

CURRICULUM VITAE

April 2015

ALLEN W. HAHN

Columbia, MO 65201

EDUCATION, CERTIFICATION & LICENSES:

- 1958 B.S. (Agriculture) - University of Missouri
- 1958 D.V.M. - University of Missouri
- 1964 M.S. (Biomedical Engineering) - Drexel Inst. of Tech.
- 1968 Ph.D. - (Biomedical Engineering) - Drexel University
- 1974 Diplomate - Am. College of Veterinary Internal Med.(Cardiology specialty)

Licensed to practice Veterinary Medicine and Surgery in Missouri.

POSITIONS:

- 2000-present PROFESSOR EMERITUS – Veterinary Medicine and Surgery - MU
- 1969-2000 PROFESSOR - Veterinary Medicine and Surgery - MU
PROFESSOR - Bioengineering - MU
- 1991-2000 CO-DIRECTOR - Medical Informatics Training - MU
- 1996-2000 CO-PI - Mo. Integrated Advanced Information Management System (NLM grant)
- 1989-present ADJUNCT PROFESSOR - Computer Science - MU
- 1997-present ADJUNCT PROFESSOR - Health Management and Informatics - MU
- 1969-1995 RESEARCH INVESTIGATOR - Dalton Cardiovascular Res. Cntr. - MU
- 1980-1990 ASSOCIATE DIRECTOR - Dalton Research Center - MU
- 1983-1988 DIRECTOR OF VETERINARY COMPUTING - Coll. of Vet. Med. - MU
- 1981-1984 INTERIM ASSOCIATE DEAN (Research and Grad. Studies) College of Vet.Med.
- 1979-1980 INTERIM DIRECTOR - Dalton Research Center (June-February)-MU
- 1968-1969 ASSOCIATE PROFESSOR - Biological Sciences Drexel Inst. of Tech. (now Drexel Univ.) Philadelphia, PA.
- 1966-1968 INSTRUCTOR - Biological Sciences
Drexel Inst. of Tech. (now Drexel Univ.) Philadelphia, PA.
- 1962-1966 SPECIAL FELLOWSHIP - National Heart Institute - Graduate Studies in Biomedical Engineering, Drexel Institute of Technology, Philadelphia, PA.
- 1961-1964 RESEARCH INSTRUCTOR IN MEDICINE, Comparative Cardiovascular Studies Unit, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, PA
- 1958-1961 RESEARCH ASSISTANT, Department of Small Animal Surgery and Medicine, School of Veterinary Medicine, Auburn University, Auburn, AL

RESEARCH AREAS AND INTERESTS:

Computer applications in veterinary medicine (Veterinary Informatics), esp. artificial intelligence, expert systems and ECG Processing; Comparative cardiovascular performance and disease in non-human species; Biological sensing electrodes; Biomaterials.

TEACHING ACTIVITIES: (prior to retirement)

HSM 471- “Decision Support Systems in Health Care” - Team taught, fall semester to executive students.

Honors College 10GH - “Veterinary Medicine and Society” with Dr. J.N. Berg

Post graduate courses in:

Electrocardiography

General Cardiology

Auscultation

Computers and Veterinary Medicine

These given to: MU Continuing Education, Veterinary Postgraduate Inst., Santa Cruz, CA; Am. Animal Hosp. Assoc., American Veterinary Medical Assoc., etc.

PROFESSIONAL AND HONORARY SOCIETIES:

American Veterinary Medical Association

Missouri Veterinary Medical Association (Life Member)

American Physiological Society

American Medical Informatics Association

Biomedical Engineering Society

Institute of Electrical and Electronic Engineers (Elected Senior Member, 1978) membership in Engineering in Medicine and Biology Society of IEEE – (Life Member in 2000)

