Applications Library

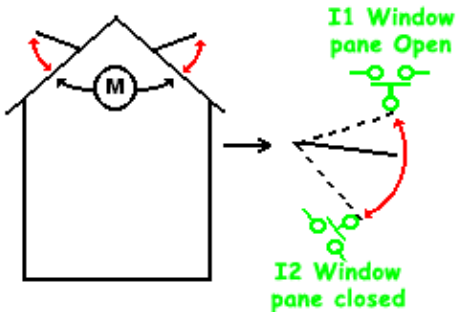
Note: The descriptions that follow offer links allowing access to the corresponding application.
If Zelio Soft 2 software is installed, a click on the link will open the program. You may then select simulation mode ***(1)*** *and start the module (**RUN**)* ***(2)****.*

Floating pop-ups are available to change and view the input-output status. To view them or mask them, use the icon bar at the bottom of the screen:

1 Applications in Ladder language

1.1 GREENHOUSE AUTOMATIC VENTILATION PANE CONTROL

Specifications:
The owner of a greenhouse would like to acquire an installation to manage the opening and closing of the ventilation window panes located on the greenhouse roof.
The greenhouse has two window panes to provide ventilation. The opening of these window panes is controlled by a motor and 2 sensors that indicate whether the window panes are open or closed:

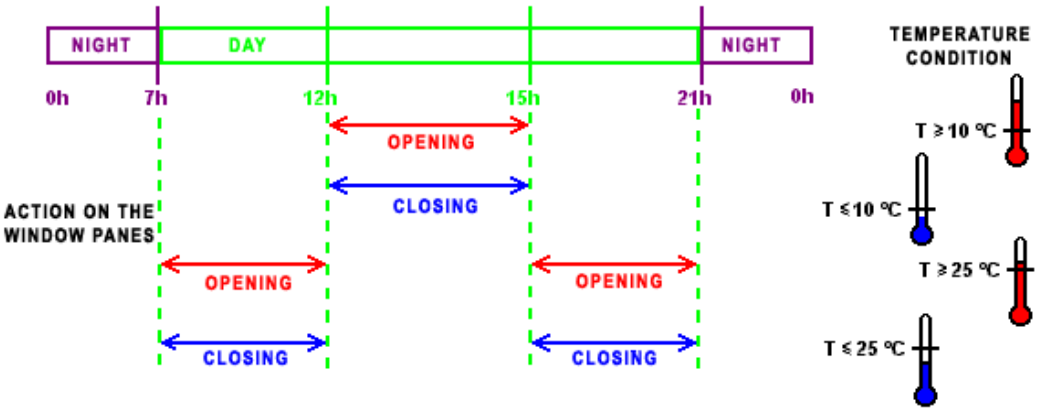


During the day, the window panes open to ventilate the structure from 12:00 to 15:00, at the time of day when, in principle, the temperature is the highest. However, if the temperature is less than 10°C, the window panes do not open, or when they are already open, they close.

In addition, the window panes open during the day when the temperature reaches 25°C. If the temperature falls below 25 °C, the window panes must close again.
Finally, at night, the window panes remain closed regardless of the temperature.

Power by http://www.hackspedia.com

Summary diagram:



Description of the inputs/ouputs:

INPUTS:	*OUTPUTS:*
I1 Opened window sensor	**Q1** Opening of the window panes
I2 Closed window sensor	**Q2** Closing of the window panes
IB Temperature (analog input)	

The temperature is supplied by a sensor with output voltage of 0 to 10 V.

Model Required:
Zelio Logic with clock and analog inputs.
SR2 B121 BD (24 V DC) ou **SR2 B121 JD** (12 V DC) par exemple.

Program Description:
3 time ranges are used:
-**Range 1**: Night, from 21:00 to 07:00
-**Range 2**: Daytime, from 7:00 to 12:00 a.m. and from 3:00 to 9:00 p.m.
-**Range 3**: Noon, from 12:00 to 15:00

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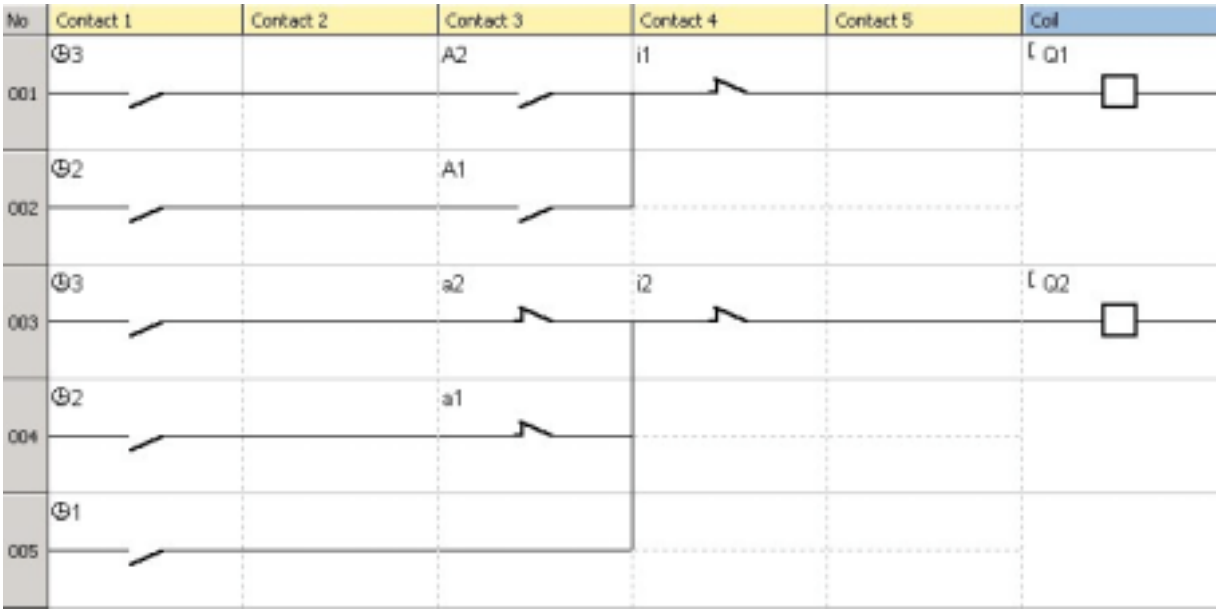
Logic diagram:



Click on the link below to access the application:

Greenhouse automatic ventilation pane control (ladder)

*Note: Use the floating pop-up of analog input **IB** to vary the temperature. To call it up, click on the corresponding icon in the lower bar.*

Power by http://www.hackspedia.com

1.2 INDOOR/OUTDOOR LIGHTING OF A HOME

Specifications:
A homeowner would like to install a system capable of controlling the lighting of a stairway and outdoor entrance providing access to the home.

