Resume

Marvin J. Pitts

5/3/2011

Registered Professional Engineer in the state of Washington
Birth date and Place: February 9, l956; Geneva, Illinois

Career Goal To educate and motivate engineering students to use their professional skills in the service of others

Professional Record

2010 – Present	Professor and Program Coordinator, Mechanical Engineering at Olympic College, Bremerton School of Mechanical and Materials Engineering Washington State University
1989 - 2010	Associate Professor, Dept. of Biological Systems Engineering, Washington State University, Pullman, Washington BA&E Graduate Program Coordinator (2004 – 2010) BSysE Undergraduate Coordinator (1998 – 2005)
1994	Guest Professor, Institut für Lebensmitteltechnologie, Universität für Bodenkultur, Wien Austria
1983 - 1989	Assistant Professor, Dept. of Agricultural Engineering, Washington State University, Pullman, Washington
l979 - l983	Instructor, Agricultural Engineering Dept., University of Illinois, Urbana, Illinois
l978 - l979	Teaching Assistant, Agricultural Engineering Dept., University of Illinois, Urbana, Illinois

Education Record

Ph.D.	Agricultural Engineering, University of Illinois, l983
M. S.	Agricultural Engineering, University of Illinois, l980
B. S.	Agricultural Engineering, University of Illinois, l978

Scientific Societies

Member of American Society for Engineering Education

- Division Chair of Biological and Agricultural Engineering Division (1996/97)

Member of American Society of Agricultural Engineers (ASBAE)

- Associate Editor, EES (1985 -88)
- Divisional Editor, EES (1988 -92)

Honor Societies

Member of Alpha Epsilon, Agricultural Engineering Honor Fraternity (Illinois Chapter President, l978)

Member of Sigma Xi, The Scientific Research Society

Awards

Boeing Scholar / Summer Faculty Fellow, Seattle WA 1999

NASA / ASEE Summer Faculty Fellow at Kennedy Space Center, 1996 and 1997
Guest Professor at the Universität für Bodenkultur, Vienna
Austrian Ministry of Science, 1994
Outstanding Paper Award, 55th meeting of the Pacific Northwest Section of the American Society for Engineering Education, 1993
DOW Distinguished Young Faculty Award, American Society for Engineering Education, 1989
Nominated as Outstanding Advisor of the Year in the College of Agriculture and Home Economics by Ag Eng Students, 1988
Featured Teacher (one of four) in the College of Agriculture and Home Economics, 1987
Nominated as Outstanding Teacher of the Year in the College of Engineering and Architecture by Ag Eng Students, 1987

Patents

Apparatus and method for measuring the mass of vegetation or fruit supported on a trellis**.** J.M. Tarara, J.C. Ferguson, F.J. Pierce, M.J. Pitts, G.M. Hyde, R.L. Wample, A.L. Baritelle- US Patent 6,854,337, Date of Patent: Feb. 15,2005

University Courses Taught. Dates within parenthesis indicate semesters the course was taught.

Washington State University

ME 316	Systems Design, junior level (2011)
ME 313	Engineering Analysis, focus on Finite Element Analysis (2010)
STAT 370	Statistics for Engineers (2010)
BSysE 541	Instrumentation (02 - 10). Cross listed with CE 549. Graduate level course in instrumentation.
BSyse 581	Advance Food Properties (05 – 08) Graduate level course in Food Engineering on the mechanical properties of food products, including viscoelastic, glass transition and moisture-related response.
Engr 120	Introductory engineering design (04 – 07). College-wide freshman course with objectives to introduce the engineering profession and the various engineering disciplines. Taught one section in 2004, managed the course in 2005 – 2007.
BE 330	Bioinstrumentation (02 - 05) Undergraduate instrumentation course for bioengineers.
BE 320	Bio-medical Mechanical Properties (02 – 05). Junior level course on mechanics of materials applied to bio-medical applications. Included an introduction to experimental statistics. Course was one of two “writing in the major” courses which required detailed laboratory reports with instructor feedback regarding the writing.
BSysE 115	Computer Tools for Engineers (99 -01)
BSysE 210	Biological Systems Analysis and Design (95)
BSysE 320/486/386	Mechanical Properties of Biological Materials (94 - 02) Third year course using case studies to develop problem solving and writing skills

in students while building expertise in working with and modeling biological materials

BSysE 110 Introduction to Biological System Engineering Design (93 -00)
First year course introducing students to the profession and to concepts related to designing within biological systems.

