

# BURGLAR ALARM



## STEMJAM Teaching Guide

Developing make spaces to promote creativity  
around STEM in schools

Acronym: STEMJAM

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# BURGLAR ALARM

## ABSTRACT

The students' task is to construct the alarm that will be triggered by a specific event. The robot's task is to warn the intruder who enters the room.

## DIDACTIC OBJECTIVES

- ❖ Introduction to computational thinking.
- ❖ Assimilation, creation and programming of algorithms.
- ❖ Learning how to use the ultrasonic sensor.
- ❖ Learning the functions of the led's on the board.
- ❖ Learning the functions of the sound sensor on the board.

STEM Subject:    Science             Technology             Engineering             Mathematics

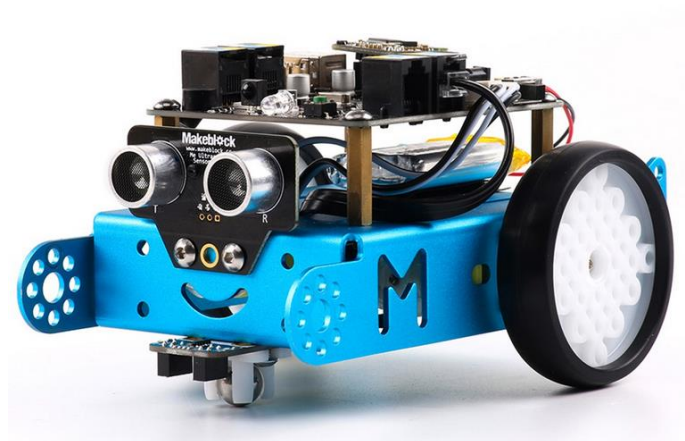
Education Level:            12-14 years             14-16 years

## PROBLEM STATEMENT

Use the sensor to confirm a specific event and communicate the occurrence of this event. The task objective is to check the operation of different sensors.

## BOM (Bill of Materials Needed)

- mBot => Ref. 90054



❖ Me LED Matrix 8 × 16:



❖ Different beams and structures:



## ACTIVITY DESCRIPTION

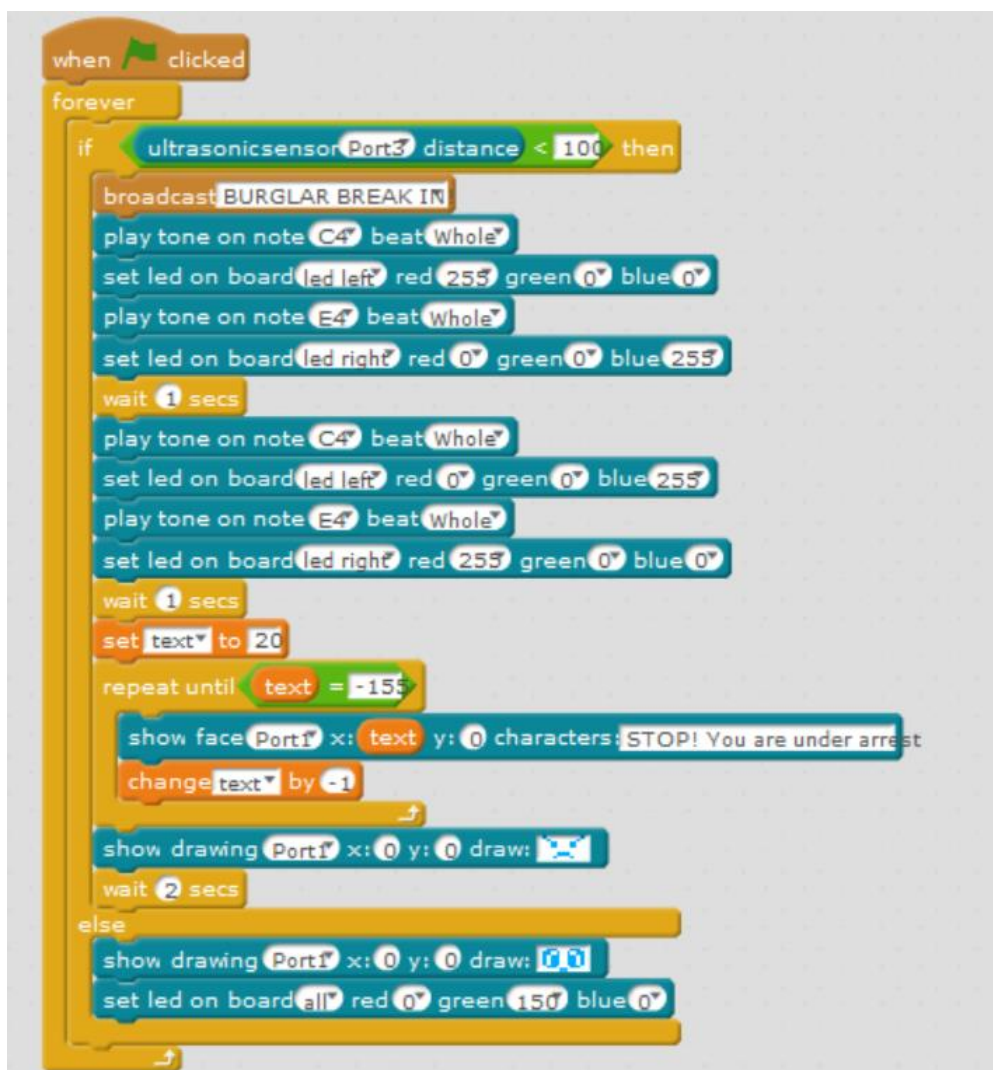
The aim of the activity is to detect and report intrusions by programming different sensors, such as the light and distance ones. The response of the mBot to these *interferences* will be in form of light and sounds.

