

Patient Lift Device for Standard Hospital Bed

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Type: Design Problem
Student Time: 8 weeks
Location: Take home

Summary

A lifting aid appliance is to be designed and constructed that will assist nurses or hospital orderly personnel in lifting a patient for movement, linen changes, bathing, or transfer. The lift should use the movement associated with the head and foot electrically controlled movements of the bed.

This open ended design problem may be an appropriate assignment for a freshman course during the first or second semester. It is suggested that it be assigned to small groups of students, and that students have approximately eight weeks to complete the project. At the half way point the group should submit a progress report of the work to the instructor. At the end of the eight weeks period, a single written report is to be submitted by the group, and a working model demonstrated to the class. Students are expected to apply the principles they may have already learned in their graphics and engineering science courses, as well as any design methodology which they may have received.

Students will be expected to make arrangements to work with the staff and equipment in some nearby health care center.

ABET Descriptors

Engr.Sci.Content: First Year Engineering
Type: Component
Elements: Define objectives, develop performance specs, evaluate concepts, communication, planning.
Features: Design methodology, creativity, open ended
Constraints: Time, specific performance specifications
Effort: Team

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Student Requirements:

You are to design and build a device to assist hospital personnel in lifting patients to make transferring, bathing, etc. the patients easy and safe. You are to use only the power and forces of the electrically driven movement of a standard, electrically operated hospital bed, so that no straining or heavy lifting is necessary by the hospital worker. The appliance should be very portable and easy to use. It is not necessary that the appliance fasten securely to the frame of the hospital bed. Some such devices have already been developed to lift and transfer the patient using a separate power source. Most of these are heavy and are used for special circumstances.

Each member of your group is required to keep a file or log of all the time and effort spent on the project. Your file will be reviewed at the end of four weeks. Also at the end of four weeks your group should submit a progress report and meet with the instructor to discuss the design activity. You are to use good design methodology and demonstrate good use of all graphics and engineering science courses you have had. At the end of the eight week period you are to submit a final report of the design activity (a single report with copies retained for each member of the group) and demonstrate a working model of the design. The presentation of the working model will be made before the class. Each member must participate in the discussion and presentation of the model. Viewgraphs should be used to permit you to explain the design path and methodology used during the activity.

Your group is responsible for locating a health care facility and medical personnel which will cooperate with you by providing a spare bed and hospital personnel who may be willing to assist you in making good design choices. You should carefully keep a record of the times, places, and personnel who assist you.

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Engineering Notes:

This assignment is primarily for encouraging students to learn to work efficiently in small groups or teams to attempt to accomplish a design objective with fixed time constraints.

Students should receive some basic information in lecture and from handouts on the rudiments of design methodology as the time approaches for the assignment to be given. The instructor may want to ask the groups to explore the availability of nearby hospital personnel who appear interested and willing to assist by being available as resources of information and willing for the students to use a spare electrically operated hospital bed.

Students should be encouraged to make use of university writing laboratory personnel so that good technical writing skills are reflected in the progress report as well as the student for keeping a history and file of the project. These might become part of the progress and final reports.

A single hospital bed should be placed in the engineering lab or classroom where the final presentations will be made, so that the students will only need to bring the appliance they have constructed.

Expected Outcomes:

Some groups will more readily find and become acquainted with the hospital personnel they need. The instructor should wait until all groups have found and reached agreements with their hospital staff personnel before revealing the actual design requirements. Without access to cooperative hospital personnel the groups will find it difficult to make progress.

Material cost could be excessive; material constraints may be needed.

Discussion/Follow-on:

Lots of opportunities for discussion will result in the class after the project; particularly if the instructor desires to continue mentioning the applicability of design methodology e.g. Creative ideas produced from a group effort, creative use of materials, portions of the design effort requiring analysis, design effort selection and evaluation, designing with deadline constraints, etc. Discussions should be encouraged concerning the adequacy or inadequacy the students felt concerning their skills and abilities in analysis, writing, graphics, communications, 'people skills', etc.