Engr 120 Introduction to Engineering Design (93 - 98)
First year course introducing students to engineering, and specific engineering disciplines. Taught a three week segment on Biological Systems Engineering using a computer simulation of a space station environment as the segment project.

Ag E 110 Introduction to Agricultural Engineering (91 and 92)
Freshman level course introducing Agricultural engineering students to the profession

AgMech and AgTm 433 (92 and 93)
Senior and graduate level course in processing machinery and processes for Agriculture students.

ME 220 Engineering Systems Design (cross listed with Agricultural, Civil, and Electrical Engineering Departments) (91, 92, 93)
Sophomore level course introducing systems design and how engineering design interacts with society. Part of a NSF grant, "Innovation in Design", to the College of Engineering and Architecture.

Ag E 551 Special Topics in Food Processing (Image analysis) (90)
Graduate level course covering three areas: food powders, finite element modeling and image analysis. Administered the course and taught image analysis section.

Ag E 551 Controls in Biological Environments (88)
Graduate level course in advance control topics with an emphasis on applying control theory in production facilities.

Ag M 211 Farm Production Management (88)
Sophomore level course covering farm equipment management within the constraints of existing farm production, geographical area, environment preservation and safe operation.

Ag E 499 Special Problems (85, 85)
Senior Ag E course stressing independent research projects including raindrop energy measurement and hop baler controls.

Ag E 584 Instrumentation and Measurements (85, 87)
Graduate level course covering instrumentation/sensor selection, use and analysis.

Ag E 482 / 582 Microcomputer Controls in Agriculture (84, 86)
Senior/graduate level course covering Micro computer-based control systems with emphasis on agricultural systems.

Ag E 354 Agricultural Engineering Analysis (84, 85, 86, 87)
Sophomore level course covering analysis of physical and biological systems.

Institut für Lebensmitteltechnologie, Universität für Bodenkultur, Wien Austria
Finite Element Computer Modeling Applications in Food and Agriculture (94)
Senior / Graduate level course for food scientists introducing the basic concepts of

finite element modeling, and demonstrating applications of the technique to the agricultural and food industries.

University of Illinois (l979 - l983)

Ag E 499 Senior Design (80, 81, 81, 82)
Senior Ag E course stressing independent research projects including computer-cassette interface, stepper motor powered model tractor, and machinery selection programs.

Ag M 22l Farm Power and Machinery Management (79, 80, 81, 82)
Junior level course for Ag M students covering selection, purchase, and maintenance of agricultural machinery.

Ag E l27 Engineering in Agricultural Production Systems (79, 80, 81, 82, 83)
Sophomore level course for Ag E students covering mathematical models and computer simulation as applied to Agricultural Systems.

Refereed Publications

Fernandez-Gutierrez, S.A., P.D. Pedrow, M.J .Pitts, J. Powers. 2010. Cold Atmosphere Plasmas Applied to Active Packaging of Apples. IEEE Trans. of Plasma Science. 2010. Vol 38(4) pg 957.

Mitsuhashi-Gonzalez, K., M.J. Pitts, J.K. Fellman, E.A. Curry, C.D. Clary. 2010. Bruising Profile of fresh apples associated with tissue type and structure. Applied Engineering in Agriculture, 2010 Vol(26(3) pg 509-517.

Mitsuhashi-Gonzalez, K., Clary, C.D., J.K. Fellman, M.J. Pitts, E.A. Curry. 2010. Harvesting by peel color to reduce bruising of "Golden Delicious" apples. International Journal of Fruit Science Vol 10(2) pg. 166-176.

Pandey, P. K. , M.J. Pitts, M.L. Soupir, P.M. Ndegwa, J.R. Alldredge. 2010. Modeling effects of granules on the start-up of anaerobic digestion of dairy wastewater with Langmuir and extended Freundlich equations. Bioprocess and biosystems engineering, 2010 Sept., v. 33(7) p. 833-845.

Chauvin, M.A.; E. Kupferman, B. Swanson, C.F. Ross, M.J. Pitts. 2010. Relationship between instrumental and sensory determination of apple and pear texture. Journal of food quality, 2010 Apr., v. 33, no. 2, p. 181-198.

Fernandez, S., P. Pedrow, M. Pitts, G. Moller. 2009. Thin active packaging films applied directly to fruits and vegetables using atmospheric pressure cold plasma. IEEE Plasma Science Abstracts. June 2009.

