ACKNOWLEDGMENTS

A research facility like the Dr. Tong Louie Living Laboratory depends very much on support from government, industry and other sponsors. We extend our sincere gratitude to the following corporations, groups and individuals that have provided equipment or financial support in 2000-2001:

Canada Foundation for Innovation
Government of British Columbia
The Rix Family Foundation
The Tong and Geraldine Louie Family Foundation
The mission of The Lab is to conduct applied research and training activities that improve the relationship between people and their daily living and working environments by studying individual interaction with features of the environment, assistive technology and other products or devices. The facility’s primary objective is to help create sensitive environments and products that facilitate independent, injury-free living and quality of life for older adults and persons with disabilities and their caregivers.

In order to accomplish this mission, the Lab’s goals are to:

- Promote scientific development and evaluation of enabling technology, including home automation systems and assistive devices.
- Provide a resource for advancement of new housing and workplace designs through the ergonomic analysis of tasks and procedures.
- Pioneer research in the area of person-environment fit by exploring the perspectives of seniors and persons with disabilities through feasibility studies, market research and field trials.
- Provide training and education to seniors, family and professional caregivers on the use of existing assistive devices and on making their living environment more accessible.
Nancy Paris-Seeley  
*Director, Health Applied Research and Development, BCIT Technology Center*

The Dr. Tong Louie Living Laboratory has always represented diversity from its founding members through to its researchers, funders and beneficiaries. Over the past year, researchers from BCIT’s Technology Centre, Schools and external partners have become engaged in a wide range of research projects. Groups utilizing the Living Lab to evaluate assistive devices range from assistive device companies, industry associations and governmental organizations. We look forward to the fruits of these multi-faceted initiatives and anticipate that results from our research will truly benefit older adults and persons with disabilities.

Dr. Gloria Gutman  
*Director, Gerontology Research Center, Simon Fraser University*

This past year a number of staff, faculty and students associated with the Gerontology Research Centre and the Gerontology teaching programs at SFU visited the Dr. Tong Louie Living Laboratory. We also were pleased to show the capabilities of the lab to a number of visiting scholars and groups. The research capacity of the Lab will be considerably increased when planned renovations are complete. A series of studies on home automation can then commence.

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**HIGHLIGHTS OF 2000/2001**

- Introduction of Brian Keane, Marcia Carr and Dr. Steve Robinivitch to the lab’s Executive Steering Committee.
- Enhancement of data collection equipment via infrastructure funding from Canada Foundation for Innovation and British Columbia Knowledge Development Fund. Such enhancements included the addition of realtime optical capture equipment and software modules as well as a force plate and related components for kinetic analysis. These important additions allow for faster, more detailed movement analysis.
- Initiated preparations for a Living Lab site visit which will take place as part of the upcoming 17th World Congress of International Association of Gerontology.
- Began first phase of renovations within the experimental area of the Living Lab. These renovations will improve existing spatial limitations, decrease project setup time and facilitate data collection of concurrent projects within the same experimental space.
- Introduced a new website and brochure to convey information about our lab, the research we do, introduce our team members and communicate any other useful information that interested readers may find beneficial and interesting.
RESEARCH ACTIVITIES

SPACE EFFICIENT UNIVERSAL DESIGN INNOVATIONS

Primary Investigator: Gloria Gutman  
Funding Source: Canada Mortgage and Housing External Research Program ($20,000)  
Funding Period: April 1998 – April 2000  
Status: Complete

Purpose
To evaluate designs developed specifically to enhance access for elderly and people with disabilities. Research objectives included:
- determining which of the universal design features are the most functionally appropriate based on evaluation of actual use by users with varying physical abilities
- identifying and describing patterns of use of test features by users with varying abilities,
- identifying alternative design features that may emerge from the research, and
- identifying the most space efficient design solutions(s) incorporating those design features.

Method
Nine different household design features (seven kitchen and two bathroom configurations) were tested and evaluated by 100 research participants with a range of mobility impairments, taking into account both relative cost, space efficiency and user friendliness, and assessing their universality. The data provided an objective assessment of human factors and a comparison of participants’ perceived experiences.

