

Dan Odell, Ph.D., CPE

*resume / portfolio / curriculum vitae*

resume

# **WORK EXPERIENCE**

# Microsoft, Redmond, WA

## **User Experience Researcher II, Hardware**      October, 2004 to present

- Manage budget, timing, and contract employees in planning and implementing user research.
- Lead user research for a diverse range of products including keyboards, mice, webcams, notebook accessories, touchscreens, gesture, and NUI interactions.
- Use wide range of methods to explore and define products, scenarios, and features and to support the product design process. This includes work at the four phases of design research: inspire innovation, evaluate opportunity, inform design, and assess product.
- Generate new product concepts – with a focus on delivering breakthroughs in comfort and then extending these across the product lines.
- Leverage knowledge of human factors (physical, cognitive, emotional, cultural and social) to improve human machine interaction. Of these, my specialty is physical human factors (ergonomics) and I led the effort in improving the comfort of computing across Microsoft.



# University of California, Berkeley, CA

## Graduate Student Researcher, BMI

- Designed and built a new bimanual computer workstation, including hardware and software, which required expertise in ergonomics, computer science, and mechanical design.
- Created and tested the effectiveness of two-handed computer input techniques, with an emphasis on command selection.
- Evaluated system performance through a series of human-based experiments.
- Helped establish a rapid prototyping lab, including FDM, laser cutter, and injection press machines.

# Icon Health and Fitness, Logan, UT

## Mechanical Engineer, Treadmill

- Designed components and assemblies and laid out treadmill solid model geometry using Solidworks, AutoCAD, and I-DEAS for use in prototyping, design evaluation, and tooling creation.
- Managed drafters, technicians, and fabrication shops.
- Created, modified and updated Bills of Material and projected project costs.
- Worked with suppliers to understand manufacturing capabilities and design for the appropriate tolerances to provide quality on-time parts.

resume

**EDUCATION**

**PROFESSIONAL CERTIFICATIONS**

# Education / Professional Certification

## University of California, Berkeley, CA

- Ph.D. Mechanical Engineering
  - Major: Design, Manufacture
  - Minor: Business
- M.S. Mechanical Engineering



## University of Utah, SLC, UT

- B. S., Mechanical Engineering



**Certified Professional Ergonomist (CPE),**  
Board of Certification in Professional  
Ergonomics, USA

#1511

CERTIFIED PROFESSIONAL  
ERGONOMIST



Microsoft


# **PRODUCTS AND PROJECTS**

# Microsoft Natural Ergonomic Keyboard 4000

- Completed work started by Hugh McLoone in improving the Natural keyboard design for the first time in the 11 years since the design was introduced.
- Ergonomic innovations of this layout included:
  - **Steeper gable “tent” slope of 14 degrees** to further minimize wrist pronation.
  - An innovative **“gull wing” QWERTY key design**: the keys on the outside columns are angled both in and up to reduce the oblique strike angle of the fingers as they strike the keys.
  - **Taller, padded palm rest** further reduces wrist extension.
- Led iterative user research for two rounds of user testing to determine user preference in design and optimize the affordances on the keyboard.
- Designed and implemented a front lift leg to provide a truly **negative slope design** of -7 degrees to minimize wrist extension.
- International patents including U. S. patent: 7,338,224
- Best selling wired keyboard over 4 years
- More than 2 million sold



## AWARDS

User-Centered Product Design Award, Product Design Technical Group  Human Factors & Ergonomics Society, 2007.

PC World's 100 Best Products of the Year (2006) at #54 – the only keyboard<sub>8</sub> selected for the list.



# Wireless Entertainment Desktop 8000

- Led front-end work to uncover user behavior regarding working in low-light conditions and computing in the living room. I used this information to define the feature set and placement of affordances.
- Collaborated with Marketing to define product architecture and establish it on the product roadmap. My user research redirected the initial product definition away from a communication bundle to entertainment.
- Developed approaches to charging the Microsoft's first rechargeable keyboard and mouse. Refined and selected concepts using user feedback and task success.
- Designed and executed user studies to inform the design and insure user preference relative to benchmarks. Evaluated user perceptions of design tradeoffs – specifically size vs. number pad presence.
- Evaluated options for navigation on the keyboard. The performance data I collected led to the successful implementation of the touch area, and verified its usability.

