



2019 NJ TSA HIGH SCHOOL DESIGN PROBLEMS

Coding

Most high schools hold a freshman orientation before school actually starts. These sessions are helpful, not only because you learn your way around the building, and get to meet some of your teachers, but you also get to meet fellow students. That way, when you show up on your first day of school, you may already recognize a few familiar faces. But, as you will probably recall, it was hard to remember everything you learned during orientation.

APP DESIGN CHALLENGE

Design an app that provides some of the most important information that a new student needs to know about your school. Please follow these guidelines:

- **PLATFORM:** The app can be on any platform (web app, desktop/PC app, a web browser extension, robot, Ruby on Rails, mobile, etc).
- **PROGRAMMING LANGUAGE:** Use any programming language: c/C++, Objective C, C#, Java, JavaScript, Python, Ruby, Swift, “block code”, etc.
- **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
- **SUBMIT THE VIDEO** through YouTube
- **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) should be emailed to tsachall@tcnj.edu by March 21, 2019. Required documentation must be submitted as a PDF attachment to the email.
- Include ID number(s) and "High School Coding" in subject line of email

Computer-Aided Design (CAD), 2D Architecture

Design Problem:

The upscale desert community of Palm Springs, California is known for its many mid-century modern homes. A New Jersey architect, who vacationed in Palm Springs several times, and a developer are planning to work together to build a community of 25 mid-century modern homes in south Jersey.

Design Brief:

Every home in the community will be of the mid-century style and customized to meet the needs of the purchaser. Your challenge is to design the model home for the new subdivision. It should be an energy efficient ranch with 3-4 bedrooms and a total of 2100 to 2500 square feet of heated space.

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 (5) mid-century modern interior features and at least five (5) mid-century modern exterior features;
- Proper scale, dimensions and notes; and
- The maximum paper size is 24" x 36" or smaller sheets mounted on a 24" x 36" sheet with no overlapping papers.

Computer-Aided Design (CAD) 3D, Engineering

Design Problem:

A New Jersey based company has obtained a five-year contract to sell beach tags on behalf of six large shore towns. In addition to selling the beach tags from boardwalk entrances, they will need to travel on the sand of various beaches to verify that each guest is displaying his/her tag. The company is requesting design proposals for a unique electric scooter specifically designed for use on New Jersey Shore beaches.

Design Brief:

Design a safe, rechargeable electric scooter specifically designed for travel on sand at the Jersey shore. The scooter should be original in design and made from at least 80 percent off the shelf parts.

Specifications/Drawing Requirements:

- Include a parts list that identifies the source of all required mechanical and electrical components as well as frame materials;
- Show frame construction, and how important mechanical and electrical parts are protected from sand and water;
- Include any views or renderings that will enhance the presentation; and
- Maximum paper size is 24" x 36" or smaller mounted on a 24" x 36" sheet with no overlapping papers.

Optical Engineering

Design and build an illuminated, handheld magnifier. Include one or more LED's and multiple lenses to assist in reading text or examining small objects. Your prototype should be attractive and designed to fit in a pocket or purse. Power should be provided by single battery.

In addition to the physical prototype/display, teams must prepare documentation and a presentation as outlined in the NJ TSA High School Supplement (beginning on page 57).

System Control Technology

Elon Musk is known for his interest in revolutionizing transportation on the road, in space, and underground. His Hyperloop One project is planning to build tunnels for high-speed vehicles that will move people between cities around the world.

Research Hyperloop One and then construct a working model that can be used to explain the concept to people who are not yet familiar with this new and innovative transportation system.