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**Conference or Workshop Item**

**Title:** Neural nets

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**Version:** Presented version

<http://nectar.northampton.ac.uk/4026/>





# Neurones and robots

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# 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);
```

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

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- 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



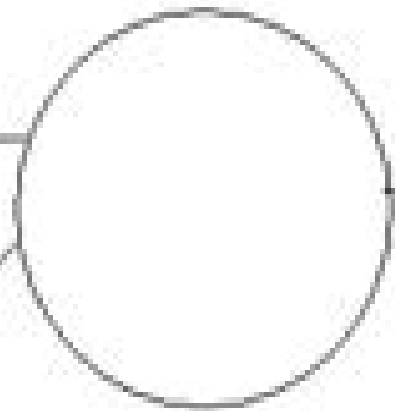
Left Sensor	Right Sensor		Output 1	Output 2
0	0		1	0
0	1		0	1
1	0		1	1
1	1		0	1



Input 1



$W_{11}$



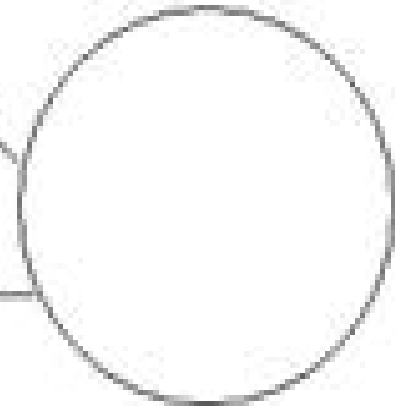
Output 1



$W_{12}$

$W_{21}$

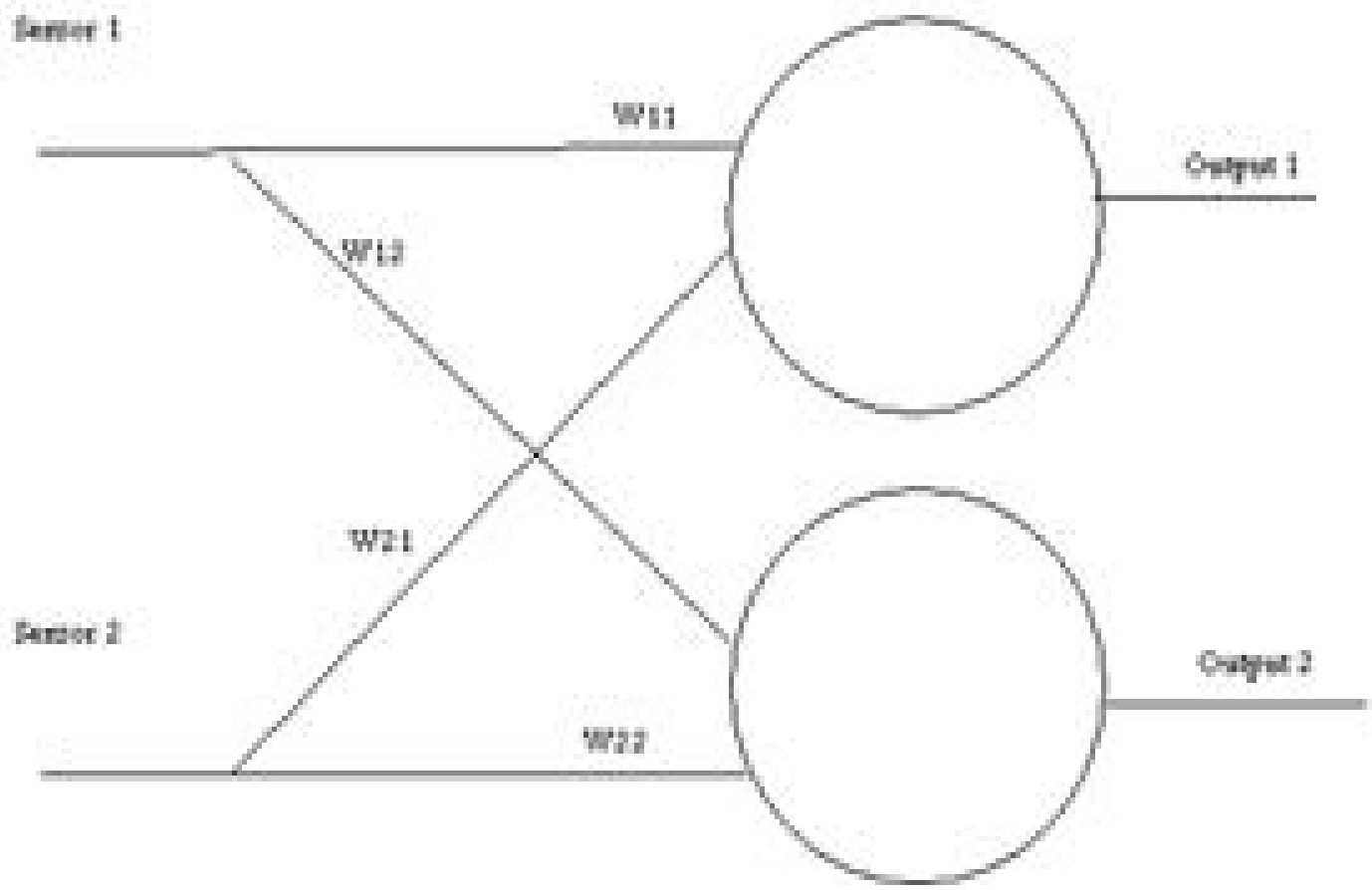
$W_{22}$



Output 2




Input 2




$$\text{output1} = \text{Sensor1} * w_{11} + \text{Sensor2} * w_{21} + \text{bias1}$$

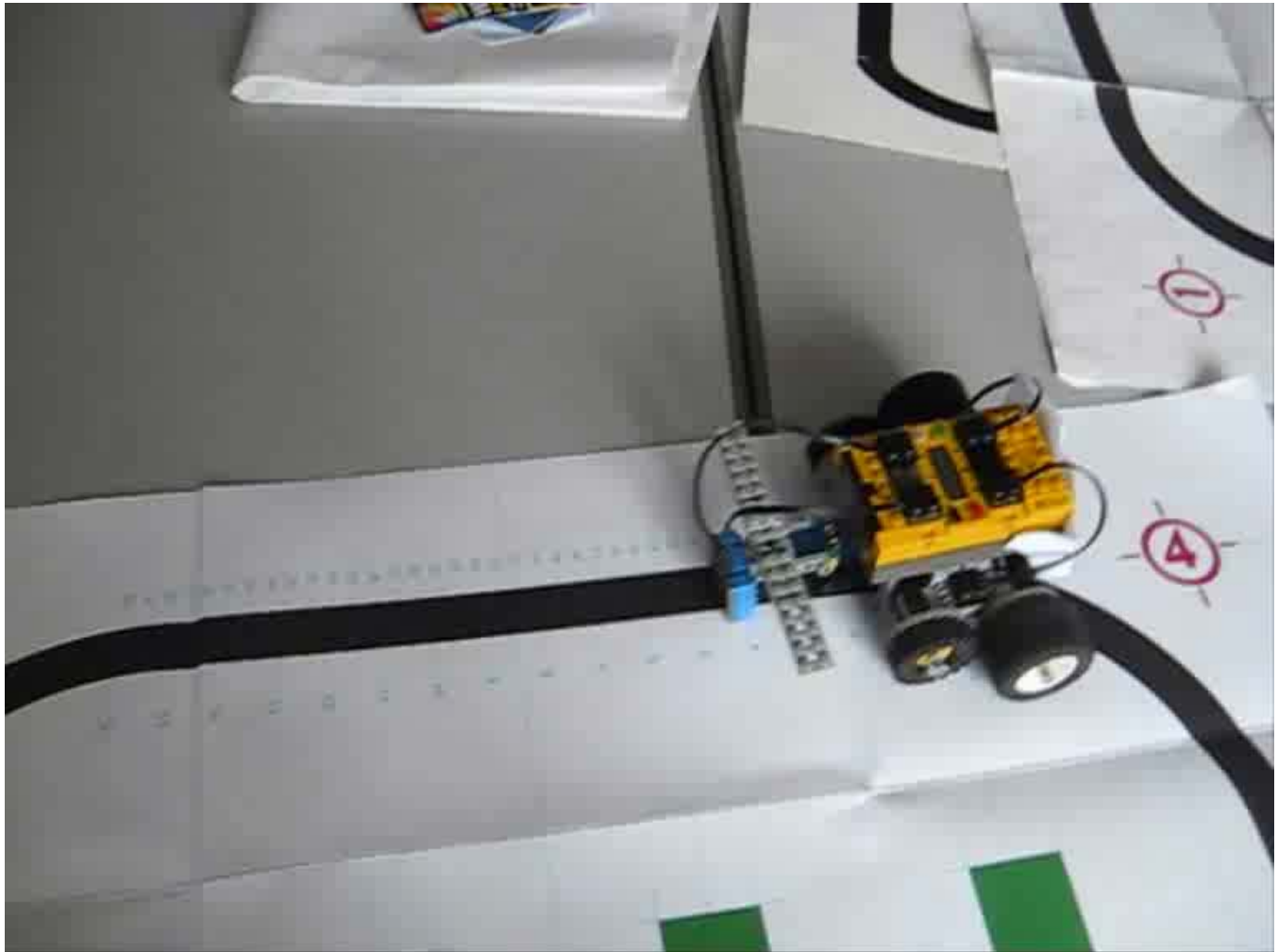
$$\text{output2} = \text{Sensor1} * w_{12} + \text{Sensor2} * w_{22} + \text{bias2}$$

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- 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**

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- **Alter the routine to find the weights itself.**



# Alternatives

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