Results
We found the inclusion of knee space adds to the accessibility of the design, as both ambulatory and non ambulatory participants performed well when knee space was available. Further, a Lazy Susan cupboard was generally a problematical design for all participants, with the effects being magnified for participants in wheelchairs.

Conclusion
The goal of this study was to demonstrate that specific design solutions can be evaluated. By testing participants with varying abilities the research demonstrated evidence for or against these design solutions. We found that performing both a quantitative and qualitative analysis of performance generated a large amount of information that will be beneficial to existing design literature as well as lead to improved design recommendations.
PILOT STUDY TO DETERMINE THE RELATIONSHIP BETWEEN FEMORAL OFFSET AND MEASURABLE GAIT CHARACTERISTICS

<table>
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<tr>
<th>Primary Investigator:</th>
<th>Silvia Raschke</th>
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<tr>
<td>Funding Source:</td>
<td>ASD GmbH ($15,880)</td>
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<tr>
<td>Funding Period:</td>
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The project examines the effect of the femoral offset on the gait of persons receiving hip (endo) prostheses. It is theorized that a mismatch between the femoral offset of the patient and that of the hip prostheses contributes to failures of the implants. The project sets out to compare the biomechanics of a patient pre- and post-operatively to determine changes in the biomechanics of gait. This will be followed by a Finite Element Analysis (FEM) of the resultant data to determine the relationship between endoprostheses design, pre- and post-operative biomechanics. It is anticipated that the resulting mathematical model can be used to develop a methodology by which the choice of endoprostheses design for specific patients is determined by the using biomechanical indicators of each individual patient. Alternately the results can be used to optimize hip prosthesis designs. It is anticipated that this will reduce the failure rate of hip implants.

PROTOGÉ: A STUDENT MENTORING PROGRAM FOR ASSISTIVE DEVICES

<table>
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<th>Primary Investigator:</th>
<th>James Watzke</th>
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<tr>
<td>Funding Source:</td>
<td>BC Information, Science, &amp; Technology Agency ($66,691)</td>
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<tr>
<td>Funding Period:</td>
<td>October 1999 – October 2000</td>
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This unique program identifies and enrolls approximately 12 BC post-secondary students or teams that have an interest in learning more about the commercialization process with their own assistive device prototypes. Through their participation in the program, each student will gain valuable knowledge of the Assistive Device industry and the complexities of product commercialization, e.g., marketing, intellectual property, prototype improvement, and user testing activities.

A set of “commercialization exploration” activities and services are executed by the students based on the particular requirements of each accepted prototype. Typical activities included a formal assessment of the prototype, some “user testing” with the prototype (such events took place in the Living Lab) and in some cases, engineering activities were executed to improve prototypes, e.g., stress testing, re-engineering of components. Equally important, the program provides students with guidance or mentoring with the product commercialization process, e.g., through mentoring teams comprised of senior level professionals with relevant marketing, assistive device industry, and clinical expertise.

Some of the prototypes from last year’s Protogé included a wheelchair anti-tipping device, three devices to help persons with disabilities open doors better, an all terrain wheelchair, and a special device to help children with hand impairments hold a writing pen. A proposal for a second year of funding for this program has been submitted.
SUBMISSIONS FOR FUNDING

- **Researcher(s):** James Watzke  
  **Agency:** Canadian Bankers’ Association  
  **Project Title:** A Study to Provide Requirements for Canadian Standards of Accessibility for Card Holder Interface Devices at Point of Sale  
  **Date Submitted:** June 15, 2001  
  **Amount Requested:** $78,719

- **Researcher(s):** James Watzke  
  **Agency:** Ministry of Competition, Science and Enterprise  
  **Project Title:** PROTOgé Year 2: A Student Mentoring Program in Assistive Devices  
  **Date Submitted:** February 15, 2001  
  **Amount Requested:** $155,100

- **Researcher(s):** PI: Nancy Paris-Seeley, Co-PI’s: Helen Heacock, James Watzke  
  **Agency:** WCB  
  **Project Title:** Lift Devices to Reduce MSI Among Home Support Workers in BC  
  **Date Submitted:** February 15, 2001  
  **Amount Requested:** $75,000