Academy of Veterinary Cardiology

American College of Veterinary Internal Medicine

Association for Veterinary Informatics

American Association of University Professors

Sigma Xi

Alpha Zeta

Phi Zeta

OFFICES AND REVIEW GROUPS

1967-68	Secretary - Philadelphia Chapter of IEEE Group on Eng.in Med. & Biol.
1968-69	Chairman - Philadelphia Chapter of IEEE Group on Eng. in Med. & Biol.
1971-72	Chairman - Columbia (Mo.) Chap. of IEEE Group of Eng. in Med. & Biol.
1976-77	President - Association Vet. Med. Data Program Participants
1975-77	Chairman - Committee on Canine ECG Standards-Acad. of Vet. Cardiology
1979-81	President, Academy of Veterinary Cardiology
1980-82	Chairman, Biomaterials and Publications Committee, IEEE/EMB Soc.
1981-84	President - Cardiology Specialty, Am. Coll. Vet. Internal Medicine
1990-91	Elected Reg. Rep., Administrative Comm., Region V, IEEE/EMB Soc.
1990-93	Group leader, Laboratory for Applied Expert Systems Research, MU
1992-93	Reelected Reg. Rep., Administrative Comm., Region V, IEEE/EMB Soc.
1997-99	Elected Vice-President, Rocky Mountain Bioengineering Society
1997-98	Elected President-Elect, Veterinary Medical Data Base
1999-00	Elected President – Rocky Mountain Bioengineering Symposium

Reviewed manuscripts for IEEE Transactions on Biomedical Engineering, J. Amer. Vet. Med. Assn. and Annals of Biomedical Engineering, Rocky Mountain Bioengineering Symposium
Reviewed grant applications for Materials Section, National Science Foundation (NSF).
Member, Board of Directors, Rocky Mountain Bioengineering Symposium
Panel Member Surgery and Bioengineering Study Section - Ad Hoc Small Business Innovative Research Reviews - National Heart, Lung & Blood Institute, NIH. 1984-1986.
Site Visitor Applied. Neurophysiology Study Section, NINCDS,NIH, 1984
Site Visitor Information Sciences Study Section, NLM, NIH, 1985
Panel Member NSF Grant Review Panel on Telecommunications in Medicine, 1994
Chairman; Exhibits - 1985 "Frontiers of Engineering and Computing in Health Care" - Chicago, September, 1985
Organizer and Chairman First Veterinary MUMPS Symposium, December 12-13, 1984, Columbia, Missouri
Program Chairman; 23rd Rocky Mountain Bioengineering Symposium, April 11-12, 1986, Columbia, Missouri
President-Elect, Am. Veterinary Computer Society, 1985-86
President, Am. Veterinary Computer Society, 1986-87
Past President Am. Veterinary Computer Society, 1987-1988
Member Organizing Committee for Am. College of Veterinary Informatics
Chair: Program for Veterinary Informatics Track, SCAMC (Symp. on Computers Applications in Medical Care), 1990, 1991
President-Elect; American College of Veterinary Informatics; 1992-1993
President American College of Veterinary Informatics; 1993-1994
AdHoc Reviewer UM President's Research Board proposals - 1992-2000
Member Amer. Vet. Med. Assoc. Subcommittee on Informatics Standards (1995-2002), Chairman - 1999-2002
President-Elect Veterinary Medical DataBase Participants - 1996-1998
President Veterinary Medical Data Base Participants - 1998-2000
Past-President Veterinary Medical DataBase Participants - 2000-2002
President-Elect Veterinary Medical DataBase Participants - 2002-2004
President Veterinary Medical Data Base Participants - 2004-2006
Immediate Past President - Veterinary Medical Data Base Participants – 2006-2008
Program Director - Veterinary Medical Data Base – 2014- Present

LISTED IN:

American Men and Women of Science
Who's Who in International Medical Electronics and Biological Engineering
Who's Who in the Midwest
Who's Who in Frontier Science and Technology

EDITORIAL RESPONSIBILITIES:

1984 - 1986 - Consulting Editor - "Engineering in Medicine and Biology Magazine" - IEEE/EMBS
1981-1983 -Senior Editor (Founding) and Publisher, "Engineering in Medicine and Biology" – Magazine for the IEEE/EMBS
1978-1981 - Editor - Engineering in Medicine and Biology Newsletter

1976-1979 - Co-Editor "Electrocardiogram of the Month", a monthly feature in the Journal of the Amer. Vet. Med. Assoc.

1987-1988 & 1989-1990- Faculty Advisor for "Intervet", national journal of the Student American Veterinary Medical Association.

CONSULTING:

Epidemiology Branch, National Cancer Institute, NIH, Bethesda, Maryland

Marion Laboratories, Kansas City, Missouri

KLI Industries, Newtown, Pennsylvania

Intech Systems Corp., Hauppauge, New York

TPS Inc. Mt. Vernon, Indiana

Idea Works, Columbia, Missouri

Mo. State Veterinarian's Office (DataBase and Animal ID design and implementation)

PATENTS:

U.S. Patent # 4,276,144 - "Oxygen Electrode and Method of Preparation Thereof" - granted June 30, 1981 (co-Inventor with M.F. Nichols, A.K. Sharma and E.W. Helmuth) Assignee: Curators of the University of Missouri and licensed to Nichols Technology, Columbia, MO.