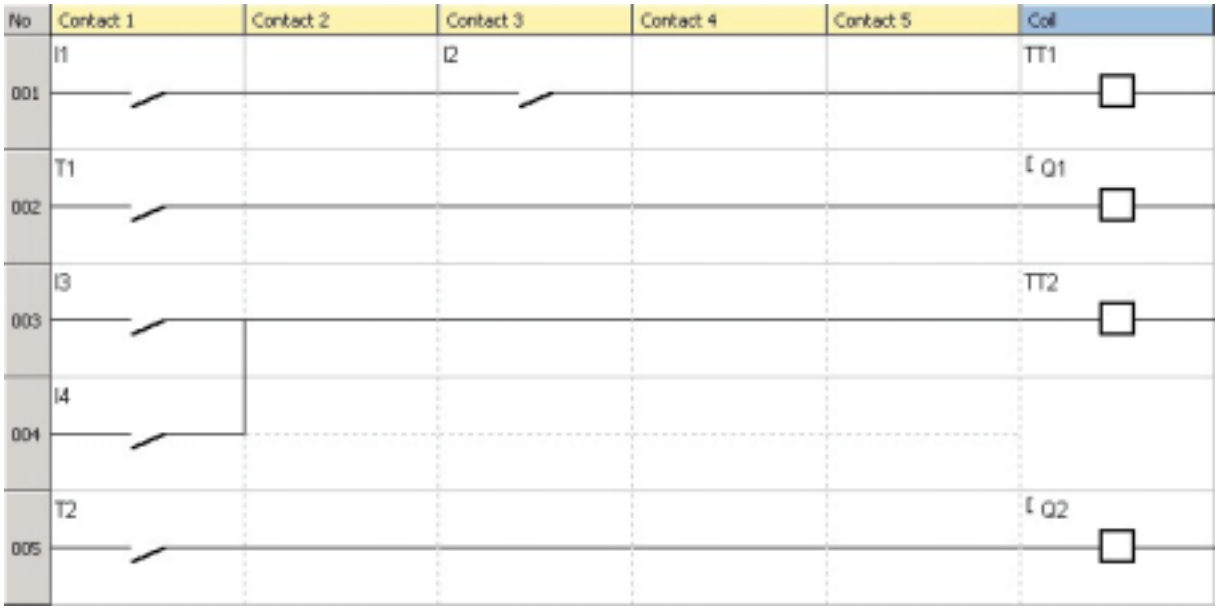
Outdoor Lighting: The circuit is activated at night by a twilight switch. A sensor detects any passage and activates the outdoor lighting for 2 minutes.
Indoor lighting: Two push-buttons are situated in the stairwell: one in the entrance, the other at the top of the stairs. Their function is identical. Time-delayed (2 minutes) lighting is obtained by quickly pressing one of the buttons.

Description of the inputs/ouputs:

INPUTS:	*OUTPUTS:*
I1 Passage sensor	**Q1** Outdoor lighting
I2 Twilight switch	**Q2** Indoor lighting
I3 Pushbutton	
I4 Pushbutton	

Model Required:
No specific condition:
SR2 B121 BD (24 VDC) for example.

Logic diagram:



Click on the link below to access the application:

Indoor/Outdoor lightning of a home

Power by http://www.hackspedia.com

1.3 ACCESS CONTROL, AUTOMATIC GATE

Specifications:
A homeowner wants access to his residence to be controlled by an automatic gate equipped with a dual direction (opening and closure) motor.

Opening: Whether the gate is closed or in an intermediate position, the remote control signal causes the full opening of the gate. During the opening process, any new action on the remote control stops or restarts the motor.

As soon as the gate is fully open, a 4-second time delay delays its closure.

Closure: During the closing process, if the remote control is activated or if the sensor detects a passage, the gate is opened. As long as the sensor is activated, (vehicle stopped in the passage way for example), the gate remains fully open.

Description of the inputs/ouputs:

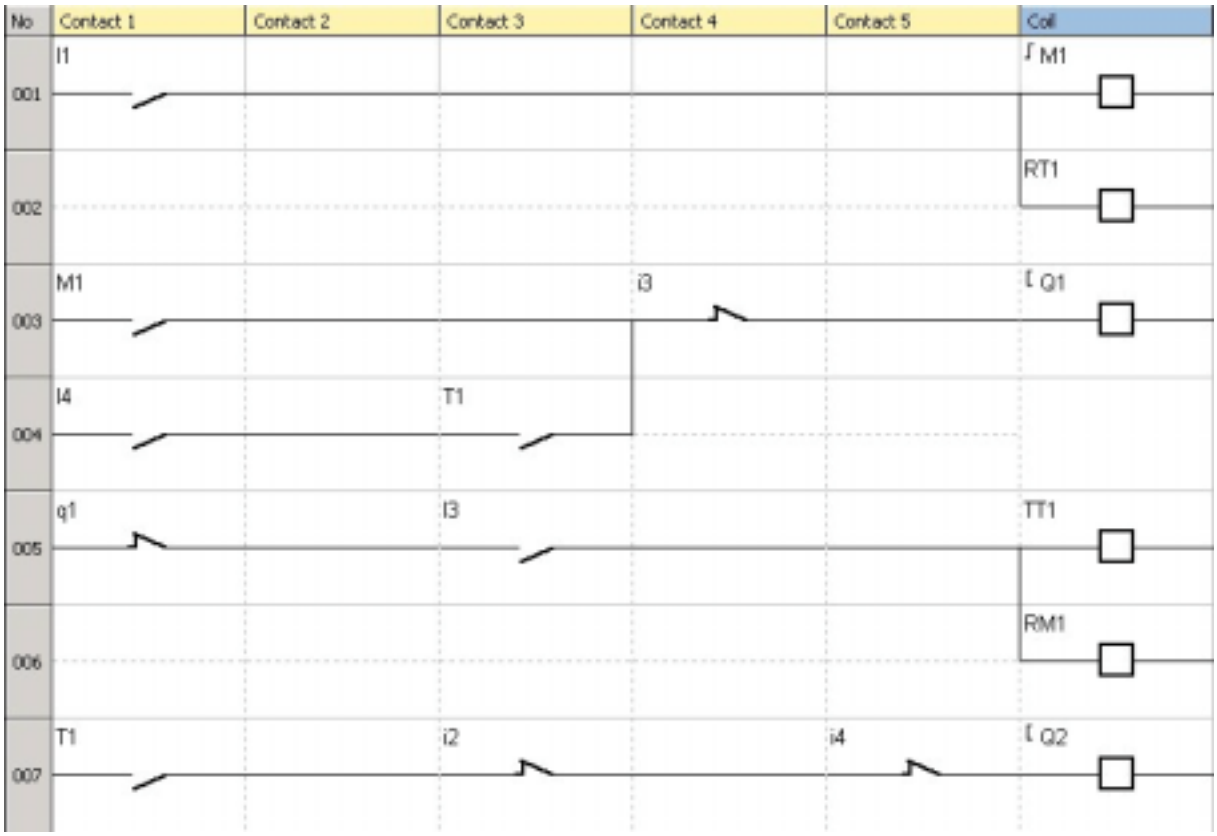
INPUTS:	*OUTPUTS:*
I1 Remote control	**Q1** Gate opening
I2 Gate closed position	**Q2** Gate closure
I3 Gate closed position	
I4 Passage sensor	

Model Required:
No specific condition.
SR2 B121 BD (24 V DC) or **SR2 B121 JD** (12 V DC) for example.

Advantages of the application:
The safety feature of being able to stop gate opening or closing via the remote control signal is an essential advantage for this type of application.

Power by http://www.hackspedia.com

Logic diagram:



Click on the link below to access the application:

[Access control, automatic gate]

Power by http://www.hackspedia.com

1.4 UNDERGROUND CAR PARK CONTROL

Specifications:
We want to complete and centralize the control of the underground car park of an administration building.
Vehicle entrance/exit control: access is allowed by an automatic barrier. Users can access the car park during business hours: Monday through Friday from 8:30 a.m. to 5:30 p.m., Saturday from 9:30 to noon. However, it is possible to manually inhibit the blocking of the barrier by pressing on **Z4** (function restored by pressing on **Z2**) in case of an exceptional event.
Counting: The car park capacity is limited to 93 vehicles. A counter will block access to the car park if it is full and will control a light panel indicating ''Car park Full''. It is also possible to manually increase or decrease (in increments) the number of vehicles present in the car park (using **Z1** and **Z3**).
CO2 level: For safety reasons, a CO2 sensor indicates when the level is high and controls the operation of a fan (10 minutes).
Light: The lighting switches on for 2 minutes each time a vehicle enters the car park or whenever a pedestrian presses the switch. .

Description of the inputs/ouputs:

INPUTS:	*OUTPUTS:*
I1 Vehicle entry	**Q1** Indicates when the car park is full.
I2 Vehicle exit	**Q2** Locks the entry barrier
I3,I4 Pushbuttons at pedestrian access points	**Q3** Lightning
IB Carbon dioxide level sensor	**Q4** Fan control
Z1 Manually increments the number of vehicles	
Z2 Resumes automatic entry control	
Z3 Manually decrements the number of vehicles	
Z4 Manual release of entry barrier	

