SIG-11 Show and Tell

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Hands-Free Pull Cart for Ambulatory User

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Client: 44 year old woman with complex regional pain syndrome (CRPS) has distributed chronic pain and limited hand strength, can lift a maximum of 10 pounds, is ambulatory, and lives on a small, 29 foot sailboat in a California marina.

NEED: SHE NEEDS A CARGO CART FOR TRANSPORTING GROCERIES, ETC. THAT SHE CAN PULL HANDS-FREE WHILE WALKING. THE CART NEEDS TO BE FOLDABLE, FOR CARRYING (EMPTY) ON PUBLIC TRANSPORTATION AND FOR STOWING ON THE CLIENT'S BOAT. IT MUST BE ABLE TO WITHSTAND THE MARINE ENVIRONMENT.

Solution: We were forced by the client's design criteria to create a completely custom cart, rather than modifying a commercially available product. We are building a three wheeled, flatbed pull cart, which is currently in a prototype/beta-testing phase. It has two fixed, 12" rear wheels and single, 8" front caster. The walking user tows and steers the cart using a tow arm that connects the cart to the back of a padded hip belt. The foldable towing/steering arm is a 48" long double arm made from aluminum tent poles with a non-elastic center cord, tightened with a custom-designed take-up reel.

THE FINISHED CART WILL WEIGH APPROXIMATELY 16 POUNDS EMPTY AND CARRY UP TO 50 POUNDS OF CARGO. THE EMPTY CART COULD BE FOLDED FLAT AND ALL THE WHEELS REMOVED. THE OVERALL CART DIMENSIONS ARE 35" LONG X 26" WIDE X 24" HIGH (NOT COUNTING THE TOW ARM AND BELT). THE CARGO BED AND FOLD-DOWN CARGO CONTAINER ARE SIZED TO CARRY 4 STANDARD GROCERY SHOPPING BAGS, 26" X 16" X 16" OVERALL. THE FRAME WOULD BE MADE PRIMARILY OF 3/4" AND SOME 1" SQUARE ALUMINUM TUBING. THE CARGO CONTAINER WOULD BE MADE FROM CORRUGATED PLASTIC SHEET, ALUMINUM TUBING AND WATER RESISTANT, RIPSTOP NYLON FABRIC.

Mobile Computer Cart: Translating interactive computer technology into functional patient gains

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A *MOBILE* COMPUTER CART OFFERS A MYRIAD OF OPPORTUNITIES FOR NEW AND INNOVATIVE PATIENT TREATMENT.

- ☐ A mobile computer cart would allow therapists to tailor their treatment interventions to a patient's needs within numerous environments vs. being restricted to use of a desktop computer only (ie- patient could utilize while in various positions- supine, seated, standing; could be utilized within different physical locals within our building- in PT gym, OT clinic, private treatment room, within group rooms, etc.).
- ☐ A mobile computer cart would offer new and innovative interactive computer tasks that could be modified to accommodate a wide range of physical abilities, (for example, height of computer monitor could be adjusted to accommodate various positions- supine, seated, standing; various interface options would be offered- keyboard vs. switch vs. touch screen use; could offer numerous options for switch placement- head rest vs. table vs. mat vs. floor)

USE OF A MOBILE COMPUTER CART WOULD OFFER NEW INTERDISCIPLINARY TREATMENT POSSIBILITIES. JOINT SESSIONS WITH OT, PT AND/OR SLP COULD BE UTILIZED TO MAXIMIZE TREATMENT BENEFITS, (FOR EXAMPLE, PHYSICAL THERAPY COULD ADDRESS A PATIENT'S TRUNK SUPPORT OR STANDING BALANCE, WHILE OCCUPATIONAL THERAPY WAS ADDRESSING VISUAL SCANNING OR PERCEPTUAL PROCESSING GOALS; OR SPEECH THERAPY COULD ADDRESS SHORT TERM MEMORY, ATTENTION, OR PROBLEM SOLVING SKILLS, WHILE OCCUPATIONAL THERAPY WAS ADDRESSING UPPER EXTREMITY STRENGTH OR FINE MOTOR COORDINATION GOALS).

- ☐ Interactions with the computer technology on the mobile cart would allow a patient to receive immediate feedback on their performance during a therapy task, (which can lead to improved awareness of deficits and improved effort on subsequent trials).

PLAY BALL!

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Jack Izer is on the pitcher's mound. He winds up and unleashes a 64 mph fastball. Then he throws a curveball, then a screwball. The crowd goes wild.

"Jack, I am so proud of you," Jill Fontana, a therapeutic recreational specialist, beams. "You can do this by yourself!"

For the first time in his life, 59-year-old Jack, a long-term care resident of The Conrad W. Raker Center who has cerebral palsy and is wheelchair-reliant, is playing baseball on the Nintendo Wii(tm) gaming system. He's doing it thanks to innovative technological adaptations by Joe Scheller, a mechanical engineering student in his junior year at Purdue University. Joe was one of three college interns who spent last summer working with Mimi Ludwig, research coordinator in Good Shepherd's assistive technology (AT) program .

THE WII USES MOTION-SENSOR TECHNOLOGY TO PLAY VIRTUAL SPORTS LIKE BASEBALL, TENNIS AND BOWLING. JOE USED A 3D COMPUTER SOFTWARE DESIGN PROGRAM CALLED SOLIDWORKS(R) TO MODEL MECHANICAL ADAPTATIONS TO THE WII SO PEOPLE LIKE JACK, WITH LIMITED OR NO USE OF THEIR HANDS AND ARMS, COULD ACCESS THE GAMES BY WEARING THE CONTROLLER ON A WRIST STRAP, PRESSING LARGE ROUND SWITCHES OR BY WEARING AN ADAPTIVE HEADPIECE.