U.S. Patent #4,390,405 – continuation-in-part for "Oxygen Electrode and Method of Preparation Thereof" granted June 28, 1983 (Hahn, et al.) Assignee: Curators of the University of Missouri; Licensed to Nichols Technology, Columbia, MO.

U.S. Patent #4,921,723 - "Process for Applying a Composite Insulative Coating to a Substrate and Coated Article Produced Thereby" - granted May 15, 1990 (co-Inventor with M.F. Nichols) . Assignee: Curators of the University of Missouri; Licensed to Nichols Technology, Columbia, MO.

U.S.Patent #5,121,706 - “ Apparatus for Applying a Composite Insulative Coating to a Substrate” - granted June 20, 1992 (co-Inventor with M.F. Nichols) . Assignee: Curators of the University of Missouri; Licensed to Nichols Technology, Columbia, MO.

U.S.Patent 5,137,780 - “Article Having a Composite Insulative Coating” - granted August 11, 1992 (co-inventor with M.F. Nichols). Assignee: Curators of the University of Missouri; Licensed to Nichols Technology, Columbia, MO.

Disclosure of "Method of Altering Surface Tension" University of Missouri Patent Committee. July 8, 1983. (not pursued for patent protection)

HONORS

MU Alumni Association Faculty Alumni Award – 1993

Lifetime member – Institute of Electrical and Electronic Engineers

Geyer Award for Public Service to Higher Education – 2001

Lifetime member – Missouri Veterinary Medical Association – 2002

Honor Roll member – American Veterinary Medical Association - 2004

CAMPUS & UNIVERSITY SERVICE:

1979-1981 Faculty Grievance Panel

1974-1987 Graduate Faculty Senate
 1983 Special Graduate Faculty Senate Task Force on Graduate Education
 1972-1976 Sinclair Comparative Medicine Farm Advisory Committee
 1980-1986 Sinclair Comparative Medicine Farm Advisory Committee
 1984-1987 Elected Chair, UMC Campus Computer Advisory Committee
 1985-1991 Elected to UMC Faculty Council from Coll. of Vet. Med.
 1986-1987 Chair, UMC Faculty Council Special Projects Committee
 1987-1990 Chair, UMC Faculty Council Academic Affairs Committee
 1987-1988 Provost's Task Force on Computing
 1988 UM Planning Task Force on Telecommunications
 1988-1991 KBIA Advisory Committee
 1989 UM President's Advisory Committee on Budget Enhancement
 1988-1989 Coordinator, H.E.R.O.(Higher Ed. Rescue Operation)
 1989-1990 Chair, MU PAC- a University Political Action Committee
 1990-1991 Member - Campus (UMC) Long Range Planning Committee
 1990-1991 Member-UM System Long Range Planning Committee
 1990-1991 Member-UM Intercampus Faculty Council
 1990-1991 Member, Provost Search Committee
 1990-1991 Member, Chancellor's Advisory Committee on Minority Affairs
 1990-1991 Elected Chair, MU Faculty Council
 1991-1992 Member, MU Planning Council
 1991 Chair, Ad Hoc Task Force on Main Frame Computing at MU
 1991 Member, MU Faculty Advisory Committee on Computing
 1991-1993 Member, Coll. Vet. Med. Promotion and Tenure Committee
 1991-1992 Chair, Dept Vet Med/Surg. Computer Committee
 1992 Member, UM President's Advisory Committee on Computing
 1992-present Chair, MU PAC- Missouri University 's Political Action Committee
 1993-1994 Chair, Tenure Task Force for MU Faculty Council
 1993-1995 Elected member Coll. Vet Med Faculty Policy Committee
 1993-1994 Chair, Coll. Vet Med Promotion and Tenure Committee
 1993-1994 Planning Board-Mo. Integrated Adv. Info. Mgt. Effort
 1993 Member-Curators Subcommittee on Telehealth
 1994-2000 Elected representative, Coll. Vet. Medicine, MU Faculty Council
 Elected Chair, Faculty Council Special Projects Committee
 1995-1997 Elected Chair, Dept. Promotion and Tenure Committee
 1993-1998 Elected Chair, MU Chapter Am. Assoc. Univ. Professors (AAUP)
 1997-1998 Elected Vice-Chair, MU Faculty Council
 1998-2000 MU Campus Computing Advisory Committee
 1999-2000 MU Health Policy Oversight Committee
 1998-2000 Elected Sec.-Treas., Missouri Assn. Faculty Senates

