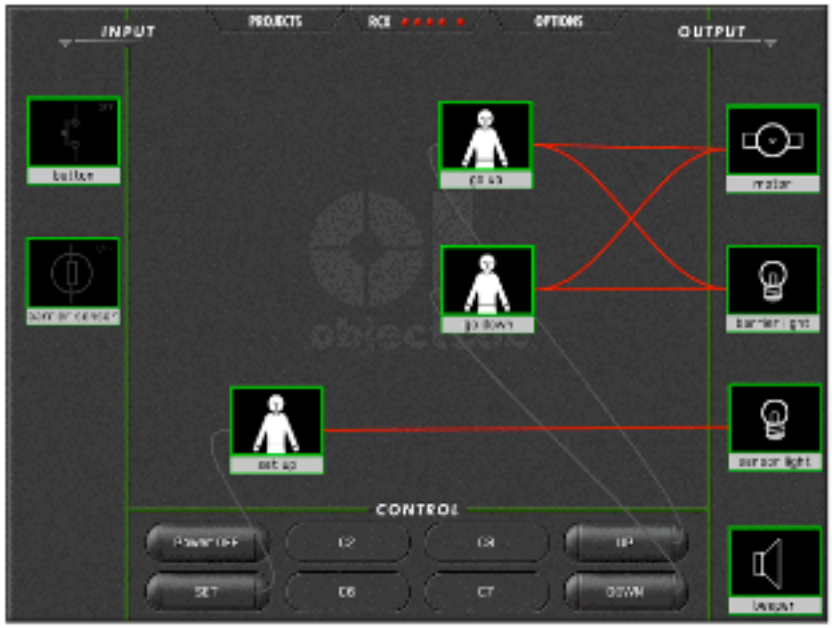
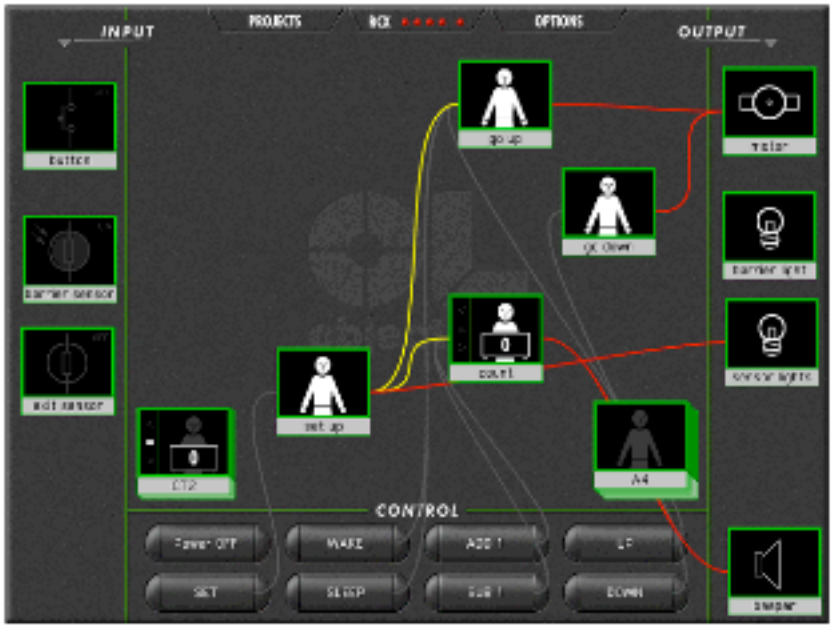
the car park

