Robotics & Automated Systems

Level 3: Student explored previously; second pathway specific course

Pathway(s): Engineering & Technology

Description

Robotics & Automated Systems is an applied course for students who wish to explore how robots and automated systems are used in industry. Upon completion of this course, students will have an understanding of the historical and current uses of robots and automated systems; programmable circuits, interfacing both inputs and outputs; ethical standards for engineering and technology professions; and testing and maintenance of robots and automated systems.

Student Learning Outcomes

Safety

1) Read and interpret safety rules established by the school/district.
2) Identify and explain the intended use of safety equipment available in the classroom.

Robotics Overview

3) Research the historical use of robotics. For example, explore areas such as the surgical field, space exploration, agriculture, and advanced manufacturing.
4) Explain the benefits of using robots in certain circumstances.
5) Identify industries, organizations, and careers in Colorado that use robotics.
    a. Explain the work activities involved.
    b. Identify postsecondary education needed.
    c. Recognize the skills needed for these careers.
6) Research the ethical considerations involved in developing new and modifying existing technologies.
    a. Describe the ethical dilemmas faced by both producers and consumers of a technology.

Programming

7) Complete a robotic system programming cycle.
    a. Create a flowchart of a program for a robotic system.
    b. Convert a flowchart into a working program.
    c. Test, modify, and optimize a program.
    d. Write a technical report evaluating the performance of the program
8) Log, store, and export data received from two or more sensors in a robotic or automated system.
    a. Explain why these procedures would be useful.

Computers and Electronics

9) Describe the parts needed to make a robot and distinguishes it from a computer and a non-robotic machine.
    a. Microprocessor

      b. Sensors for input and output

      c. Controls

      d. Motors

10) Design, develop, and test a program to control a robotic system and robotic subsystems.

11) Use feedback loops in a robotic system.

Mechanics

12) Use mechanical tools, such as motors, gears, and gear trains in the construction of a robotic or automated system.

      a. Identify where forces are acted upon various points in the system.

13) Develop a system to demonstrate force, torque, work, and power acting upon or being done by a robotic or automated system.

Testing, Maintenance, Documentation, and Quality Assurance

14) Use appropriate instruments to measure and record electrical, light, and audio outputs of a robotic system.

      a. Compare measured data to acceptable norms for the system.

      b. Document whether the system is performing within accepted parameters.

      c. Perform maintenance or follow recommended procedures to correct malfunctions or underperformances within the system.

15) Create a service and maintenance report on a robotic or automated system.

Projects

16) Design and create a robotic solution to a given problem.

      a. Incorporate the engineering design process.

      b. Maintain an engineering notebook to document the details of the project.