- **Researcher(s):** Gary Birch (NSF)  
  **Agency:** BC Neurotrauma Initiative  
  **Project Title:** Palm PC Technology For The Next Generation Of Aids For Daily Living  
  **Date Submitted:** February 1, 2001  
  **Amount Requested:** $88,851 (sub-contract to BCIT – Living Lab $20,752)

PUBLICATIONS

- **JOURNAL ARTICLES**


- **TECHNICAL REPORTS**

  **Watzke, J.** (March 2001). Assistive Device Use by Seniors and Injuries: A Recent Literature Review. Health Canada, Division of Aging & Seniors, Ottawa, ON.

  **Watzke, J.** (March 2001). Standards for Assistive Devices in Canada: An Intelligence Project. Health Care Technology Program, Canadian Standards Association, Toronto, ON.

  **Watzke, J. (November, 2000) PROTOgé: A Student Mentoring Program for Assistive Devices (Year 1).** BC Information, Science, & Technology Agency (ISTA), Victoria, BC.
BOOK CHAPTERS


NEWSLETTER ARTICLES
CONFERENCE PRESENTATIONS


**Watzke, J.** (September 2000). My Home Works For Me - Ways that environmental design and enabling technology can promote safe independent living and aging in place. Invited keynote presentation. Annual meeting of the BC Retired Teachers Association, Richmond.

WORKSHOPS, CONFERENCES, SYMPOSIA


**Gutman, G.M.** Housing and infrastructure in rural areas – challenges for the elderly. Invited symposium, First International Conference on Rural Elderly, Charleston, West Virginia, June 7-11, 2000.

**Gutman, G.M.** Perspectives on aging in place. Workshop at 8th annual conference, BC Non-profit Housing Association, Vancouver, Nov. 16, 2000


**Jones, Y.** Cost Justification of Ergonomics. Association of Canadian Ergonomists, BC and Yukon Region, British Columbia Research Institute, Vancouver, April 7, 2000.


MEDIA INTERVIEWS


Watzke, J. (2000, May 10). All-terrain wheelchair user-testing. Radio CKWX.

Watzke, J. (2000, May 10). All-terrain wheelchair user testing. BCTV News Hour 6 p.m; repeated on BCTV Late News 11:30 p.m and BCTV Early News (May 11). British Columbia Television.


Watzke, J. (2000, October 12). Medical Report with Dr. Rhonda Low with students and participants from the Arthritis user testing event. Live @ Five News. Vancouver Television.


EXTERNAL SERVICE

ELECTED POSITION IN PROFESSIONAL ORGANIZATION

Carr, Marcia.
BC Clinical Nurse Specialist Professional Practice Group – Secretary
Canadian Nurse Continence Advisors Association – Vice President

Gutman, G.M.
International Association of Gerontology – President-elect

Jones, Y.
Association of Canadian Ergonomists, BC and Yukon Regional Council – Treasurer (2000–present)

Paris-Seeley, N.J.
BC Medical Device Industry Association – Director and Treasurer
Medical Device Development Centre, British Columbia, Canada – Board Member

Watzke, J.
Association of Canadian Ergonomists, BC and Yukon Regional Council – Vice President (2000 – present)
ASSOCIATION AND COMMITTEE SERVICE

**Carr, M.**
- Burnaby Coalition to Prevent Falls – *Chair*
- Burnaby Hospital:
  - Restorative Care Committee and Fall Harm Reduction Committee – *Chair of both*
  - Geriatric Services Program Team – *Co-Chair*
  - Sub-acute Care Committee – *Member*
  - Site Management – *Member*
  - Patient care Operations – *Member*
- Burnaby Services for Seniors – *Co-Chair*
- Health Canada/Veterans Affairs Canada –
  - Grant Application Review Committee: grant for fall prevention initiative within SFHR.
    - Phase 1 – until Oct /01, Phase 3 – RFP in progress for 25 month project to end in 2004
- Nikkei Seniors Health Care and Housing Society – *Board of Directors*
- Registered Nurses Association of British Columbia (NABC) –
  - Board of Examiners and Program Accreditation Site Visitor
- Seniors Well Aware Program – *Advisory Member*
- Simon Fraser Health Region (SFHR) and Burnaby Hospital Least Restraints Committee –
  - *Chair of both*
- SFHR:
  - Fall Prevention Coalition Council – *Member and Acting Chair of the Expert Advisory Committee*
  - Clinical Practice Council – *Member*
  - Adult Guardianship Steering Committee – *Member*
  - Acute Care Management Committee – *Member*
  - Geriatric Services Program Team – *Member*
  - Mental Health Research Committee – *Member*
  - Mental Health Management Committee – *Member*