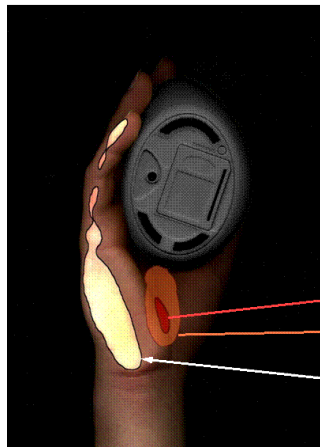


# Natural Wireless Laser Mouse 6000

- Performed front-end research to establish user desire for an ergonomic mouse and get the product on the product roadmap.
- Defined target ergonomic postures for new Natural mouse based on objectives to reduce Carpal Tunnel Pressure, reduce tendon pulley friction, and alter contact pressure areas to move them to lower-risk areas of the hand.



Natural™ Wireless Laser Mouse 6000



- Designed to promote a more natural posture and to relieve pressure on carpal tunnel area.
- No Contact in Sensitive Area

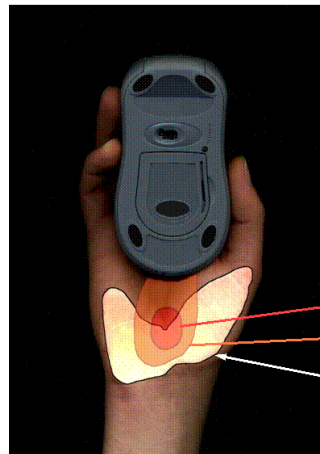
Carpal Tunnel Pressure Sensitivity to External Force

Very High

High

Hand Contact Area

Traditional Mouse



- Traditional mouse posture can result in pressure on carpal tunnel area.
- Contact in Sensitive Area

Carpal Tunnel Pressure Sensitivity to External Force

Very High

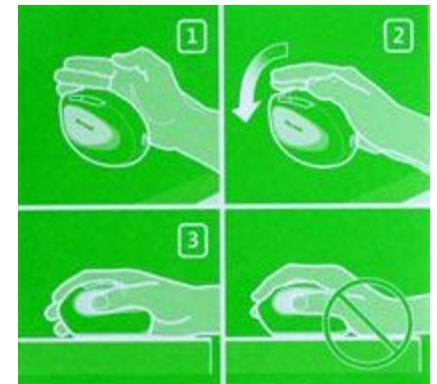
High

Hand Contact Area



# Natural Wireless Laser Mouse 6000 (continued)

- Collaborated with Industrial Design to generate over 100 concept mice designed to deliver the target postures.
- Evaluated and refined the concept mice through 3 rounds of testing to optimize user preference, verify the desired target postures, and insure that pointing performance met or exceeded a traditional mouse.
- Executed 3 month Beta study to verify long-term comfort benefit.
- Ran study to evaluate education effects on mouse use. This affected details of the OOBE, including grip description.
- The result has been very successful and has generated frequent user reviews about “no more wrist pain,” as well as positive press.



# Arc Touch Mouse



- Microsoft's first ever touch surface mouse
- Ran research to size and locate the gesture regions and define the touch interaction
- Helped to define and verify the value proposition to make the best product. This led to marketing messaging testing – refining the message to focus on the “curve for comfort, flatten to pack” message.
- Identified best mouse angle to maximize comfort and reduce retrograde scrolling
- Measured physical properties (such as weight of hand on mouse) to inform the folding tail mechanism.
- Ran benchmark and form studies to demonstrate the desirability of the mouse and identify areas for improvement.
- Led Out-of-box experience field study that identified issues and confusion that were later corrected in packaging redesign.
- Oversaw Beta test to measure experience and comfort changes over time and identify bugs in functioning units.



Engadget 2010 “Best 12  
new PC Input Device”

# Sidewinder x6 Keyboard

- Ran user research to understand gamer behavior with keyboards. This led to my ‘cruise control’ concept included on the x6, and the definition of the feature set.
- Executed iterative design research to refine keyboard comfort, aesthetics, numpad attachment mechanism, macro banks, backlighting color and location, and placement of macro keys.