Weminlinger, E., P. Pedrow, M. Garcia-Perez, S. Ha, O. Marin-Flores, M. Pitts. 2009. Atmospheric pressure cold plasma applied to steam reforming of small

oxygenated molecules from bio-oil. IEEE Plasma Science Abstracts. June 2009.

Hicks, D.G., M.J. Pitts, R.S. Bagley, A. Vasavada, A.V. Chen, F.A. Wininger, J.C. Simon. 2009. In vitro biomechanical evaluations of screw-bar–polymethylmethacrylate and pin-polymethylmethacrylate internal fixation implants used to stabilize the vertebral motion unit of the fourth and fifth cervical vertebrae in vertebral column specimens from dogs. Amer. J. of Vet Research. Vol. 70, No. 6, Pages 719-726

Morris, C.F., M.J. Pitts, A.D. Bettge, G.E. King, K. Pecka, and P.J. McClusky. 2008. Compressive Strength of Wheat Endosperm: Comparison of Endosperm Bricks to the Single Kernel Characterization System. Cereal Chem. 85(3):359-365.

Morris, C.F., M.J. Pitts, A.D. Bettge, K. Pecka, G.E. King, and P.J. McClusky. 2008. Compressive Strength of Wheat Endosperm: Analysis of Endosperm Bricks. Cereal Chem. 85(3):351-358.

Hicks, D., Pitts, M., Bagley, R., Vasavada, A., Simon, J. Chen, A., Wininger, F. 2008. Biomechanical evaluation of two internal fixation implants used for canine cervical spine arthrodesis. Abstract. American College of Veterinary Internal Medicine

Pitts, M.J., D.C. Davis, R.P. Cavalieri. 2008. Three-point bending: An alternative method to measure tensile properties in fruit and vegetables. Postharvest Biology and Technology, 48:63-69.

Pandit R.B., Tang J., Liu F., Pitts M., 2007. Development of a novel approach to determine heating pattern using computer vision and chemical marker (M-2) yield. *J. Food Eng.,* 78: 522-528

Tarara, J. M., J. C. Ferguson, P. E. Blom, M. J. Pitts, F. J. Pierce.2004. Estimation of Grapeline Crop Mass and Yield via Automated Measurements of Trellis Tension Transactions of the ASAE. Vol. 47(2): 647-657

Bajema, R.W., A. L. Baritelle, G. M. Hyde, M. J. Pitts.2000. Factors Influencing Dynamic Mechanical Properties of Red 'Delicious' Apple Tissue. Transactions of the ASAE. VOL. 43(6): 1725-1731.

Pitts, M.J. and G.W. Stutte.1999. Modeling Wheat Harvest Index as a Function of Date of Anthesis. Biosphere and Life Science, 6(2):123-128

Pitts, M.J. and G.W. Stutte.1999. Computer Model of Hydroponics Nutrient Solution pH Control using Ammonium. Biosphere and Life Science, vol26(2):87-96.

Wu, N., and M. J. Pitts.1999. Development and Validation of a Finite Element Model of an Apple Fruit Cell. Postharvest Biology and Technology 16(1999) 1-8.

Pitts, M. J., and Drysdale, A. 1998. Modeling Nutrient Mineral Transport in Advanced Life Support Systems. SAE Paper No. 981752. SAE 28th International Conference on Environmental Systems , Danvers, MA

Pitts, M.J., R.P. Cavalieri, and J. Abbott. 1997. Measuring Apple Tissue Tensile Properties Using 3 Point Bending and Finite Element Analysis. Conference on Food Engineering Proceedings (AIChE), Los Angels

Pitts, M.J. and D.C. Davis. 1996. SpaceStation - Computer simulation tool demonstrating biological systems. Journal of Engineering Education 85(3):187-192.

Zhao, K. R.P. Cavalieri, G.M. Hyde and M.J. Pitts.1993. Apparent Density of Gas-Liquid Mixtures. Transactions of the ASAE. 36(1):103-111.

M.J. Pitts, R.F. Crain and D.C. Davis. 1993, Integrating societal issues into engineering education through system design. Presented at the 1993 meeting of the American Society for Engineering Education, Urbana, IL, to be published in 1993 Proceedings.

Mitchell, K.C., L.G. James and M.J. Pitts. 1991. An Analysis of Digital Water Stage Data Acquisition. Journal of Irrigation and Drainage Engineering. 117(3):151-155.