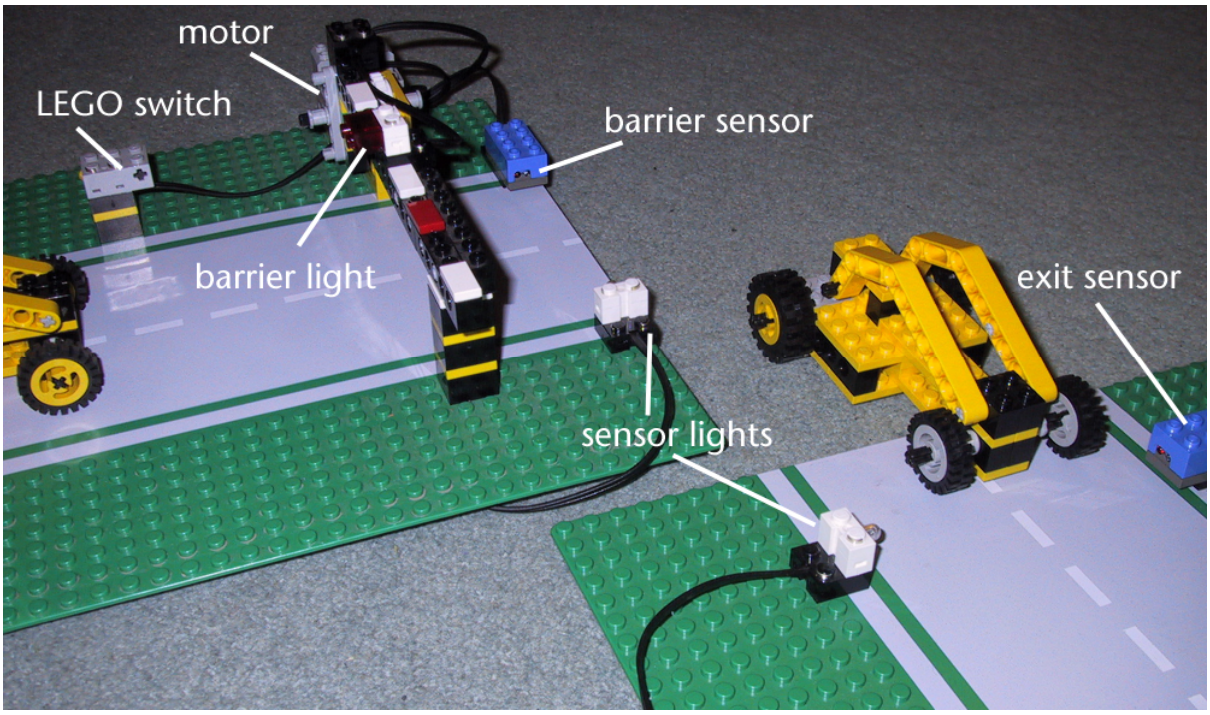

INPUT
PROJECTS
OPTIONS
OUTPUT
CONTROL
Power OFF
C2
C3
UP
C5
C6
C7
DOWN


INPUT
PROJECTS
OPTIONS
OUTPUT
CONTROL
SET
C6
C7
DOWN


INPUT
PROJECTS
OPTIONS
OUTPUT
CONTROL
Power OFF
MAKE
ADD 1
UP
SET
SLEEP
SUB 1
DOWN

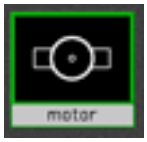
the car park (draft V7)

In this project you are going to write a program that will control the barrier that lets cars into a car park. You are going to have to make the program 'fail-safe' so that the barrier can not come down on a car. Also your program is going to have to count the cars as they enter the car park. When the car park is full, no more cars are to be allowed in, until other cars leave.



part 1

- load the program called ‘car park - part 1’

- click on the output called ‘motor’, and test out the barrier 

Hints
How fast should the motor go?
How many seconds does it take to go up?
How many seconds does it take to go down?

- click on the UP and the DOWN buttons near the bottom of the screen

- nothing happens yet because you still have to put in the messages

====> 

====> ???

- put messages into the ‘go up ‘ actor to make the barrier arm go up

- — **and stop at the top**

- test your messages out with the UP button

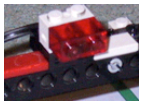
- put messages into the ‘go down’ actor to make the arm go down

- **— and stop at the bottom**

- test your messages out with the DOWN button

part 2

Now you have to make your program raise the barrier when the LEGO button is pressed. You have to allow 5 seconds for the car to pass through, and then the barrier goes down.

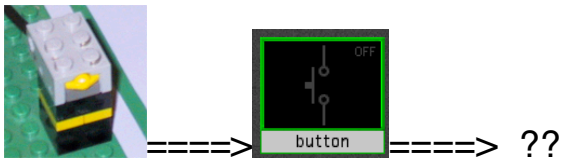


- change the messages in the ‘go up’ actor so that the barrier light starts to flash 4 seconds **before** the barrier starts to go up

- change the messages in the ‘go down’ actor so that the barrier light stops flashing 4 seconds **after** the barrier reaches the bottom

- test out your new messages using the UP and the DOWN screen buttons

- when the LEGO button is pressed it should make the barrier go up



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- which actor is it going to send a message too?

- now add a **single** message to the ‘go up’ actor that—

    - 5 seconds **after** the barrier has reached the top
    - will do everything that the ‘go down’ actor does

Hint

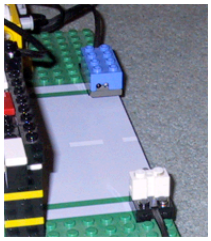
Remember that one actor can send a message to another actor, after a delay if necessary.

