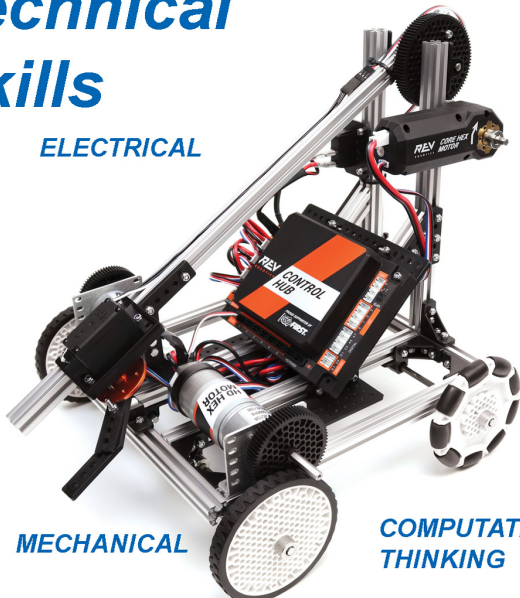


Technical Skills

ELECTRICAL



MECHANICAL

COMPUTATIONAL
THINKING



Workforce Skills



**Technical and workforce skills
developed through robotics competition
in the classroom.**

FIRST

Robot Systems |
 Rubrics |
 REV Motors |
 REV Build System |
 REV EduBot Online

Courses / Crossroads Curriculum / Robot Systems

Building a robot manipulator

Essential Question

How can we use the engineering design process to make manipulators for our robot that meet our game strategy?

Advance to Slide 2

Understanding the Problem

When you decomposed parts of a robot, you learned about each of the systems. The last system to consider is manipulators. A manipulator is something that controls something else. In your game strategy and your robot design, you will be manipulating objects...In discussions how will you utilize

Interacting with objects.

How do I transform rotary motion from a motor to interact with the object?

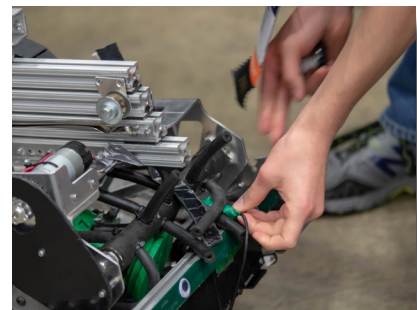
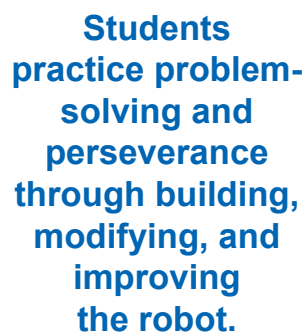
In your kit you have several different options for a motor to interact with an object versus one already driving it from the motor shaft:

Now use the internet to find out more about how you might improve your idea for your design. For instance, could you add another component of interaction with the object to make it move differently driven by the same motor?

Leverage in an arm. Use of a lever and a motor!

Two gears working together to grip something

Second level of roller for a wheel

[illegible][illegible]



Teams compete in presentations and class mini-game for awards in robot technical design, engineering notebook, and career readiness.



Teams and individuals use rubrics tied to learning outcomes to set goals and improve through iteration.

Robot Technical Design Rubric Level 2	
Robot Systems Design Rubric	
Exceeds	Meets
Innovation and Creativity The student shows evidence of creative thinking and innovation in the design process.	The student shows evidence of creative thinking and innovation in the design process.
Reliability and Functionality The student shows evidence of reliability and functionality in the design process.	The student shows evidence of reliability and functionality in the design process.
Motor Use and Performance The student shows evidence of motor use and performance in the design process.	The student shows evidence of motor use and performance in the design process.
Chassis and Drive The student shows evidence of chassis and drive in the design process.	The student shows evidence of chassis and drive in the design process.
Electrical Systems The student shows evidence of electrical systems in the design process.	The student shows evidence of electrical systems in the design process.
Computational Thinking and Control The student shows evidence of computational thinking and control in the design process.	The student shows evidence of computational thinking and control in the design process.
Manipulator Design The student shows evidence of manipulator design in the design process.	The student shows evidence of manipulator design in the design process.
Cosmetic Design and Aesthetics The student shows evidence of cosmetic design and aesthetics in the design process.	The student shows evidence of cosmetic design and aesthetics in the design process.

Career Ready Practices Rubric	
Core Values Application to Career Skills	
Exemplary	Accomplished
Act as a responsible and contributing citizen and employee The student shows evidence of responsible and contributing citizen and employee skills in the design process.	The student shows evidence of responsible and contributing citizen and employee skills in the design process.
Use critical thinking and problem-solving skills The student shows evidence of critical thinking and problem-solving skills in the design process.	The student shows evidence of critical thinking and problem-solving skills in the design process.
Use mathematical and scientific practices The student shows evidence of mathematical and scientific practices in the design process.	The student shows evidence of mathematical and scientific practices in the design process.
Use technology and engineering practices The student shows evidence of technology and engineering practices in the design process.	The student shows evidence of technology and engineering practices in the design process.
Use communication and collaboration skills The student shows evidence of communication and collaboration skills in the design process.	The student shows evidence of communication and collaboration skills in the design process.
Use personal and social skills The student shows evidence of personal and social skills in the design process.	The student shows evidence of personal and social skills in the design process.

Student Engineering Notebook Checklist Rubric	
Engineering Design Process and Business Plan To Be Used As Individual Documentation Assessment	
Exceeds	Meets
Identify the Engineering or Business Problem The student shows evidence of identifying the engineering or business problem in the design process.	The student shows evidence of identifying the engineering or business problem in the design process.
Business Plan and Project Management The student shows evidence of business plan and project management in the design process.	The student shows evidence of business plan and project management in the design process.
Understanding the Problem The student shows evidence of understanding the problem in the design process.	The student shows evidence of understanding the problem in the design process.
Brainstorming and Explore The student shows evidence of brainstorming and explore in the design process.	The student shows evidence of brainstorming and explore in the design process.
Thinking Through Ideas and Prototyping The student shows evidence of thinking through ideas and prototyping in the design process.	The student shows evidence of thinking through ideas and prototyping in the design process.
Testing and Modifying The student shows evidence of testing and modifying in the design process.	The student shows evidence of testing and modifying in the design process.
Reflection and Improving Learning The student shows evidence of reflection and improving learning in the design process.	The student shows evidence of reflection and improving learning in the design process.

Individuals earn digital badges through Tallo to demonstrate skills and competencies to others.

Students discover academic and technical skills needed for building a robot using the digital learning management system.