

# **Chapter 6**

# **MANHATTAN COLLEGE**

**School of Engineering**  
**Mechanical Engineering Department**  
**Riverdale, NY 10471**

**Principal Investigator:**

*Daniel W. Haines (718) 862-7145*  
*dhaines@mcs1.rlc.mancol.edu*

# MOTORIZED ADJUSTABLE PARALLEL BARS

*Designers: Steven Lembo, Ahmed Mahmud, James Masucci*

*Client Coordinators: Kathy Ruff, O.T., Dan Schipf, Brandywine Nursing Home, Briarcliff Manor, NY*

*Supervising Professor: Dr. Daniel W. Haines*

*Mechanical Engineering Department*

*Manhattan College*

*Riverdale, NY 10471*

## INTRODUCTION

The client, an occupational therapist, uses a set of parallel bars to retrain walking skills in individuals with limited motor ability. There is an optimum bar height setting for each individual. Adjusting the bars to a new height is time-consuming and tedious. She requested a motorized system to quickly adjust the height of the bars with less effort.

## SUMMARY OF IMPACT

This system meets the requirement for bar adjustability. However, it involves power cords that must be strung along the floor to provide power to the motors

(Figure 6.1). This proved unacceptable for the client, and the parallel bars have been restored to their original configuration.

## TECHNICAL DESCRIPTION

Originally, each of the two horizontal bars rested on two vertical supports, set at approximately the quarter points of the bars. Standing twelve inches away from each vertical support are the lifting devices, which are based on the rack and pinion principle with an electric motor, turning the pinion.



Figure 6.1. Adjustable Parallel Bars.

Figure 6.3 shows an overall view of the motorized adjustable parallel bars. The four motors are controlled by panel mounted on a support, shown on the left in Figure 6.3.

The cost of the Adjustable Parallel Bars is \$439.17



Figure 6.2. Designer Adjusting a Lifting Mechanism.



Figure 6.2. Overall View of the Adjustable Parallel Bars.

# THE SCOOPER: A MOTORIZED SYSTEM TO FILL A FLOWER POT WITH SOIL

*Designers: Eric Alemany, Charles Collado, Luis Miranda  
Client Coordinators: Susan Holmes, Gloria Laemmel, Dan Schipf  
Brandywine Nursing Home, Briarcliff Manor, NY  
Supervising Professor: Dr. Daniel W. Haines  
Mechanical Engineering Department  
Manhattan College  
Riverdale, NY 10471*

## INTRODUCTION

The client, a horticultural therapist at a nursing home, requested a device to aid residents who have difficulty filling a flowerpot with soil due to multiple sclerosis. It was important that the device be battery-powered because of a lack of electric supply in the nursing home greenhouse.

The Scooper allows the pot to be tipped so that the user may push soil into it. When the user activates a switch, the pot is lifted to the vertical position.

## SUMMARY OF IMPACT

The Scooper met the expectations of the clients and is now in use in the nursing home greenhouse.



Figure 6.4 The Scooper

**TECHNICAL DESCRIPTION**

The Scooper, shown in Figure 6.4, consists of a DC motor in a transparent plastic housing. A chain is wound around a spool that is turned by the motor. The other end of the chain is attached to a ring encircling the green pot. When the pot is resting on its side, the activation of a switch turns on the motor,

pulls the pot to its vertical position. Any of a wide variety of switches could be used. A close-up of the Scooper is shown in Figure 6.5

The cost of the Scooper is \$63.03.

