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# INITIATE Lesson Plan: *Design an AV Car/Transport & present your design to class.*

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## *Lesson plan at a glance...*

**Name:** *Design & Present an AV Car/Transport*

**Course:** CAD 1 & CAD II, Design Architecture

**Grade Level:** 10th -11th -12th

**Prerequisites:** *SketchUp - Software knowledge*

**Time: 1 week?** **Preparation: Acquaint students with what AV transportation is and the general overview of same.**  
**Instruction:** Look at slides of what they look like now to give students a base of knowledge to work from.

**Standard(s):** 178020 -

## *In this lesson plan...*

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**Outcome: 1.4. Knowledge Management and Information Technology:**

Demonstrate current and emerging strategies and technologies used to collect, analyze, record, and share information in business operations.

1.4.2. Select and use software applications to locate, record, analyze, and present information (e.g., word processing, electronic mail, spreadsheet, databases, presentation, Internet search engines).

**Outcome: 6.1. Proposals:**

Develop and present a design, proposal, or concept.

**Outcome: 6.3. Drafting:**

Design residential, industrial, civil, and commercial plans in accordance with the American National Standards Institute (ANSI) Y14.5M- 2009 graphics standard.

- 6.3.4. Construct mechanical, electrical, and plumbing plans and schematics in accordance with the ANSI Y14.5M-2009 graphics standard.
- 6.4.4. Read, interpret, and organize construction drawings, specifications and other contractual documents
- 6.5.2. Apply measurement scales to layout length, width, and angle measurements.
- 6.5.4. Use proportional reasoning and apply indirect measurement techniques (e.g., right triangle trigonometry, properties of similar triangles).

## Lesson Overview

In this lesson...I am doing a Project Based Learning (PBL) lesson and the project has many facets and parts that are included in this lesson. Starting point for the lesson is an introduction of the AV technology, stepping points are sketch/preliminary design phase. Move your prelim design into the computer phase, building a model that is based on the initial design sketches student creates. Upon completion of the design student will create a presentation for the class to hear and see. They will need to use CAD software and PowerPoint/Google Slides to complete this lesson.

## Driving Questions

Overarching Driving Question for INITIATE Wide Project:

- **How safe are autonomous vehicles?**

Lesson Specific Question: **What safety features are included in your design? Point them out in your classroom presentation.**

### **LINK LIBRARY (used in the course of this lesson plan):**

Link : <https://www.wired.com/story/guide-self-driving-cars/>

Link: <https://www.trafficsafetystore.com/blog/driverless-cars-what-are-the-biggest-obstacles-for-the-road/>

Link: <https://adata.org/factsheet/ADA-accessible-transportation>

Link: Initiate AV intro power point -

<https://classroom.google.com/u/2/c/MzQ3NjQ5NjI4NDIa/a/NDA3MDQ3NTA4ODha/details>

Link: Videos for safety and convenience

<https://classroom.google.com/u/2/c/MzQ3NjQ5NjI4NDIa/a/NDA3NDY3OTYzNzJa/details>

Link: <https://classroom.google.com/u/2/c/MzQ3NjQ5NjI4NDIa/m/NDA2ODk1NzY2ODZa/details>

## Materials and Equipment

*Student Check sheet, Sketch / Graph Paper, CAD software and Power Point (PP) / Google Slides*

**Preparation Tasks - May need to break the class into groups.**

	Search the internet and find an image of AV transportation - SKETCH THAT IMAGE	Time: 15 minutes
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**The Lesson - May need to be done in groups. Each activity may need some of their own lesson plans.**

<u>Warm-up Activity: Internet search for images of current AV transportation -Maybe a visit from a manufacturer of AVs.</u>	Time 20-30 min.
<u>Activity 1: Import your sketch into the CAD software and start a formal layout of the design.</u>	Time: 2- 4 class periods maybe longer ??
<u>Activity 2: Export images of your design that can be added to your classroom presentation and begin your PP slides - outline key features of your design.</u>	Time: 3-4 class periods
<u>Activity 3: Present slide shows to the class</u>	Time: 1-2 class periods
<u>Wrap-up Activity: access students fulfilment of project and have students complete quick exit ticket/survey.</u>	Time:10-15 min.

**Warm-up Activity:** Internet search for images of current AV transportation - Maybe a visit from a manufacturer of AVs. (Navya, Waymo etc) (20-30 minutes)

**Activity Overview:** In this activity, students will...search the internet for images of current AV transport vehicles.

**Activity:** Students will search for the required number of images and save images in their student computer folders for use later in this project. Images should range from the most common type of vehicles to the more unique ones. This activity could branch out into an exploration of existing technology based on a visit from a manufacturer of AVs.