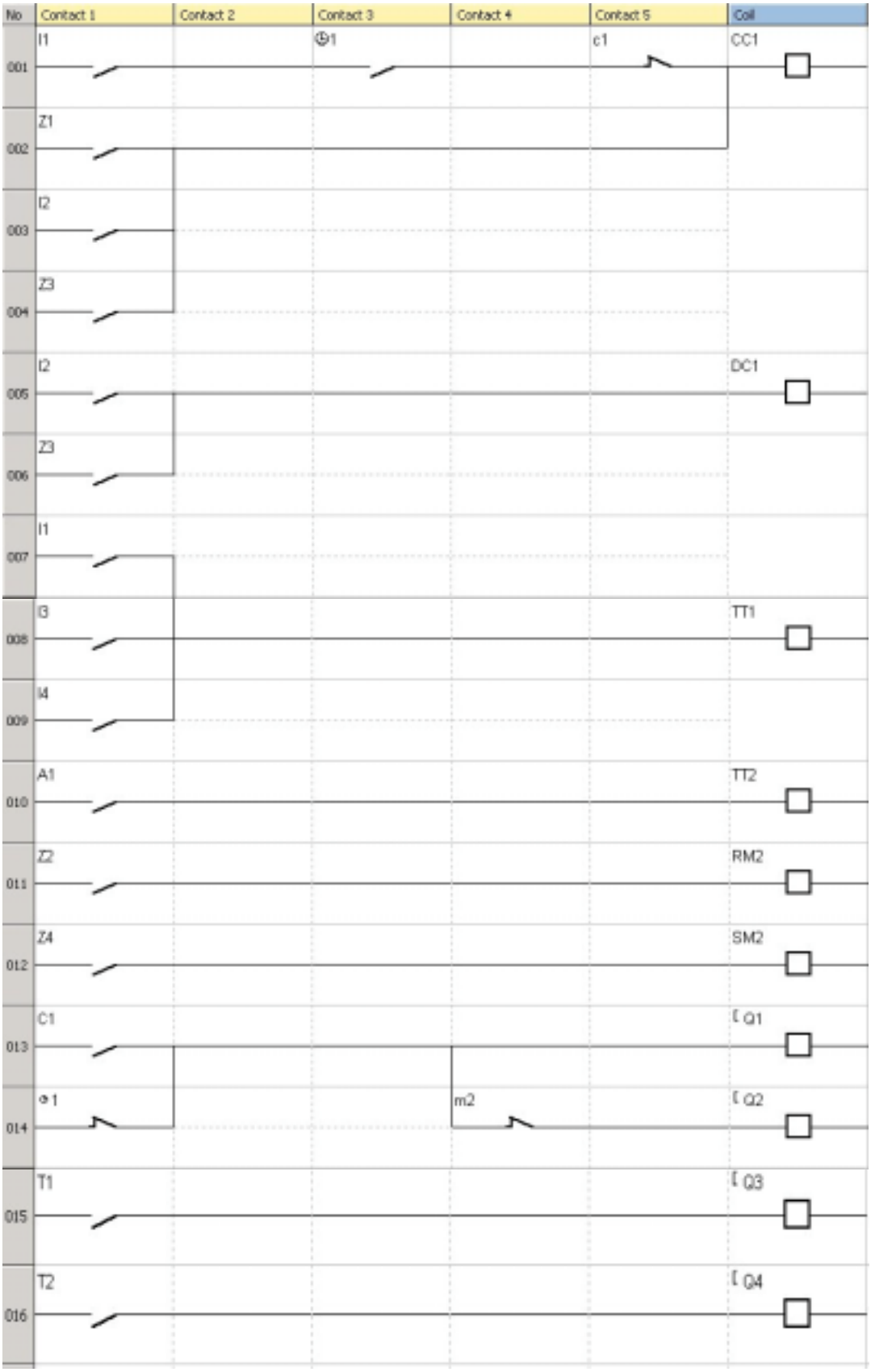
Model Required:
Model with clock and analog inputs.
SR2 B121 BD (24 V DC) or **SR2 B121 JD** (12 V DC) for example.

Advantages of the application:
Full car park control using a single logic module.

*Note: Use the floating pop-ups to simulate the variation of the level of CO2 (analog input **IB**) and to use the push-buttons. To call them up, click on the corresponding icons in the lower bar.*

Power by http://www.hackspedia.com

Logic diagram:



Click on the link below to access the application:

[Underground car park control]

Power by http://www.hackspedia.com

1.5 ROOM TEMPERATURE REGULATION

Specifications:
The ambient temperature of a room is controlled in the heat mode by a heater and a fan, and in the chill mode only by the fan. A heat sensor provides a 0-10 V signal. A switch is used to deactivate temperature regulation.
The direct evolution of inputs and outputs can be monitored in a supervision window.

Description of the inputs/ouputs:

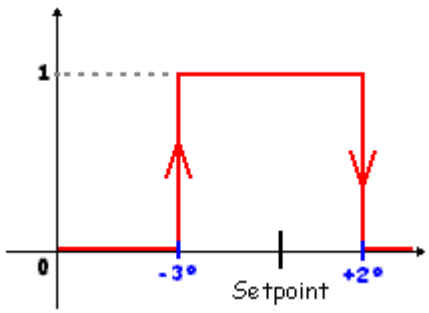
INPUTS:	*OUTPUTS:*
I1 On/Off switch	**Q1** Heater
I2 Mode selection	**Q2** Fan
IB Ambient temperature (analog input)	
IC Setpoint (analog input)	

The temperature is supplied by a sensor with output voltage of 0 to 10 V.

Model Required:
Zelio Logic with analog inputs.
SR2 B121 BD (24 V DC) or **SR2 B121 JD** (12 V DC) for example.

Program Description:
Input I1 =0 : regulation is off.
Input I1 =1 : Regulation is on.
Input I2 =0 : chill mode.
Input I2 =1 : heat mode.

