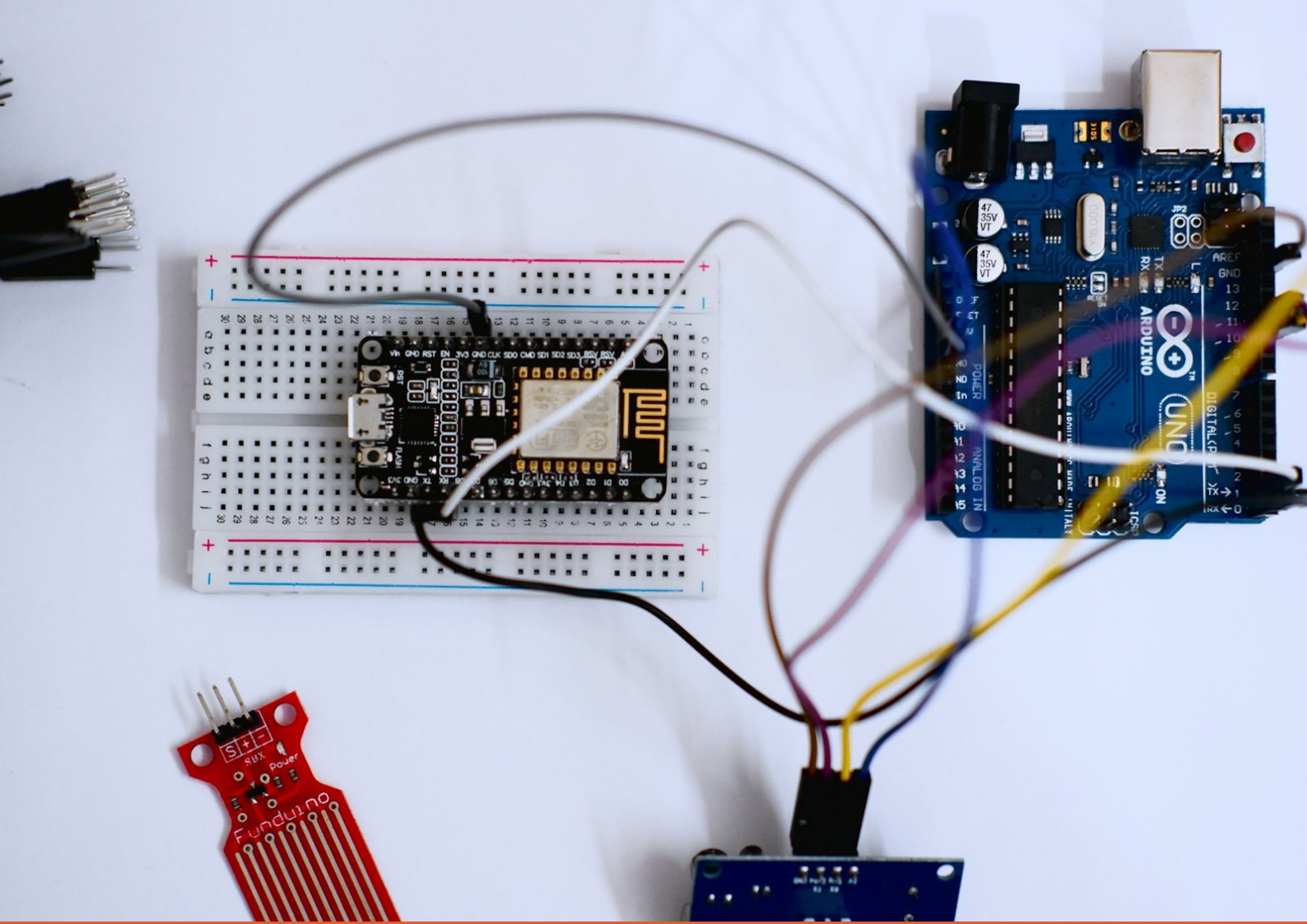




EduTrend Contents

EDUTECH · HANDS-ON ROBOTICS PROJECTS · MIDDLE SCHOOL

Plant-Watering Alarm

Build a moisture sensor alarm that tells you when a plant needs water

Ages 12–14

Level: Intermediate

75 minutes

Pairs · up to 30

Activity 04

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

ACTIVITY 04 · AT A GLANCE

Plant-Watering Alarm

Pairs connect a soil moisture sensor to a micro:bit or similar board, record readings in dry, damp and wet soil, and choose a threshold. They program an alarm, such as an icon or sound, when soil is too dry, test it with real pots and discuss where to place the sensor and how to avoid false alarms.

Learning outcomes

By the end of the session students can:

- connect a sensor to a microcontroller;
- calibrate with real samples;
- program an alert;
- evaluate reliability.

KEY WORDS

moisture sensor · analog reading · threshold · calibration · alert · false alarm

CURRICULUM LINKS

Biology: plant needs. Maths: ranges and averages. D&T: products for users.

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)

- Microcontroller (such as micro:bit)
- Soil moisture sensor and leads
- Three pots of soil (dry, damp, wet)
- Device
- Worksheets 1, 2 and 3

Before the session

- Prepare pots of soil.
- Check sensors and connections.
- Prepare starter code.
- Print worksheets.

SAFETY

Keep electronics away from standing water. Dry hands before touching boards.

ACTIVITY 04 · SESSION PLAN

Step by step

Simple moisture probes corrode over time; power them only when reading if possible.

Time	What happens	Say or ask
0–10 min Hook	How do we know a plant needs water?	<i>“Could a sensor tell us?”</i>
10–25 min Connect	Wire sensor and display readings.	<i>“What values appear?”</i>
25–40 min Calibrate	Dry, damp, wet readings.	<i>“Where is the threshold?”</i>
40–60 min Program	Alarm below threshold.	<i>“Does it trigger correctly?”</i>
60–75 min Evaluate	Test and discuss reliability.	<i>“Any false alarms?”</i>

CHALLENGE CARD (print or copy onto the board)

Build a plant-watering alarm that alerts only when soil is dry, calibrate it with real soil and evaluate its reliability.

ACTIVITY 04 · FACILITATOR NOTES

The project know-how in brief

Many simple soil moisture sensors measure how well the soil conducts electricity or its capacitance. Wet soil gives different readings from dry soil, so the value indicates moisture.

A threshold chosen from calibration readings decides when to alert. Readings vary with soil type and probe depth, so testing in real conditions reduces false alarms.

Common ideas to listen for

- “The sensor measures water directly.” It measures an electrical property.
- “One threshold suits all soils.” Calibrate for each.
- “More alarms are safer.” False alarms get ignored.

Adapting the activity

Support

Provide starter code with the display.

Stretch

Log readings over a week and graph them.

WORKSHEET 1

Calibration

Name: _____

Class: _____ Date: _____

Record readings.

Calibration

Soil	Reading 1	Reading 2	Mean
Dry			
Damp			
Wet			

WORKSHEET 2

Alarm tests

Test your alarm.

Alarm tests

Test	Soil	Alarm?	Correct?
1			
2			
3			
4			

WORKSHEET 3

Evaluation

How reliable is it?

Reliability and improvements

FOR THE TEACHER

Assessment checklist

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

Student	Connects sensor	Calibrates threshold	Evaluates reliability

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

ABOUT THIS ACTIVITY

Plant-Watering Alarm is a sample activity from the EduTrend Contents Edutech Hands-On Robotics Projects 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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