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**Activity 1:** Export images of your design that can be added to your classroom presentation and begin your PP slides - outline key features of your design. (2-4 Classes)

**Activity Overview:** In this activity, students will ...Begin designing an AV by using their own sketch that they have created in previous preparation and some of the images from internet search that were of interest.

**Activity:** Students will need to import into the software a starting point for design an elevation of front and sides for the vehicle that they will present to the class. Students can trace over an image but will need to alter the design in order to make it unique to them. All safety systems will need to be designed in and called out in notes for emphasis later in the project/lesson.

**Teaching Tips:**

- *Make sure to alter the design to be unique to the design you are creating.*
- *Play a youtube video that can help students understand what safety feature to emphasize.*
- *Link to this article: <https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety>*

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**Activity 2:** Export images of your design that can be added to your classroom presentation and begin your PP slides - outline key features of your design. (3-4 Classes)

**Activity Overview:** In this activity, students will ... prepare for their presentations to the class of their AV design.

**Activity:** Prepare your slide show using PowerPoint or Google Slides making a minimum number of slides & images that will show the students design and the key features of both mechanical systems & safety systems. Students should practice their presentations and be able to present the slide show and field questions from other students.

**Teaching Tips:**

- *Students will need to have access to the internet through their classroom computers*
- *Link: <https://www.youtube.com/watch?v=wPbylymgQEs>*

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**Activity 3:** Present slide shows to the class (1-2 Classes)

**Activity Overview:** In this activity, students will ... Present the design of their AV transportation

**Activity:** Organize the parts of their design into a power point/google slides presentation. Students or a group will stand in front of class and present the PP of the final design.

**Teaching Tips:**

- List any suggestions you would have for someone else who might teach this lesson.
- Link: <https://www.youtube.com/watch?v=eHhqWbl0y4M>

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**Wrap-up Activity:** Analysis and reflection (10-15 minutes)

**Activity Overview:** In this activity, students will ... review their own student projects and have complete quick exit ticket/survey. Discussion about the overall concept of safety of these vehicles.

**Activity:** review students projects and have students complete exit ticket/survey. Have them list at least 2 things that they learned during the entire length of the project. Pose a question as well on the board or exit slip that can be answered with a short sentence or paragraph.

1. Have some questions made up to engage the students in discussion part of this wrap up session.
2. Link: <https://www.iotforall.com/16-questions-self-driving-cars-ces-highlights-show-floor-solving-social-problems-machine-learning/>
3. Possible Questions re Cyber Security:
  1. What cyber security measurements are implemented in this autonomous shuttle ?
  2. Will the autonomous shuttle have an emergency force shutdown technique in case if hacked ?
  3. Will the autonomous shuttle have hardware and software security? If yes what are the hardware security they are incorporating within their shuttle bus ?

**Assessment:**

**Learning Objectives and Standards**

Learning Objectives	Standards
Work with software	<b>Outcome: 6.3. Drafting:</b> Design residential, industrial, civil, and commercial plans in accordance with the American National Standards Institute (ANSI) Y14.5M- 2009 graphics standard.
Search the internet	1.4.2. Select and use software applications to locate, record, analyze, and present information (e.g., word processing, electronic mail, spreadsheet, databases, presentation, Internet search engines).
Present to a group of peers	<b>Outcome: 6.1. Proposals:</b> Develop and present a design, proposal, or concept.

## Additional Information and Resources

### Project-based Learning Features

Feature	Where does this occur in the lesson?
<b>Collaborative Opportunities</b>	<i>In all activities students are... working with fellow students and discussing all areas of the AV projects</i>
<b>Investigation &amp; Problem Solving</b>	<i>In Warm Up activity students are searching the internet and gathering images for later use</i>
<b>Making Sense of Data &amp; Technology Incorporation</b>	<i>In activities 1 &amp; 2 students are... working with software in the design phase as well as the typical dimensions and data that they have gathered in regards to the current AVs on the road.</i>

### Computational Thinking Concepts

Concept	Where does this occur in the lesson?
<b>Decomposition</b>	<i>In activity 1 students are breaking down... the dimensions of an AV and using those dimensions in the design of their own</i>
<b>Abstraction</b>	Students are using this throughout the entire project as a way of thinking about how they can incorporate their ideas into an AV of their own design.

### Administrative Details

**Contact info:** 028

**Sources:** [Ohio Content Standards](#) [YouTube](#) [Bloxter](#)

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**Template adapted from:** <https://edu.google.com/resources/programs/exploring-computational-thinking/>