



The Lighthouse project (Level 3)

Worksheet for students

Team:.....

Aim: To make the lighthouse blink at different rates only at dark and according to the distance of the sailing ships

Imagine a lighthouse that blinks faster than the normal when a ship is nearby. Is this mechanism useful for sailors? How it can be implemented? Write your thoughts below.

Review several structures of lighthouses and start taking decisions for your own design. Sketch your lighthouse and list the crafting material that you may need.

Area for sketches

List of crafting material:

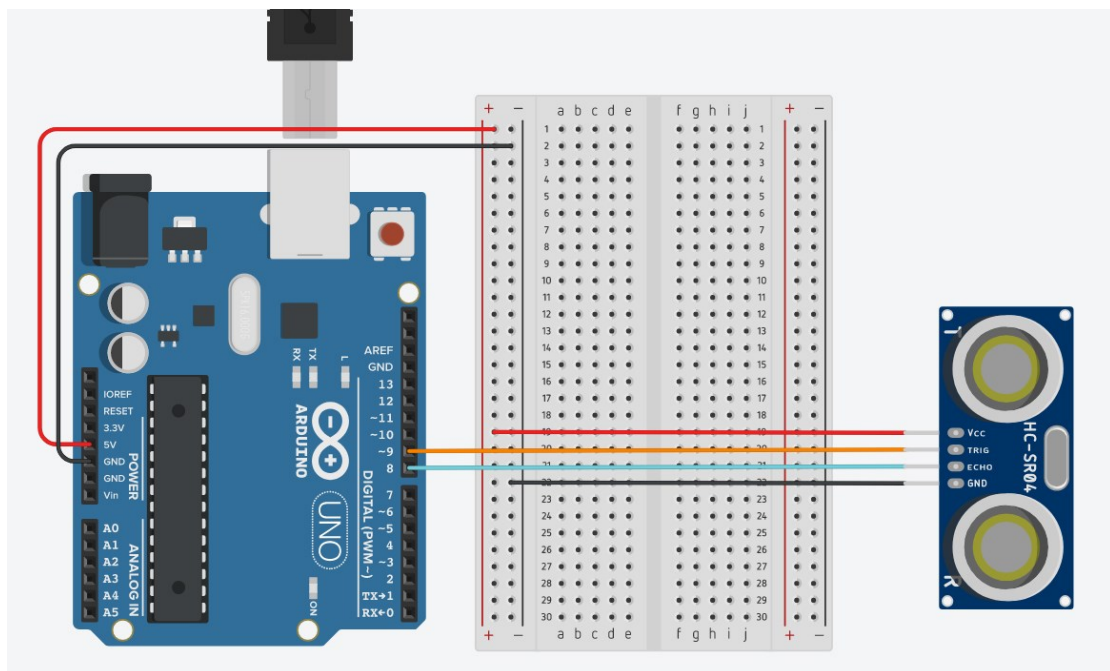
Time for crafting! Start working on the design of the lighthouse model using the available crafting materials; bear in mind that your model will be revised several times and adjustments/improvements will be introduced.

Time for circuit making!

The image below depicts a circuit in which an Ultrasonic sensor is connected. For the needs of this level, you will also need to connect a LED and a photoresistor:

- How will you connect them?
- Which one will you connect to one of the digital pins and which to one of the analog pins?
- Apart from jumpers, will you need any other component?

Try to draw the circuit or create the simulation on TinkerCAD



What does the ultrasonic sensor do? Explain briefly below.

Time for hands-on practice!

