

DR. CELAL BATUR
(U.S. Citizen)

Expertise:

Process identification and control applied to diagnostics, health monitoring, crystal growth control , motion control and polymeric systems.

DEGREES IN FIELD

Ph.D. In Process Modeling and Control, University of Leicester, England, 1976.

B. Sc. and M.Sc. in Mechanical Engineerig. Technical University of Istanbul, Turkey
1970, 1971.

EXPERIENCE

1999-	Prof. and Chair of Mechanical Engineering
1994-	Prof. of Mechanical Eng. Univ. of Akron, Akron-Ohio.
1984-1994	Assoc. Prof. of Mechanical Eng. Univ. of Akron, Akron-Ohio.
1982-1984	Chief Engineer and Partner, Vacuum Plast, Istanbul, Turkey.
1980-1982	Visiting Prof. of Mechanical Eng. Univ. of Akron, Akron-Ohio.
1976-1980	Assist. Prof. of Mechanical Eng. Technical Univ. of Istanbul, Turkey.

EXPERIENCE IN TEACHING

A. GRADUATE COURSES INTRODUCED AND TAUGHT

1.	4600-645	Process Identification and Computer Control
2.	4600-646	Expert Systems in Controls and Manufacturing
3.	4600-544	Robotics, Design, Controls and Application
4.	4600-642	System Analysis and Controller Design
5.	4600-697	Neural and Fuzzy Control Systems
6.	4600-541	Control System Design

B. UNDERGRADUATE COURSES TAUGHT

1.	4600-203	Dynamics
2.	4600-440	System Dynamics and Control
3.	4600-444	Robotics, Design, Controls and Application
4.	4600-305	Thermal Science
5.	4600-483	Measurement Laboratories
6.	4600-401	Design of Energy Systems
7.	4600-461	Design of Mechanical Systems
8.	4600-380	Engineering Analysis
9.	4600-340	System Dynamic and Response
10.	4600-441	Control System Design

- 11. 4600-105 Tools of Mechanical Engineering
- 12. 4600-460 Concepts of Design (team taught)
- 13. 4600- Industrial Automatic Control 542

C. PH.D DISSERTATIONS DIRECTED (ADVISOR)

- 1. Neural Networks for Controls
Vicken S. Kasparian, December 1992
- 2. Crystal Growth Control
Arvind Srinivasan, Fall 1994
- 3. Polymer Processing Control
Tawfik Maged, 1997
- 4. Crystallinity Control in Extrusion
Leephakpreeda Thananchai, Spring 1996
- 5. Javeed Nizami
Polymer Processing Control, December, 1997
- 6. Mahmut Karaman
Melt Spinning Control, December, 1997
- 7. Hui Zhong
December, 2004
- 8. Santanu Chandra,
Microgripping, December 2007
- 9. Juntao Fei
Sliding Mode Controller, 2007

D. THESIS DIRECTED, (ADVISOR AND CO-ADVISOR)

- 1. Design of a Totally Implantable Artificial Bladder and Sphincter
Kathleen M. Kellackey, Spring 1988
- 2. Left Ventricle Assist Device
B.F. Hete, Spring 1987 (Co-advisor)
- 3. Crystal Growth Control
R. Sharpless, Spring 1991
- 4. Fault Diagnosis
A. Srinivassan, Spring 1991
- 5. Impact Propagation
Dan Deckler, Spring 1990
- 6. Gripper Control
Mark Hodowanec, Fall 1991 (Co-advisor)
- 7. Stereo Vision
Shailesh Kozarekar, Summer 1990
- 8. Microprocessor Control
Gopichandra Surnilla, Spring 1992
- 9. Neural Networks
Haiyan Zhang, December 1991
- 10. Robust Controller Design for the Crystal Growth Furnace
Chang-Rae Lee, Summer 1992