COMMUNITY SERVICE:

1972-1978 - Assistant Scoutmaster, Troup 733, Columbia, Missouri
 1979-1981 - Post Advisor, Explorer Post 503, Columbia Missouri
 1977-1979 - Chair.-"Swim-for-Hearts" fund drive Am. Heart Assoc. Mo. Affil.
 1978-1984 - Member-Cardiac Rehab. Committee, Am. Heart Assoc. Mo. Affil.
 1981 - Member - Columbia Missouri Redistricting Commission

1972-2000 - Leader, Columbia Masters Swimming

HOBBIES and RECREATION:

Competitive swimming (Masters)

Selected Mo. "Showme State Games" Male Athlete of the Year, 1996)

Canoeing and backpacking Fly-fishing

BIBLIOGRAPHY - Allen W. Hahn

(in chronological order)

Papers in peer reviewed journals and conferences, and book chapters

- 1] Hahn, A. W., "Angiocardiography in Canine Dirofilariosis." J. of Amer. Vet. Med. Assn., Vol. 136, pp. 355-358, 1960.
- 2] Kendall, B., Amoss, D., Sun, H., Hahn, A. W. and Farrel, D., "The Noise-Free Fetal Electrocardiogram Recorded from the Maternal Abdomen." Amer.J. of Obst. and Gyn., Vol. 97, pp. 1129-1134, 1967.
- 3] Massie, H., Racine, P., Pasker, R., Hahn, A. W. and Sun, H., "Study of Power Generating Implantable Electrodes." Med. and Biol. Eng., Vol. 6, 1968.
- 4] Huckaba, C. E. and Hahn, A. W., "A Generalized Approach to the Modeling of Arterial Blood Flow." Bull. of Math. Biophysics, 30:645, 1968.
- 5] Tallarida, R., Herr, A., Sun, H. and Hahn, A. W., "Mathematics Courses for Physicians and Other Life Scientists." J. Med. Educ., Vol. 44, pp. 1170, 1969.
- 6] Plank, R., Hahn, A. W., Beard, R. and Cooper, J., "Chronic Implantation Studies of Biological Power Cells." J. Assoc. for Adv. of Med. Inst., Vol. IV, p. 28, 1970.
- 7] DeRosa, J., Beard, R. B. and Hahn, A. W., "The Fabrication and Evaluation of Cathode and Anode Materials for Implantable Hybrid Power Cells." IEEE Trans. on Biomed. Eng. BME-7, Vol. 17, 1970.
- 8] Hahn, A. W., "Auscultation of Heart Sounds in More Common Forms of Heart Diseases in the Dog." In: Kirk's Current Veterinary Therapy, III, W. B. Saunders Co., Philadelphia, 1971.
- 9] Tsou, F. K., Frankel, S. N., Chous, P. C., and Hahn, A. W., "An Integral Method for the Analysis of Blood Flow." Bull. Math. Biophysics, 33:117-128, 1971.
- 10] Coffman, J. R., Garner, H. E., Hahn, A. W. and Hartley, J., "Characterization of Refractory Laminitis." A.A.E.P. Proc., pp. 351-358, 1972.
- 11] Garner, H. E., Coffman, J. R., Hahn, A. W. and Hartley, J., "Indirect Measurement of Blood Pressure in the Horse." A.A.E.P. Proc., pp. 343-349, 1972.
- 12] Cooper, J. B. and Hahn, A. W., "Hybrid Biological Power Cells for Cardiac Pacemakers: Materials Evaluation." IEEE Trans. on Biomedical Engineering. BME-20:336-345 Sept. 1973.
- 13] Hahn, A. W. Garner, H. E., Coffman, J. R. and Sanders, C. W., "Indirect Measurement of Arterial Blood Pressure in the Laboratory Pony." Lab. Animal Science, 23(6), pp. 889-893, 1973.
- 14] Cywinski, J. K., Cooper, J. B., Hahn, A. W., "Biogalvanic Power Sources" in Cardiac Pacing, Proc. of IV Int'l. Symp. H. J. Thalen, ed., Van Gorcum & Co., Assen, the Netherlands, 1973.
- 15] Mayhan, K. G., Havens, M. R., Peace, B. W., and Hahn, A. W., "Plasma Formed Polymers and Their Biomedical Application - Part I: Synthesis and Fundamental Studies." National Bureau of Standards, Sp. Publ. 415, "Biomaterials", pp. 1-12, May 1, 1975.
- 16] Hahn, A. W., Sanders, C. R., Mayhan, K. G., and Easley, J. R., "Plasma Formed Polymers and Their Biomedical Application - Part 2: Biocompatibility and Applications." National Bureau of Standards, Sp. Publ. 415, "Biomaterials", pp. 13-18, May 1, 1975.
- 17] Dorn, C. R., Garner, H. E., Coffman, J. R., Hahn, A. W., and Tritschler, L. G., "Castration and Other Factors Affecting the Risk of Equine Laminitis." The Cornell Veterinarian, Vol. 65: No. 1, January 1975.
- 18] Garner, H. E., Hahn, A. W., Hartley, J. W., Hutcheson, D. P., and Coffman, J. R., "Indirect Blood Pressure Measurement in the Dog." Lab. An. Sci., 23:197-202 (April), 1975.
- 19] Garner, H. E., Coffman, J. R., Hahn, A. W., Ackerman, N., and Johnson, J. H., "Equine Laminitis and Associated Hypertension: A Review." J. Am Vet. Med. Assn., 166:56-66, 1975.

