Level 3 Robotics (4th-6th) Standards Alignment

Level 3 CCSS English Language Arts Alignment for Robotics

Reading Informational Text	Application in Curriculum
RI.6.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.	Sessions include technical terms that the students learn and integrate into their vocabulary.
Writing	
W.4-6.2d Use precise language and domain-specific vocabulary to inform about or explain the topic.	Reflection questions allow students to use engineering and computer science jargon to accurately recount their actions and relate those actions to the world around them.
Speaking and Listening	
SL.4-6.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade appropriate topics and texts, building on others' ideas and expressing their own clearly.	Students collaborate in teams to accomplish their goals of building and programming the robot, discussing such topics as engineering principles and proper coding syntax.

Level 3 CCSS Mathematics Alignment for Robotics

Mathematical Practice	Application in Curriculum
MP.1 Make sense of problems and persevere in solving them.	Students apply their acquired programming skills in a project-based learning environment to accomplish a variety of goals for their robot. These goals are realized through extensive planning and trial and error.
MP.2 Reason abstractly and quantitatively.	Moving the robot involves abstract planning and keeping track mentally of the robot's intended position and quantitative scrutiny in coding its movements to match those abstractions.
MP.3 Construct viable arguments and critique the reasoning of others.	Team members debate as to the best method of traversal for various challenges and articulate a defense for their particular position.

MP.5 Use appropriate tools strategically.	Challenges are presented to the students in the form of physical phenomena that require students to implement strategic thinking when using their robot. Both physical and mental tools are used to maintain the peak performance of the robot.
MP.8 Look for and express regularity in repeated reasoning.	Computer programming revolves around repeated reasoning and strict adherence to regularity in logical progression.
Number and Operations in Base Ten	
5.NBT.3 Read, write, and compare decimals to thousandths.	Students utilize decimals of varying magnitude when determining the robot's movement timing.
Ratios and Proportional Relationships	
6.RP.2 Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship.	Ratios of distance and time arise in the programming of the robot as students equate an inputted time to a relative distance.
Measurement And Data	
4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	Through the programming of their robot, students are constantly solving problems involving intervals of time and distance. Such calculations involve using the four operations and are at times represented on diagrams that depict relative scale.

Level 3 NGSS Alignment for Robotics

Standard	Application in Curriculum
3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved	Programming the robot to accomplish various tasks is centered upon undertaking trials with controlled variables. Additionally, students are asked for their input as to what they would do to their robots to improve its performance and given resources to enact some of those changes.
W.3.1.B Provide reasons that support the opinion	Students form hypotheses about the functions of various hardware components prior to the robot's construction and provide evidence for their claims based on previously held knowledge and visual and tactile observations.
RST.6-6.7. 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)	Results from various measurements are expressed in a variety of forms including in text, diagrams, tables, and other assorted graphic organizational tools.