BIOGRAPHICAL SKETCH

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NAME	POSITION TITLE
Armstrong, Thomas J.	Professor, Industrial and Operations Engineering and Biomedical Engineering Director, Center for Ergonomics
eRA COMMONS USER NAME (credential, e.g., agency login) thomasja	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	MM/YY	FIELD OF STUDY
University of Michigan, Ann Arbor	BSE	05/71	Aerospace Engineering
University of Michigan, Ann Arbor	MPH	05/72	Industrial Health
University of Michigan, Ann Arbor	PhD	12/76	Industrial and Operations Engineering, Industrial Health Science, and Physiology

A. Personal Statement

My research interests are in biomechanics, the hand, work, occupational health and rehabilitation. Examples of my research include developing biomechanical models of the hand to study work-related musculoskeletal disorders and to design equipment. Also, I focus on developing methods to analyze physical work stresses, studying musculoskeletal disorders, designing jobs and finding ways of accommodating disabled workers by conducting epidemiological studies of work and musculoskeletal disorders. I also study climbing, particularly how hand forces and risk of falling are affected by structures, handholds, climbing style and secondary tasks as well as studying friction as it affects coupling between the hand and work objects. Studying variations in work processes, equipment, materials and methods and risk of musculoskeletal disorders is also a main focus, as well as studying how variations in surgical procedures affect patient outcomes and resident training.

B. Positions and Honors

Positions and Employment

9/78 - 7/83 Assistant Professor, Department of Environmental Health, The School of Public Health, The University of Michigan
9/83 - 7/90 Associate Professor, Department of Environmental Health, The School of Public Health, The University of Michigan
9/90 - 8/91 Associate Professor, Industrial and Operations Engineering, The University of Michigan
9/90 – 8/06 Professor, Industrial Health, Department of Environmental and Industrial Health, The University of Michigan
9/91-present Professor, Industrial and Operations Engineering, The University of Michigan
1998–2004 Director, University of Michigan Rehabilitation Engineering Research Center
1998–present Director, University of Michigan Center for Ergonomics
9/98-present Professor, Biomedical Engineering, The University of Michigan

Other Experience and Professional Memberships

American Industrial Hygiene Association
American Institute for Medical and Biological Engineering
American Conference of Governmental Industrial Hygienists
American Society of Biomechanics

Ergonomics Society
Human Factors and Ergonomics Society
International Commission on Occupational Health
Diplomat of the American Board of Industrial Hygiene, Certified in the Comprehensive Practice of Industrial Hygiene, No. 2180
Certified Professional Ergonomist
Commercial Pilot 1689514 (ASME, SES, Instrument, Glider), Certified Flight Instructor Airplanes and Instruments

Honors

Second Prize American Institute of Aeronautics and Astronautics Great Lakes Student Paper Conference 1971. Armstrong, T. (1971). An experimental study of reinforced corrugated panels. AIAA
Fellow American Industrial Hygiene Association
Fellow American Institute for Medical and Biological Engineering
Fellow Human Factors and Ergonomics Society
U of M Department of Industrial and Operations Engineering Outstanding Faculty Award, 2003
U of M College of Engineering Research Excellence Award, 2005
University of Bologna Institute for Advanced Studies Fellow, 2003

C. Selected Peer-reviewed Publications

1. Armstrong, T. and D. Chaffin. An investigation of the relationship between displacement of the finger and wrist joints and the extrinsic finger flexor tendons. *J Biomech* 11(3):119-128, 1978.
2. Buchholz, B. and T. Armstrong. A kinematic model of the human hand to evaluate its prehensile capabilities. *J Biomech* 25(2):149-162, 1992.
3. Armstrong, T., J. Foulke, B. Martin, J. Gerson and D. Rempel. Investigation of applied forces in alphanumeric keyboard work. *Am Ind Hyg Assoc J* 55(1):30-35, 1994.
4. Mansfield, J. and T. Armstrong. Library of Congress workplace ergonomics program. *Am Ind Hyg Assoc J* 58:138-144, 1997.
5. Armstrong, T., C. Bir, L. Finsen, J. Foulke, B. Martin and G. Sjogaard. Muscle responses to simulated torque reactions of hand held power tools. *Ergonomics* 42(1):146-159, 1999.
6. Latko, W., T. Armstrong, A. Franzblau, S. Ulin, R. Werner and J. Albers. A cross-sectional study of the relationship between repetitive work and the prevalence of upper limb musculoskeletal disorders. *Am J Ind Med* 36:248-259, 1999.
7. Armstrong, T., A. Haig, A. Franzblau, W. Keyserling, S. Levine, B. Martin, S. Ulin and R. Werner. Medical management and rehabilitation in the workplace: emerging issues. *J Occup Rehab* 10(1):1-6, 2000.
8. Gerard, M., T., Armstrong, B. Martin, and D. Rempel. The effects of work pace on within-participant and between-participant keying force, electromyography, and fatigue. *Human Factors* 44(1):51-61, 2002.
9. Womack, S. and T. Armstrong. Use of a computerized decision support system for primary and secondary prevention of work-related MSD disability. *J Occup Rehab* 15(3): 313-28, 2005.
10. Franzblau, A., T. Armstrong, R. Werner, S. Werner. A cross-sectional assessment of the ACGIH TLV for hand activity level. *J Occup Rehab* 15(1):57-67, 2005.
11. Ebersole, M. and T.Armstrong. Analysis of an observational rating scale for repetition, posture, and force in selected manufacturing settings. *Human Factors* 48(3): 487-98, 2006.
12. Seo, N., T. Armstrong, J. Ashton-Miller and D. Chaffin. The effect of torque direction and cylindrical handle diameter on the coupling between the hand and a cylindrical handle. *J Biomech* 40(14): 3236-43, 2007.
13. Greishhaber, D., D. Christian, T. Armstrong, D. Chaffin, W.M. Keyserling, J. Ashton-Miller. The Effects of Insertion Method and Force on Hand Clearance Envelopes for Rubber Hose Insertion Tasks. *Human Factors* 51(2):152-163, 2009.
14. Young, J., C. Woolley, T. Armstrong, J. Ashton-Miller. Hand-Handhold Coupling: Effect of Handle Shape, Orientation, and Friction on Breakaway Strength. *Human Factors* 51(5):705-717, 2009.

