



2018 NJ TSA HIGH SCHOOL DESIGN PROBLEMS

Computer-Aided Design (CAD), Architecture

Design Problem:

The first Craftsman homes were built in Southern California more than 100 years ago. By 1920, Craftsman bungalows became the most popular small home style in the United States. Today they remain extremely popular, and often sell for more money than similar size homes of other designs.

Design Brief:

A New Jersey Builder has secured the land needed to build a community of 36 Craftsman bungalows for first time buyers. She plans to build each home on a 100' X 100' lot and give the buyers an opportunity to customize their homes, so long as they remain faithful to the Craftsman style. The home you design should range between 1200 and 1500 square feet.

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) Craftsman exterior features and at least five (5) interior features;
- Proper scale, dimensions and notes; and
- 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), Engineering

Design Problem:

Robotic vacuums have become very popular. They are now manufactured by several different companies and competition has caused the retail price of the vacuums to drop dramatically. To build on the success of these products, the company that makes Swiffer Dry Floor Mop products wants to add a robotic mop to its line of products.

Design Brief:

Design an affordable, robotic mop sweeper using "off the shelf" parts and items included in the Swiffer Sweeper Floor Mop Starter Kit (\$11.99, Amazon.com).

Specifications/Drawing Requirements:

- Include a parts list that identifies the source of all required mechanical and electrical components;
- Show how the starter kit items are included in the robot you design;
- Drawings should show the interior and exterior (top and bottom) of the robotic sweeper;
- Include any views or renderings that will enhance the presentation; and
- Maximum paper size is 24" x 36" or smaller sheets mounted on a 24" x 36" sheet with no overlapping papers.

Optical Engineering

Design and build a multi-purpose, portable LED light with changeable optics that allow the user to control the illumination pattern. The prototype should be capable of producing a small spot, medium spot and large spot. In addition to the physical prototype prepare a brief portfolio (5 pages or less) that describes how you used the Engineering Design Process (EDP) to solve this problem. Include enough details so that others can build a similar prototype.

System Control Technology

Urban communities throughout the United States have a shortage of parking spaces. Many college campuses, hospitals and office buildings in suburban areas have the same problem. Automated Parking Systems (APS) allow vehicles to be stored without human intervention and can consume half the space of a conventional self-parking garage.

Design and build a model APS garage that uses a computer, sensors and mechanical components to move two (2) toy cars into the garage and park them into an empty slot on the second level.