Dr. Chi-haur Wu, Associate Professor
Department of Electrical Engineering & Computer Science
Northwestern University
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Research Interest:

1) Solar-powered (or battery-powered) electrical motor-driven vehicles.
2) Electronic circuit design, sensor circuit design and control.
3) Muscle compliant control for computer assisted surgical robot and rehabilitation robot.
4) Intelligent product assembly manufacturing.
5) Tele-manipulation and sensing control.
6) Human augmentation control for hoist and material handling applications.
7) Industrial robotics, micro-controller and embedded system control.
8) Damper control for active suspension, force absorbing, and vibration isolation.

Education:

Ph.D.(6/1981), Computer Engineering, Purdue University, IN.
M.S. (6/1977), Electrical Engineering, Virginia Poly. Insti. & S.U., VA.
B.S. (6/1973), Electrical Engineering, National Taiwan University, Taiwan.

Ph. D. Students Supervised: 11

1. Clyde Moseberry, Ph.D. in Computer Engineering, June 2005.
   Thesis Title: Dynamic Computer Performance Optimization based upon a Collerative CMAC Design
1. Swee Mok, Ph.D. in Computer Engineering, Jan. 2003.
   Thesis Title: A Structured Product Coding System (SPCS) for Intelligent Product Data Management.
2. Shih-Lang Chang, Ph.D. in Mechanical Engineering, May 1998.
   Thesis Title: Design of an Active Suspension with a Controllable Damper.
3. Julius Gyorfi, Ph.D. in Electrical Engineering, May 1998.
   Thesis Title: A Hierarchical Model for Coordinated Planning and Control of Multiple Machines in Surface-Mount Manufacturing.
4. Heinrich Juhn, Ph.D. in Computer Science, September 1995.
   Thesis Title: Daydreaming: Reinforcement Learning in a Virtual Environment for Neural Control.
5. Jaeyoung Lee, Ph.D. in Computer Science, June 1994.
   Thesis Title: Three-Dimensional Object Identification System Using Artificial Neural Network.
6. Kao-Shing Hwang, Ph.D. in Computer Science, May 1993.
   Thesis Title: The Neuromuscular Model for Robotic Compliance Control.
7. Kuu-Young Young, Ph.D. in Electrical Engineering, December 1990.
   Thesis Title: Robot Accuracy Compensation, Path Feasibility Analysis, and Study of Limb Movement for Compliance Control.
8. Myong G. Kim, Ph.D. in Computer Science, April 1990.
   Thesis Title: Modeling of Assembly Operations for Robot Compliance Control.
9. Chi-cheng Jou, Ph.D. in Computer Science, December 1989.
   Thesis Title: Structured Trajectory Planning, Dynamic Capability, and Motion Control for Robot Manipulators.
10. William K. Veitschegger, Ph.D. in Electrical Engineering, January 1987.
    Thesis Title: Robot Kinematic Error Analysis, Modeling, Calibrating, and compensation.

M.S. Students Supervised: 33

Publications:

(A) Patents:

1. Swee Mok and Chi-haur Wu, “Manufacturing, and De-fabrication Analysis Method and Apparatus”, US Patent No. 7,136,713 B2, Nov. 14, 2006.

2. Swee Mok, Janice Danvir, and Chi-haur Wu, “Heated nozzle assembly”, US Patent No. 6,837,293. Jan. 4, 2005.
3. D. T. Lee and Chi-haur Wu, “An Intelligent System for Regulating the Speed of an Electric Motorcycle”, US Patent No. 6,324,464, Nov.27, 2001.
4. Chi-haur Wu and D. T. Lee, “Non-Linear Muscle-like Compliant Controller”, US Patent No. 6,243,624 B1, June 5, 2001.

(B) Journal Papers:

1. Gyorfi, Julius S., and Chi-haur Wu, “An Efficient Algorithm for Placement Sequence and Feeder Assignment Problems with Multiple Placement-Nozzles and Independent Link Evaluation”, IEEE Trans. on Systems, Man, and Cybernetics, PART A, Vol.38, No. 2, pp. 437-442, March, 2008.
2. Wu, Chi-haur, Yujun Xie, and Swee Mok, “Linking Product Design in CAD with Assembly Operations in CAM for Virtual Product Assembly” Assembly Automation, Vol. 27, No. 4, 2007.
3. Gyorfi, Julius S., and Chi-haur Wu, “A Minimum-Jerk Speed-Planning Algorithm for Coordinated Planning and Control of Automated Assembly Manufacturing”, IEEE Transactions on Automation Science and Engineering, vol. 3, no.4, pp. 454-462, Oct. 2006.
4. Mok, Swee, C. H. Wu, and D. T. Lee, “Modeling Automatic Assembly and Disassembly Operations for Virtual Manufacturing,” IEEE Trans. on Systems, Man, and Cybernetics, PART A: Systems and Humans, Vol. 31, No. 3, pp. 223-232, May 2001.
5. Gyorfi, J. S. and C. H. Wu, "Coordinated Planning and Control of Automated Assembly Manufacturing", IEEE Trans. on Systems, Man, and Cybernetics, PART A: Systems and Humans, Vol. 30, No. 2, March 2000, pp. 173-180.
6. Jiang, J., S. Tang, M. Dalal, C. H. Wu, and D. G. Hanson, "Integrated Analyzer and Classifier of Glottographic Signals", IEEE Transaction on Rehabilitation Engineering, Vol.6, No.2, June 1998, pp. 227-234.
7. Wu, C. H., K. S. Hwang, and S. L. Chang, "Analysis and Implementation of A Neuromuscular-Like Control for Robotic Compliance," IEEE Transaction on Control Systems Technology, Vol.5, No.6, November 1997, pp. 586-597.
8. Kienzle, T., D. Stulberg, M. Peshkin, A. Quaid, J. Lea, A. Goswami, and C. H. Wu, ``An Computer-Assisted Total Knee Replacement Surgical System Using a Calibrated Robot," IEEE Engineering in Medicine and Biology Magazine, Vol.14, No. 3, May/June, 1995, pp. 301-306.
9. Wu, C. H. and M. G. Kim, "Modeling of Par t Mating Strategies for Automating Assembly Operations for Robots,", IEEE Trans. on Systems, Man, and Cybernetics, Vol. 24, No. 7, July 1994, pp. 1065-1074.
10. Young, K. Y. and C. H. Wu, "Path Feasibility and Modification," Journal of Robotic Systems, Vol. 9, No. 5, July 1992, pp. 613-633.
11. Wu, C. H., K.Y. Young, K.S. Hwang, and S. Lehman, "Analysis of Voluntary Movements for Robotic Control," IEEE Control Systems Magazine, Vol. 2, No. 1, Feb. 1992, pp. 8-14.
12. Wu, C. H. and Jou, C.C., "Design of A Controlled Space Curve Trajectory for Robot Manipulators," Trans. of the ASME Journal of Dynamic Systems, Measurement, and Control, June issue, 1991, pp. 248-258.
13. Wu, C. H. and K. Y. Young, "A Concise Closed-Form Solution of Inverse Jacobian Problem for Wrist-Partitioned Robots," IEEE Journal of Robotics and Automation, Vol. 6, No. 1, February 1990, pp. 117-123.
14. Wu, C. H. and C. C. Jou, "Planning and Control of Robot Orientational Path," IEEE Tran. on System, Man, and Cybernetics, Vol. 19, No. 5, Sep./Oct. 1989, pp. 1234-1241.
15. Veitschegger, W. K. and C. H. Wu, "Robot Calibration and Compensation," IEEE Journal of Robotics and Automation, Vol. 4, No. 6, December 1988, pp. 643-656.
16. Veitschegger, W. K. and C. H. Wu, "Robot Accuracy Analysis Based on Kinematics," IEEE Journal of Robotics and Automation, Vol. RA-2, No.3, Sep. 1986, pp. 171-179.
17. Wu, C. H., "Compliance Control of A Robot Manipulator Based on Joint Torque Servo," The International Journal of Robotics Research, Vol. 4, No. 3, Fall 1985, pp. 55-71.
18. Wu, C. H. and C. C. Lee, "Estimation of the Accuracy of a Robot Manipulator," IEEE Transaction on Automatic Control, Vol. AC-30, No. 3, March 1985, pp. 304-306.
19. Wu, C.H., "A Kinematic CAD tool for the Design and Control of Robot Manipulator," The International Journal of Robotics Research, Vol. 3, No. 1, Spring 1984, pp. 58-67.
20. Wu, C.H. and R. Paul, "Resolved Motion Force Control of Robot Manipulator", IEEE Transaction on System, Man, and Cybernetics, May/June 1982, pp. 266-275.