Mission 12:
Night Light

Student Workbook

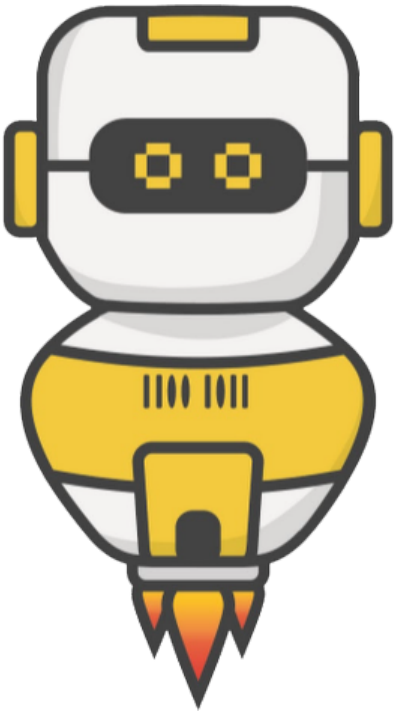
FIRIA LABS

Mission 12: Night Light

Make a smart night light that turns on when the room gets dark.

Ready to light up the night?

Make a smart night light that turns on when the room gets dark.



Go to the Mission 12 Log and fill out the Pre-Mission preparation.

- CodeX has a built-in light sensor. What 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

Mission 12: Get started

- Go to https://make.firialabs.com/ and log in.
- Go to Mission 12 
- Click NEXT and start Mission 12.

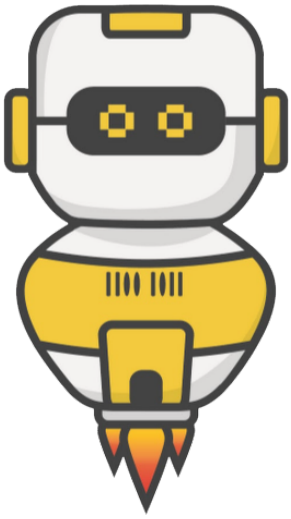
Objective #1: Let there be sensor

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 light sensor and read the first 2 paragraphs
- Go to the Mission Log and answer the questions.

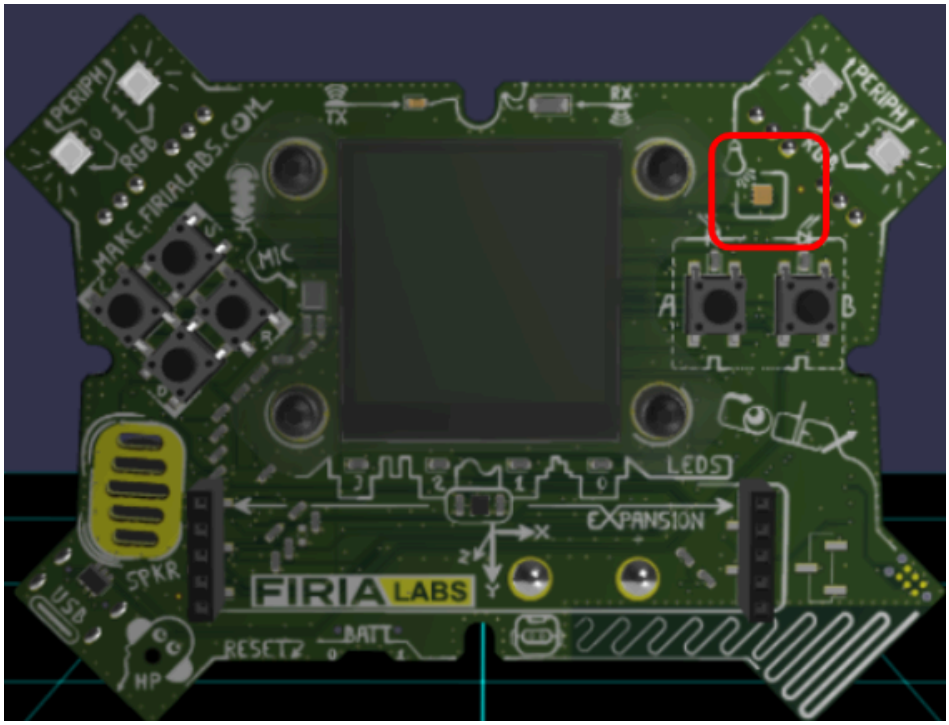
- Then close the toolbox.