- 20] Garner, H. E., Coffman, J. R., Hahn, A. W., Hutcheson, D. W., and Tumbleson, M. E., "Equine Laminitis of Alimentary Origin: An Experimental Model." *Am. J. Vet. Res.*, 36:441-444 (April), 1975.
- 21] McGrath, C. J., Nichols, M. F., Hahn, A. W., Short, C. E. and Paddleford, R. R., "Spontaneously Occurring Pulses Alternans in Anesthetized Dogs." *Vet. Anes.*, 2:24-48, 1975.
- 22] Garner, H. E., Hahn, A. W., Salem, C., Coffman, J. R., Hutcheson, D. P. and Johnson, J. H., "Cardiac Output, Left Ventricular Ejection Rate, Plasma Volume and Heart Rate Changes in Equine Laminitis-Hypertension." *Am. J. Vet. Res.*, 38:725-729 (June) 1977.
- 23] Hahn, A. W., "Digitalis Glycosides in Canine Medicine." In *Current Vet. Therapy VI*, R. L. Kirk, editor, W. B. Saunders Co., Philadelphia. pp. 329-339, 1977.
- 24] Hahn, A. W. and Garner, H. E., "Indirect Measurement of Blood Pressure in Animals." In *Advances in Comparative Medicine and Veterinary Science*, Simpson and Brandley, editors, Academic Press, New York. Vol. 21:1-18, 1977.
- 25] Cywinski, J.K., Hahn, A.W. and Easley, J.R., "Performance of Implanted Biogalvanic Pacemakers." In *Cardiac Pacing; (Proc. Vth Int'l. Symp. Tokyo, 1976)*. Watanabe, Y., ed. - *Exerpta Medica*. Amsterdam, 1977 - pp. 447-451.
- 26] Cywinski, J. K., Hahn, A. W., Nichols, M. F. and Easley, J. R., "Performance of Implanted Biogalvanic Pacemakers." *Pace - Vol. 1*, Jan. 1978.
- 27] Tang, T. E., Murphy, V. G., Hahn, A. W. and Barr, R. E., "Operation of Platinum Oxygen Sensing Microelectrodes." *J. Bioengineering* 2:381-388, 1978.
- 28] Ackerman, N., Burk, R., Hahn, A. W., and Hayes, H. M., Jr.: "Patent Ductus Arteriosus in the Dog: A Retrospective Study of Radiologic, Epidemiologic and Clinical Findings." *Am. J. Vet. Res.* 39 (Nov.) 1805-1810, 1978.
- 29] Nichols, M. F., Hahn, A. W., Easley, J. R. and Mayhan, K. G., "Bioevaluation of Plasma Polymerized Films in Skeletal Muscle." *J. Biomed. Materials Research*:13 (March) 299-315, 1979.
- 30] Gaynor, F., Hoffer, R. E., Nichols, M. F., Moraff, H., Hahn, A. W., and McCoy, D. M.: "Physiologic Features of the Canine Esophagus: Effects of Tranquilization on Esophageal Motility". *Am. J. Vet. Res.* 41:727-732 (May) 1980.
- 31] Hahn, A. W., Nichols, M. F., Sharma, A. K. and Hellmuth, E. W.: "Glow Discharge Polymer Coated Oxygen Sensors". Chap. in "Biomedical and Dental Application of Polymers." C.G. Gebelein and F. F. Koblitz, editors, Plenum Press, New York, 1981 pp. 85-96.
- 32] Nichols, M. F., W. J. James, A. K. Sharma, H. K. Yasuda and A. W. Hahn: "Cyclic Voltammetry for the Study of Polymer Film Adhesion to Platinum Neurological Electrodes." *Biomaterials*, 2:161-165 (July) 1981.
- 33] Sathir, R. K., W. J. James, H. K. Yasuda, A. K. Sharma, M. F. Nichols and A. W. Hahn: "The Adhesion of Glow Discharge Polymers, Silastic and Parylene to Implantable Platinum Electrodes: results of tensile pull tests after exposure to isotonic sodium chloride. *Biomaterials*, 2:239-243, October 1981.
- 34] Hahn, A. W., D. H. York, M. F. Nichols, G. Amromin and H.K. Yasuda: "Biocompatibility of Glow Discharge Polymerized Films and Vacuum-Deposited Parylene". *J. Appl. Polymer Science. (Appl. Polymer. Symp.)* 38:55-64, 1984.
- 35] Nichols, M. F. A. W. Hahn, W. J. James, A. K. Sharma and H. K. Yasuda.: "Evaluating the Adhesion Characteristics of Glow Discharge Polymerized Films by a Novel Voltage Cycling Technique". *J. Appl. Polymer Science.(Appl. Polymer Symp.)* 38:21-33, 1984.
- 36] Turrentine, M.A., A.W. Hahn, & G.S. Johnson: "The Factor VIII Complex in Canine Plasma after Submaximal Treadmill Exercise". *Am. J. Vet. Res.* 47:39-42 (Jan.), 1986.
- 37] Hahn, A.W., (editor): "Biomedical Sciences Instrumentation" Vol. 22:1986 Proc. 23rd Annual Rocky Mountain Bioengineering Symposium, Columbia, Missouri, April 11-12, 1986.

