**Summary**

In this activity, students in grades 5 to 12 learn about accuracy and precision by working in teams to design and build a robotic basketball player that can nail three free-throw shots in a row.

**Grade level:** 5 -12

**Time:** Three or four 45-minute session

**Learning objectives**

After doing this activity, students should be able to:

* Understand and implement the engineering design process to solve a problem
* Understand the difference between precision and accuracy
* Use knowledge of simple machines to refine the projectile’s trajectory
* Calculate accuracy percentages and use scatter plots to visualize precision

**Standards**

**National Science Education Standards**

* Content Standard B: Physical Science*. As a result of their activities, students should develop an understanding of motions and forces, and transfer of energy [Grades 5-8] or interactions of energy and matter [Grades 9-12].*
* Content Standard E: Science and Technology. *As a result of activities, students should develop abilities of technological design and understandings about science and technology. [Grades 5 -12]*

**Principles and Standards for School Mathematics**

**Measurement Standard**. Apply appropriate techniques, tools, and formulas to determine measurements. Use common benchmarks to select appropriate methods for estimating measurements [Grades 6-8]. Analyze precision, accuracy, and approximate error in measurement situations. [Grades 9-12]

**Common Core State Mathematics Standards**

* [CCSS.Math.Content.6.SP.A.2](http://www.corestandards.org/Math/Content/6/SP/A/2) Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. [Grade 6]
* [CCSS.Math.Content.6.SP.A.3](http://www.corestandards.org/Math/Content/6/SP/A/3) Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. [Grade 6]
* High School: **Use probability to evaluate outcomes of decisions**
* [CCSS.Math.Content.HSS-MD.B.7](http://www.corestandards.org/Math/Content/HSS/MD/B/7) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).