Objective #1: Let there be sensor



DO THIS:

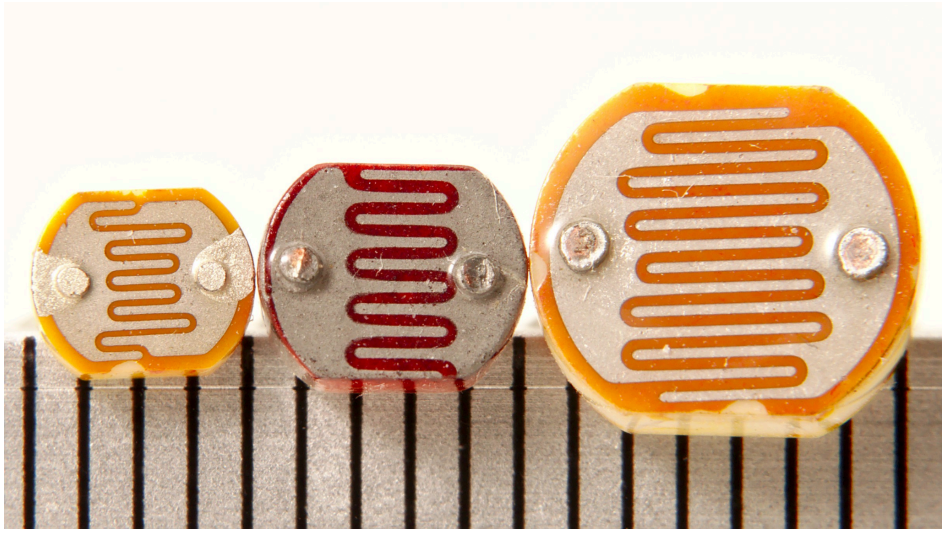
- Close the instruction panel
- Use the camera controls to rotate and zoom in
- Click on the light sensor
- Create a new file named **NightLight**



Objective #2: Light sensing code

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

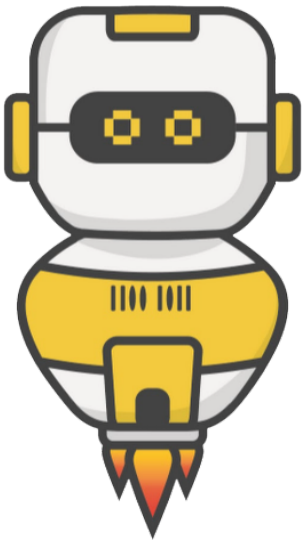
- **Dark** = lower values
- Light = higher values
- Digital values go from 0 to 65,535
- Any value below 2,000 is pretty dark!
- To read from the light sensor, use:
  - `value = light.read()`



Objective #2: Light sensing code

This mission will use CodeX's built-in light sensor.

- Go to the Mission Log and complete the table as you work on this code.



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 ×

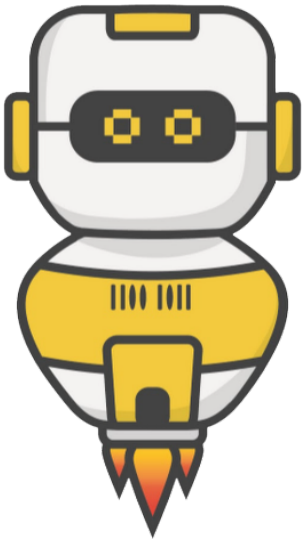
```
1   from codex import *
2   from time import sleep
3
4   while True:
5       value = light.read()
6       display.print(value)
7       sleep(0.5)
8
```

