Unit 5 - Sensors, Data and Decision Making

Content Area: **Unified Arts**
Course(s): **Tech Apps 8**
Time Period: **November**
Length: **20 Days**
Status: **Published**

Unit Summary

Throughout the unit, students will utilize sensors such as keyboards, cameras, ultrasound sensors, touch sensors, color sensors to collect data, and that data is used by programs to make decisions. Students will also realize that knowledge of the tool you are using to solve a problem acquired through practice, and knowledge and understanding of the problem you are trying to solve through questioning, are both essential to solving a problem.

Standards

TECH.K-12.1.4.a	know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
TECH.K-12.1.4.c	develop, test and refine prototypes as part of a cyclical design process.
TECH.K-12.1.4.d	exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.
TECH.K-12.1.5.a	formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.
TECH.K-12.1.5.b	collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.
TECH.K-12.1.5.c	break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.
TECH.K-12.1.5.d	understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.
SCI.6-8.MS-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
SCI.6-8.MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
SCI.6-8.MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
SCI.6-8.MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
TECH.8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
TECH.8.1.8.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.2.8.A.2	Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.

TECH.8.2.8.A.4	Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.
TECH.8.2.8.C.6	Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.
TECH.8.2.8.C.CS3	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.
TECH.8.2.8.D.3	Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.
TECH.8.2.8.D.CS2	Use and maintain technological products and systems.
TECH.8.2.8.E.1	Identify ways computers are used that have had an impact across the range of human activity and within different careers where they are used.
TECH.8.2.8.E.2	Demonstrate an understanding of the relationship between hardware and software.
TECH.8.2.8.E.3	Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.
TECH.8.2.8.E.4	Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms).
TECH.8.2.8.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

Student Learning Objectives

- Students will learn independently use online resources to learn new skills.
- Students will learn various sensors on a robot to gather information and make decisions in a program to complete a challenge.
- Students will learn to ask questions to determine the requirements for a technical solution.

Essential Questions

- Why does a robot require programming inputs from sensors?
- What type of responses does the robot provide as an output?
- How can computational logic such as looping and conditionals solve a problem?

Enduring Understandings

- Students will understand that sensors such as keyboards, cameras, gyroscopes, color sensors collect data and data is used by programs to make decisions.
- Students will understand that sensors can be configured for sensitivity.
- Students will understand that knowledge of the tool you are using to solve a problem acquired through practice, and knowledge and understanding of the problem you are trying to solve through questioning, are both equally essential to solving a problem.

Application

- Students will be able to independently use their learning to learn XP by completing robotics challenges. To complete the challenge, they must first use an online curriculum to learn on their own how to program the robot. The challenge descriptions are all online on a teacher developed webpage. Students ask questions and work through trial and error to complete the challenge.
- Students will be able to independently use their learning to use color, ultrasound and touch sensors, as well as program control structures such as switches and loops.

Skills

Students will be skilled at:

- Programming a robot to complete tasks using sensors, motors, and computational logic to solve a problem.