

Night Light

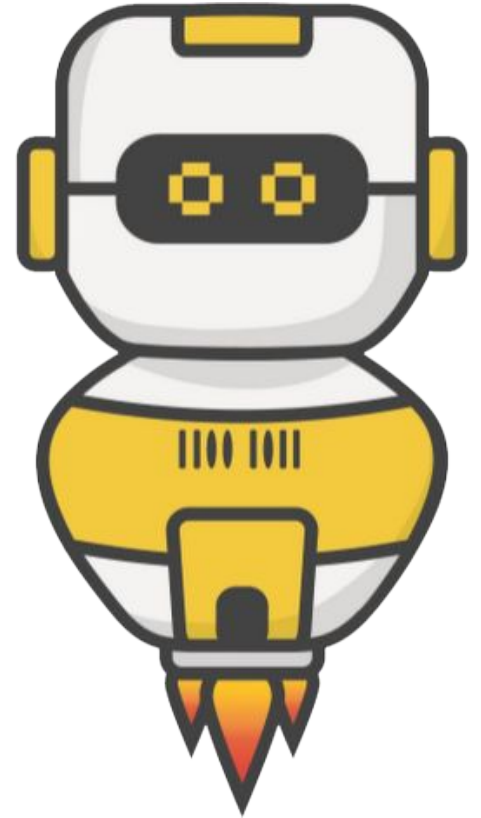
Mission 12



Pre-Mission Preparation

In this mission you will use CodeX's built-in light sensor.

- What real-world projects can it be used for?



Mission 12: Night Light

You'll use the CodeX's built-in light sensor to detect light and use the pixels as a night light!

You will create two versions of the night light.

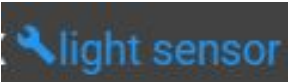
Project Goals:

- Use a simple on/off control
 - Light (pixels) turn on when the sensor detects “dark”
- Variable dimming
 - Brighter light for a darker room



Objective #1: Let there be sensor

So you want to make a night light?

- This is going to be easy with CodeX
- It has its own built-in light sensor
- Click on  and read the first 2 paragraphs
- Go to the Mission Log and answer the questions.

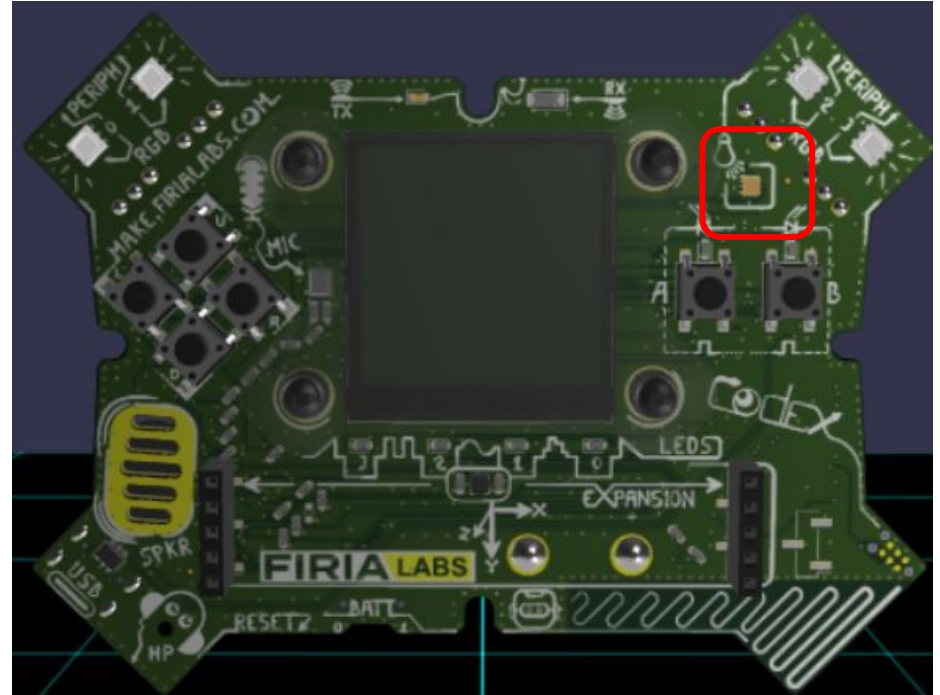
- Then close the toolbox.



