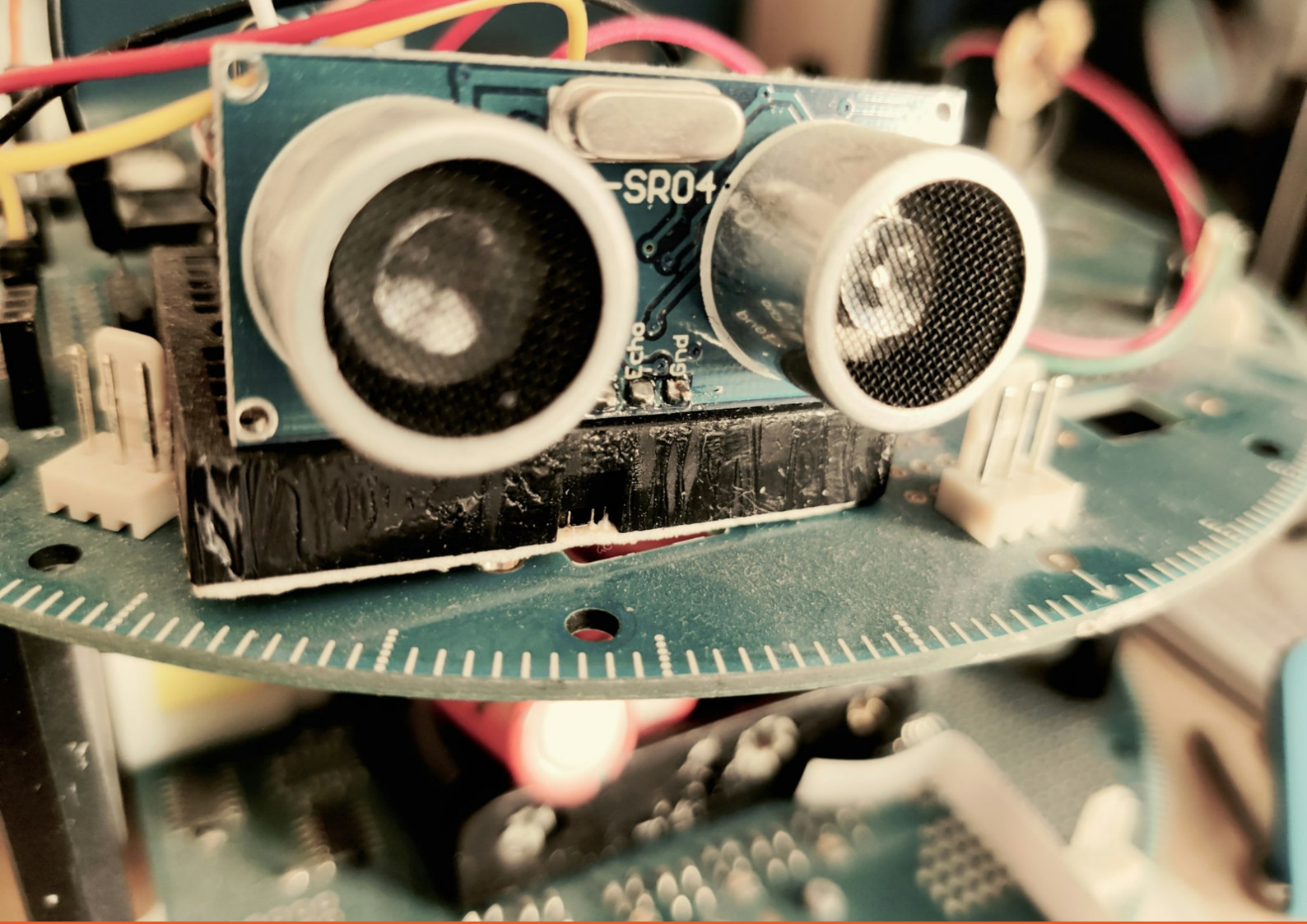




EduTrend Contents

EDUTECH · HANDS-ON ROBOTICS PROJECTS · MIDDLE SCHOOL

Colour Sorting Machine

Design a machine that separates objects by colour

Ages 10–12

Level: Intermediate

2 × 60 minutes

Groups of 3 · 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

Colour Sorting Machine

Groups design a sorting machine: objects arrive one at a time, a colour sensor reads each one, and a motor or servo pushes it into the correct bin. They sketch designs, build from a kit and card, record sensor values for each colour, program the decisions, and test with a mixed set, measuring accuracy.

Learning outcomes

By the end of the session students can:

- design a mechanism;
- calibrate a colour sensor;
- program multi-way decisions;
- measure sorting accuracy.

KEY WORDS

colour sensor · servo · mechanism · calibration · accuracy · decision

CURRICULUM LINKS

Science: light and colour. Maths: percentages. D&T: mechanisms and recycling sorting.

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 group)

- Robot kit with colour sensor and motor or servo
- Coloured blocks or balls
- Card, tape
- Device
- Worksheets 1, 2 and 3

Before the session

- Prepare colour objects.
- Check colour sensors.
- Provide card for chutes and bins.
- Print worksheets.

SAFETY

Keep fingers away from moving arms. Use soft objects.

ACTIVITY 03 · SESSION PLAN

Step by step

Lighting changes colour readings; calibrate in the room where you will test.

Time	What happens	Say or ask
Lesson 1: 0–15 min Design	Sketch mechanisms.	<i>“How will objects move?”</i>
15–60 min Build	Build feeder, sensor, pusher.	<i>“Does each part work?”</i>
Lesson 2: 0–15 min Calibrate	Record colour values.	<i>“Are colours distinct?”</i>
15–40 min Program	Decisions for each colour.	<i>“What about unknown colours?”</i>
40–60 min Test	Sort 20 objects.	<i>“What is the accuracy?”</i>

CHALLENGE CARD (print or copy onto the board)

Design, build and program a machine that sorts objects by colour, and measure its accuracy on 20 mixed objects.

ACTIVITY 03 · FACILITATOR NOTES

The project know-how in brief

A colour sensor measures red, green and blue light reflected from a surface. Each colour gives a pattern of values, which the program compares to decide where the object goes.

Accuracy is the percentage sorted correctly. Lighting, distance and object shape affect readings, so calibration and consistent positioning improve accuracy.

Common ideas to listen for

- “Colour sensors see colours like we do.” They measure light values.
- “Once programmed, it always works.” Lighting changes readings.
- “Faster sorting is better.” Accuracy may fall.

Adapting the activity

Support

Sort two colours only.

Stretch

Add a count display for each colour.

WORKSHEET 1

Calibration

Name: _____

Class: _____ Date: _____

Record colour values.

Calibration

Colour	Reading 1	Reading 2	Reading 3
Red			
Blue			
Green			
Yellow			

WORKSHEET 2

Accuracy test

Sort 20 objects.

Accuracy test

Colour	Correct	Wrong	Accuracy %
Red			
Blue			
Green			
Total			

WORKSHEET 3

Improvements

How could accuracy improve?

Our ideas

FOR THE TEACHER

Assessment checklist

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

Student	Designs mechanism	Calibrates sensor	Measures accuracy

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

ABOUT THIS ACTIVITY

Colour Sorting Machine 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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