NASA ROBOTICS ALLIANCE PROJECT ROBOTIC DESIGN GUIDE

Reading & Reflection Questions

HW#4 – Part 1

CS450H0 – Robotic Design & Fabrication

ASSIGNMENT DETAILS

READ CHAPTER 5.1-5.2, PAGES 98-129

15 QUESTIONS X 5 POINTS EACH = 75 POINTS

QUESTION #4 IS WORTH 30 POINTS

QUESTION #8 IS WORTH 30 POINTS

135 POINTS TOTAL

QUESTION 1 – ROBOT SUBSYSTEMS

What is the most important robot subsystem? Why?

QUESTION 2 – DRIVETRAIN TERMS

Define terms in the table below:

Term	Definition
Chain-in-tube	
Drop center	
Wheel track	
Artificial drop center	

QUESTION 2 – DRIVETRAIN TERMS

Define terms in the table below:

Term	Definition
West Coast Drive (WCD)	
Inverted WCD	
Holonomic Drivetrain	
Articulating Drivetrain	

QUESTION 3 – DRIVETRAIN WHEELS

Describe each type of wheel and include an example image or sketch.

Wheel	Description	Image/Sketch
Colson Wheels		
VersaWheels		
Plaction Wheels		
Rubber Treaded Wheels		

QUESTION 3 – DRIVETRAIN WHEELS

Describe each type of wheel and include an example image or sketch.

Wheel	Description	Image/Sketch
Molded Wheels		
Pneumatic Wheels		
Omni Wheels		
Mecanum Wheels		

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

6-Wheel Drop Center

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

8-Wheel Drop Center

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

2+2 Drive

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

4+2 Drive

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

All Omni Drive

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

Mecanum Drive

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

Kiwi Drive

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

X-Drive

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

H-Drive

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

Swerve Drive

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

Crab Drive

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

Butterfly Drive

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

Octocanum Drive

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

Swag Drive

QUESTION 4 – ROBOT DRIVETRAIN TYPES

Describe and sketch each type of drivetrain.

Powered Swag (Perpendicular Drop Drive)

QUESTION 5 – PARALLEL PLATE CONSTRUCTION

What is parallel plate construction? What are the pros and cons of this construction style?

QUESTION 6 – BOX TUBE CONSTRUCTION

What is box tube construction? What are the pros and cons of this construction style?

QUESTION 7 – SHEET METAL BOX TUBE

What is sheet metal ”box tube?” What are the pros and cons of this construction style?

QUESTION 8 – DESIGN A DRIVETRAIN RAIL

Follow the steps in the textbook to CAD a drive rail assembly in Onshape. Use the West Coast Products single speed gearbox and 4” Colson wheels found in MKCAD . Use the provided dimensions. The final assembly should be identical to the screenshots shown on page 121. Submit a screenshot of your final CAD below.

QUESTION 9 –DESIGN A DRIVETRAIN RAIL REFLECTION

Put into your own words the steps you took to model your drivetrain rail.

QUESTION 10 –BELLYPAN

What is a bellypan?

QUESTION 11 –ELEVATORS

What are elevators? What are they typically used for?

QUESTION 12 –ELEVATOR STAGES

What is the difference between a single-stage and a multi-stage elevator? What are the pros and cons of each?

QUESTION 13 – CONTINUOUS ELEVATOR

Create a labeled diagram of a continuous elevator.

QUESTION 14 – CASCADING ELEVATOR

Create a labeled diagram of a cascading elevator.

QUESTION 15 – ELEVATOR RIGGING

Define the following terms:

Term	Definition
Timing Belts	
Chain	
Cable	
Rack & Pinion	
Lead Screw/Ball Screws	

QUESTION 16 – ELEVATOR STRUCTURE

Describe the different types of elevator structures.

QUESTION 17 – ELEVATOR COUNTERBALANCE

What happens to the speed of an elevator when you counter-balance it? What are methods used for counterbalancing?