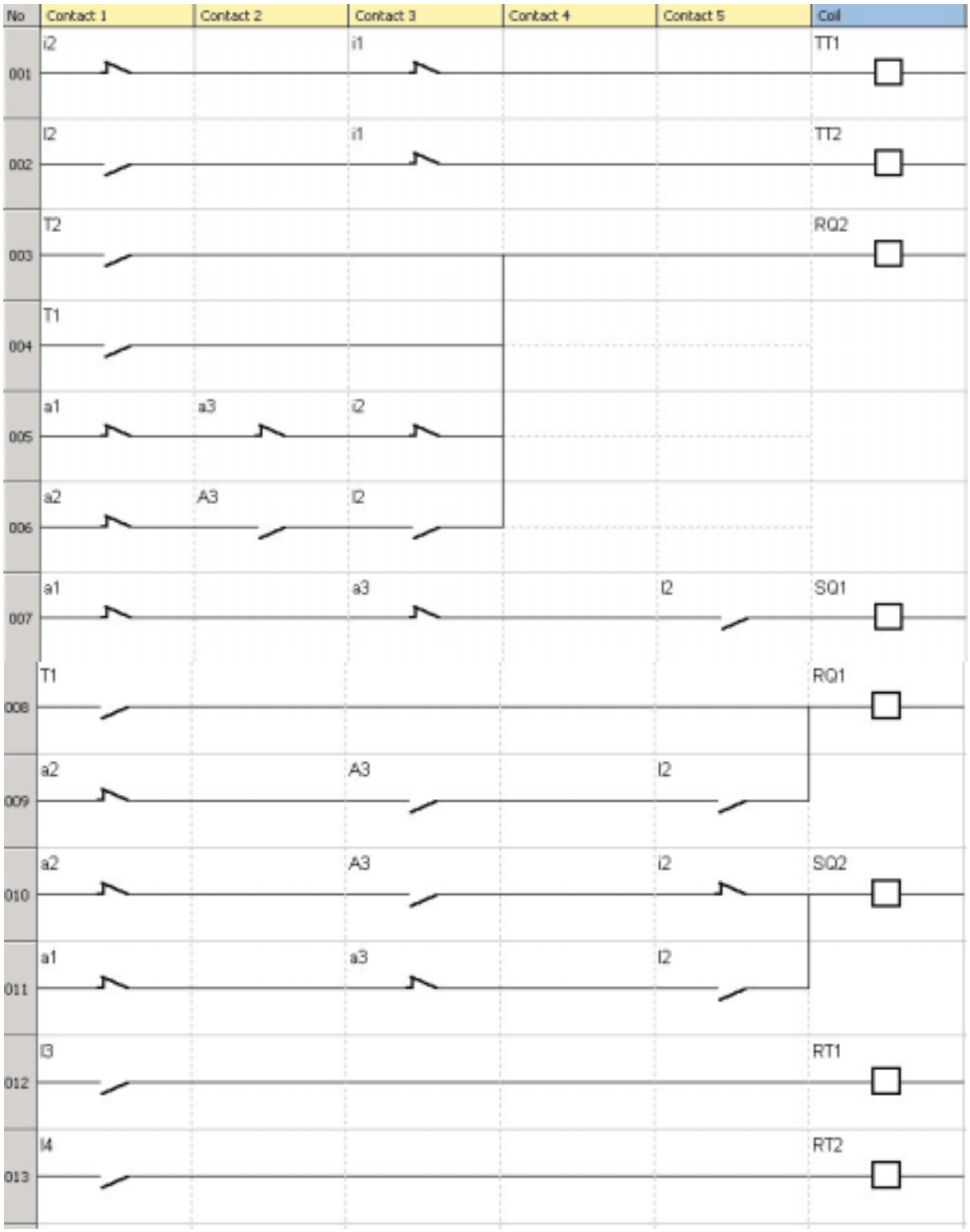
Hysteresis:



Advantages of the application:
Use of 0-10 V analog inputs.
The supervision window.

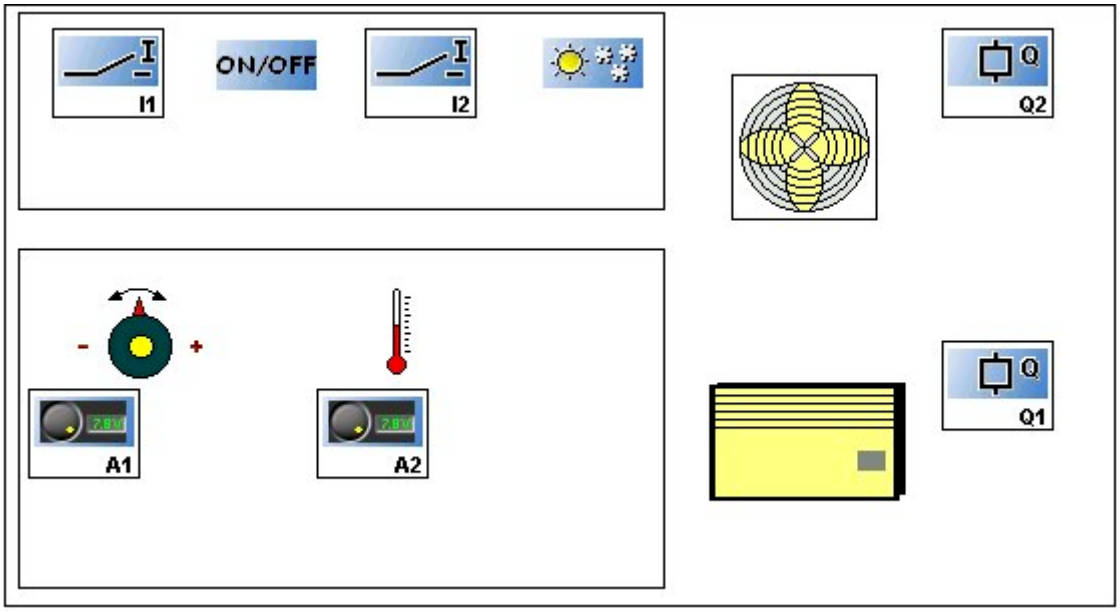
Power by http://www.hackspedia.com

Logic diagram:



Power by http://www.hackspedia.com

Supervision window:



Click on the link below to access the application:

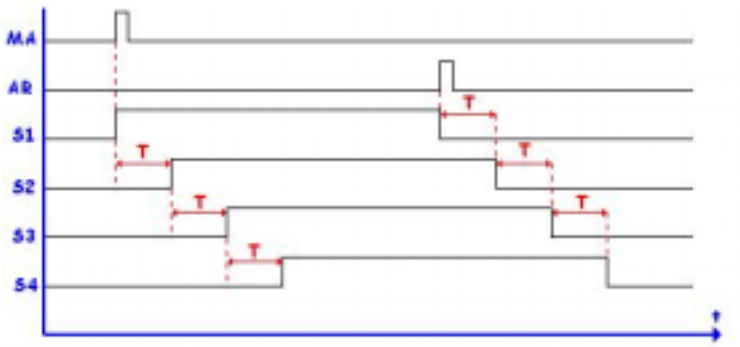
Room temperature regulation

*Note: to simulate this program, first adjust the setpoint using analog input **IC** then switch on the temperature regulation (I1=1, click on **I1**). If the chill mode is selected (I2=0), the fan will be activated as soon as the temperature exceeds the setpoint of 3°C and will stop when it drops 2°C below the setpoint. And conversely for the heat mode.*

Power by http://www.hackspedia.com

1.6 PROGRESSIVE HEATING OF BOILER ELEMENTS

Specifications:
To avoid over-consumption on boiler start-up, the heating elements are heated progressively, and stopped progressively when the boiler is stopped.
This operating principle is shown by the following timing diagram:



An “On” (**MA**) button authorizes the activation of the first heating element (**S1**). After a time-delay T, the second element (**S2**) starts up. After the same time-delay, the third elements starts up (**S3**), then the fourth element (**S4**) again after time-delay T. An “Off” (**AR**) button deactivates **S1**. The three other elements are progressively deactivated after time-delay T with each deactivation of the preceding element.

