FY-43 August 3, 1996
[Filename: BATHER.DOC]

Bathing Assist Device for the Partially Disabled

Contributor:	Raghu Echempati
Affiliation:	Mechanical Engineering Department University of Mississippi University, Ms 38677
Phone:	(601) 232-5698
Email:	meechemp@olemiss.edu

Type:	Design Problem/Design Project
Student Time:	Six Weeks
Location:	Take home

Summary

This project deals with the design of a semi-automatic or a fully automatic bathing assist device for the partially disabled person, for example, a patient with paralyzed lower body. This device should preferably be installed in a standard bath, and be foldable against one of the walls of the tub. The device should incorporate the usual bathing cycles of wetting, soaping, washing, rinsing and drying. The disabled person should be able to adjust the flow and the temperature of the water to the desired level. This project is intended for the first year students to develop ideas, write specifications and possibly to come up with conceptual designs; or this project may be assigned as a senior Capstone Design Project that includes more thorough and detailed design of pneumatics and control systems. This project may be done in a group of 3 or 4 students. Issues such as the need, specifications, safety of the device, cost, material, manufacturing, and other pertinent issues. Any available information may be used and the different design alternatives studied to propose an optimum design. This information can be used in the understanding of the design and development of devices for the disabled.

At the end of the project, the student will hand in project need, specifications, alternative solutions, the final concept, and a diagram or sketch of the device. A prototype of the device may be made and tested.

ABET Descriptors

Engr Sci Content:	First Year Engineering
Type:	Systems Design
Elements:	Establish objectives, synthesis, specifications, conceptual design
Features:	Design methodology, creativity, design alternatives, open-ended, feasibility
Constraints:	Performance, cost, optimum design, weight, safety, aesthetics (Must appeal to the patients)
Effort:	Team

FY-43 August 3, 1996
[Filename: BATHER.DOC]

Bathing Assist Device for the Partially Disabled

The purpose of this project is to design and develop bathing assist device for the partially disabled. The device should be installed in the normal bath. This device can be portable or of a permanent type, and possibly be foldable against a tub wall. Normal bathing cycles of wetting (soaking), soaping (foaming), washing, rinsing and drying should be incorporated in the device. The way the device is proposed to be used is as follows: The (disabled) person comes to the bath room in a wheel chair or in a similar device. He/She will then be assisted to be transferred to the bath tub after unfolding the bathing device. The person uses the device by operating the different hand controls unassisted with great morale and comfort. The person will be transferred back in to the wheel chair after the shower, and out of the bath room in "clean and hygienic" conditions.

You are to define the scope of the project, need and write the design specifications of the device to the best of your ability. You may use any available literature in assisting you to study the different other similar devices. The information developed in this project may be used to understand the needs of the disabled persons, and to see how to design and manufacture devices for the disabled.

You will have to consider other factors such as safety, human factors, product liability, aesthetics of the product, its cost, weight, ease of use, etc. You should describe how the unit may be tested if built.

You will hand in a report outlining your activities and results. It must include a complete design definition and specifications, as well as a conceptual drawing with enough details showing your product solution.

FY-43 August 3, 1996
[Filename: BATHER.DOC]

Automatic Bathing Device for the Partially Disabled

Engineering Notes:

Objectives/Comments

A comprehensive list of specifications may be developed by the students for the design of this device. Any available literature may searched for studying the different design alternatives of the bathing showers that are used by the handicapped persons. A doctor from a local or a VA hospital, a Biomedical Engineering Professor, and/or a pastor of a church may provide a lot of information about the disabled persons. Based on some simple engineering calculations and using the physical laws, sequential logic of operation of the various control valves may be studied. If possible, a prototype of the model may be built and tested to see if the device moves as anticipated.

Expected Outcome

The student is expected to visualize the situation and come up with a list of design specifications and a conceptual design of the proposed device. In this project, the details of control system, and the mechanical design of the device are to be studied in detail by the senior capstone design students. The various assumptions made in the analysis are to be clearly outlined during the design process. Individual failure criteria needs to be established while designing the members and the other components. As discussed in the class, the students are expected to define the scope of the project, the objectives, design specifications, idea generation and selection, and final implementation. The report should document each activity, including a sketch of the product in sufficient detail showing the dimensions and to show how it is designed.

It is expected that students will be exposed to the design process before undertaking this project. As a result, they should be able to determine the design steps from the given information and form the process accordingly.

Discussion/Follow-up

The project may be continued in future classes like, Control Systems, Static Force Analysis, Stress Analysis using Finite Element Method, Materials Selection, Machine Component Design, Senior Capstone Design. Issues such as economics, manufacturing, human factors , etc., are to included. Liability and safety issues may also be discussed in the other design courses.