



## 2024 NJ TSA HIGH SCHOOL DESIGN PROBLEMS

### Coding

#### NJ Tourist Promoter

New Jersey, The Garden State, has often received a bad reputation as a state with nothing to do, but that couldn't be further from the truth. With miles of beautiful shoreline, lush tree-filled parks, and some of the best dining around, New Jersey has a lot to offer.

To promote New Jersey as a state to visit, conduct research to determine New Jersey's most popular tourist destinations and design an app to entice prospective vacationers to come visit our beautiful "Garden State".

Brainstorm to identify ideas that will help future tourists gain knowledge about New Jersey and its many sites.

Create a model app that can be used to guide tourists to many popular sites as well as off the beaten path sites. Provide photos of 10 destinations. For each destination, include 2-4 sentences of additional information to describe the site. Also, as part of your app, include at least 5 links for activities that will assist tourists, such as but not limited to: local places to stay, dine, history, and landmarks.

Keep in mind that the goal is to market New Jersey as a premier tourist destination to visit for day trips or extended vacations.

**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 clearly explains the following information:

- First name of each team member
- The name of the app
- The purpose of the app
- The tools and coding language used to create the app
- How the app works

**DOCUMENTATION:** 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 PDF of the documentation, and URL of the video, must be finished, submitted, and accessible via the Internet by 11:59pm on March 27, 2024. Submission procedures for NJ TSA's online system will be shared with advisors.

## **Computer-Aided Design (CAD), 2D Architecture**

### **Help Restore Lahaina, Hawaii**

#### Design Problem:

On August 8th 2023, a Hawaiian fire devastated the County of Maui and in particular, the town of Lahaina. Over 2,100 structures were destroyed, leaving thousands of people homeless. Still months later, many residents are still trying to find a place to stay, but they remain homeless. They are not able to return to their land as of yet, and even when permitted to go back, many cannot afford the price it would take to rebuild their permanent homes.

Help Lahaina residents get back to their homeland. Your challenge is to design a 'tiny home' that could house a family of four adults. The home should be transportable so they can live in it at a temporary site until they are permitted to go back to their property in Lahaina, once they are allowed.

Tiny homes are very common in Hawaii. The Hawaii Tiny House Initiative was originally started to help farm workers on Hawaii Islands find places to live. The County rules say that small houses with a living area, kitchen, and bathroom that are at least 220 square feet, and no greater than 400 square feet, are allowed.

One important rule is that the tiny house must be no taller than 13.5 feet, so it can pass under bridges and other low-hanging things when being transported. The width can vary, depending on the county, but is usually between 8.5 and 10 feet. The length is usually no more than 40 feet, including the tongue of the trailer.

#### Design Brief:

Design a 'Tiny Home' no less than 220 square feet, with a max of 400 square feet. The home should include: living area, kitchen, three fixture bathroom, and sleeping area(s). The areas do not need to be permanent, but can be creatively transformable. The home should be able to be transported from one location to another easily. The home may not always be connected to essential utilities such as electric and water, therefore, the design must include ways to be sustainable with renewable energy.

### Specifications/Drawing Requirements:

- Working drawings that include a floor plan as well as front, side and rear elevations;
- Include notes that identify at least five creative ways you utilized minimal space;
- Include any other views / 3D renderings that will enhance the presentation;
- Use proper scale, dimensions and notes;
- The maximum paper size is 24" x 36" or smaller sheets mounted on a 24" x 36" sheet with no overlapping papers.

Follow directions in the NJ TSA Supplement to submit your entry.

## **Computer-Aided Design (CAD) 3D, Engineering**

### **4-in-1 Lawn Tool**

#### Design Problem:

Stihl® is well known for their high-quality lawn and garden tools and are sold in many garden and home stores. They are planning to add a new product this year to reduce the clutter in one's shed or garage where one keeps their garden and yard tools.

#### Design Brief:

Design a prototype yard tool that will perform the task of 4 tools in one. Include at least two (2) electrical/electronic features, and at least two (2) mechanical features. Your product should transform or telescope to different lengths.

### Specifications/Drawing Requirements:

- Include a parts list that identifies all the major mechanical and support components of the tool.
- Show the necessary views to describe the 4-in-1 tool.
- Include any views or renderings that will enhance the presentation.
- The maximum paper size is 24" x 36" or smaller sheets mounted on a 24" x 36" sheet with no overlapping papers.

Follow directions in the NJ TSA Supplement to submit your entry.

## **Optical Engineering**

### **Dimly Lit Restaurants**

Restaurants often use dim lighting to create a cozy and intimate atmosphere for diners. Dim lighting can also help to relax and soothe customers, encouraging them to stay longer and enjoy their meals. Additionally, softer lighting can make food appear more appealing and enhance the overall dining experience. People dining at dimly lit tables tend to feel more content with their dining experience.

One diner's atmosphere enjoyment, however, could be another diner's struggle to read the menu. Restaurants sometimes overlook that not everyone can see well.

Your challenge is to creatively design and build something that will be for use on individual tables to read a menu in dim lighting, but does not disrupt the ambiance the restaurant is trying to provide. The object should have a minimum of two (2) functions. The object should work well for use by diners to help with reading a menu.

The optical object you design should be attractive and able to adapt to a two (2) person AND four (4) person table. It can use 1-3 LED's and be powered by AA or AAA batteries. In addition to the physical prototype, prepare the documentation outlined in the NJ TSA Supplement.

Follow directions in the NJ TSA Supplement to submit your entry.

## **System Control Technology**

### **Chicken organizer**

A well-known fast food chicken restaurant is known for its delicious chicken strips and nuggets, and also it's long lines. Some potential customers are turned away from ordering because of having to wait in the long lines. The back up with the lines tends to be from a problem with getting chicken nuggets and strips orders out quickly and accurately. When the nuggets and strips are physically counted by the staff, there have been mistakes which makes for longer transactions to customers. There have been strips and nuggets mixed together in orders. The management would like to create a faster system of delivering an 8-piece nugget and a 4-piece strip order to their customers with efficiency and accuracy.

Task: Design and build a computer-controlled system that can separate chicken nuggets and chicken strips into one 8-piece nugget container, and two 4-piece strip containers.

Your model system will need to demonstrate that it can process a mixture of at least 16 chicken items (minimum of eight (8) of each kind) and place them in three (3) separate containers. One 8-piece nugget, and two 4-piece strip containers. Model the nuggets and strips (3D print, wood, etc) to correct size. (Do not use actual chicken for the demonstration.)

Chicken Nugget size: 1"x 2" x 1/2"

Chicken Strip size: 1" x 5" x 3/4"

Your model working system should be no larger than 2' x 2'.

Follow directions in the NJ TSA Supplement to submit your entry.