11. Optimization by Neural Networks
Karaman Mahmut, Summer 1993.
12. Fuzzy Control
M. Crapo, Spring 1992.
13. Stereo Particle Tracing
V. Purushhothaman, Summer 1993.
14. Process Control
Mike Michaud
15. Artificial Intelligence for Controls
Joseph Saus
16. Computerized Force Control of a Pneumatic Robot Gripper
G. Namala, Jan. 1993
17. Computer Interface for High-Torque Stepping with an AC Synchronous Motor
M. Jayaram, Jan. 1993
18. Life and Reliability Analysis of Aircraft Transmission
M.G. Prasanna, Jan. 1993
19. Computerized Cold Forming in Scale
P. Shah, Jan. 1992
20. Computer Controlled Cold Forming for Circular Plate
S. Krishnaswami, Jan. 1991
21. Controlled Indexing Dynamics Using Computer Pulsed Stepping Motors
R.J. Knorr, Jan. 1984
22. Self-tuning rubber cut control
Michael E. Wroe 1992
23. Projective Control
A. Srinivassan, Fall 1993
24. Stability of Fuzzy Logic Controller
Leephakpreeda Thananchai, Fall 1993
25. Set-membership Identification
Khen Cheng, Fall 1996
26. Internet Based Control
Qui Ma, Fall 1998
27. Hydraulic Motion Control
Mani Grindra, Fall 1998
28. Observer Based Sliding Mode Control of an Electrohydraulic servovalve
Linghui Zhang, May 2001
29. Identification and Discrete Time Sliding Mode Control of a Pneumatic System
Wei Ye, May 2001
30. Support Vector Machines
Ling Zhou, 2001
31. Mems Gyro,
K. Qais, Spring 2002
32. An Internet Based Tuning and Monitoring of a Position Control System,
Laxmi Vulpala, 2000
33. Sliding Mode Control of Actuators
Syed Jalal, 2003

34. High Temperature Piezo Electric Materials
Zoltan Gubinyi, 2006
35. Fatigue in Piezo Materials
Jess Robbins, Spring 2009
36. Electrospinning Control
Charlie Druesedow, August 2008.

E. SPECIAL PROJECTS DIRECTED

1. Fuzzy Control
V. Kasparian, Spring 1989
2. Self-tuning Control
T. Soldat, Spring 1989
3. Multivariable Self-tuning Control
C. Christodolu, Spring 1990
4. Flexible Robotic Workcell
V. Peng, Spring 1990
5. Robotic Vision System for Flexible Manufacturing
C. Phillipou, Spring 1988
6. Optical Encoders for Position and Rate Feedback in Robotics
V. Kottamasu, Spring 1987
7. Self-tuning Regulators
Julio Valejo, Spring 1986
8. Neural Networks
Hussam Samour, Spring 1990
9. Expert Systems
Mark Gibbs, Spring 1991
10. Fuzzy Control
Robert Beer, Summer 1998.
11. M. Musher
Hydraulic Control, December, 2004

SCHOLARLY PUBLICATION

A. BOOK CHAPTERS

1. C. Batur, V. Kasparian, "Fuzzy Knowledge Based Controller Design", in Intelligent Systems in Design and Manufacturing. 1994. Published by ASME Press.
2. C. Batur, Chan C-C, Srinivasan, A. "Inverse Fuzzy Model Based Controllers", Methods and Applications of Intelligent Control, pp. 173-197. Kluwer Academic Publisher, 1997.

B. REFEREED JOURNAL PUBLICATION

1. Batur, C., "Prediction in control systems", Journal of ITU., Vol. 37, No. 5. 1979.

2. Batur, C., "System Identification and Adaptive Control Based on Box and Jenkins Control Scheme", Bull. of Tech. Univ., Vol. 32, pp. 65-71, 1979.
3. Batur, C., "Optimum and sub-optimum stochastic control", Journal of ITU., Vol. 37, No. 4, pp. 46-50, 1979.
4. Batur, C., "Identification of electric process heater by microprocessor", Bull. Tech. Univ., Vol. 35, pp. 63-70, 1982.
5. Batur, Celal, "A Modified Algorithm for the Least Squares Identification", Trans. of ASME Journal of Dynamic Svstems Measurement and Controls, pp. 50-52, March 1983.
6. Batur, Celal., "Self Tuning Controller for the Smith Control Scheme", Instrumentation Systems and Automation, Vol. 40, Part 1, pp. 637-642, Oct. 1985.
7. Braun, M.J., Ida, N., Batur, C., Rose, B., Hendricks, R C., Mullen, R.L., "A Non-invasive Laser Based Method in Flow Visualization and Evaluation in Bearings", Paper No: C-288/87, IMechanical Engineering, London-England, pp. 37- 46, 1987.
8. Mussivand, T., Navarro, R., Chen, J., Braun, M.J., Harasaki, H., Kiraly, R., Batur, C., McMillin, C.R., Nose, Y., "Flow Visualization in Artificial Hearts Using Diffuse and Planar Laser Lighting", Trans. of Amer. Soc. of Artificial Internal Organs, Vol 34, July-September 1988, No 3, pp. 317 - 321.
9. Batur, C., Braun, J.M., Shaffer, T., Rose, B., "Computer Based Flow Visualization as an Instructional Tool for Fluid Dynamics", Coed. Journal of Computers in Education. Vol. VII, No. 4, October 1988, pp. 14-20.
10. Padovan, J., Choy, F K., Batur, C., Canilag, L., "Seismic Induced Impeller Blade Rubs in Rotating Power Plant Components, ", Journal of Pressure Vessel Technology, Vol. 110, No. 4, pp. 405-413, 1988.
11. Choy, F K., Padovan, J., Batur, C., "Rub Interactions of Flexible Casing Rotor Systems with Base Excitations", ASME Journal of Engineering for Gas Turbines and Power, Vol. 111, No 4, pp: 652-659, October 1989.
12. Batur, C., Braun, M.J., "Measuring Flow With Machine Vision", Intech., Intern. Journal of ISA, Vol. 36, No. 2, 1989.
13. Hete, B.F., Savage, M., Batur, C., "A High Pressure Portable Pneumatic Drive Unit", Journal of Artificial Organs, Vol. 13, No. 6, 1990, pp. 539-545.
14. Braun, M.J., Batur, C., "Non-Intrusive Laser Based Full Field Quantitative Flow Measurements Aided by Digital Image Processing, Part 2: The Case of Hydrostatic Bearing," , Journal of Tribology International, pp. 277-289, Vol. 13, 1991.