# Mobile Memory Mouse 8000

- Microsoft's first right-handed mobile mouse.
  - I was responsible for delivering excellent comfort in a portable form factor
- Microsoft's first rechargeable mouse.
  - I and an Industrial Designer developed a new USB –based recharging method using magnetic couplings.



# Wide Spacebar



- My studies revealed that relaxed hand posture results in thumb resting *below* spacebar for 70% of people
- Implication - the spacebar is incorrectly positioned and users must *reach* to hit spacebar (the most frequently hit key)
- Hypothesis – wider spacebars will yield more comfort and better posture
- Testing - this simple change significantly improved wrist posture, as much as curved keysets.

Non-Microsoft

# **PRODUCTS AND PROJECTS**

# Command Chair

- Integrated input workstation designed to be more efficient and ergonomic.
- PhD thesis work – generated concept, made conceptual prototypes, and then made 3 iterative fully functional units.
- Ran simulations and modeling to predict human performance
- Ran human studies to verify ergonomic benefits: EMG for muscle loads, performance for combination pointing / typing tasks, and electrogoniometry to measure posture.

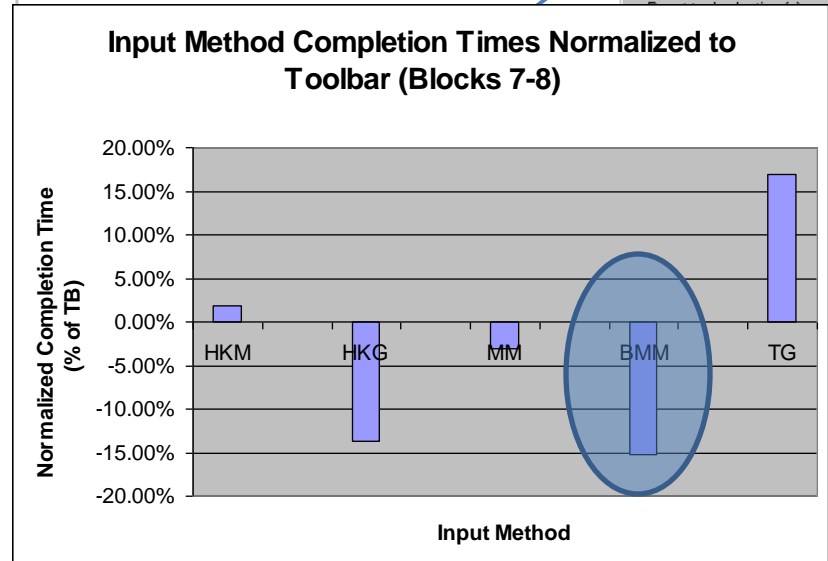
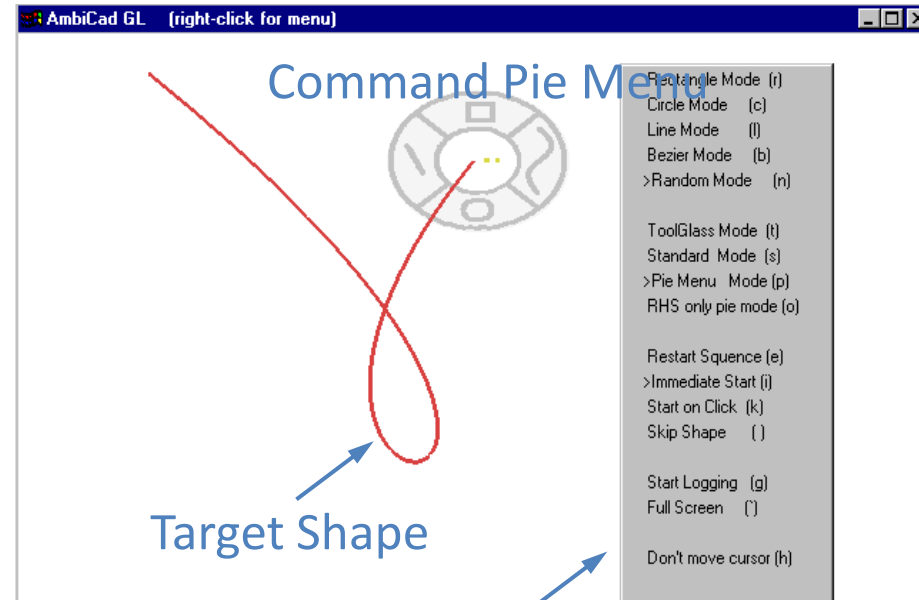