Mission Activity #1

DO THIS:

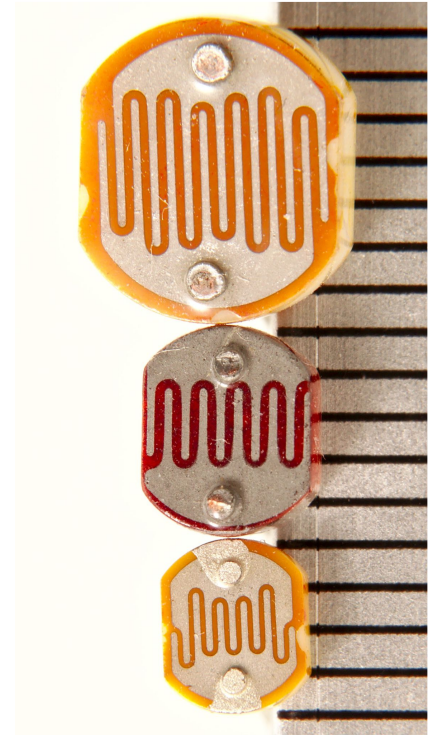
- Close the instruction panel
- Use the camera controls to rotate and zoom in
- Click on the light sensor
- Create a new file named **NightLight**



Objective #2: Light sensing code

The light sensor changes, or converts, light level into a digital value.

- **Dark** = lower values
- **Light** = higher values
- Digital values go from 0 to 65,535
- Any value below 2,000 is pretty dark!
- To read from the light sensor, use:
 - `value = light.read()`



Mission Activity #2

DO THIS:

- Import codex and time modules
- Read the light sensor
- Display the value
- Change the light on the sensor by trying three different types of light:
 - Regular room light
 - Shine a flashlight for bright light
 - Cover the sensor with your hand for dark light
- Write the value readings in the Mission Log

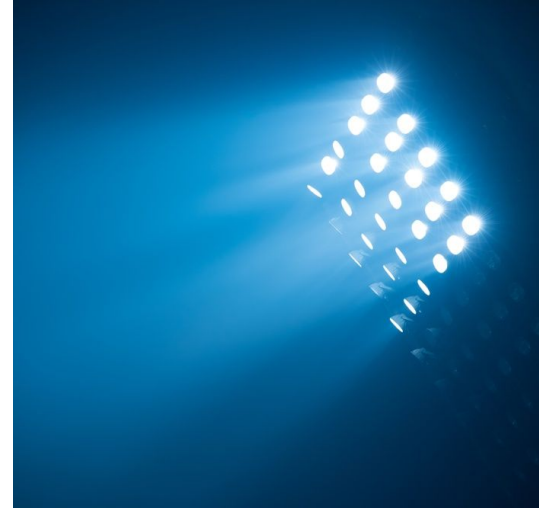
```
NightLight x
1  from codex import *
2  from time import sleep
3
4  while True:
5      value = light.read()
6      display.print(value)
7      sleep(0.5)
8
```



Objective #3: Pixel filler

- Stadiums turn on all their lights when it gets dark.
- You will turn on the four LED pixels when CodeX senses it is dark.
- You can set all four LED pixels the same color quickly with this code:

```
pixels.fill(WHITE)  -- turn on  
pixels.fill(BLACK)  -- turn off
```



Mission Activity #3

DO THIS:

- Add an if statement to your code
- If the value from the sensor is dark (less than 2000) turn on the pixels
- Else, turn off the pixels
- Delete `display.print()` and `sleep()`
- Test the code by covering and uncovering the sensor

```
from codex import *
from time import sleep

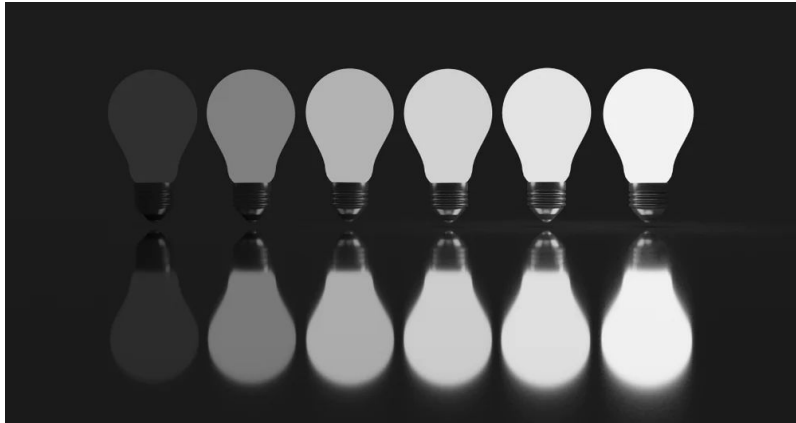
while True:
    value = light.read()
    if value < 2000:
        pixels.fill(WHITE)
    else:
        pixels.fill(BLACK)
```



Objective #4: Dimmable light sensor

Your night light is either fully on or completely off.