Younce,F.L., M.J. Pitts and G.M. Glenn. 1991. Solid Model Geometry by Screen Digitizing Images. Applied Engineering in Agriculture 7(3):361-363.

Liao, K., R. P. Cavalieri and M. J. Pitts. 1990. Hausdorff Dimensional Analysis and Digital Imaging Based Quality Inspection. Transactions of the ASAE. 33(1):298-304.

Mitchell, K. C., L. G. James, S. Elgar and M. J. Pitts. 1990. Characterizing Cyclic Water-Level Fluctuations in Irrigation Canals. Journal of Irrigation and Drainage Engineering. 116(2):261-272.

Glenn, G. M., M. J. Pitts and K. Liao. 1990. Moisture dependent changes in the mechanical properties of isolated wheat bran. Journal of Cereal Science.

Glenn, G. M., M. J. Pitts, K. Liao and D. W. Irving. 1990. Block-surface staining for differentiation of starch and cell walls in wheat endosperm. Biotechnic and Histochemistry.

Zhao, K., R. P. Cavalieri, G. M. Hyde and M. J. Pitts. 1990. Theoretical Analysis of Gas liquid Mixtures as Separation Media. Transactions of the ASAE, 33(5):1657-1666.

Hyde, G. M., K. Zhao, M. J. Pitts, R. E. Thornton and J. A. Robertson. 1989. Cut Potato Seed Piece Separation. Transactions of the American Society of Agricultural Engineers 32(1):250-255.

Zhao, K., G.M. Hyde, R.E. Thornton and M.J. Pitts. 1989. Optimizing Potato Seed Cutting. Transactions of the ASAE 32(1):285-290.

Pitts, M.J. and R.P. Cavalieri. 1988. Objective Measurement of Apple Maturity. Transactions of the ASAE 31(3):962-966.

Mace, A.G., M.J. Pitts and G.M. Hyde. 1987. Economic Comparison of 2 vs. 3 Plane Potato Seed Cutting. Transactions of the ASAE 30(5):1512-1517.

Pitts, M.J. and D.C. Davis. l987. Plot l0 simulation graphics package for microcomputers. Western Computer Center 2(2):1-5.

Pitts, M.J., G.M. Hyde. l987. Algorithms for determining shape of tuber and seed piece. Transactions of ASAE, 30(2):566-570.

Pitts, M.J., G.M. Hyde and R.P. Cavalieri. l987. Modeling Potato Tuber Mass with Tuber Dimensions. Transactions of ASAE 30(4):1154-1159.

Pitts, M.J. l986. An Integrated Computer Plan for Engineering Education. CoED Journal, Computers in Education Division of ASEE Vol (VI)4:19-21.

Pitts, M.J., J.W. Hummel and B.J. Butler. l986. Transient Behavior of Bypass Flow Nozzles. Transactions of the ASAE 29(3):718-722.

Pitts, M.J., J.W. Hummel and B.J. Butler. l986. Sensors Utilizing Light Reflection to Measure Soil Organic Matter. Transactions of the ASAE 29(2):422-428.

Professional Society Paper Presentations

Kalita, L.D., M.J. Pitts and R.P. Cavalieri. 1996. Two dimensional hausdorff analysis and it applications on apple firmness estimation. ASAE Paper No. 963066.

Pitts, M. J. Using Case Studies to teach Biological Material Properties. Presented at the ASEE 95 Conference in Anaheim CA.

Wu, N, M.J. Pitts, D.C. Davis, R. P. Cavalieri and S. Drake. 1994. Modeling Mechanical Behavior of Apples with Finite Element Method. ASAE Paper No. 943585. Presented at the 1994 Winter Meeting of ASAE in Atlanta GA.

Pitts, M.J, and D.C. Davis. 1994. SpaceStation© - Computer Simulation Tool Demonstrating Biological Systems. ASAE Paper No. 943587. Presented at the 1994 Winter Meeting of ASAE in Atlanta GA.

Pitts, M.J., R.F. Crain and D.C. Davis. 1993, Integrating societal issues into engineering education through system design. Presented at the 1993 Pacific Northwest regional meeting of the American Society for Engineering Education, Pullman WA. Won Outstanding Paper Award..

Davis, D.C. and M.J. Pitts. 1992. Integrating Societal Issues into Engineering Education through System Design. Presented at the International ASAE Conference, Alberque, NM.