- 38] Hahn, A.W.: "The Physiologic Cardiac Diagnosis - Normal and Abnormal Rhythms in Cardiac Diagnosis in the Dog & Cat: A Diagnostic Handbook", Gompf, R.E. (editor), Am. An. Hosp. Assn. Denver, CO, 1986, pp. 128-141.
- 39] Hahn, A.W.; review of "Bolton's Handbook of Canine and Feline Electrocardiography" by N.J. Edwards. J. Am. Vet. Med. Assoc. 191:719(Sept. 15), 1987
- 40] Nichols, M.F. and A.W. Hahn: "Electrical Insulation of Implantable Devices by Composite Polymer Coatings." I.S.A. Transactions 26:15-18(No. 4), 1987
- 41] Nichols, M.F., A.W. Hahn and A.K. Sharma: "The Effect of High Energy, Electrodeless Plasma Polymerized Methane Polymers on the Adhesion Characteristics of Poly-p-Xylylene Films." J. Adhesion Sci. & Tech. 2:59-66(No. 1), 1988
- 42] Sharma, A.K., A.W. Hahn and M.F. Nichols: "Optimizing Poly (chloro-p-xylylene) or Parylene C Synthesis." J. Appl. Polymer Sci. 36:(No. 7), 1557-1565, 1988.
- 43] Ansbacher, L., M.F. Nichols and A.W. Hahn: "The Influence of the Parasite, *Encephalitozoon cuniculi* on Neural Tissue Responses to Implanted Biomaterials in the Rabbit." J. Lab. Animal Sci. 38:689-695(Dec., No. 6), 1988.
- 44] Schulz, K., D., McCaw and A.W. Hahn: "Ventricular Tachycardia in Metastatic Disease; ECG of the Month". J. Am. Vet. Med. Assn. 197:1464-1465 (Dec. 1), 1990.
- 45] (anon): "Heart Disease", chapter in Merck Veterinary Manual, 7th edition, 1991, Merck, Sharp and Dohme. Rahway, NJ.
- 46] Jiang, B., K. S. Rugh, D.S. Hatfield, D. Jiang and A.W. Hahn: "Nonlinear Algorithm for the Identification of a Fiducial Marker for Various Cardiac Events". Proc. 15th Annual Symposium on Computer Applications in Medical Care (SCAMC), pp 455-459, Nov. 17-20, 1991, McGraw-Hill, Publishing, Washington, DC.
- 47] Rugh, K. S., B. Jiang, D.G. Hatfield, H. E. Garner and A. W. Hahn: "Cardiac Cycle Variability in Ponies at Rest and During Exercise. J. Appl. Physiology. 73(4):1572-1577, 1992
- 48] Anderson, M.A., F.A. Mann, C. Wagner-Mann, A. W. Hahn, B.L. Jiang and J. L. Tomlinson." A Comparison of Nonthreaded, Enhanced Threaded, Ellis Fixation Pins Used in Type I External Skeletal Fixators in Dogs." Vet. Surg. 22:482-489, 1993.
- 49] Hahn, Allen W., Michael J. Knowles and J. Craig Klimczak: "A Listener/Viewer for Phonocardiograms". J. Am. Med. Informatics Assn. Symp. Supp.-Proc. 18th Ann. Symp. on Computers in Med. Care - (an electronic demonstration) - Nov. 5-9, 1994 - pg. 1039.
- 50] Klimczak, J. Craig, Allen W. Hahn, MaryEllen Sievert and Joyce A. Mitchell: "Getting Around in a Large Nomenclature File: Browsing SNOMED International." J. Am. Med. Informatics Assn. Symp. Supp.-Proc. 18th Ann. Symp. on Computers in Med. Care - (an electronic demonstration) - Nov. 5-9, 1994- pg. 1023.
- 51] Schrope, Donald P., P.R. Fox, A.W. Hahn, B. Bond and S. Rosenthal.: "Effects of Electrocardiograph Frequency Filters on P-QRS-T Amplitudes of the Feline Electrocardiogram." Am. J. Vet. Research 56:1534-1540 (Nov) 1995.
- 52] Carson, C. Andrew, J.M. Keller, K.K. McAdoo, D. Wang, B. Higgins, C.W. Bailey, J.G. Thorne, B.J. Payne, M. Skala and A. W. Hahn: "E. coli O157:H7 Restriction Pattern Recognition by Artificial Neural Network". J. Clin. Microbiology, 33:2894-2898 (Nov) 1995.
- 54] Hausam, Robert D. And Allen W. Hahn: "Representation of Clinical Problem Assessment Phrases in U.S. Family Practice Using Read 3.1 Terms: A Preliminary Study" J. Am. Med. Informatics Assn. Symp. Supp.-Proc. 19th Ann. Symp. on Computers in Med. Care - Oct. 28 Nov. 1, 1995 pp. 426-430.
- 55] Klimczak, J. Craig, Allen W. Hahn, Mary Ellen Sievert, Greg Petroski and John Hewitt: "Comparing Clinical Vocabularies Using Coding System Fidelity", J. Am. Med. Informatics Assn. Symp. Supp.-Proc. 19th Ann. Symp. on Computers in Med. Care - Oct. 28-Nov. 1, 1995 pp. 883-887.