"I WAS ABLE TO MAKE THESE MODIFICATIONS USING MATERIALS BOUGHT AT PLACES LIKE RADIO SHACK OR THE HARDWARE STORE," JOE SAYS.

INNOVATIVE THINKING LIKE THIS SHOWS HOW PEOPLE WITH DISABILITIES AND GOOD SHEPHERD'S ASSISTIVE AND REHABILITATION TECHNOLOGY PROGRAMS CAN BENEFIT FROM THE NEXT GENERATION OF BIOMEDICAL AND MECHANICAL ENGINEERS. OTHER SCHOOLS PARTNERING WITH GOOD SHEPHERD ARE DREXEL UNIVERSITY, LEHIGH UNIVERSITY AND CLARKSON UNIVERSITY.

"IT'S REALLY IMPORTANT TO LOOK AT NEW TECHNOLOGIES AND HOW THEY SUPPORT OUR MISSION, WHICH IS WHY WE'RE TRYING TO BUILD A RESEARCH AND BIOMEDICAL ENGINEERING DEPARTMENT HERE AT GOOD SHEPHERD," SAYS MIMI, WHO BRINGS A RARE COMBINATION OF DEGREES IN BOTH ENGINEERING AND OCCUPATIONAL THERAPY. "WE'RE WORKING ON PROJECTS ALONG WITH THE BEST OF THE BEST IN THE UNITED STATES AND IT'S EXCITING."

HENRY AHNERT, A SENIOR MECHANICAL ENGINEERING MAJOR AT DREXEL WHO DID A SIX-MONTH COOPERATIVE INTERNSHIP WITH GOOD SHEPHERD, HAS A PARTICULAR INTEREST IN MANUFACTURING AND DESIGN. THE INTERNSHIP GAVE HIM EXPOSURE TO AN INNOVATIVE DEVICE PATENTED BY GOOD SHEPHERD CALLED THE SWING PACK. THE EQUIVALENT OF A MOTORIZED BACKPACK, IT ATTACHES TO THE BACK OF A WHEELCHAIR. THE USER ACCESSES THE PACK BY PRESSING A SWITCH WHICH ACTIVATES A MOTOR THAT SWINGS THE PACK AROUND TO WITHIN REACH.

"I REALLY ENJOYED GETTING INVOLVED IN THE ENGINEERING AND WORK AT THE MACHINE SHOP FOR THE SWING PACK," HENRY SAYS. "AND I LIKED THE EXPOSURE TO THE SOLIDWORKS DESIGN SOFTWARE, WHICH I DIDN'T HAVE BEFORE. THAT KIND OF EXPERIENCE IS A RESUME-BUILDER."

PAUL CHIALASTRI, A JUNIOR BIOMEDICAL ENGINEERING STUDENT ALSO AT DREXEL, HELPED MARYJANE FRICK, AN OCCUPATIONAL THERAPIST AND ASSISTIVE TECHNOLOGY PROGRAM COORDINATOR, BY SOLVING ENGINEERING AND SOFTWARE PROBLEMS, AND DEVELOPING EASY-TO-READ COMPUTER PROGRAM MANUALS FOR CLIENTS.

"PAUL HELPED IN SO MANY WAYS," SHE SAYS. "HE TRULY HAS BEEN A BLESSING."

HE ALSO WORKED WITH MIMI ON A PROJECT SO PEOPLE WITH LIMITED MANUAL COORDINATION COULD PLAY A WII PROGRAM CALLED "GUITAR HERO." PAUL WIRED LARGE BRIGHTLY-COLORED BUTTONS TO THE WII WHICH ACTIVATED MUSICAL NOTES AND CHORDS WHEN PRESSED. ON A TRIAL RUN, PAUL SMILED AS SEVERAL GOOD SHEPHERD RESIDENTS IN WHEELCHAIRS LINED UP AND PLAYED A ROCKING VERSION OF THE 1982 HIT "EYE OF THE TIGER."

"IT'S BEEN A GREAT EXPERIENCE WORKING AT GOOD SHEPHERD," PAUL SAYS.

ADDS MIMI, "WE ALL ENJOYED THE PROCESS OF DISCOVERY AND LEARNED A LOT FROM THE STUDENTS. WE EDUCATE THEM AND THEY EDUCATE US. THAT'S HOW WE LEARN."

PHOTO: MECHANICAL ENGINEERING STUDENT INTERN JOE SCHELLER AND JILL FONTANA, THERAPEUTIC RECREATIONAL SPECIALIST, HELP RESIDENT JACK IZER PLAY BASEBALL ON THE WII.

AUTOMATING SOFTWARE INSTALLATION AND LOOK-AT LOOK-THROUGH INTERFACE

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AUTOMATING SOFTWARE INSTALLATION: MANAGING COMPUTER TECH LABS

IF A PERSON HAS A NUMBER OF COMPUTERS TO MANAGE, INTERMITTENT REINSTALLATION OF SOFTWARE CAN BE REQUIRED. CREATING AN AUTO-INSTALLER FOR MULTIPLE SOFTWARE PACKAGES, USING A TOOL SUCH AS THE FREE AUTOIT, CAN MAKE THIS PROCESS MUCH SIMPLER.