Pitts, M.J., C.A. Stockle. 1991. Modeling with STELLA™. ASAE Paper No. 923007. Presented at the 1992 Summer meeting of ASAE.

Pitts, M.. J., R. P. Cavalieri and S. Drake. 1991. Evaluation of the PFT apple firmness sensor. ASAE Paper No. 913017. Presented at the 1991 Summer Meeting of ASAE.

Pitts, M. J., R. P. Cavalieri and K. Liao. Signal Analysis Using the Hausdorff Dimension for Characterizing Surfaces. ASAE Paper No. 903549. Presented at the 1990 Winter Meeting of ASAE.

Pitts, M. J., D. C. Davis and L. G. James. 1990. Instruction with Stella. ASAE Paper No. PNW90-102.

Younce, F. L. M. J. Pitts and D. C. Davis. 1990. Model Wheat kernel stresses with finite elements. ASAE Paper No. PNW90-603.

Pitts, M. J. and R. P. Cavalieri. 1990. Evaluation of the PFT Apple firmness Sensor. ASAE Paper No. PNW90-602.

Glenn, G. M., M. J. Pitts, R. M. Saunders and D. C. Davis. 1989. 3-D Computer Modeling of Hard and Soft Wheat Kernels. Presented at the 74th annual meeting of the American Association of Cereal Chemists, October, 1989. Paper #2.

Pitts, M. J., K. Liao and G. M. Glenn. 1989. Classifying Wheat Kernel Milling Performance Via Starch Granule Size. American Society of Agricultural Engineers, Paper No. 89-3566.

Liao, K., R.P. Cavalieri and M.J. Pitts. 1988. Fractal and Hausdorff Dimensional Analysis of Digitized Fruit Images. ASAE Paper No. 88-6017.

Cavalieri, R.P. and M.J. Pitts. 1987. Objective Assessment of Apple Maturity. ASAE Paper No. 87-6020.

Pitts, M.J. and R.P. Cavalieri. 1987. Apple Starch Location and Measurement. ASAE Paper No. 87-3042.

Zhao, K., G.M. Hyde, M.J. Pitts, R.E. Thornton and J.A. Robertson. 1986. Seed Piece Optimization and Seed Piece Separation. ASAE Paper No. PNR 86-103.

Davis, D.C. and M.J. Pitts. l986. Educating for Effective Engineering in Agriculture. Proc. of the 94th ASEE Annual Conference.

Pitts, M.J. l986. An Integrated Computer Plan for Engineering Education. Proc. of the 94th ASEE Annual Conference.

Pitts, M.J., G.M. Hyde and R. Thornton. l985. Algorithms for Determining Tuber Shape and Cutting Potato Seed Pieces. ASAE Paper No. 85-60l8. Selected for inclusion in Engineering Potatoes published by ASAE, 1985.

Pitts, M.J.and G.M. Hyde. l985. Algorithms for Determining Tuber Shape and Cutting Potato Seed Pieces. ASAE Paper No. PNR 85-403. Selected for inclusion in Engineering Potatoes published by ASAE, 1985.

Pitts, M.J. l984. Introduction to Digital Math. ASAE Paper No. 84-5509. Selected for inclusion in Ag Electronics - 1983 and Beyond published by ASAE, 1984.

Pitts, M.J. l983. Field Data Logger Design. ASAE Paper No. 83-3034.

Pitts, M.J., J.W. Hummel and B.J. Butler. l983. Sensors Utilizing Light Reflection to Measure Soil Organic Matter. ASAE Paper No. 83-l0ll.

Pitts, M.J., J.W. Hummel and B.J. Butler. l983. Control System for Sprayers with Soil Organic Matter Sensing. ASAE Paper No. 83-l088.

Pitts, M.J. and C.E. Goering. l979. Modeling Soil Cone Changes Induced by Drive Wheel Traffic. ASAE Paper No. 79-1552.

Conference Proceedings to Washington State Agricultural Industry

Pitts, M.J., and R.P. Cavalieri 1994. Apple Firmness Sensor Update. Presented to the Washington State Tree Fruit Research Commission Firmness Subcommittee, Summer 1994 in Wenatchee, WA.

Pitts, M.J., R.P. Cavalieri and S.R. Drake. 1993. Apple Firmness Sensor Update. Presented to the Washington State Postharvest Conference, Spring 1993 in Wenatchee, WA.