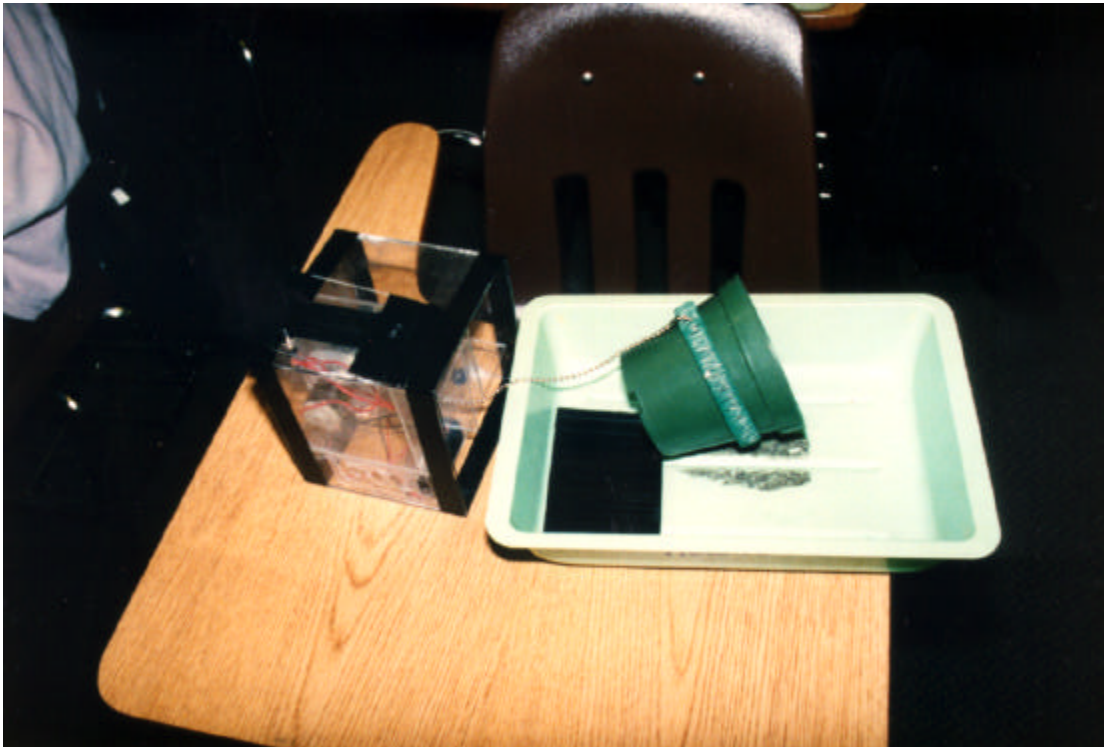


Figure 6.5. Close-up View of the Scooper.

# MODIFICATIONS AND ENHANCEMENTS TO THE LAZY SUSAN AND WATERWORKS PRODUCTS

*Designers: Lawrence C. Ciufu, Tai Tien Ly, John Thankachan, Robert S. Vitelli*  
*Client Coordinators: Susan Holmes, Gloria Laemmel, Dan Schipf*  
*Brandywine Nursing Home, Briarcliff Manor, NY*  
*Supervising Professor: Dr. Daniel W. Haines*  
*Mechanical Engineering Department*  
*Manhattan College*  
*Riverdale, NY 10471*

## INTRODUCTION

For more than five years, the designers of Manhattan College have built devices to serve the special needs of individuals who use a nursing home greenhouse. Some of these devices, such as plant watering devices and adjustable tables, have functioned well from the outset. Others have developed problems, and warrant modification based on observations after a period of use. The Lazy Susan and the Water Works, earlier projects, fell in the latter category. The Lazy Susan quickly became inoperable. The principal switch on the Water Works required improvement.

## SUMMARY OF IMPACT

The goal of this project was to improve existing products. These goals were accomplished and the clients are pleased with the outcome.

## TECHNICAL DESCRIPTION

Figure 6.6 shows the four designers with their products. The Lazy Susan is a turntable, rotated by an electric motor and powered by a battery. Its purpose is to water successively up to five plants resting on the

turntable. A nursing home resident can water several plants in succession by rotating the Lazy Susan and operating the on-off switch of the battery operated Water Works. Figure 6.7 shows a close-up of the Water Works at the left and the Lazy Susan in the center.

The Lazy Susan had a rusted and misaligned motor shaft. It was put back into full service after re-alignment and greasing of the shaft.

The switch for the Water Works is based on the rocker arm principle. A mercury switch mounted on the rocker was used to operate the unit. The original designers intended for the rocker to return to its original position when the pressure was released. However, this feature malfunctioned. The conducting wire attached to the rocker became caught. A wire of sufficient length was attached and located in a better position. The rocker now returns freely.

The cost of the materials for this project was less than \$30.00.



Figure 6.6. Photograph of Four Designers with the Improved Products.



Figure 6.7. Close-up of the Water Works (Left) and the Lazy Susan (Center).

# A CUSTOM TRAVEL DESK FOR A WHEELCHAIR USER

*Designers: Sean P. Foley, Thomas V. Naudus, Leon J. Zick  
Client Coordinator: Dan Schipf  
Brandywine Nursing Home, Briarcliff Manor, NY  
Supervising Professor: Dr. Daniel W. Haines  
Mechanical Engineering Department  
Manhattan College  
Riverdale, NY 10471*

## INTRODUCTION

A wheelchair user requested a custom lapboard that incorporated the items he needed most often.

## SUMMARY OF IMPACT

The client reported satisfaction with the Travel Desk and indicated that he uses it frequently. Figure 6.8 shows him with his new Travel Desk, flanked by two members of the design team



Figure 6.8. The Travel Desk.



**TECHNICAL DESCRIPTION**

The Travel Desk is a Plexiglas board on which a set of items prescribed by the user is mounted. The items include a clipboard, writing pad, calculator, and desk lamp. The desk was fitted to the dimensions of the user and his wheelchair. Figure 6.9 shows a close-up of the Travel Desk.