Description of the inputs/ouputs:

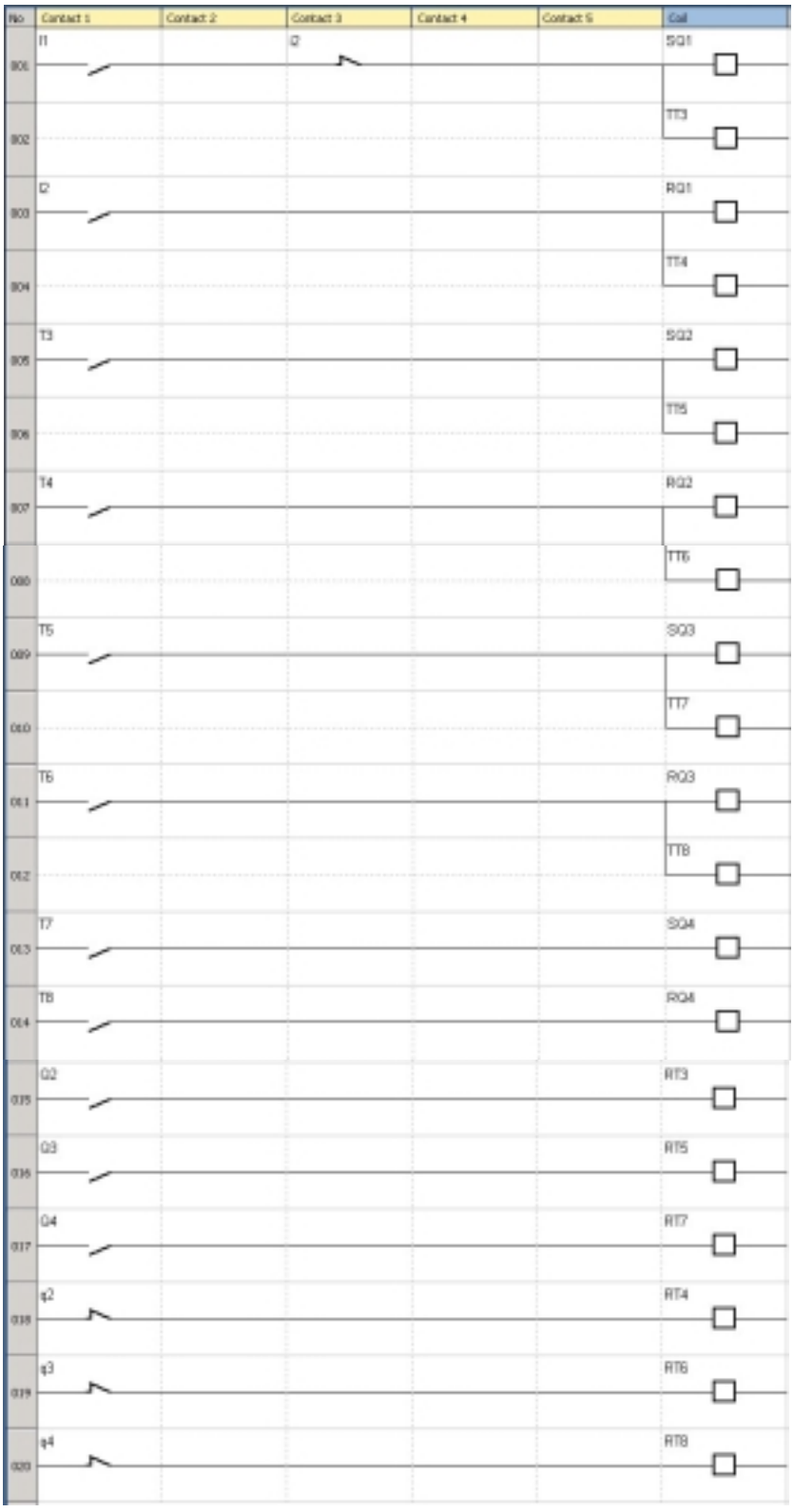
INPUTS:	*OUTPUTS:*
I1 On button	**Q1** First heating element S1
I2 Off button	**Q2** Second heating element S2
	Q3 Third heating element S3
	Q4 Fourth heating element S4

Model Required:
No specific condition:
SR2 B121 BD (24 V DC) or **SR2 B121 JD** (12 V DC) for example.

Program Description:
In principle, time delay T is identical for the activation/deactivation of all the heating elements. The program includes three TIMER function blocks. The function to perform according to the specifications requires entering the same time-delay value in the three blocks.
As a result, if the user wants to modify one of them, he/she will have to enter the new selection in the three blocks.

