Spintronics: Engineer and Design Mechanical Circuits

Grade Levels
3-8

Educational Setting
Both in school and/or out of school.

Informational Webinar(s)
- Jan. 14, 3:30 p.m. REGISTER HERE
- Jan. 15, 3:30 p.m. REGISTER HERE
- Jan. 16, 3:30 p.m. REGISTER HERE

Recordings on Iowa STEM's Website

Award Provides
A classroom kit which includes.
- 16 Act One games
- Two Act Two games
- Two Power Pack games
- Five extra packs of chain
- One extra pack of resistors
- Stipend: $139 for in-person training, $60 for online training

2025-26 STEM Scale-Up Program Summary

Electricity and circuits are all around us, but we often don't notice them until the power goes out! Understanding electronics usually requires complex math, but Spintronics allows students to learn through hands-on puzzles. Instead of imagining invisible electrons running through wires, the students can see the chains moving through the sprockets. Through solving the challenges, students not only learn how electronics work, but also engage in the engineering design process through play and discovery. Every puzzle invites them to plan their approach, build it, and adjust. Tutorials teach concepts, circuit diagramming, and theory, including advanced concepts like Kirchoff's law. Students practice solving problems, communicating with others, thinking through multiple step processes, and perseverance.




Requirements to Implement the Program

- Educators must attend one three-hour training session.
- Educators must participate in the STEM Council Scale-Up Survey.

Additional Cost(s) to Awardee During Award Period
None.

Approximate Sustainability Cost(s) After Award Period
None.

Website
spintronics.com

Video
Spintronics

Social media
Facebook:
@EndlessCuriosity

YouTube:
@UpperStory

Iowa Standards Alignment

NGSS Science: Spintronics fulfills the grade 4 energy science standards. It teaches how energy, electronics, and circuits work at the fundamental level. It gives them a concrete understanding of how energy is manipulated in those circuits to be useful in everything that uses power. Instead of invisible electrons moving through wires and in a circuit, Spintronics lets players build mechanical circuits with a chain moving around sprockets so that they can see and feel how the electrons move. 4-PS3-1. Tutorial 1, puzzles 1-5, 4-PS3-2. Tutorial 5, puzzles 9-12, 4-PS3-4. Ammeter info, puzzles 9-12

Technology: By creating mechanical circuits, they develop skills in problem solving, logic, and creative solutions. These skills are the foundation of technology literacy, transferable to coding, software use, and expressing themselves creativity.

NGSS Engineering Design: It fulfills all standards for grades 3-5 and Middle School by inviting players to design small mechanical machines, troubleshoot, and improve them. Every puzzle (149) presents an engineering challenge, including the criteria for success and constraints. They are encouraged to test their design and look for weaknesses to improve the machine. The content is focused on electronics and electricity, which is a natural segue into electrical engineering, mechanical engineering, renewable energy and nanotechnology. 3-5-ETS1-1, 2, 3. MS-ETS1-1, 2,3, 4

Professional Development

Duration:
Half-day (three hours) of training.

Date(s):
All training sessions will be delivered during the month of July

Location:
Educators may choose between one in-person training that will be delivered in Ames or Des Moines or four synchronous virtual sessions.

To Learn More or To Apply: educate.iowa.gov/STEM/ScaleUp