The desk is padded and notched to accommodate the wheelchair's joystick control. It is securely affixed to the desk by straps.

The cost of the Travel Desk is \$373.67.

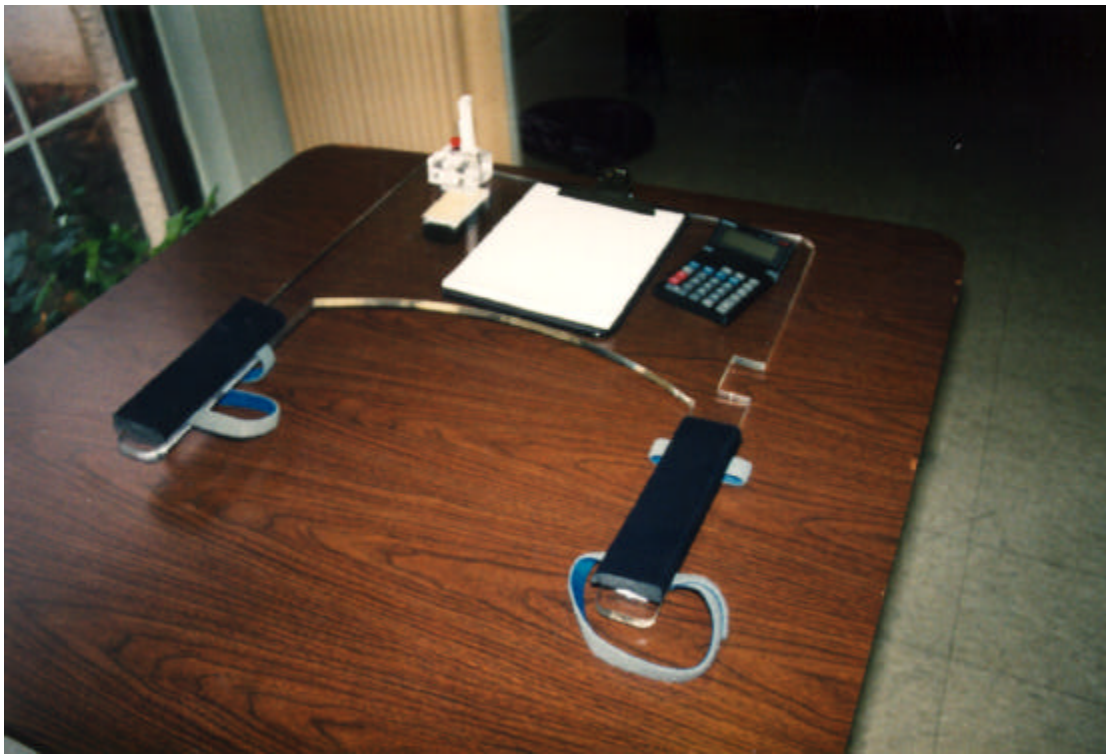


Figure 6.9. Close-Up of the Travel Desk.

# CUSTOMIZED DESKS FOR NURSING HOME RESIDENTS

*Designers: Steven Lembo, Ahmed Mahmud, James Masucci  
Client Coordinators: Mrs. Murphy, Mrs. Sasser, Alex Avelino, Dan Schipf  
Brandywine Nursing Home, Briarcliff Manor, NY  
Supervising Professor: Dr. Daniel W. Haines  
Mechanical Engineering Department  
Manhattan College  
Riverdale, NY 10471*

## INTRODUCTION

In recent years Manhattan College designers have provided a number of successful pieces of furniture to enhance the work and entertainment of nursing home residents. Considerations involve space constraints and residents' physical limitations. At times residents request modifications after using products.

Two individuals who share the same room requested tables to hold their personal items, including a television set. The tables were to have two shelves each for storage, and to be mounted on wheels for ease of cleaning. The clients also requested a power cord for easy connection of their electronic equipment. The administrators of the nursing home required that any electrical work comply with the New York State code.

One resident requested a lamp to be mounted on a computer desk previously built for him.

## SUMMARY OF IMPACT

The three clients report that they are pleased with their products, which are currently in use.

## TECHNICAL DESCRIPTION

Figures 6.10 and 6.11 show the residents' tables. Stock tables were simply assembled.

The desk with mounted lamp is shown in Figure 6.12. Also present is the power strip furnished by the designers.

The cost of the working desks and modifications was \$275.55.



Figure 6.10. Customized Desk with Power Strip.



Figure 6.11. Customized Desk.



Figure 6.12. Customized Desk with Lamp.