15. Seo, N., and T. Armstrong. Friction coefficients in a longitudinal direction between the finger pad and selected materials for different normal orces and curvatures. *Ergonomics* 52(5):609-616, 2009.

D. Research Support

Ongoing Research Support

5T42OH005455-02 (Robins) 07/01/08 – 06/30/13
NIOSH
The University of Michigan Education and Research Center.
Role: Co-PI
Project Goals: This is an Occupational Safety Engineering Training Grant that provides support for some of my graduate students to perform the aforementioned research.

5T42OH005455-02 (Robins) 07/01/09 – 06/30/10
NIOSH
Sungchan Bae Pilot Project: Development of a Biomechanical Hand Model for Study of Hand Posture, Strength, and Musculoskeletal Disorders.
Role: PI
Project Goals: The goal of this work is to gather new knowledge and develop new models that describe natural movements of the fingers while reaching for and grasping different size and shape objects. This knowledge will be used to develop models that can be used to evaluate hand impairments in workers with hand injuries and diseases and for design of equipment that is held or manipulated with the hand.

MIOSHA 10-20 10/01/09 – 09/30/10
State of Michigan
Ergonomics Training, Job Analysis, and Follow-up Activities for Small and Medium Sized Companies.
Role: PI
Project Goals: The goal of this grant is to help small Michigan employers prevent work-related musculoskeletal disorders and accommodate injured workers through individualized training. This project also provides access to worksites for field studies concerned with prevention of musculoskeletal disorders and rehabilitation.

TCS30196 (Reed) 10/01/09 – 08/31/10
General Motors
Virtual Simulated Work Environment Part Handling: Modeling Grasp Planning and Postures Extension Project.
Role: Co-PI
Project Goals: This project aims to develop models that can be used to simulate hand motions for building cars and related activities.

Completed Research Support

PO#020071220 (Reed) 11/01/07 – 08/31/08
Ford Motor Company
Developing Guidelines for Biomechanical Analysis of Industrial Tasks with Bracing.
Role: Co-PI
Project Goals: The goal was to study and model how one hand or part of the body is used to stabilize the body while pushing, pulling or lifting with the other hand.

5T42OH005455-02 (Robins) 07/01/08 – 06/30/09
NIOSH
Justin Young Pilot Project: Development of a Biomechanical Model of Hand/Handhold Coupling.
Role: PI

Project Goals: The goal of this work was to gather knew knowledge and develop new models that describe the relationship between voluntary hand strength, handle design, friction, gloves and breakaway strength for prevention of falls.

MIOSHA 07-19 10/01/04 – 09/30/09
State of Michigan
Ergonomics Training, Job Analysis, and Follow-up Activities for Small and Medium Sized Companies.
Role: PI
Project Goals: The goal of this grant was to help small Michigan employers prevent work-related musculoskeletal disorders and accommodate injured workers through individualized training. This project also provided access to worksites for field studies concerned with prevention of musculoskeletal disorders and rehabilitation.

Dept of Defense-Army 07/11/07 – 12/31/09
Analysis Tools for Rehabilitation of Injured Soldiers.
Role: PI
Project Goals: The goal of this project was to develop a video processing tool for identification of gaps between required tasks demands and individual capacities to facilitate returning injured warriors to active duty.

TCS14297 (Reed) 01/01/09 – 12/31/09
General Motors
Virtual Simulated Work Environment Part Handling Feasibility Study.
Role: Co-PI
Project Goals: This project aimed to develop models that can be used to simulate hand motions for building cars and related activities.