### First version

The robot will react when the distance sensor detects the object at a distance of 1m. The robot will react with sound and light.

The main sensor will be the ultrasonic sensor. The activity will be developed as follows:

1. The robot is guarding the room.
2. A burglar enters.
3. The mBot reports the intrusion by sending a message to the person controlling the computer, who will “call police reinforcements”.
4. The mBot performs sound and light effects already settled in the original code.
5. The mbot shows the following text on the led matrix: “STOP! You are under arrest!”, and then it shows an angry face.
6. If there is no burglar intrusion, the mBot will remain steady with a wide-eye open face and showing blue light.



```
when clicked
  forever
    if ultrasonicsensor Port3 distance < 100 then
      broadcast BURGLAR BREAK IN
      play tone on note C4 beat Whole
      set led on board led left red 255 green 0 blue 0
      play tone on note E4 beat Whole
      set led on board led right red 0 green 0 blue 255
      wait 1 secs
      play tone on note C4 beat Whole
      set led on board led left red 0 green 0 blue 255
      play tone on note E4 beat Whole
      set led on board led right red 255 green 0 blue 0
      wait 1 secs
      set text to 20
      repeat until text = -15
        show face Port1 x: text y: 0 characters: STOP! You are under arrest
        change text by -1
      show drawing Port1 x: 0 y: 0 draw: [Angry Face]
      wait 2 secs
    else
      show drawing Port1 x: 0 y: 0 draw: [Wide Eye Open Face]
      set led on board all red 0 green 150 blue 0
```

Performance when message received:

```
when I receive BURGLAR BREAK IN!  
say Burglar brake in!!!  
wait 2 secs  
say Calling police reinforcements: sending a unit to the building!  
wait 5 secs
```



This is less complicated code for beginners:

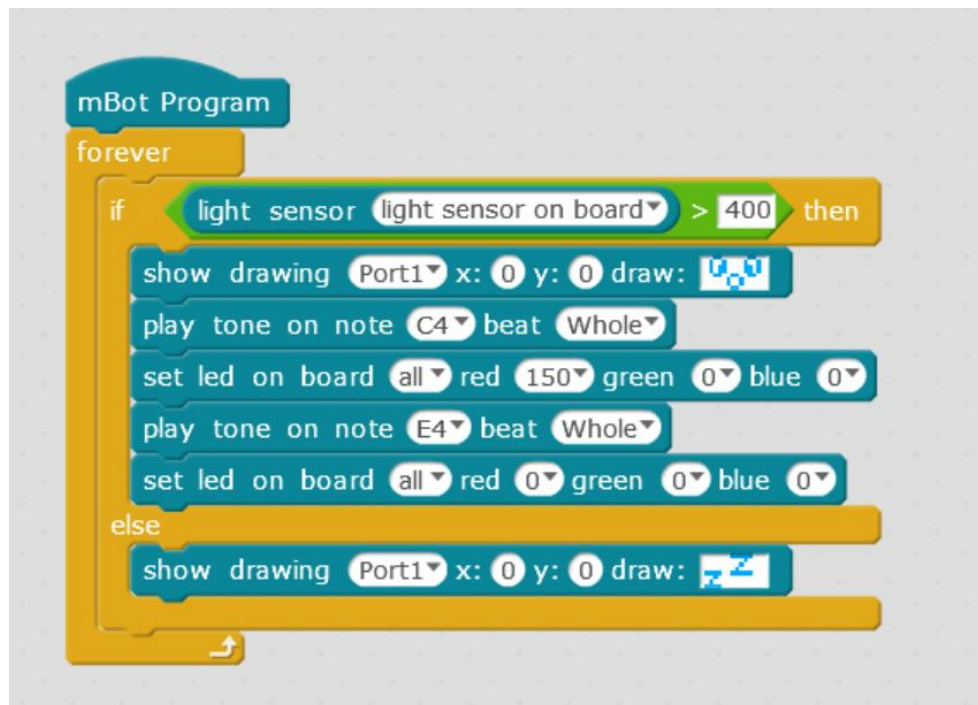
```
mBot Program  
forever  
  if ultrasonic sensor Port3 distance < 100 then  
    play tone on note C4 beat Whole  
    play tone on note E4 beat Whole  
    set led on board led left red 255 green 0 blue 0  
    set led on board led right red 0 green 0 blue 255  
    wait 1 secs  
    play tone on note C4 beat Whole  
    play tone on note E4 beat Whole  
    set led on board led left red 0 green 0 blue 255  
    set led on board led right red 255 green 0 blue 0  
    wait 1 secs
```

## Second version

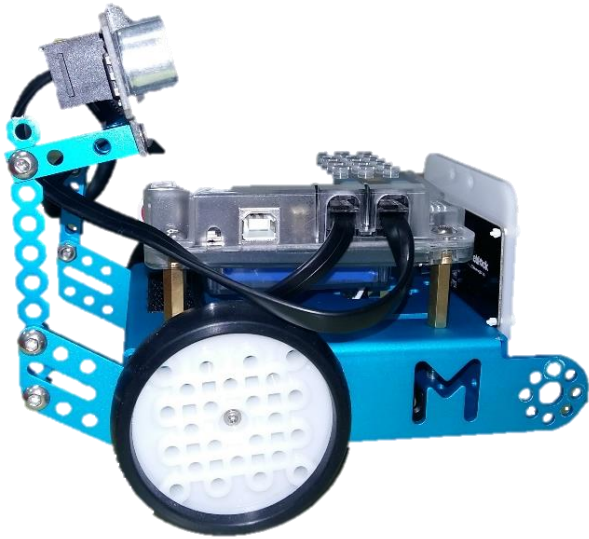
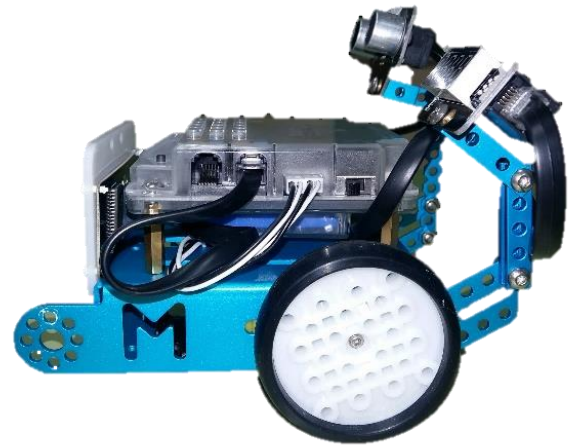
The robot will be set up in a dark room, box or cabinet. When it gets lighter, the robot signals it with sound and light.

