1
1	0		1	1
1	1		0	1


Sensor 1
W11
Output 1
W12
W21
Sensor 2
Output 2
W22

$$output1 = Sensor1 * w11 + Sensor2 * w21 + bias1$$

$$output2 = Sensor1 * w12 + Sensor2 * w22 + bias2$$

- Your task is to find the weights to make the output 1 and 2 in the table by selecting weights and then add the weights to the code at the end of the document. Remember that output will be 1 if the weighted sum is greater than or equal to 0, otherwise it is 0.

NEXT STAGE

- Alter the routine to find the weights itself.


A
1

Alternatives

- Get one robot to follow another.
- Get the robot to avoid obstacles.