15. Batur, C., Kasparian, V., "Predictive fuzzy expert controllers", International Journal of Computers and Industrial Engineering. Vol. 20, No. 2, pp. 199-209, 1991.
16. Batur, C., Srinivasan, A., Chan, C.C., "Automated Rule Based Model Generation for Uncertain Complex Dynamic Systems", Journal of Engineering Applications of Artificial Intelligence, Vol. 4 , No.4, May 1991.
17. Batur, C., "Process modeling by neural nets", Journal of Modelling and Scientific Computing, submitted..
18. Batur C., Kasparian, V., "Adaptive Expert Control", International Journal of Control, Vol. 54, Number 4, pp. 867-881, 1991.
19. Batur, C., Kasparian V., "Model based fuzzy control", Journal of Mathematical and Computer Modeling, Pergamon Press, Vol. 15, No. 2. pp. 3-15, 1992.
20. Batur, C., Sharpless, R. B., Duval, W.M.B , Rosenthal, B.N., "Self-tuning multivariable Pole Placement Control of Multizone Crystal Growth Furnace", Journal of Adaptive Control and Signal Processing, Vol. 6, pp. 111-123, 1992.
21. Batur, C., Sharpless, R B, Duval, W.M.B, Rosenthal, B.N., Singh, N B, "Identification and Control of a Multizone Crystal Growth Furnace", Journal of Crystal Growth, 119, pp. 371-380, 1992.
22. Batur C., Kasparian, V., "Fuzzy Adaptive Control", International Journal of Systems Science, Vol. 24, No.2, 301-314, 1993.
23. Srinivasan, A., Batur, C., "Fault Detection and Isolation in Unsupervised Learning Environment", Journal of Pattern Recognition Letters, 15, 235-242, March 1994.
24. Srinivasan, Arvind., Batur Celal., "Hopfield/Art-I Neural Networks Based Fault Detection and Isolation", IEEE Transactions on Neural Network, Volume 5, Number 6, November 1994, pp: 890-900.
25. Srinivasan, A., Batur, C., Chan, C.C., "Using Inductive Learning to Determine Fuzzy Rules for Dynamic Systems", Journal of Engineering Applications of Artificial Intelligence, Vol. 6., No. 3 pp. 257-264, 1993.
26. Batur, C., Kasparian V.S., " A Self-tuning Fuzzy Controller with Switching Control Modes", Journal of Dynamic Systems Measurement and Controls, December 1994, Vol 116/1 , pp: 795-801.
27. Janson , R. W., Batur , C., Krishna L., "The Effects on Energy Markets Subjected to Regulatory Changes Using Neural Network Methodology", The Ohio Journal of Science, Volume 94, Number 3, June 1994 pp: 60-70.