The main sensor will be the light sensor on board. The activity will be developed as follows:

1. The robot is guarding a closet.
2. A burglar opens the closet.
3. The mBot detects a change on the ambient lighting and shows an alarm face.
4. It performs sound and light effects already settled in the original code.
5. If there is no burglar intrusion, the mBot will remain steady with a sleeping face.

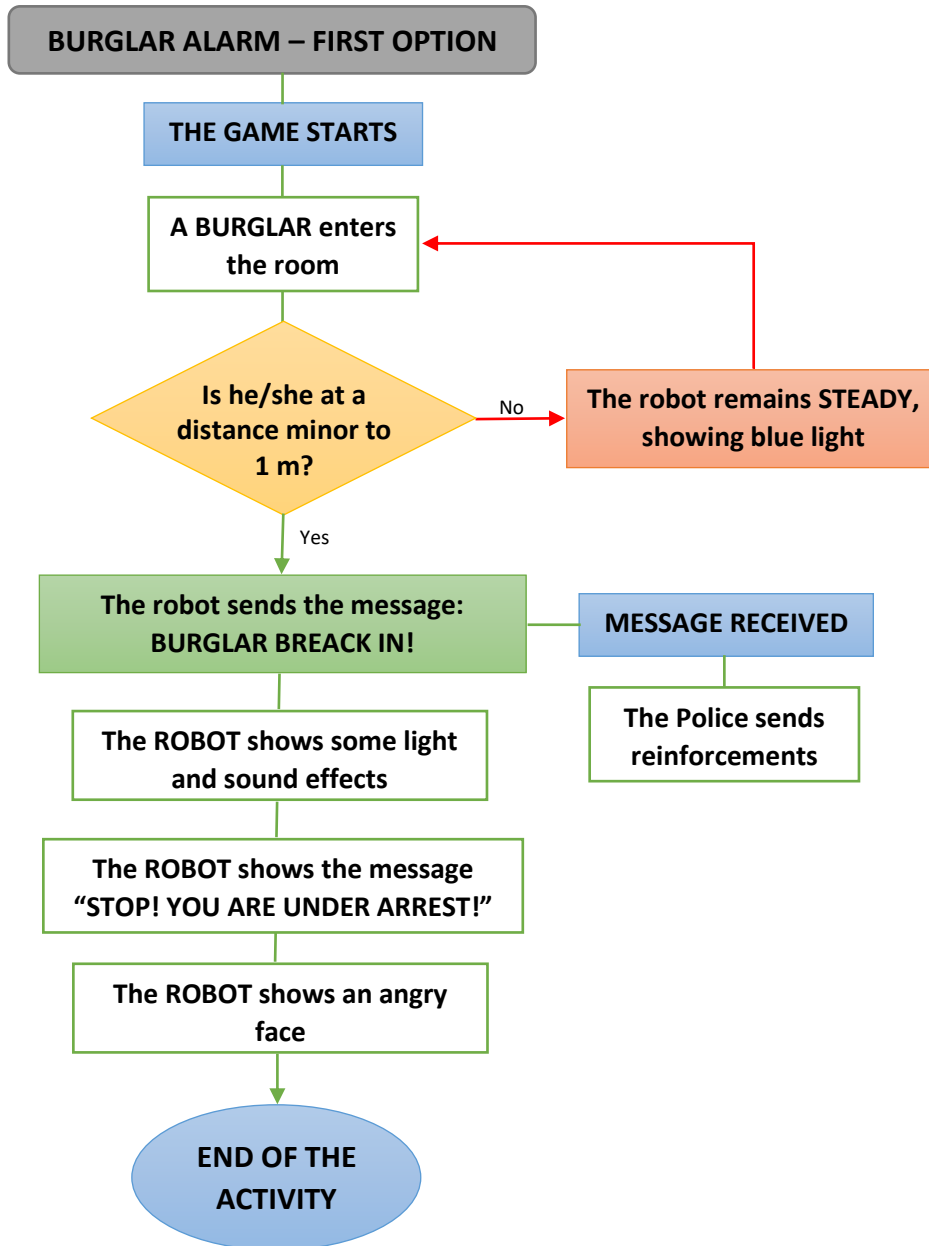