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
```

Objective #3: Pixel filler



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

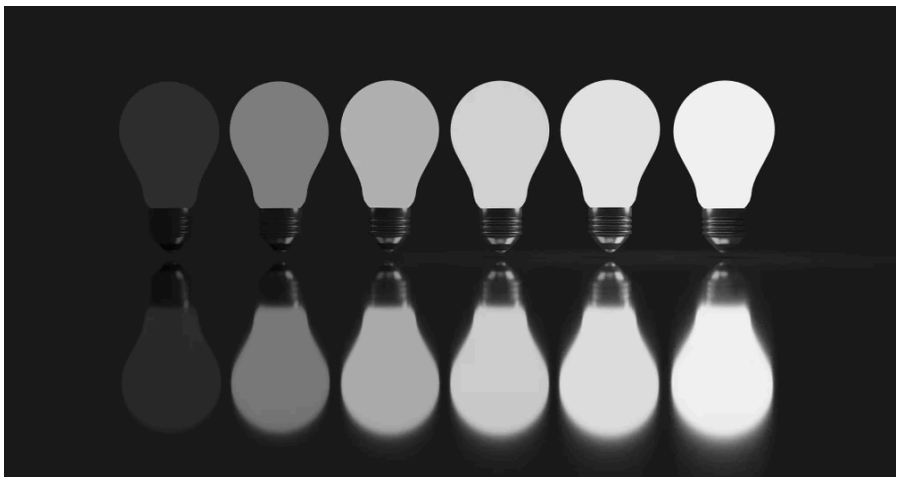
```
from codex import *
from time import sleep

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

Objective #4: Dimmable light sensor

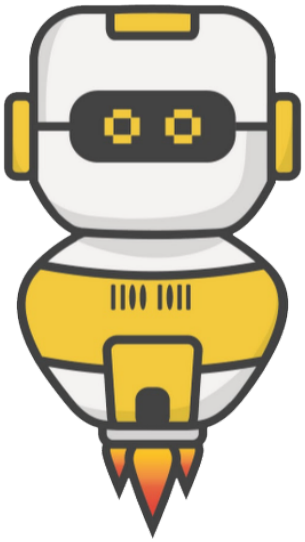
Your night light is either fully on or completely off.

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



Objective #4: Dimmable light sensor



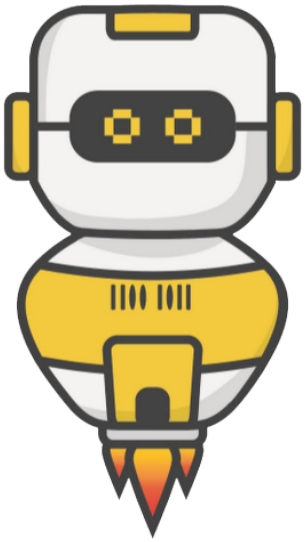
DO THIS:

- 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:

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

- I could use **ROOM = 5500**

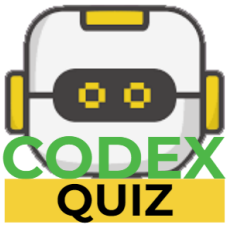
Objective #4: Dimmable light sensor



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)
```



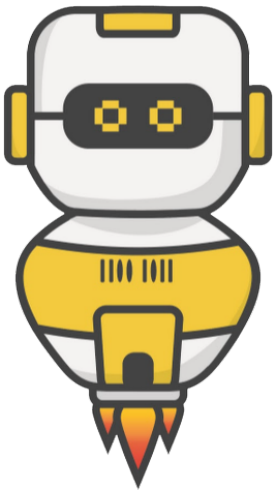
Mission Quiz: Light Test

Test your skills by **taking the quiz**.

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.



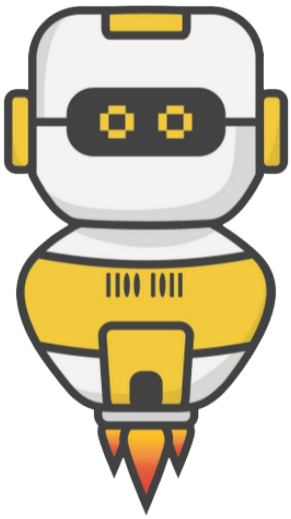
DO THIS:

- 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)
```

Mission Complete

You have completed the twelfth mission.



Do this:

- Read your “Completed Mission” message
- Complete your Mission 12 Log
    - Post-Mission Reflection

Wait! Before you go ... Clear the CodeX

Go to FILE -- BROWSE FILES

Select the “**Clear**” file and open it

Run the program to clear the CodeX

Okay. Now you can go.