**Gutman, G.M.**
- BC Adult Injury Management Network Steering Committee – *Member*
- Canadian Standards Association International, Strategic Advisory Committee on Aging & Design for Aging Committee – *Member*
- Jewish Federation of Greater Vancouver, Non-profit Housing Committee – *Member*

**Paris-Seeley, N.J.**
- Health Technology Review Committee, Science Council of British Columbia – *Member*

**Waszke, J.**
- Health Research Awareness Week (Council of University Teaching Hospitals) Core Steering Committee – *Member (1998 – present)*
- Research Advisory & Review Committee, GF Strong Rehabilitation Centre –
  - *Member (2000 – present)*
- SOLUTIONS Design Exposition organizing committee – *Member (1995 – present)*
- West End Seniors Network (WESN) – *Board Member (1993 – present)*
EDITORIAL ACTIVITIES

Groves, M.A.

• Editor, Seniors’ Housing Update, Gerontology Research Centre, Simon Fraser University, Volumes 10(1) August 2000 and 10(2) March 2001 (ISSN# 1188-1828).
  [www.harbour.sfu.ca/gero/shup]

OTHER INSTITUTIONS

Carr, M.

• Adjunct Professor, University of Victoria School of Nursing; McMaster University School of Nursing (pending).
• Guest Lecturer, University of British Columbia School of Nursing.
• Preceptor and Mentor, Simon Fraser University, University of Victoria, University of British Columbia and McMaster University.

Groves, M.A.


FINANCIAL REPORT

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<tr>
<th>OPERATIONS</th>
<th>INFRASTRUCTURE</th>
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<td><strong>Salaries &amp; Benefits</strong></td>
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<td>Meals Expenses</td>
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<td>Local Conferences/Events</td>
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<td>Plant Maintenance</td>
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<td>Equipment Purchases General</td>
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<td>Consulting &amp; Professional Fees</td>
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<td>9,630</td>
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<tr>
<td><strong>Total Operating Expenses</strong></td>
<td>58,130 55,220</td>
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<tr>
<td><strong>Total</strong></td>
<td>3,670 7,055</td>
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EQUIPMENT

- **KINEMATIC AND KINETIC ANALYSIS**

  Peak MOTUS motion capture system, including:
  - 8 gen-locked digital optical capture video cameras
  - 6 gen-locked CTV cameras
  - 10 infra-red light sources
  - 6 Panasonic S-VHS VCRs
  - 6 Horita TG50 time code generators

  Pentium III workstation, including motion capture hardware, graphics accelerator, video capture and compression data boards

  Peak MOTUS software, includes additional 3D gait, analog and miscellaneous calculation modules

  Adobe Premier software

  Bertec force plate and 4 gain amplifier

  2 Event & video control units (permits up to 12 cameras)

  PEAK 32 channel A/D converter for analog acquisition

  This system allows the researcher to digitize body landmarks, thus generating temporal and spatial coordinate data. It enables state-of-the-art video acquisition and compression at 60 frames per second at a resolution of 640x480 (NTSC) and at 50 frames per second at a resolution of 720x526 (PAL). Motus allows one to capture video for manual or automatic coordinate acquisition, capture real-time analog data, or capture real-time optical coordinate data all in the same system. The kinematic and kinetic systems are linked using the PEAK Motus A/D software/hardware package.