DAN!  
2003



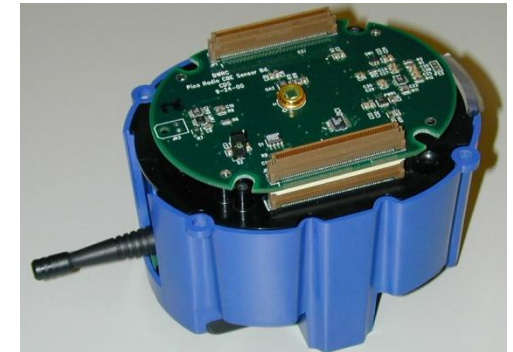
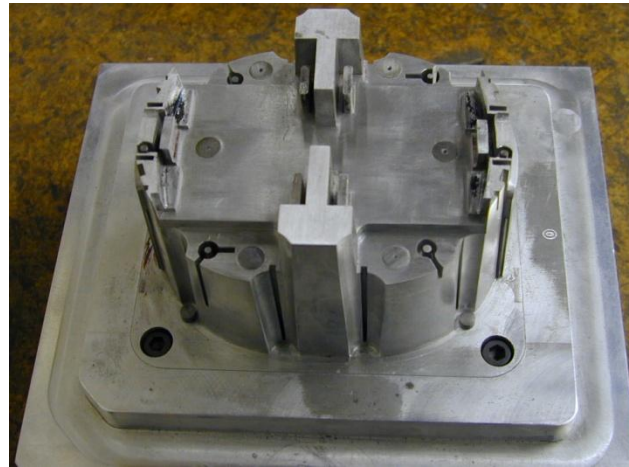
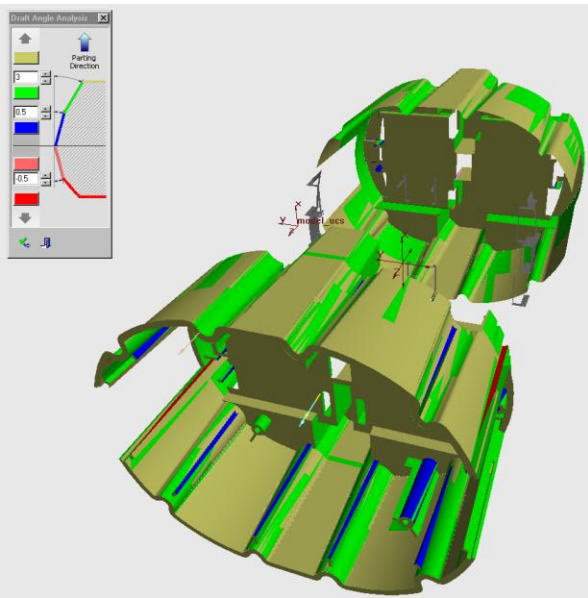
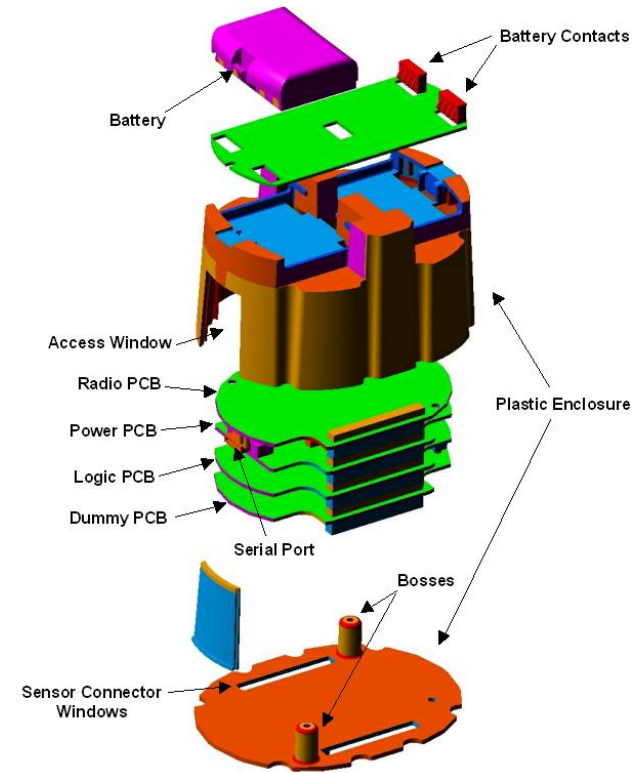
# Bimanual Marking Menus (BMMs)