- test out your program with a car going under the barrier, can you think of any problems?

part 3

Imagine what would happen if the driver stalled the car half way through with this simple program? CRUNCH ! You now have to add a light sensor to make sure that the barrier only comes down AFTER the car has passed through.

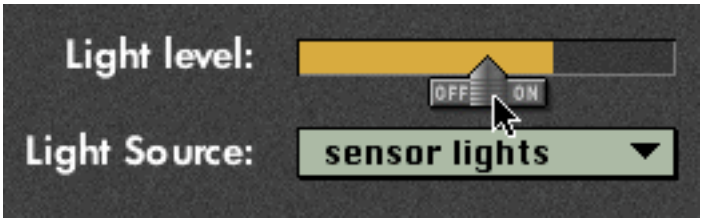
- load the program called ‘car park - part 3’
- test out the barrier using the UP and the DOWN buttons near the bottom of the screen
- put a message into the input called ‘button’ that will make the actor called ‘go up’ begin to carry out its messages
- imagine that you are the car driver, and push in the LEGO button
- the barrier should go up with the warning light flashing— nothing else should happen
- click on the screen button called SET and the light facing the barrier sensor should come on

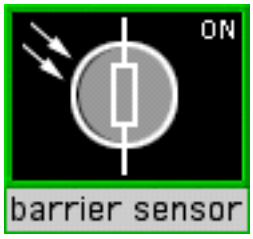


The problem that you have to solve is how to make the arm come down **after** the car has passed through the light beam. You **MUST** test out your program by pretending that the car stalls under the barrier.

READ THE NEXT PAGE BEFORE STARTING !

- click on the icon called ‘barrier sensor’ and watch what happens to the light level as a car passes
- move the car backwards and forwards, and set the OFF-ON pointer so that the barrier sensor blinks ON and OFF as a car passes





You have to decide whether you want your program to react to the light level going up, or to the light level going down.

- if you want your messages to take effect when the light level goes **up**- click the ON tab at the bottom of the screen

- if you want your messages to take effect when the light level goes **down**- click the OFF tab at the bottom of the screen

- now add the message that will bring the barrier down and stop the light flashing **AFTER** the car has passed through

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Hints

Which actor are you going to be sending a message to?

Remember that you have to have the sensor lights on *before* you test out your program- click on the ‘SET’ button to turn them on.

Test out your program a couple of times. If it doesn’t work try using the other ‘tab’ in the barrier sensor.

Does it still work if the car goes quickly, or very slowly?

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part 4

Now that you have the barrier working, the next problem is to ONLY let cars in when there is space for them to park. Image that there are only 5 spaces in the car park.

Your program is going to have to count the cars as they come in, and when the count reaches 5 the barrier has to stay down **even if the LEGO button is pressed.**

When the car park is full the light on the barrier should stay flashing, but when the car park has spaces the light on the barrier should not be flashing.

When the car park is full, pressing the button must only raise the barrier once a car has left through the exit, and the count has come down.

- load the program called 'car park - part 4'
- put a message into the input called 'button that will make the actor called 'go up' begin
- put a message into the input called 'barrier sensor' to make the actor called 'go down' begin (remember — **after** the car has passed)
- put a message into the actor called 'go down' that will make the 'count' go up by one
- put messages into the actor called 'count' that will stop the barrier going up once it has reached the value 5, (**even if** the LEGO button is pressed)– you also have to start the barrier light flashing
- put a message into the input called 'exit sensor' to make the 'count' go down by one, and the barrier light stop flashing (**remember** that the LEGO button should be working again too)

READ THE HINTS ON THE NEXT PAGE BEFORE STARTING !!

Hints
Experiment with the ADD 1 and SUB 1 buttons, and the SET button. What effect do they have on the counter?

What happens when the count gets to 5? Look at the messages in the actor called count for ideas.

Putting an actor to sleep is one way to stop it sending on messages. (Try out the 'WAKE' and 'SLEEP' buttons and see what they do.)

Remember to set the level in the sensors so that they act as the car passes.

Remember that you have to have the sensor lights on when you test out your program- click on the 'SET' button to turn them on.

Work on the problem of counting the cars in first. When you have solved it, think about the sensor on the exit to your car park.

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part 4b

An extra feature
Imagine that you wanted to keep a count of the **total** number of cars that had gone in to the car park.

- drag out another counter actor, give it a name, and use it to keep a count of the total number of cars