# LIFTING MECHANISM FOR WHEELCHAIR REPAIR

*Designers: Eric Alemany, Charles Collado*  
*Client Coordinators: Paul Notto, Freddie Rodriguez, Dan Schipf*  
*Brandywine Nursing Home, Briarcliff Manor, NY*  
*Supervising Professor: Dr. Daniel W. Haines*  
*Mechanical Engineering Department*  
*Manhattan College*  
*Riverdale, NY 10471*

## INTRODUCTION

Nursing home technicians are frequently called upon to repair wheelchairs. It is necessary to raise the chair from floor to desk level for servicing. A hydraulic lift once used for lifting residents in and out of a bathtub had been adapted for this purpose. The technicians requested that its small and shaky platform be improved.

## SUMMARY OF IMPACT

The designers developed a stable platform of adequate size. The clients were pleased with the outcome.

## TECHNICAL DESCRIPTION

Figure 6.13 shows the large rectangular plywood platform provided. Not visible is the support system, which consists of a transverse steel support beam. This beam and its attachment were effective in stabilizing the platform such that cable stays were not required.

The cost of the lift accessories is \$249.35.



Figure 6.13. A Lifting Mechanism for Wheelchair Repair.

# A DECORATED WALL-MOUNTED WHEEL OF FORTUNE FOR NURSING HOME RESIDENTS

*Designers: Lawrence C. Ciufu, Ty Tien Ly, John Thankachan*

*Client Coordinator: Laura Meza, O.T.*

*Brandywine Nursing Home, Briarcliff Manor, NY*

*Supervising Professor: Dr. Daniel W. Haines*

*Mechanical Engineering Department*

*Manhattan College*

*Riverdale, NY 10471*

## INTRODUCTION

One popular activity in the recreation room of a nursing home is a “wheel of fortune” game. Residents enjoy betting on the outcome and some are capable of spinning the wheel. The wheel they had been using was crudely constructed and consequently stopped at the same location (Bankrupt!) on each spin. Furthermore, the wheel often became detached and fell to the floor. This was decidedly an unsatisfactory situation. The client requested a replacement wheel.

## SUMMARY OF IMPACT

Many residents expressed their pleasure and appreciation for the product, which is currently in use.

## TECHNICAL DESCRIPTION

Figure 6.14 shows two of the designers with the Wheel of Fortune. A close-up of the wheel is shown in Figure 6.15. Made of decorated plywood, it is attached to a flanged mounted steel ball bearing pillow block with a ½-inch bore. The wall column on which it was to be mounted consisted of panels of sheetrock to conceal piping, and was not adequate to support the wheel. Consequently, the pillow block was mounted on a plywood panel that was attached directly to the wall through the column by means of toggle bolts

The cost of the Wheel of Fortune was \$298.41.



Figure 6.14. Wall-Mounted Wheel of Fortune



Figure 6.15. A Decorated Wall-Mounted Wheel of Fortune.

# THE SIDE-TABLE: AN ADJUSTABLE TABLE FOR USE IN A NURSING HOME GREENHOUSE

*Designers: Luis Miranda, Thomas Naudus, Robert Vitelli  
Client Coordinator: Susan Holmes  
Brandywine Nursing Home, Briarcliff Manor, NY  
Supervising Professor: Dr. Daniel W. Haines  
Mechanical Engineering Department  
Manhattan College  
Riverdale, NY 10471*

## INTRODUCTION

During 1995-1996, Manhattan College designers had built the "Up N Down" table for nursing home residents who work in a greenhouse. This table had many desirable features, and has proven to be useful in the greenhouse. However, the Up N Down table was not well suited for some residents in wheelchairs. The supports that extended from the end of the table interfered with these residents' arms. A horizontal bar that supported the jack of the table interfered with their feet. The client requested another table, retaining the vertical adjustment feature, but with leg spacing to fit around the wheel of the wheelchair so that the table could be brought close to the sides of residents in wheelchairs. The outcome was a new table, the Side-Table.

## SUMMARY OF IMPACT

The Side-Table met the design requirements and is currently in use.

## TECHNICAL DESCRIPTION

One unique feature of the Side-Table is a top that can be slid over its support frame safely and easily. Figure 6.16 shows two of the designers with the Side-Table. The crank that operates the jack to provide vertical adjustment is shown on the right.

A close-up of the crank and jack mechanism is shown in Figure 6.17. The frame is mounted on wheels. The table surface can be shifted about six inches to the right or left. An underside view of the table, revealing the sliding feature, is shown in Figure 6.18. The cost of the Side-Table is \$277.49.



Figure 6.16 The Side-Table.





Figure 6.17. Close-up of the Crank and Jack Mechanism.



Figure 6.18. The Underside View of the Side-Table.