- Researched useful methods to make use of simultaneous two-handed computer input
- Developed a novel command selection technique (based on new object/command metaphor), called Bimanual Marking Menus
- Implemented and tested the BMM method in a drawing environment
- BMMs tested as fast as the fastest technique, with a faster learning curve and stronger user preference



# Pico Node

- Collaborative ME/EE project to develop early wireless networking node.
- I designed the full assembly, designed for injection molding (including flow and undercut analysis), generated short-run casings



# TriConnector

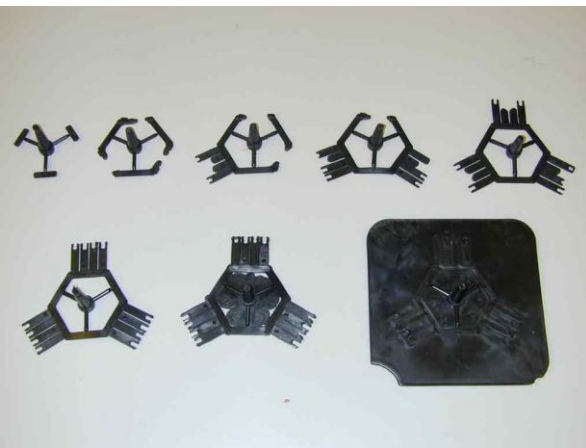
- Project with Prof. Carlo Sequin to develop 'topology legos'
- Developed concept to FDM prototypes to mold design and manufacture to short-run production
- Project became course curriculum as an introduction to injection molding



FDM prototype



Machined Aluminum mold



Dialing in molding parameters

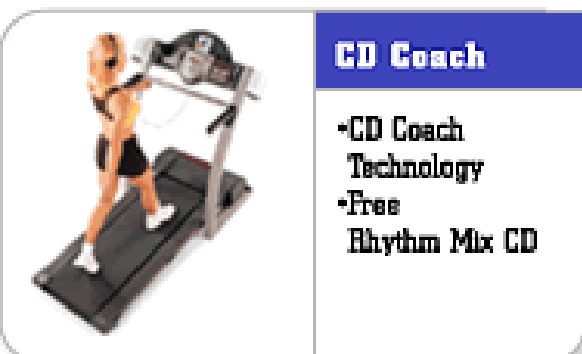
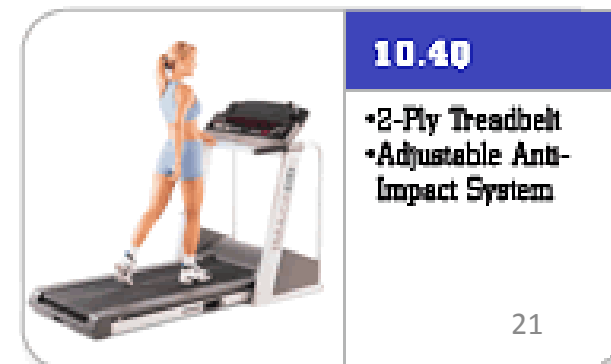


Final triconnectors in saddle and sphere assemblies



# Treadmills

- Engineered over 40 treadmills, innovating in:
  - Developed several 4-bar linkage folding mechanisms with gas springs
  - First treadmill with a book holder – based on user observations
  - First treadmill with cushioned belt
  - Patented power-adjustable deck cushioning
  - First treadmill with integrated music player
  - Improving treadmill quality and reducing costs
  - First Reebok treadmill
  - DFM



