**Stage 1 Digital Technologies**

**Assessment Type 1: Project Skills**

**Product Design Plan: Advanced Automation Vehicle**

**Purpose**

In the previous task, *Creating an Autonomous Vehicle*, you created a basic autonomous vehicle, which could navigate around obstacles. True autonomous vehicles, however, must provide passengers with additional safety and warning sensors, and improved obstacle avoidance systems.

The purpose of this task is to determine the necessary requirements needed to create a more advanced automation vehicle that takes into consideration improved safety and collision avoidance systems.

**Assessment Description**

* You will work collaboratively in groups of 2-3 for the duration of this task.
* Review, from Task 1, the techniques that autonomous vehicles use to sense and react to their environment and the safety features that are incorporated.
* Research additional sensors that can be incorporated into your existing product.
* Create a design brief which identifies the necessary features and components of an advanced autonomous vehicle.
* Create one or more high level design plans for a proposed advanced vehicle.

*(Note, each group could propose multiple potential designs.)*

This should include:

* + potential modifications and extensions to original project ideas, flowcharts, relationship/object diagrams, or similar (as appropriate)  
    *(Note: these diagrams can be created using* [*https://www.draw.io*](https://www.draw.io)*)*
  + for each feature/component, represent potential attributes and algorithms using pseudocode and/or UML diagrams   
    *(Note: these diagrams can be created using* [*https://www.draw.io*](https://www.draw.io)*)*
  + the order features could be developed.
* Create a development portfolio, which includes:
  + - * the design process
      * a justification of the extent of the automation and its relevance to a real-world application.

**Assessment Conditions**

* Design brief and plan.
* Portfolio containing the design process used and justification of automation features.

**Assessment Design Criteria**

CT1 Application of computational thinking skills to explore problems and possible solutions

CT2 Development and application of programming skills to create a digital solution or prototype

DE1 Development and application of program-design skills to create a digital solution or prototype

DE3 Contribution to collaborative work

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|  | **Computational Thinking** | **Development and Evaluation** | **Research and Ethics** |
| **A** | Insightful and sustained application of computational thinking skills to explore problems and possible solutions.  Focused development and strategic application of a wide range of programming skills to create a digital solution or prototype.  In-depth analysis of patterns and relationships in data sets and/or algorithms to draw insightful conclusions. | Purposeful and well-considered development and application of program-design skills to create digital solutions or a prototype that include innovative features.  Insightful evaluation of the effectiveness of a digital solution or prototype.  Insightful and proactive contribution to collaborative work. | In-depth research into and discussion of the ethical considerations in digital solutions and/or data use. |
| **B** | Some insights in the application of computational thinking skills to explore problems and possible solutions.  Thorough development and well-considered application of a range of programming skills to create a digital solution or prototype.  Some depth in analysis of patterns and relationships in data sets and/or algorithms to draw well-informed conclusions. | Well-considered development and application of program-design skills to create digital solutions or a prototype that include one or more innovative features.  Well-considered evaluation of the effectiveness of a digital solution or prototype.  Mostly consistent and effective contribution to collaborative work. | Some depth in research into and discussion of the ethical considerations in digital solutions and/or data use. |
| **C** | Application of computational thinking skills to explore problems and possible solutions.  Competent development and application of programming skills to create a digital solution or prototype.  Description, with some analysis of patterns and relationships in data sets and/or algorithms, to draw generally informed conclusions. | Development and application of program-design skills to create digital solutions or a prototype that may include one or more innovative features.  Description, with some evaluation of the effectiveness, of a digital solution or prototype.  Effective contribution to collaborative work. | Considered research into and discussion of the ethical considerations in digital solutions and/or data use. |
| **D** | Some application of basic computational thinking skills to describe problems and possible solutions.  Basic development and some application of programming skills to create one or more partial solutions or prototypes.  Basic description of patterns and relationships in data sets and/or algorithms to draw one or more basic conclusions. | Some development and application of program-design skills to create one or more partial solutions or prototypes.  Basic description of a digital solution or prototype and one or more aspects of its effectiveness.  Some contribution to collaborative work. | Basic research into and discussion of the ethical considerations in digital solutions and/or data use. |
| **E** | Attempted application of a limited number of simple computational thinking skills to describe a problem and/or possible solution.  Attempted development and/or application of basic programming skills.  Attempted description of one or more patterns and relationships in data sets and/or algorithms. | Attempted development and application of program-design skills.  Attempted description of a digital solution or prototype.  Limited contribution to collaborative work. | Attempted discussion of an ethical consideration in digital solutions and/or data use. |