2022 NJ TSA HIGH SCHOOL DESIGN PROBLEMS

Coding

Best of New Jersey APP CHALLENGE

New Jersey residents know that the Garden State is a great place to live. There are so many good things to do that it's impossible to do them all. But it will be fun to try.

Conduct research among your friends and classmates to identify some of their favorite New Jersey places and activities. Possibilities include, sports, concerts, restaurants, the shore, etc. Add your own ideas and finalize a top 10 list. The App you create should include a photo and useful information including at least one link for each of the 10 activities/places. Include a place that will allow users of your App to leave one sentence reviews.

- **PLATFORM:** The app can be on any platform.
- **PROGRAMMING LANGUAGE:** Use any programming language.
- **FUNCTIONALITY:** The app must have some degree of functionality.
- **CONTENT SUITABILITY:** All content must be in good taste and observe all school rules.
- **ORIGINALITY:** The app must be original in design and content.
- **VIDEO**: Create a 1-3 minute video that contains the following information:
    - First name of each team member
    - The name of the app
    - Clearly explain the purpose of the app
    - The tools and coding language used to create the app
    - Show how the app works
- **IN ADDITION** submit a document that includes the following information:
    - Your ID number(s)
    - Title of the app
    - Explain the app in ONE sentence.
    - What is your app trying to accomplish? (200 characters max.)
    - What technical /coding difficulty did you face in programming your app, and how did you address this technical challenge? (500 characters max.)
    - With what you've learned, what improvements would you make to version 2.0 of your app? (500 characters max.)

EVALUATION

- **VIDEO** (50 points)
    - The purpose of the app is explained (10 points)
    - Tools and coding language are explained (10 points)
    - At least 3 features of the app are demonstrated and explained (30 points)
- **DOCUMENTATION** (50 points)
    - Written description of the app's purpose (10 points)
    - Technical difficulty and solution are explained (20 points)
    - Improvements that should be included in version 2.0 are explained (20 points)

SUBMISSION INSTRUCTIONS

- The URL for the video (posted on YouTube), and required documentation (PDF) must be uploaded to the NJ Online Conference System by 11:59pm on March 30, 2022. Specific upload procedures will be provided by NJ TSA. Entries/files must be labelled with ID number(s) and "High School Coding."

Computer-Aided Design (CAD), 2D Architecture

Design Problem:
The Farnsworth House is a 1,500 square foot historically important home designed and built between 1945 and 1951 by Ludwig Mies van der Rohe. It was constructed as a weekend home in a rural community not too far from Chicago, IL. In 2021, The New York Times named it as one of the 25 most significant works of architecture since World War II. Today the home is a museum.

During a recent vacation, a New Jersey family that has had a long-term interest in architectural history visited the home. They are now interested in having a home built that includes the essential qualities of the Farnsworth home. The have a two-acre lot and want to feel certain that their new home will be safe from flooding caused by the nearby river.

Design Brief:
Design a 2,000 square foot family home inspired by the Farnsworth House. The homeowners are knowledgeable about art and architecture in general. After their initial visit, they have returned to the Farnsworth House several times. You will need to learn more about van der Rohe and the Farnsworth House before beginning to design the home.

Specifications/Drawing Requirements:
- Working drawings that include a floor plan as well as front, side and rear elevations;
- Include notes that identify at least 5 features that are based on van der Rohe style and the Farnsworth House;
- Include any other views that will enhance the presentation; and
- Use proper scale, dimensions and notes.

Computer-Aided Design (CAD) 3D, Engineering

Design Problem
Top brand skateboard manufacturers have noticed that there is a lot of interest in the ONEWHEEL battery powered skateboard, which is available in several models that start at $950.00, and can cost as much as $2,000.00. The traditional skateboard companies are not interested in making or selling electric skateboards, but they are interested in selling an affordable skateboard that uses big wheel technology, rather than traditional skateboard wheels.

Design Brief
Design a prototype non-electric big wheel skateboard that will appeal to skateboard enthusiasts looking for exciting new challenges in technical skateboarding and street transportation. For additional stability, designs that use 2 big wheels will also be considered. To provide the necessary strength and support for the big wheel(s) and the rider, the skateboard deck should be made of a strong, flexible material. Include battery-operated LED lights to enhance the look of the skateboard and increase nighttime visibility.

Specifications/Drawing Requirements
- Include a parts list that identifies all the major mechanical and support components of the skateboard;
- Show the top and bottom of the skateboard; and
- Include any views or renderings that will enhance the presentation.

Optical Engineering

One of the problems with attending live concerts is that you may be far from the stage and surrounded by people who stand throughout the performance. One way to see over people standing in front of you would be to use a periscope. Simple periscopes are easy to make using a tube and two mirrors. More complex periscopes, such as those that have been used on submarines, have used a combination of mirrors or prisms and lenses.

Your challenge is to build a prototype of a periscope that uses 2 mirrors and 2-3 lenses for use at a concert.

The documentation portfolio, digital display (including prototype/device) and presentation video must be uploaded to the NJ Online Conference System by 11:59pm on March 30, 2022. Upload instructions will be provided by NJ TSA. Entries/files should be labeled with ID# and include “Optical Engineering.”