Standalone work

# **CONCEPT AND HOBBY PROJECTS**

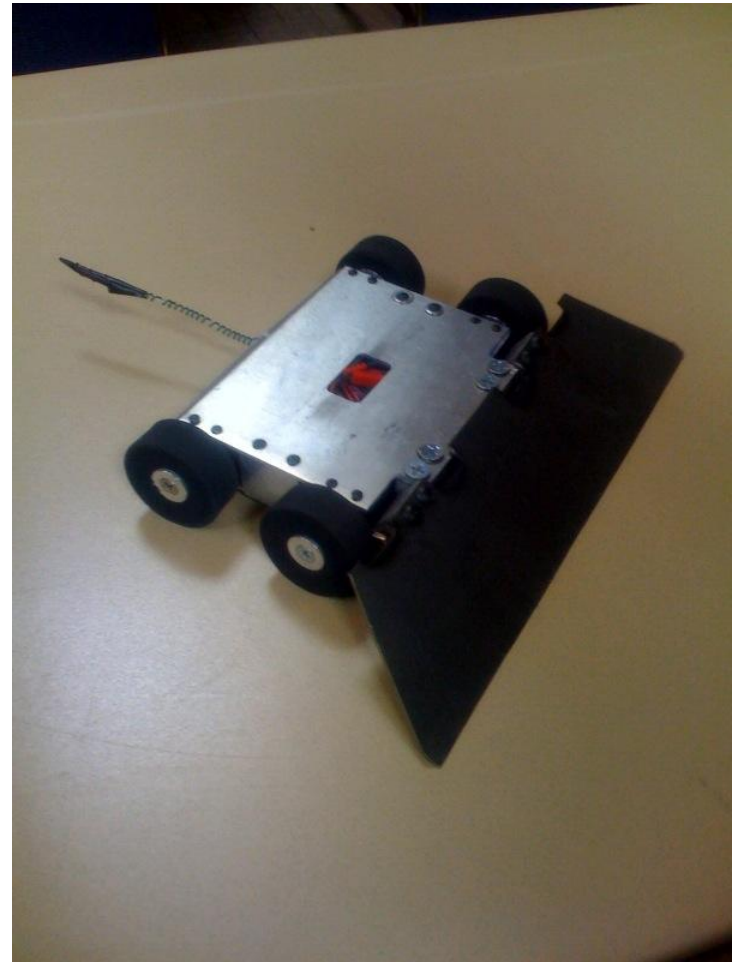
# Keyboard Chaps - 2005

- *Tongue-in-cheek solution to genuine text entry problems*
- **Ergonomics** – placing the hands in the lap provides excellent typing posture and provides natural forearm support on the thighs.
- **Flexibility** – type in a variety of positions, avoid static postures.
- **Convenience** – always have a keyboard at hand.
- **Mobility** – provides a full-size input device that travels with the user into any mobile scenario (heads-up display, personal server, etc.).



# Combat Robots – Team DBM

- Designed robots in CAD (solidworks)
- Generated Prints
- Researched components to identify best performers and most robust
- Sourced parts
- Manufactured components and assembled robots
- Drove robots
- Served as pit crew in robot repair
- 2/3 of my Robots rose to #1 rank in the US



Gutter Monkey

# **CURRICULUM VITAE**

# Patents

- Odell, D., Dalebout, W., United States Patent # 6,174,267, [Treadmill with adjustable cushioning members](#)
- Odell, D., Dalebout, W., United States Patent # 6,280,362, Treadmill with adjustable cushioning members
- Chatterjee; M. O'Neil; D., Odell; D. US Patent# 7,589,496, User input device charging system
- Other Utility patent applications pending:
  - Continuous Automatic Key Control
  - Managing Inputs from a Plurality of User Input Device Actuators
  - Reduced Impact Keyboard with Cushion Keys
  - Ergonomic Computer Mouse
  - Electrical Connection between Devices
  - Recharging system for wireless input devices
  - Ergonomic Apparatus for Keyboard
- 7 design patents + others pending

# Dissertations

Odell, D., [Bimanual Computer Input and Forearm Support Implemented and Evaluated in an Integrated System](#), Doctoral Dissertation, Fall 2004

