Retractable Field Challenge

v2.0

Systems of Technology: Integrated Engineering Challenges | Teacher Lesson Plan

Challenge Overview

In this challenge, teams will apply mathematics and computational thinking skills as they create aretractable sports field that can move inside and outside of a stadium on command. Teams will utilize light sensors to position the field inside or outside of the stadium.

Click here **to explore the entire Kid Spark Curriculum Library.**

Learning Objectives & NGSS Alignment

- Design and engineer a retractable sports field.
- Create a sketch/program that can be uploaded to the ROKduino and used to control the retractable sports field.
- Demonstrate/present a working prototype to peers.

Scientific/Engineering Practice - Using mathematics & computational thinking
Crosscutting Concept - Stability & change

Activity Time:
120 - 180 Minutes

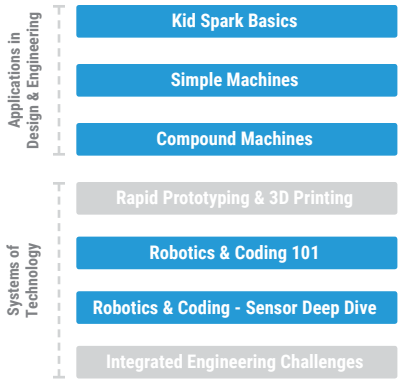
Targeted Grade Level:
6 - 8

Student Grouping:
Teams of up to 4

Additional Lesson Materials:
- Challenge Packet
- Example Solutions Video

Kid Spark Mobile STEM Lab:
Engineering Pathways

Prerequisite Kid Spark Units:



Pre-Lesson Preparation:

1. Prepare enough challenge packets for each team.
2. Make sure labs are inventoried and ready to go. We recommend you have students help you with this step! *Note: each lab should include a laminated inventory and organization guide that can be used to keep the labs organized and ready for instruction. If guides are missing or need to be replaced, you can download new ones by visiting our downloads page at kidsparkeducation.org/downloads.*
3. Thoroughly review the entire challenge packet to become familiar with the challenge.
4. Try the challenge for yourself! This will give you valuable insight and experience that you can share with your students as they are working on the challenge. *Note: we have provided an example solutions video for teachers to use with students at their discretion.*

Challenge Activity:

1. Group students in teams of up to 4. Make sure each team has an Engineering Pathways Mobile STEM Lab, Challenge Packet, and access to a ROKduino-compatible computer.
2. Instruct students to assemble the stadium and field. *Challenge Packet - Pages 3 - 4*
3. Review the challenge and criteria/constraints with students. *Challenge Packet - Pages 1 - 2*
   If you previously developed a solution to the challenge, you can show it to the students as an example.

4. Briefly review pages 5 - 10 in the Challenge Packet. Instruct students to complete the necessary information on each page as they are developing a solution to the challenge. Make sure to review the challenge rubric so students understand how they will be evaluated for this project. *Challenge Packet - Page 10*

5. Instruct teams to work through each step in the Kid Spark design and engineering process to develop a solution to the challenge. Students should place a check in each box as each step is completed. *Challenge Packet - Page 5*

   Challenge tips & information :

   - *We have provided an example solutions video for teachers to use with students at their discretion. In this video we present three example solutions to the challenge. We recommend you only show students these examples if they are having trouble coming up with ideas for the challenge. This will stimulate a culture of creativity and challenge students to develop their own, unique solutions.*

   - *Feel free to modify the criteria and constraints to make the challenge more or less difficult. Here are a couple of ideas:*

     Less difficult - increase the budget to allow teams to use more materials in their design

     More difficult - incorporate multiple sensors to the design

   - *Make sure students can access previous Kid Spark robotics units/lessons (Robotics & Coding 101, Robotics & Coding - Sensor Deep Dive). Students may need to re-visit past learning experiences or utilize example programs/sketches they can apply to new robotics projects.*

Challenge Closure:

1. Project presentations - Instruct each team to share the design they created with the rest of the class. Be specific with what information you want students to share. (Example: teams are required to share how their design works, the overall dimensions of the design, how each team member contributed, etc..)

2. Lab cleanup - After teams have finished their presentations, instruct them to disassemble their designs and pack all engineering materials back into the labs correctly. *Note: each lab should include a laminated inventory and organization guide to help students pack engineering materials back correctly.*

3. Lesson reflection - If time permits, do a quick recap/review of the lesson/project.

Assessment/Evaluation:

A. Design & Engineering Challenge (30 Points)