56] Williams, N., J. L. Tomlinson, A.W. Hahn, G.M. Constantinescu, C. Wagner-Mann: "Heat Conduction of Fixator Pins with Polymethylmethacrylate External Fixation." *Veterinary and Comparative Orthopedics and Traumatology* 10:153-159,1997.

National and International Conference Proceedings (Full Papers)

- 1] Hahn, A. W., "Auscultation as an Aid in the Diagnosis of Heart Disease in Dogs." Sci. Proc. 100th Ann. Mtg. AVMA, pp. 124, 1962.
- 2] Hahn, A. W., "Some Applications of Phase-Plane Analysis to Certain Biological Systems." Proc. Eng. Fndn. Res. Conf., (Engineering in Medicine, II), Proctor Academy Andover, New Hampshire, 1964.
- 3] Townsend, J. L., and Hahn, A. W., "A Thermodilution Flowmeter." Proc. 18th Ann. Conf. on Eng. in Med. and Biol., 1965.
- 4] Amoss, D., Kendall, B., Hahn, A. W. and Sun, H., "Extraction of Fetal Electrocardiogram Complexes Recorded from Maternal Abdomen." Proc. Symp. on Bioeng., Milwaukee, Wisconsin, Vol. 1, 1966.
- 5] Sun, H., Hahn, A. W. and Bennison, B., "The Process of Retraining the Life Scientist into a Biomedical Engineer." Proc. 4th Bioeng. Symp., Terre Haute, Indiana, 1966
- 6] Amoss, D., Sun, H., Hahn, A. W. and Kendall, B., "Modified Method for On-Line Extraction of Fetal Electrocardiograms." Proc. 19th Ann. Conf. on Eng. in Med. and Biol., 1966.
- 7] Anderson, C., Eisenstein, B., and Hahn, A. W., "Information Flow in the Corticospinal Tract." Proc. 19th Ann. Conf. on Eng. in Med. and Biol., 1966.
- 8] Sun, H. Amoss, D., Kendall, B. and Hahn, A. W., "Real-Time Analysis of Simultaneously Recorded Fetal Electrocardiograms." Proc. 7th Intl. Conf Eng. in Med. and Biol., Stockholm, 1967.
- 9] Rogers, V. A., Hahn, A. W. and Sun, H., "A Mechanical-Hydraulic Circulatory Analog." Proc. 20th Ann. Conf. on Eng. in Med. and Biol., Boston, Mass., 1967.
- 10] Saklad, E., Hahn, A. W. and Sun, H., "A Technique for Studying Flow Profiles Through Valves." Proc. Ann. Conf. on Eng. in Med. and Biol., Boston, Mass., 1967.
- 11] Amoss, D., Sun, H., Hahn, A. W., Winter, J. and Kendall, B., "An Approach to Fetal Electrocardiography Using General Purpose Digital Computer." 6th Ann. Symp. on Biomath, etc., Houston, 1968.
- 12] DeRosa, J., Beard, R. and Hahn, A. W., "Fabrication and Evaluation of Cathode and Anode Materials for Implantable Hybrid Cells." Proc. 21st Ann. Conf. on Eng. in Med. and Biol., Houston, 1968.
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**GRANTS, GIFTS AND CONTRACTS AWARDED
(Hahn as Principal Investigator)**

