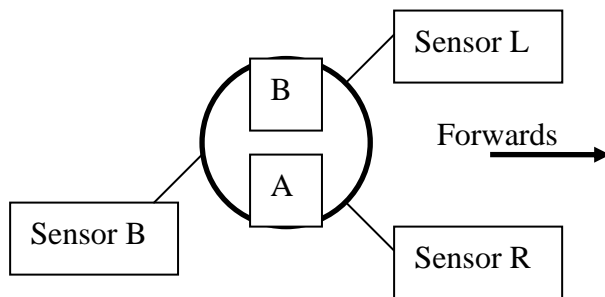


## Computer Science Logic gate questions

1. What does an XOR gate do?
  - (a) Give a high output when one or more of its inputs are high
  - (b) Give a high output when only one if its inputs are high
  - (c) Give a low output when one or more of its inputs are high
  - (d) Give a low output when only one if its inputs are high
  
2. An alarm system has sensors in three different places. These sensors will go off if: the floor sensor (A) is activated or the infrared sensor (B), which is attached to the door. The alarm will go off if there is a 1 (on- signal) at the outlet (Y), which is the case if either sensor is activated and the alarm system (C) is ON.
  - a) Draw a truth table showing the value Y for all combinations of A,B and C
  - b) Draw the circuit diagram of the circuit for this system
  
3. A robot vacuum cleaner has a very simple logic control system based on three proximity sensors and two motors. Motors outputs A and B will be ON unless otherwise stated. Motor output A reversed is OFF unless otherwise stated.



- a. If L detects an obstacle motor (sensor L on) A turns OFF.
- b. If R detects an obstacle motor (sensor R on) B turns OFF.
- c. If both sensor R and L are on A reversed turns ON unless all sensors are on in which all motor outputs are OFF.
- d. If sensor B is on, motor A and B turn ON unless all sensors are on in which case all motor outputs OFF. This statement takes priority over statements a. and b.

Construct the logic circuit to produce the required outputs A, B and A reversed.

4. Complete the values for D for each row of the table.

A	B	C	Logic for D	Value for D
0	0	0	(NOT (A AND B)) OR C	
1	1	1	(NOT (A AND B)) OR C	
1	1	0	(NOT (A AND B)) OR C	
0	0	0	A XOR (B NOR C)	
0	1	1	A XOR (B NOR C)	
1	1	1	A XOR (B NOR C)	