Power by http://www.hackspedia.com

Logic diagram:



Click on the link below to access the application:

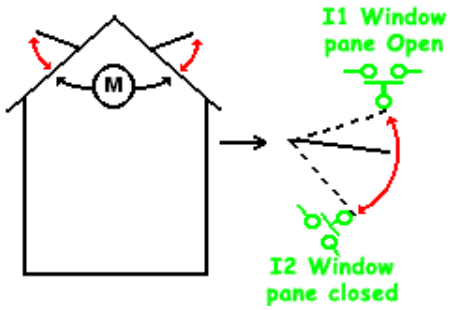
[Boiler elements]

Power by http://www.hackspedia.com

2 Applications in FBD language

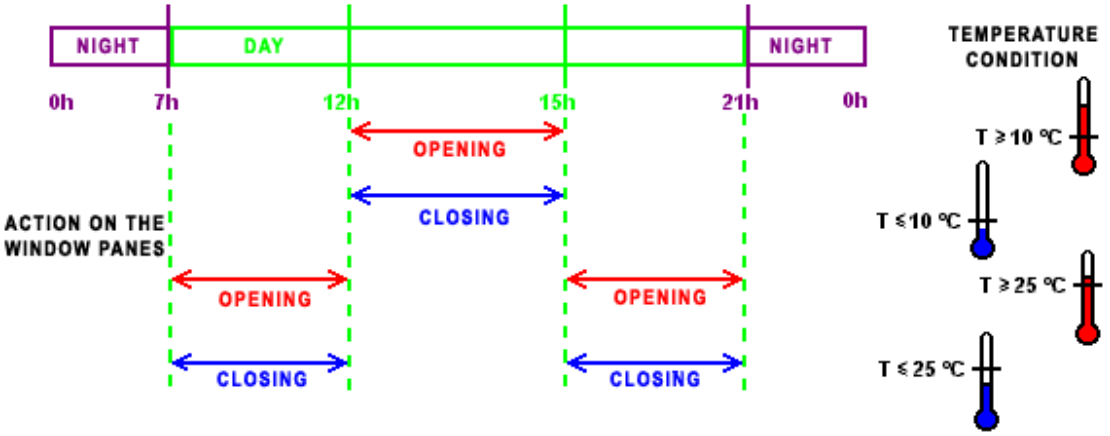
2.1 GREENHOUSE AUTOMATIC VENTILATION PANE CONTROL

Specifications:
The owner of a greenhouse would like to acquire an installation to manage the opening and closing of the ventilation window panes located on the greenhouse roof.
The greenhouse has two window panes to provide ventilation. The opening of these window panes is controlled by a motor and 2 sensors that indicate whether the window panes are open or closed:



During the day, the window panes open to ventilate the structure from 12:00 to 15:00, at the time of day when, in principle, the temperature is the highest. However, if the temperature is less than 10°C, the window panes do not open, or when they are already open, they close.
In addition, the window panes open during the day when the temperature reaches 25°C. If the temperature falls below 25 °C, the window panes must close again.
Finally, at night, the window panes remain closed regardless of the temperature.

Summary diagram:



Description of the inputs/ouputs:

INPUTS:	*OUTPUTS:*
I1 Opened window sensor	**Q1** Opening of the window panes
I2 Closed window sensor	**Q2** Closing of the window panes
IB Temperature (analog input)	

The temperature is supplied by a sensor with output voltage of 0 to 10 V.

Model Required:

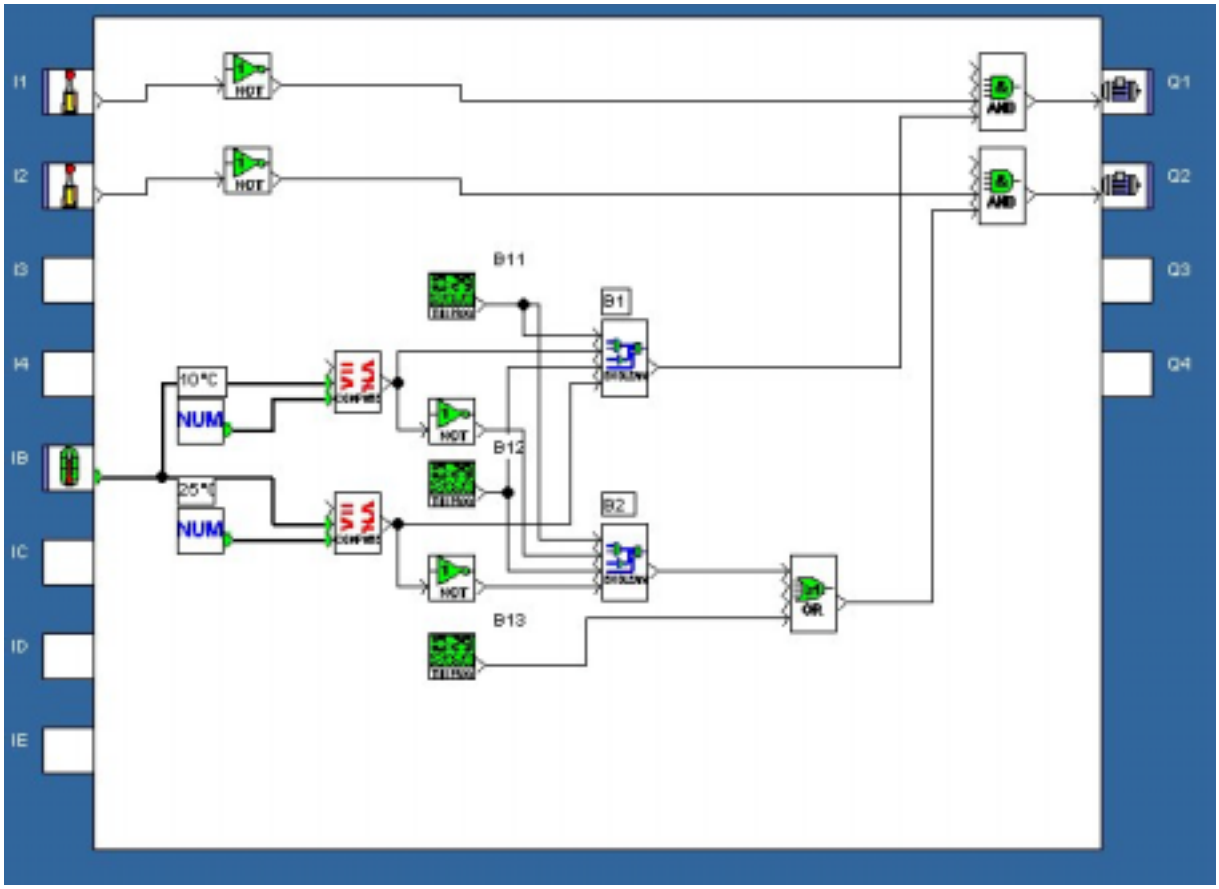
Power by http://www.hackspedia.com

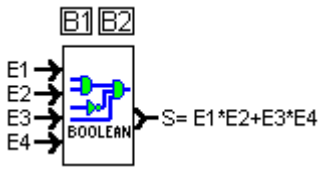
Zelio Logic with clock and analog inputs.
SR2 B121 BD (24 V DC) or SR2 B121 JD (12 V DC) for example.