Years	Project Title and Agency	Direct Cost	Indirect Cost	Total Cost
1969-76	"Self Powered Cardiac Pacing System", NHLI of NIH	\$30,000	\$8,397	\$38,397
	Mo. Heart Assn.	9,127	913	10,040
	Vitatron Medical, BV	10,329	2,619	12,948
1971	Plasma Polymers for Biomedical Applications", National Science Fnd.	29,625	12,958	45,583
1972	“	29,625	12,958	42,583
1973	“	34,420	11,006	45,426
1974	“	34,420	11,006	45,426
1972	Chronic Implantable Oxygen Electrodes, US Army Med. R&D Command	28,358	5,817	34,175
1973	Continued after 1st year with R. E. Barr as P.I. - Hahn as Co-P.I	34,852	8,995	43,847
1974	“, NASA	17,023	4,415	21,438
1975-77	Tissue Response to Titanium Encased Cardiac Pacemakers, Vitatron Medical, B.V	3,728	232	3,960
1979-81	Glow Discharge Polymers for Neural Prosthetic Devices, NINCDS of NIH (Contract)	368,182	139,064	507,246
1981-84	Renewal of above	492,259	172,981	665,240
1982	Production of EMB Magazine, IEEE EMB Society (Year 1)	28,590	2,149	30,739
1982-83	(Year 2)	33,227	2,000	35,227
1983-84	(Year 3)	18,408		18,408
1982	Digital Computer for Vet. Med. Hospital Operations (Donation of PDP-11/23 system to College of Vet. Med.) Digital Equipment Corp.	30,000		30,000
1983	Evaluation of Portable ECG/PCG for Veterinary Use, Intech Systems Corporation	2,700	2,000	4,700
1984	Digital Computer for Vet. Med Research, (Donation of DEC PDP 11/34), Adac Labs.	25,000		25,000
1984	MUMPS Language in Veterinary Medicine, (Donation	10,000		10,000

	of MUMPS Operating System) , MUMPS Users Group & Digital Equip. Corp.			
1984-88	Protective Coatings for Neural Prosthetic Devices, NINCDS of NIH (contract)	475,900	162,431	638,331
1988-89	Digital Signal Processing of the Equine Exercise Electrocardiogram, USDA Formula Funds	11,100		11,100
1989	The Application of Modern Digital Processing Techniques to Veterinary Medicine, UM Weldon Spring Endowment Fund	24,500		24,500
1990	Macintosh Portable Computer for Equine Electrocardiography, Apple Computer Finishing Funds	4,536		4,536
1990-91	Digital Processing of Equine Electrocardiogram, CVM COR grant	3,575		3,575
1991-19 92	Post Exercise Heart Rate Variability in Ponies, USDA MO-AgES Animal Health Funds	4,410		4,410
1991-19 92	Post Exercise Heart Rate Variability in Ponies, CVM C.O.R. grants	2,880		2,880
1991	Veterinary Cardiology Research, Kallos Fund to Vet Teaching Hosp.	2,000		2,000
TOTAL		\$1,798,774.00	162,431	\$2,361,715.00