1. Line Detection (Loops & Switches)

Content Area: **Technology**
Course(s):
Time Period: **Cycle**
Length: **8 days**
Status: **Published**

General Overview, Course Description or Course Philosophy

This 22-day cycle course serves as an introduction of basic robotics principles to 7th grade students. Through problem solving activities and project based collaboration, students will use experimentation, testing, and analysis to develop foundational skills in the areas of algorithm construction, scripting, engineering design, and prototype testing. The course culminates in students designing and completing their own robot using knowledge that they've acquired over the marking period, with the goal of solving a given challenge.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Students will understand:

- the concept of the Loop.
- the concept of a switch and how to use it for true and false operations.

CONTENT AREA STANDARDS

SCI.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.
SCI.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.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.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.
CS.9-12.8.1.12.AP.1	Design algorithms to solve computational problems using a combination of original and existing algorithms.
CS.9-12.8.1.12.AP.2	Create generalized computational solutions using collections instead of repeatedly using simple variables.
CS.9-12.8.1.12.AP.3	Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice.
CS.9-12.8.1.12.AP.4	Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.
CS.9-12.8.1.12.AP.5	Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.

CS.9-12.8.1.12.AP.6	Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.
CS.9-12.8.1.12.AP.7	Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users.
CS.9-12.8.1.12.AP.8	Evaluate and refine computational artifacts to make them more usable and accessible.
CS.9-12.8.1.12.AP.9	Collaboratively document and present design decisions in the development of complex programs.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

LA.RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LA.RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
LA.RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LA.WHST.6-8.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

STUDENT LEARNING TARGETS

Refer to the 'Declarative Knowledge' and 'Procedural Knowledge sections.

Declarative Knowledge

Students will understand that:

- Loops can be used to repeat specific functions multiple times in a row.
- Programs can be made to execute different segments of code depending on a given input.

Procedural Knowledge

Students will be able to:

- Design ways to improve driving safety by helping to prevent drivers from falling asleep and causing an accident.
- Design ways to avoid accidents between vehicles and objects in the road.

EVIDENCE OF LEARNING

Refer to the 'Formative Assessments' and 'Summative Assessments' sections.

Formative Assessments

Daily checklist

Project checklist

Summative Assessments

Performance of challenge task

Challenge checklist

RESOURCES (Instructional, Supplemental, Intervention Materials)

Mindstorms EV3 Programming app (on computer)

– Wait Block
– Color Sensor
– Loop Block
– Switch Block
– Loop Interrupt Block

INTERDISCIPLINARY CONNECTIONS

Mathematics

Communication

Science, technology, Engineering, and Math

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.