- **AUDIO VISUAL, COMMUNICATION AND HOME AUTOMATION EQUIPMENT**

  3 Optiquest 19” interactive SVGA viewing monitors

  Audio/visual & communications links
  (ceiling speakers, microphones & intercoms for communication between all lab areas)

  1 Panasonic 27” TV monitor

  1 Pelco 13” color surveillance monitor

  1 ATV Multiplexer

  1 Extron SVGA distribution amplifier

  X10 electronic control modules
  (wall outlets, switches, lighting controls, 2 pressure mats)

  X10 Multiview software

  1 EMI electrical filter

  1 Stargate SG1 Home Automation Control Panel

  1 Infra-Red Expander – learning infra-red controller
This network of infrastructure not only enhances the flexibility of the Lab but also supports research on home automation, person-environment fit and open end/universal and accommodative design. With this multi-component base system, other interfaces such as communication, HVAC, peripheral and environmental controls can be added and research completed which will enable determination of conditions/devices most suitable for persons with differing and/or multiple disabilities (e.g. mobility impairment, heart problems, vision or hearing deficits, cognitive impairment).

■ MANUFACTURING

1. Vacuum Former with 6” & 12” reducing plates
1. Motorola Microprocessor Development Kit
1. Craftex Bandsaw
1. - 37” 16 gauge foot shear
1. - 48” Box & Pan brakes
1. circular saw 7.25”
1. cordless drill

With its own manufacturing equipment the Living Lab has the capacity for rapid development of prototypes and customizing of devices, thus facilitating the assessment, development and modification of devices that increase function and independence of the elderly and disabled in the home or workplace.

■ GENERAL COMPUTER EQUIPMENT

1. Power Mac G3 G3 Mini-CAD Computer Station
3. desktop PC network workstations
   (1 base station, 1 multimedia controller and 1 home automation controller)
1. Epson photo 700 inkjet printer
1. Lexmark Optra postscript laser printer,
1. IBM Thinkpad with external 250 MB Zip

These computers provide the necessary power to run audio-visual, surveillance and home automation equipment, monitor data capture, process with data and other tasks integral to the efficient functioning of the lab.

■ OTHER

1. 10-keypad Option Finder Audience Response System, including analysis software
1. Ergowatch Ergonomic measurement and analysis software
1. Kodak Digital Camera
1. Rosscraft Centurion anthropometric measurement kit
1. Adobe Web Design Package (Illustrator, Photoshop, GoLive, LiveMotion)
The addition of supplemental data recording and collection equipment further enables Lab researchers and staff to document and distribute information relevant to the research and development community as well as those individuals who are most affected by the research which takes place in our lab.

**OUR TEAM**

**Gloria Gutman**, Ph.D.  
Professor and Director, Gerontology Research Centre and Program, Simon Fraser University

Director, Health Applied Research and Development Program, BC Institute of Technology

**Marcia Carr**, RN, BN, MSc, GNC(c), NCA.  
Clinical Nurse Specialist – Geropsychiatry, Coordinator of Acute Geriatric Care, Burnaby Hospital, Simon Fraser Health Region

**Mark Groves**, Ph.D. BC  
Real Estate Foundation Research Fellow in Environmental Gerontology, Gerontology Research Centre, Simon Fraser University

**Brian Keane.**  
Research Associate, Technology Centre, BC Institute of Technology

**Yvette Jones**, MSc.  
Research Associate and Co-ordinator, Dr. Tong Louie Living Laboratory, Simon Fraser University/BC Institute of Technology

**Silvia Raschke**, Ph.D. C.O.(c).  
Instructor, Prosthetics and Orthotics, BC Institute of Technology

**Stephen Robinovitch**, PhD.  
Assistant Professor, School of Kinesiology;  
Director, Injury Prevention and Mobility Lab, Simon Fraser University

**James Watzke**, Ph.D.  
Research Head, Product Evaluation, Health Technology Research Group, Technology Centre, BC Institute of Technology

**TECHNICAL SUPPORT**

**Nigel Halsted**, Research Analyst, Technology Centre, BC Institute of Technology

**Joe Newton**, Research Associate, Technology Centre, BC Institute of Technology

**Colin Wilson**, Research Assistant, Technology Centre, BC Institute of Technology