



EduTrend Contents

EDUTECH · ROBOTICS RESOURCES FOR STUDENTS · MIDDLE SCHOOL

Nightlight Robot

Use a light sensor to switch on LEDs, and raise a flag with a servo

Ages 10–14

Level: Intermediate

90 minutes

Pairs · up to 30

Activity 03

Inside: activity at a glance · step-by-step session plan · facilitator notes · 3 student worksheets · assessment checklist

ACTIVITY 03 · AT A GLANCE

Nightlight Robot

Students use the micro:bit light sensor, or the MakeCode simulator, to measure room brightness. They program the LEDs to switch on when the reading drops below a chosen value. If a servo is available, it raises a small card flag at the same time. They test by covering the sensor and adjust the value until it works in their room.

Learning outcomes

By the end of the session students can:

- read a light sensor;
- choose and tune a threshold;
- program an output response;
- optionally control a servo.

KEY WORDS

light sensor · threshold · LED · servo · tune · test

CURRICULUM LINKS

Science: light. D&T: product design.
Maths: ranges and values.

1**SENSE**

What can it detect?

2**THINK**

What should it decide?

3**ACT**

What should it do?

4**TEST**

Run it

5**DEBUG**

Find and fix

6**IMPROVE**

Make it better

Materials (per pair)

- micro:bit or MakeCode simulator
- Small box
- Optional servo and card flag
- Worksheets 1, 2 and 3

Before the session

- Check micro:bits or simulator.
- Prepare boxes.
- Test servos if used.
- Print worksheets.

SAFETY

Keep electronics dry. Keep fingers away from the servo arm while powered.

ACTIVITY 03 · SESSION PLAN

Step by step

The right threshold depends on the room; testing and adjusting is the point.

Time	What happens	Say or ask
0–10 min Measure	Display light readings.	<i>"What is bright and dark?"</i>
10–30 min Program	LEDs on below a value.	<i>"What value will you choose?"</i>
30–50 min Test	Cover the sensor; tune.	<i>"Does it work in this room?"</i>
50–75 min Servo (optional)	Raise a flag.	<i>"What angle?"</i>
75–90 min Build and share	Put it in a box and demo.	<i>"What would you change next?"</i>

CHALLENGE CARD (print or copy onto the board)

Build a nightlight robot that switches on when the room is dark, tune it for your room and, if possible, add a servo flag.

ACTIVITY 03 · FACILITATOR NOTES

The learning know-how in brief

The micro:bit uses its LED display to sense light level, giving a reading from 0 to 255. The program compares the reading with a threshold to decide when it is dark.

A servo turns to a set angle, so the same condition can also raise a flag. Tuning the threshold in the real room makes the device reliable.

Common ideas to listen for

- “The sensor knows it is night.” It measures light level.
- “One threshold works everywhere.” Rooms differ.
- “A servo spins forever.” It moves to angles.

Adapting the activity

Support

Provide a starter program.

Stretch

Fade the LEDs gradually as it gets darker.

WORKSHEET 1

Light readings

Name: _____

Class: _____ Date: _____

Record values.

Light readings

Condition	Reading
Bright room	
Normal	
Covered sensor	
Chosen threshold	

WORKSHEET 2

Tests

Tune the threshold.

Tests

Test	Threshold	Worked?
1		
2		
3		
4		

WORKSHEET 3

Learning record

Photo, goal, problem and fix.

My nightlight project record

FOR THE TEACHER

Assessment checklist

Use during the session. One sheet covers up to eight students; copy as needed.

Student	Reads sensor	Tunes threshold	Programs response

Suggested codes: W = working towards · E = expected · G = greater depth

ABOUT THIS ACTIVITY

Nightlight Robot is a sample activity from the EduTrend Contents Edutech Robotics Resources for Students programme (middle school, level: intermediate). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

Full 15-, 20- and 32-week programmes are available from EduStore at edutrend.org.

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