Program Description:
3 time ranges are used:
-**Range 1**: Night, from 21:00 to 07:00 (B13)
-**Range 2**: Daytime, from 7:00 a.m. to 12:00 p.m. and from 3:00 to 9:00 p.m. (B12)
-**Range 3**: Noon, from 12:00 to 15:00 (B11)

Advantages of the application:
The programmable logic function is used simplifying the diagram

Logic diagram:





Click on the link below to access the application:

Greenhouse automatic ventilation pane control (FBD)

Power by http://www.hackspedia.com

2.2 INDOOR/OUTDOOR LIGHTING OF A HOME

Specifications:

A homeowner would like to install a system capable of controlling the lighting of a stairway and outdoor entrance providing access to the home.

Outdoor lighting: The circuit is activated every year from June 1st to October 1st and at night by a twilight switch. A sensor detects any passage and activates the outdoor lighting for 2 minutes.

Indoor lighting: Two pushbuttons are situated in the stairwell; one in the entrance, the other at the top of the stairs. Their function is identical.

- Time-delayed (30 seconds) lighting is obtained by quickly pressing one of the buttons. The timer can be inhibited by renewed action on one of the buttons.
- Permanent lighting is activated if one button is depressed for at least 2 seconds. A quick press stops it.

Table of inputs/outputs:

INPUTS:	*OUTPUTS:*
I1 Passage sensor	**Q1** Outdoor lighting
I2 Twilight switch	**Q4** Indoor lighting
I3 Pushbutton	
I4 Pushbutton	

Model Required:
Zelio Logic with clock:
SR2 B121 BD (24 VDC) for example.

Program Description:
Programming is possible at two levels.
Level 1 : Program satisfying the specifications.
Level 2: Use of SFC/Grafcet functions

Advantages of the application:

It is possible to handle the application with sequential functions.

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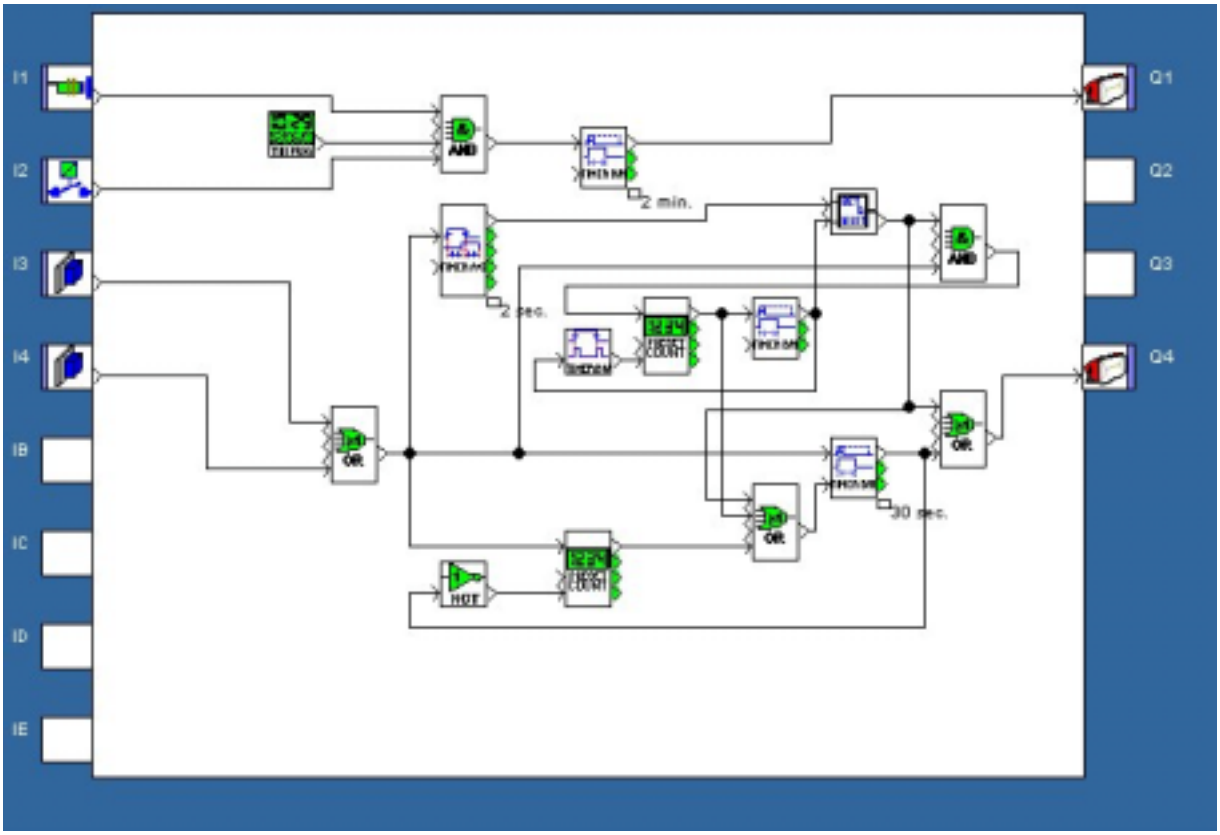
Logic diagram Level 1:



Click on the link below to access the application:

[Indoor/Outdoor lightning of a home - level 1]

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