Once, the programming is finished, we start BUILDING UP THE STRUCTURE where all the mechanical elements will be set, just as the electronic elements.



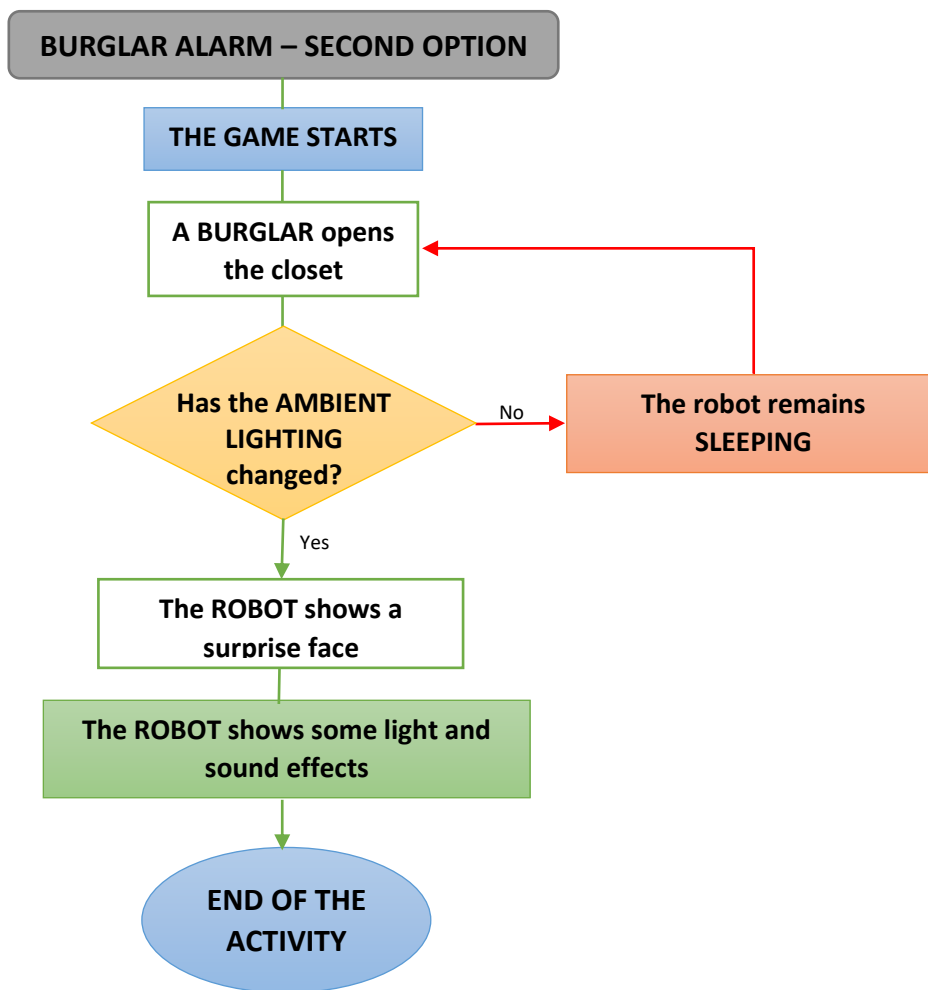
# FLOW CHART

## First version





## Second versión



## STUDENT'S EVALUATION

The student's task is to test the alarms of other groups and determine what event will trigger the alarm and in what way it will be signalled.

## BIBLIOGRAPHY

<http://www.makeblock.com/>

## SCALABILITY

The design is based on students with "zero" preconditions.