Pitts, M.J., R.P. Cavalieri and S. R. Drake. 1992. Nondestructive Apple Firmness Measurement. Washington Technology Center Legislative Conference, Olympia WA.

Pitts, M.J., R.P. Cavalieri and S. R. Drake. 1992. Nondestructive Apple Firmness Measurement. Washington State Horticultural Association Conference, Yakima WA.

Cavalieri, R. P. and M. J. Pitts. 1991. Non-destructive sensor for apple firmness. Washington State Horticultural Association Conference, Wenatchee WA.

Hyde, G.M., K. Zhao, M.J. Pitts and R.E. Thornton. 1988. Seed Cutter Operation Insights. Proceedings, 27th Annual Washington Potato Conference and Trade Fair.

Waelti, H., R.P. Cavalieri and M.J. Pitts. 1988. Washington Storage Structures - What are They Like? Proceedings, 27th Annual Washington Potato Conference and Trade Fair.

Mace, A.G. and M.J. Pitts. 1988. Live Oyster Shucking - A Literature Review. Prepared for Hilton Seafood, Seattle, WA.

Cavalieri, R.P. and M.J. Pitts. 1987. Instrumentation of the Starch-Iodine Apple Maturity Index using Computer Imaging. Presented to the Department of Horticulture and Landscape Architecture, WSU, on Feb. 9.

Davis, D.C., R.P. Cavalieri and M.J. Pitts. 1986. Apple Watercore Detection. Presented to the Washington State Tree Fruit Research Commission at IAREC, WSU, on Apr. 8.

Cavalieri, R.P., D.C. Davis and M.J. Pitts. 1986. Postharvest Quality: Measurement and Control. Presented at the Symposium on the Technology and Science of Preserving Perishable Products, WSU Research and Technology Park on Sept 17.

Departmental Publications and Software Developed for the Teaching Program

"SpaceStation" A STELLA dynamics simulation for the Macintosh computer written for BSysE 110 and for the BSysE segment of Engr 120.

“Finite Apple Model” A series of parametric finite element apple models for use by firmness sensor inventors. The model is used by the MARC finite element program. Currently, the model is stored and run on the Cray YMP 90 at the San Diego Super Computer Center.

"Dam & Power" A STELLA dynamics simulation for the Macintosh computer written for Ag E 220.

“Water Tank” A STELLA dynamics simulation for the Macintosh computer written for AgE 220.

“AgTm 433 Formulas” Hypercard application that provides background instruction on the use of power and energy related formulas used in AgTm 433.

“AgTm Bernoulli Equation” A Hypercard application that computes parameters in the Bernoulli equation. Students use the application

through a graphical interface to specify the plumbing, and pull down menus containing required data.

"River Navigation"
A Stella dynamics simulation for the MacIntosh computer written for the Young Scholars program, 1990.

"Cookie Factory"
A Stella dynamics simulation for the MacIntosh computer written for the Student Computer Contest as part of the PNW Regional ASAE meeting, 1990.

"Irrigation Choices"
A Stella dynamics simulation for the MacIntosh computer written for a MESA workshop held in Sunnyside WA. in Fall 1990.

"Seed Separation"
A Stella dynamics simulation for the MacIntosh computer written for a MESA workshop held in Sunnyside WA. in Fall 1990.

"Watershed"
A Stella dynamics simulation for the MacIntosh computer written for the COEA 1991 Young Scholars program.

Ag Eng Department Computer Plan (1984)
This plan, authored by Dr. Pitts, recommended by the Departmental Computer Committee and approved by the Ag Eng Faculty, outlines levels of compatibility in student computers, faculty office computers and the Departmental office computers. Twenty-one computers were purchased under the provisions of this plan.

Operating Software Shell for FORTRAN on the HP150
This "executive" level shell simplified the interactive use of a word processor (MemoMaker, HP) and FORTRAN compiler (Microsoft) by students and faculty. The shell directs the user to alternative sets of commands based on the number and types of errors encountered during compilation.

Plot 10 Emulation Software for FORTRAN on the HP150
This software (co-authored with D.C. Davis) emulated the functions of the graphics software package Plot 10 (Tektronix). Dr. Pitts wrote assembly level procedures which interfaced with the graphics screen of the HP150. Dr. Davis wrote FORTRAN subroutines which received the data from the FORTRAN calling routine and supplied coordinates to the assembly procedures. The FORTRAN subroutines and assembly procedures were integrated into the FORTRAN compiler library by Dr. Pitts. As a result, the user (student or faculty) can integrate graphics into their FORTRAN program without calling a special library.