Odell, D., [Concurrent Product Design: A Case Study on the Pico Radio Test Bed](#), Master's Thesis 2001

# Publications

- Asundi, K., Odell, D., Dennerlein, J., The effect of inclines on upper extremity postures during notebook computer use, IEA 2009
- Asundi, K., Odell, D., Dennerlein, J., Upper extremity postures during notebook computer use in common portable computing scenarios, IEA 2009
- Houwink A, Oude Hengel KM, Odell D, Dennerlein JT. (2009) [Providing ergonomic instructions enhances the biomechanical improvements of an alternative computer mouse design.](#) Human Factors, 51(1): 46 -55.
- Rempel D, Nathan-Roberts D, Chen BY, Odell D. (2009) [The effects of split keyboard geometry on upper body postures.](#) , Ergonomics, Volume 52, Issue 1 January 2009 , pages 104 - 111
- Kimmerly, L., Odell, D. (2009) [Children and computer use in the home: Workstations, behaviors, and parental attitudes](#) , Work: A Journal of Prevention, Assessment and Rehabilitation, Vol 32, Number 3, pages 299-310
- Oude Hengel, K., Houwink, A., Odell, D., Dieen, J., Dennerlein, J (2008), [Smaller external notebook mice have different effects on posture and muscle activity.](#) , Clinical Biomechanics 23 (2008) 727-734
- [Maximize your comfort with the Natural Wireless Laser Mouse 6000](#) , Microsoft Web Article 2007
- Odell, D., Johnson, P. (2007), [Evaluation of a Mouse Designed to Improve Posture and Comfort](#) , WWCS 2007, 115
- Dan Odell; Alan Barr; Robert Goldberg; Jeffrey Chung; David Rempel, 2007 [Evaluation of a dynamic arm support for seated and standing tasks: a laboratory study of electromyography and subjective feedback](#) , Ergonomics, Vol. 50, #4, pp. 520-535
- [The Importance of Ergonomic Input Devices in the Workplace \(The Scope of Computer-Related Repetitive Strain Injuries and Methods for Their Prevention\)](#) , Microsoft white paper, 2005
- Odell, D., Davis, R., Smith, A., Wright, P. K., [Toolglasses, Marking Menus, and Hotkeys: A Comparison of One and Two-Handed Command Selection Techniques](#) , Graphics Interface, 2004, May 17-29, pp. 17-24
- Odell, D., Wright, P. K., [An Integrated Bimanual Computer Input Station: the Command Chair](#) , BMI white paper, 2003
- Odell, D., Wright, P. K., [Concurrent Product Design: A Case Study on the Pico Radio Test Bed](#) , Revised for ASME's 2002 Design and Engineering Technical Conference (DETC), DFM #34154
- Ahn, S. H., Montero, M., Odell, D., Roundy, S., and Wright, P. K., 2002, [Anisotropic Material Properties of Fused Deposition Modeling \(FDM\) ABS](#) , Rapid Prototyping Journal, Vol. 8, Number 4, pp. 248-257 - Winner of the 2003 Literati Club Highly Commended Paper Award
- Montero, M. G., Roundy, S., Odell, D., Ahn, S., Wright, P. K., [Material Characterization of Fused Deposition Modeling \(FDM\) ABS by Designed Experiments](#) Proceedings of Rapid Prototyping and Manufacturing Conference, SME, 2001.

## Press Articles referencing Dan

- **Elementary Ergonomics**, T.H.E Journal ,06/01/09 – Jennifer Grayson
- ***Setting up your computer environment the right way can help prevent repetitive stress injuries and other pains.*** by Marc Saltzman  
10/4/2007
- SharkyExtreme.com: Interview with [Microsoft's](#) Dan Odell By [Vangie Beal](#) : April 17, 2007
- **Save Your Back and Wrists: Top Ergonomic Tips**, Inc. Magazine - 9/2006, By Marc Saltzman
- **Ergonomist Provides Tips for Creating an Ergonomic Workspace**  
May 17, 2006 -- *Jennifer Anderson*
- **A Gull's Wing for Flying Fingers**, New York Times  
9/08/2005 By Andrew Zipern