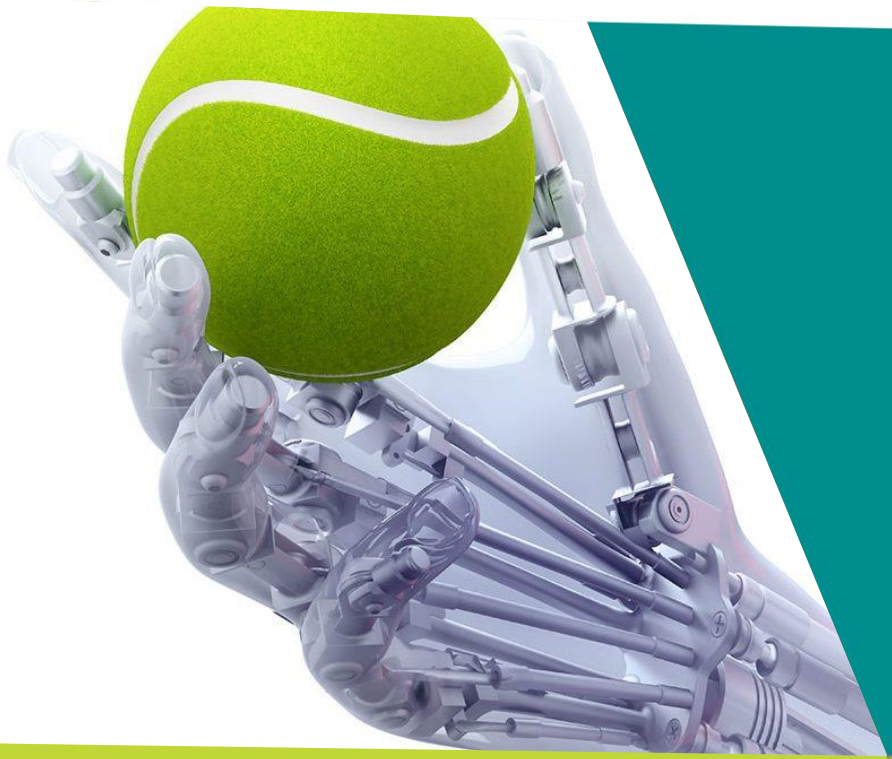
CREST AWARDS

GOLD AWARD

DESIGN A ROBOTIC 'BALL-BOY'

70H Typically 70 hours of project work
Recommended for 16-18 year olds



Design & make project

Make sure you research the hazards and complete a risk assessment.

#physics
#robots
#sport

HOW TO RUN CREST USING THIS ACTIVITY

Entering your project without a teacher or facilitator? No problem! You can enter your work yourself by following this link: **www.crestawards.org/sign-in**

Looking for some support? Find a mentor by contacting your local STEM Ambassador hub: **www.stem.org.uk/stem-ambassadors/local-stem-ambassador-hubs**

To use their project to achieve a CREST Gold Award your students will need to:

- **Develop and lead the project**
- **Complete a minimum of 70 hours of project work**
- **Consider the broader impact of their project and demonstrate an innovative approach**
- **Write a project report or portfolio of evidence**
- **Reflect on their work during the project using a student profile form**

Preparation

Ready to get going with CREST? Sign up for a CREST account here: **www.crestawards.org/sign-in**

Create a new Gold Award project with the name(s) of the student(s) and the title of their project. If you don't have all these details, you can fill them in later!

We have some super handy workbooks and profiles for your students to use when running a CREST Award. You can download these when you create your CREST account by following the link above.

Run the project

Encourage your students to use the Gold student guide to plan and carry out their project. Each student involved in the project should complete their own profile form.

You don't want all their good work to go to waste, so be sure they keep a record of all their amazing progress. Keeping a regular project diary will save them precious time when writing their final project report.

The students should spend at least 70 hours on the project in total.

Remember to consider safety and risks!

Reflection

So, your students have been hard at work and completed their CREST project, but don't let this be the end of their learning. At the end of the project, each student should complete a Gold profile form and communicate their project. This is a chance for them to reflect on all the interesting things they've learnt and the invaluable skills they have used.

Students working in a group can either submit a joint report or separate reports, but they must each complete a profile form.

Use the CREST criteria on the profile form to help the students check that they have included everything in their report.

Enter your project for a CREST Gold Award

Hard work deserves a reward! Celebrate and certify your student's achievements by entering their project for a CREST Gold Award. Simply:

Log in to your CREST account at **www.crestawards.org/sign-in**

Select your project and upload the profile form per student, project report and other evidence, such as pictures and diagrams.

Finally, complete the delivery and payment details for assessment and to order your snazzy certificates.

Congratulations on submitting for CREST Gold!

What next?

Is university on the horizon for your students? They can use their project to help demonstrate their newly found STEM skills and knowledge in UCAS personal statements.

Don't keep all the fun to yourselves, encourage others to take part in CREST projects and share the wonder of science. For free ideas on how to get started, see **www.crestawards.org**

STUDENT BRIEF

GOLD AWARD

Design a robotic 'ball-boy'

For this project, you will develop an automatic 'ball boy' for tennis or cricket practice. You could, of course, decide to make the robot for something entirely different - the scope is endless, and it's up to you what you do!

Getting Started

You will need to research automated machines and robots.

You have to decide exactly what you want your robot to do. A robotic 'ball boy' needs to:

- Be activated
- Find balls, move towards the balls and pick them up
- Hold onto the balls and release them at its 'home' position
- Not bump into the net.

Artificial Intelligence: You then have to develop the Artificial Intelligence (AI) algorithms. You will need to carry out research about how to do this; you can sometimes download AI programmes from the internet. You may need some help from your mentor with this aspect.

Design the shell: When your AI is working, you need to design the 'shell' of the robot. You need to think about:

- How will you collect balls?
- Where will they be stored?
- How many balls will it be able to hold?
- How will it release them?

Try making a scale model of your robot and then linking it to a microcomputer to run the AI. Try it out on a scaled-down tennis court/cricket pitch.

Making the real thing: If it all works, you'll have to make the real thing! This requires different sorts of engineering – welding, cutting, soldering etc. of steel, or other materials you may choose to use. You'll have to think about various other properties, too, such as water-resistance, strength and how heavy it will be. Finally, you need to think about the on-board computer. How will you build it? How will you make it lightweight enough so as not to weigh the robot down?

Things to think about

Another important factor is the way the robot will find the balls. Here are two suggestions that may be possible. It's up to you to research their feasibility:

- Ultrasonic SONAR
- Visual Detection System.

Useful Resources

You could try linking up with a robotics department of your local university to find out about robotics, Artificial Intelligence and on-board computers. You will need a mentor from the robotics industry as this is a complex project.

STUDENT BRIEF

GOLD AWARD

Health and Safety

Science project work is both dynamic and exciting but can also carry some risk. To avoid any accidents, make sure you stick to the following health and safety guidelines before getting started:

- find out if any of the materials, equipment or methods are hazardous;
- assess the risks (think about what could go wrong and how serious it might be);
- decide what you need to do to reduce any risks (such as wearing personal protective equipment, knowing how to deal with emergencies and so on);
- make sure your teacher agrees with your plan and risk assessment.

Remember!

Science isn't just about data. The most successful projects will demonstrate good communication skills and show original ideas that address a real-world problem.

Look at the world around you and consider all the innovative ways that you could address the challenge. Even if things go wrong, use this to show what you have learned. Don't forget to use the student profile form to help structure your project.