Terminal Emulation for the HP150 to the IBM 3090
This software, written in assembly language, increased the ability of the HP150 to serve as a terminal to the IBM mainframe. Existing software was unable to correctly receive and display graphics information, the emulation does and configures the HP150 for use as a terminal. This software is used in all (21) Departmental HP150's by students and faculty.

Software to simplify the use of Kermit between the HP150 and IBM 3090
This software, written in assembly language, configures the HP150 for use as a terminal to the IBM mainframe and returns the HP150 to the original microcomputer configuration after the use of Kermit.

Student Recruitment

Biological Systems Engineering and Agricultural Technology and Management Brochures (92, 94)

As chair of the Department's recruitment committee, Dr. Pitts oversaw the design and printing of these brochures. The committee developed and implemented a nine step proactive recruitment plan to increase student numbers in all five undergraduate programs.

NSF Young Scholars Program, College of Engineering and Architecture (91, 90)

This two week program was divided into two parts: one week of student teams training in math and science areas, and one week of working with a researcher. The student teams then finish or augment the research project when they return home. In 1990, Dr. Pitts presented a four hour seminar / demonstration on computer modeling to the Young Scholars, hosted the Young Scholars' tour of the Agricultural Engineering Department and mentored of student team from Sunnyside WA. working with expert systems to automate apple grading.

In 1991, Dr. Pitts presented a day and a half seminar / workshop on computer modeling the high school teachers of the Young Scholars, a four hour workshop on computer modeling to the students, and worked with the student teams and their teachers on a computer simulation project (Watershed). Dr. Pitts worked with these student teams after they returned to their high schools on the computer project.

NSF Young Scholars Program, College of Agriculture and Home Economics (88, 89)

This two week program was divided into two parts: group demonstrations of the research and teaching facilities of the participating departments, and an individual student/mentor working period during the second week. Drs. Pitts and Cavalieri presented two half-day workshops designed by Drs. Pitts, Cavalieri and Davis based on the Potato Seed Piece Cutting research (Proposal 9) and a computer model written by Dr. Hyde. The workshop consisted of background on the research and the aerodynamic forces used to separate viable and nonviable seed based on size, a simulation period where the students chose design parameters using the computer simulation, and an experimental period where the computer simulations were tested in a prototype seed separator. During the weekend, Dr. Pitts hosted two students interested in Ag Engineering and took the opportunity to show them basic surveying skills and arranged for them to participate in nearby grain harvesting operations. Dr. Pitts served as a mentor for two students in the area of computer image analysis.

Yakima Valley MESA Program (88, 89, 90, 91)

As part of this day long workshop for students in the MESA program, Dr. Pitts presented the concepts of engineering design within the framework of a contest using robots to pick up and transport pencils from a stack to a cup. The need for cooperation was demonstrated by blindfolding the robot operator, requiring team members to supply visual feedback of the robot's movements to the operator.

Spokane Valley MESA Program (90, 91)

As part of this day long workshop for students in the MESA program, Dr. Pitts presented the concepts of engineering design within the framework of a contest using robots to pick up and transport pencils from a stack to a cup. The need for cooperation

was demonstrated by blindfolding the robot operator, requiring team members to supply visual feedback of the robot's movements to the operator.

On Campus MESA student Ag Eng Demonstration (Part of a more extensive Ag Eng Tour), (86, 87, 88, 89, 90, 91)

The students were introduced to image processing equipment and concepts. In 1988, the imaging equipment was used to stage a "robot simulation" where students were used as the data collectors, actuators and reasoning parts of a robotic system. Through student experiences in communicating within the normal resources of robot communication systems, the concepts and problems of computer communication were introduced.

On Campus MESA student Ag Eng Demonstration (1985)

Repeat of 1984 Demonstration (24 students). The computer model was improved to include graphics, and a primitive image analysis system was shown as an automatic means to measure the tuber dimensions.

On Campus MESA student Ag Eng Demonstration (1984)

Twenty-one junior and senior high school students were introduced to mathematical and computer modeling through the use of a competition to cut potato tubers into seed pieces with a target mass. In the two hour session, the students first guessed at the proper seed piece mass, used an equation to estimate the mass, and finished by using a computer model written by Dr. Pitts to estimate seed piece mass.