Name: _____ **Date:** _____

Engineering through Robotics and Automated Patient Care Activity – Engineering Design Project Packet

Client Statement

Hello fellow engineers, and welcome to the annual DaVinci Engineering team meeting. Due to recent events, the board of directors has decided to change the direction of our company. We are no longer in the business of food processing; instead, we will focus on developing automated medical devices. Together we will create the hospital of the future! The board of directors has identified two medical devices that, if automated, would help increase the quality of treatment for hospital patients. Many patients in today's hospitals are confined to their hospital beds or wheelchairs. When patients spend extended amounts of time in one position, certain health conditions may develop, with deep vein thrombosis and pressure ulcers being the most common. Currently, prevention is the best treatment for these conditions. Unfortunately preventing these health issues from occurring is very time consuming and labor intensive for healthcare workers. If healthcare facilities had robotic wheelchairs and hospital beds that would automatically reposition the patients, healthcare workers would be able to dedicate more of their time to other pressing issues and the quality of healthcare would be improved. As a member of our elite engineering team, you will need to design and build the first generation prototype for either an automated wheelchair or an automated hospital bed.

Problem Statement (define the problem in detail):

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Functions (what the product does):

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Objectives (describe the attributes of the product itself, not what it does):

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_____

Constraints (Criteria that must be met to be considered acceptable):

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Background Research

Use the internet to research: modern medical devices, pressure ulcers and deep vein thrombosis, as well as other related topics. Make sure to keep a record of relevant material and the website(s) used for research.

Design Solutions

In the chart below (left column) sketch three design solutions. Discuss each design with your team members. Within the chart, place a check mark or notation for each identified function/objective/constraint that your design solution meets. This analysis should be used to select the best possible design solution.

Design Solutions	Function			Objective			Constraint		
	1	2	3	1	2	3	1	2	3

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Creation of Prototype (Describe selected design and why it was chosen)

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Test Design

Develop a three to four question survey to evaluate the effectiveness of your hospital bed or wheelchair design. The survey should evaluate how well your design meets the defined functions and objectives.

Then, have five people evaluate your group's medical device design.

Survey and Test Results

Survey Questions (Scale: 1-10, with 1 = "low" and 10 = "high")	Tester/Evaluator					Average Score
	1	2	3	4	5	
How much effort would be required of the hospital staff to reduce the occurrence of pressure ulcers?	5	6	4	7	6	5.6
How well does the bed fit the average adult?	9	8	10	9	10	9.2
How well does the bed keep the existing functions of the current hospital bed?	4	5	5	3	6	4.6
How well would this bed reduce the occurrence of pressure ulcers?	7	8	9	8	9	8.2

Evaluation of Results (based on test results, was your design effective? How do you know?)

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Future Recommendations (Based on the test results and your evaluation of the results, what you would recommend for improvements to your design, why would you make the selected changes)

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Sketch any design changes in the space below.

Using a diagram, identify the person or group that filled each role during the design process and their relationship to each other.