

# Spintronics



Mid-Valley  
STEM-CTE HUB



[www.midvalleystem.org](http://www.midvalleystem.org)  
[midvalleystemctehub@linnbenton.edu](mailto:midvalleystemctehub@linnbenton.edu)  
Linn-Benton Community College  
Albany Campus - CC-212



# Spintronics

The Spintronics kit enables hands-on STEAM learning through building mechanical circuits. Students assemble components to understand electronic principles, developing skills in physics, engineering, and problem-solving. With engaging puzzles, the kit supports activities that encourage creativity and critical thinking



## Grade Level

4th - 12th grades

## Group Size

Up to 2 students per set

## Time Duration

60 - 90 Minutes

## Content of Kits

### Components

- 8x Spintronics Act One sets



# Usage

## Getting Started

1. **Understand the Components:** Identify and understand the function of each mechanical part in the kit.
  2. **Setup Challenges:** Use the puzzle booklet to set up challenges that mimic electronic circuits.
  3. **Construct Circuits:** Assemble the mechanical circuits according to puzzle requirements.
  4. **Experiment and Learn:** Observe the mechanical "current flow" and adjust components to see how they affect the overall circuit.
- 

## Storage

Keep all components neatly organized in the kit box to prevent loss and ensure easy access for future use.

## Troubleshooting

- Ensure all mechanical connections are tight and secure.
- Refer to the puzzle guide for the correct setup and solutions if you encounter difficulties.



# Activity Guide

## Beginner

### Simple Circuits

Students will start by learning the basics of circuit construction by solving the first few puzzles in the Spintronics Act 1 booklet. They will explore how electricity flows through circuits, how different components interact, and the fundamentals of resistance and current. This hands-on introduction provides a strong foundation in circuit design and problem-solving.

## Intermediate

### Complex Configurations

Building on their basic circuit knowledge, students will tackle more challenging puzzles that introduce series and parallel circuit configurations. They will experiment with different setups, troubleshoot issues, and analyze how current behaves in various pathways. This activity enhances critical thinking and reinforces key electrical engineering concepts.

## Advanced

### Full System Builds

Students will apply their knowledge to construct complex systems that simulate entire electronic operations. They will integrate multiple components to create working models of real-world electronic devices, developing a deeper understanding of power distribution and circuit efficiency. This activity encourages strategic problem-solving and introduces practical applications of electrical engineering.

## Extension Activity:

### Design Your Own Puzzles

Students will design original Spintronics puzzles or challenges that incorporate learned principles into new circuit designs. They will test and refine their designs to ensure logical consistency and solvability. This activity fosters creativity, deeper engagement with circuit logic, and peer collaboration as students challenge each other with their custom puzzles.



# Learning Extensions

## STEAM Connections: Technology - Circuit Building

### Learning Objectives:

- Develop an understanding of basic electronic principles through mechanical simulation
- Enhance problem-solving skills
- Foster an interest in physics and engineering

### Career Connections:

- **Electrical Engineering** – Understanding circuits, current flow, and resistance introduces students to careers in designing and developing electrical systems, power grids, and consumer electronics.
- **Mechanical Engineering** – Exploring how physical components interact in circuit-based systems helps build skills relevant to designing mechanical and electromechanical devices.
- **Systems Design** – Working with complex circuit configurations mirrors real-world problem-solving in creating efficient and optimized electronic and mechanical systems.
- **Robotics & Automation** – Applying circuit principles to functional systems connects to careers in robotics, industrial automation, and control system engineering.
- **Renewable Energy Technology** – Learning about energy flow and distribution provides insight into designing sustainable power solutions, such as solar or wind energy systems.

### Essential Employability Skills:

- Analytical Thinking
- Creativity Problem Solving
- Technical Aptitude
- Systems Thinking
- Spatial Reasoning
- Innovation
- Adaptability
- Attention to Detail





# Resources and Accessibility

## Safety Guidelines

- Monitor student interaction to ensure safe handling of mechanical parts.
- Keep the workspace organized and free from hazards.

## Accessibility

- Ensure that all students can manipulate the components comfortably; provide tools or aids if necessary.
- Adapt challenge setups to be accessible for all students, including those with visual or physical impairments.

## Library Catalog



## Library Resources



## Feedback

QR to feedback survey