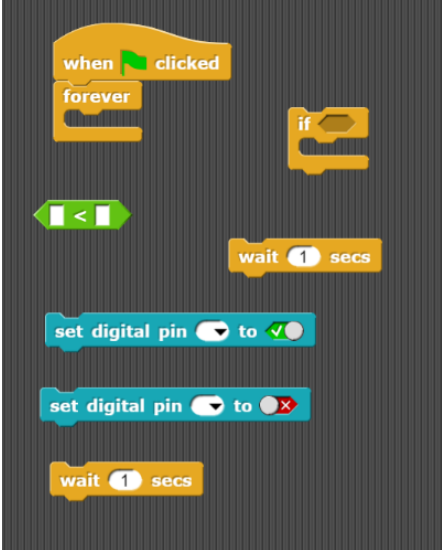
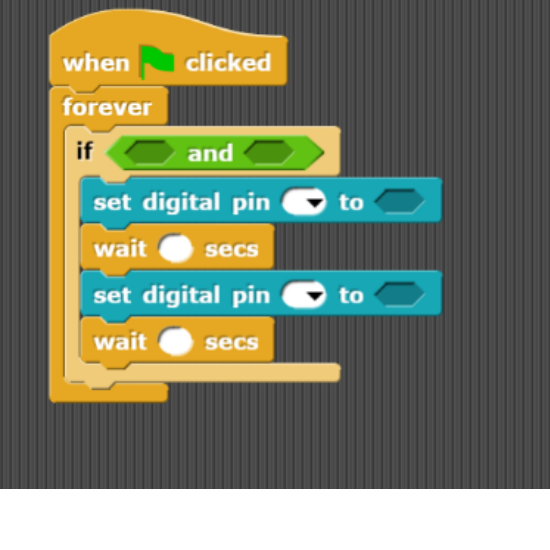
Let's add the corresponding components to the circuit from the previous level or create the circuit from scratch.

Time for programming!

At this level, you should implement the blinking functionality only at dark but also to check a new condition: when a ship approaches, the led flashes quicker. In other words, you need two scripts that run in parallel: one that ensures that the blinking takes place only at dark (script 1) and one that ensures that when it is dark and a ship is nearby the blinking rate will be faster (script 2).

Can you make these two scripts in Snap4Arduino? Use the semi-structured scripts below:

Do not forget to connect your Arduino in Snap4Arduino.

Script 1	Script 2
	

Place an object 3cm from the sensor. What value does the sensor return?

What will happen if the 2 conditions within the 'and' Boolean operator ... are not met?

Time to revise your model! Start improving the design of the lighthouse model using the available crafting materials. Integrate the electrical circuit and the script that you made to add a level of interactivity.

Tips Zone

Programming blocks



This is a *hat* block that indicates that the script should be carried out when the green flag will be clicked.



This is a C-block. The slot inside the C shape is a special kind of input slot that accepts a *script* as the input. Any script placed **in there** will be carried out forever in a circle.



This is a control block that pauses the execution of the script for a predefined number of seconds (keeping the current state on): in this case 1 sec.



This block sets the selected digital pin (in this case 13) to the logical true value. You can toggle between the true and false values directly in the block. Normally a LED is connected to pin 13.



The C-shaped if block runs its input script if (and only if) the expression in its hexagonal input reports true.



This block can be used to create a condition/predicate that evaluates to true or false. Don't get confused; a hexagonal block is a predicate/condition, but the value it reports is a Boolean.



The 'and' Boolean operator, serves to indicate that ALL specified conditions must be met in order for a query to return true.






Condition 1: it is dark

Condition 2: the ship is close to the lighthouse

Tips Zone

Electrical components

The following table is an index containing all the components that need to be implemented for accomplishing the present activity.

	LED light
	220 Ω resistor
	10 KΩ resistor
	photoresistor
	Ultrasonic Sensor

ROBOSCIENTISTS PROJECT

Motivating secondary school students towards STEM careers through robotic artefact making

Erasmus+ KA2 2018-1PL01-KA201-051129

Creators

Rene Alimisi, Chrysanthi Papasarantou, Konstantinos Salpasaranis (EDUMOTIVA)

Declaration

This report has been prepared in the context of the ROBOSCIENTISTS project. Where other published and unpublished source materials have been used, these have been acknowledged.

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