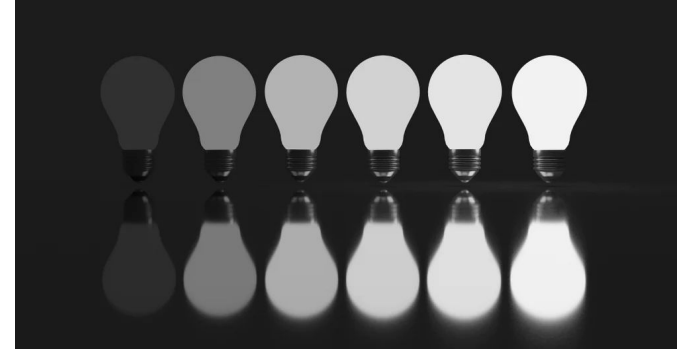
- If it is a little dark, a little light will do.
- Make the night light gradually brighter as the room gets darker.



Objective #4: Dimmable light sensor

- Add information to the `pixels.fill()` command to control the brightness of the pixels.
- `brightness` is a value from 0 to 100
- Use the brightness level like this:

```
pixels.fill(WHITE, brightness = 20)
```



Mission Activity #4

DO THIS:

- Look at your table from Objective #2
- What value did you write down for room light?
- Use a number a little less than that for your ROOM value.
- For example, if my table looked like this:
- I could use

ROOM = 5500

Amount of Light	Value from reading the sensor
Room light	5650
Bright light (flashlight)	65105
Dark (cover with hand)	270

<continued



Mission Activity #4

DO THIS:

- Define ROOM
- Change the condition of the if statement
- Do a little math to calculate the brightness level
- Test your code
- *WARNING - it may be a little glitchy*

```
from codex import *
from time import sleep

ROOM = 4700

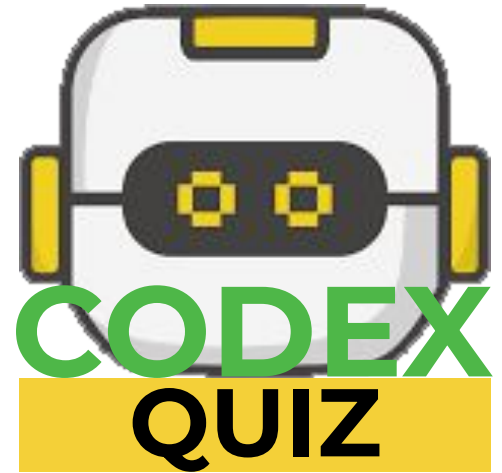
while True:
    value = light.read()
    if value < ROOM:
        scaled = (value / ROOM) * 20
        level = int(scaled)
        pixels.fill(WHITE, brightness = level)
    else:
        pixels.fill(BLACK)
```



Light Test

During this mission you have learned about the light sensor.

- Answer 2 quiz questions about the concepts.



Objective #5: Reversed

When testing your code, you might notice that the pixels get darker as the room gets darker.

- You want the opposite!
- You will need to reverse the math.



Mission Activity #5

DO THIS:

- Change the math to reverse the value for brightness
- Test your code

```
from codex import *
from time import sleep

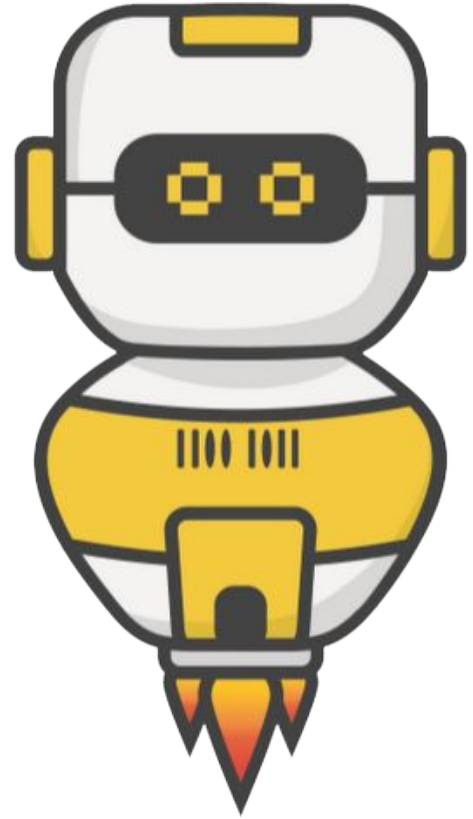
ROOM = 5500

while True:
    value = light.read()
    if value < ROOM:
        scaled = (1 - value / ROOM) * 20
        level = int(scaled)
        pixels.fill(WHITE, brightness = level)
    else:
        pixels.fill(BLACK)
```



Post-Mission Reflection

- Read the “completed mission” message and click to complete the mission
- Complete the Mission 12 Log



Clearing your CodeX

Go to FILE -- BROWSE FILES
Select the “**Clear**” file and open it
Run the program to clear the CodeX



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