28. Srinivasan A., Batur, C., Veillette R., "Projective Control Design for Multi-zone Crystal Growth Furnace", IEEE Transactions on Control System Technology, Vol. 2. No. 2, June 1994.
29. Kasparian V.S., Batur, C., Zhang, H., Padovan J., " Davidon Least Squares Based Learning Algorithm for Feedforward Neural Networks", International Journal of Neural Network, Vol. 7, No. 4, pp. 661-670, 1994.
30. Kasparian V.S., Batur, C., Duval, W.M.B, Rosenthal, B.N., Singh, N B "Application of Stereo Imaging for Recognition of Crystal Surface Shapes", Journal of Crystal Growth, Vol., 141 455-464, 1994.
31. Kasparian V.S., Batur, C., " Neural Network Based Adaptive Controller", IEEE Transactions on Neural Networks., submitted.
32. Batur, C., Srinivasan, A., Chan, C.C., " Fuzzy Model Based Fuzzy Predictive Controllers", Journal of Intelligent & Fuzzy Systems, Volume 3 No. 2, 1995.
33. Batur, C., Srinivasan, A., Duval, W. M. B, Rosenthal, B. N., Singh, N. B., "Crystal Growth Control in Bridgman Furnace", Journal of Progress in Crystal Growth and Characterization, Vol. 30, pp. 217-236, 1995.
34. Batur, C., Leephakpreeda, T, "Control of Crystallinity in Polymer Extrusion Processes", Journal of Inverse Problems in Engineering Vol. 4, pp. 153-176, 1996.
35. Batur, C., Leephakpreeda, T, " Dynamic Control of Crystallinity During Sheet Extrusion", ASME Journal of Dynamic Svstems Measurement and Controls, submitted.
36. Srinivasan, A, Batur, C., Duval, W. M. B, Rosenthal, B. N., Singh, N. B., "On line Control of Solid-Liquid Interface", International Journal of Control, submitted.
37. Leephakpreeda, T, Batur, C., " Distributed Crystallinity Control During Cast Film Extrusion", International Polymer Processing, Vol. XII, December 1997, pp. 373-377, 1997.
38. Leephakpreeda, T, Batur, Celal., "Stability Analysis of Fuzzy Control System", Thammasat Int. Journal. Vol. 2, No. 1, pp1-6, 1997.
39. Kasparian, V., Batur C., "Model Reference Based Neural Network Adaptive Controller", ISA Transactions, Volume 37, No.1, pp. 21-39, 1998.
40. Batur, C., Duval, M. B. W., Bennett, R. J., " Control and design of crystal growth furnace", ISA Transactions 38, pp. 73-85, 1999.

41. Leephakpreeda, T. and Batur, C. (1997). A Design Sensitivity Analysis for Crystallinity Control, *Thammasat International Journal of Science and Technology*, Vol. 2, No. 2, pp. 18-23.
42. Leephakpreeda, T. and Batur, C. (1997). A Design Sensitivity Analysis for Crystallinity Control, *Thammasat International Journal of Science and Technology*, Vol. 2, No. 2, pp. 18-23.
43. Leephakpreeda, T. and Batur, C. (1997) Modelling of Local Crystallinity in Polymer Extrusion Process, *Research and Development Journal of The Engineering Institute of Thailand*, Vol. 7, No. 2, pp. 76-81.
44. Leephakpreeda, T. and Batur, C. (1997). Stability Analysis of a Fuzzy Control System, *Thammasat International Journal of Science and Technology*, Vol. 2, No. 1, pp. 1-5.
45. Batur, C. and Leephakpreeda, T. (1996). Optimization of Crystallinity Distribution in Sheet Extrusion, *Journal of Inverse Problems in Engineering*, Vol. 4, pp. 153-176.
46. Batur, C., Vhora, M. H., Cakmak, M., Serhatkulu, T. "On line crystallinity measurement using laser Raman spectrometer and neural network", *ISA Transactions*, 38, pp. 139-148, 1999.
47. Batur, C., Srinivasan A., Duval, W. M. B, Singh, N. B., Golovaty, D., "On line control of solid liquid interface by state feedback, *Journal of crystal growth*, 205, pp 395-409, 1999.
48. Nizami, J., Batur, C., Nizami, J., Batur, C., "Stability Analysis and Controller Design for Polymer Sheet Extrusion" *Journal of Vibration and Control*, 6, 1083-1105, 2000.
49. Seidensticker, R.G., Rosch, W.R., Mazelsky, R., Hopkins, R.H., Singh, N.B., Coriell, S.R., Duval, W.M.B., Batur, C" Active control of interface shape during crystal growth of lead bromide", *Int. Journal of Crystal Growth*, 198/199, pp. 988-994, 1999.
50. Ergungor Z., Cakmak M., Batur C., "Effect of Processing Conditions on the Development of Morphology in Clay Nanoparticle Filled Nylon-6 Fibers", *Macromolecular*, 185, 259-276 (2002).
51. Islam, M. S., Husain, I., Veillette, R., Batur, C., "Design and Performance Analysis of Sliding Mode Observers for Sensorless Operation of Switched Reluctance Motors", *IEEE Trans. On Control System Technology*, pp:283-390, May 2003, Volume 11.
52. G. Song V. Chaudhry and C. Batur "Precision tracking control of shape memory alloy actuators using neural networks and sliding mode based robust controller", *Journal of Smart Materials and Structures*, 12, pp:223-231, 2003.
- 53.

54. G. Song V. Chaudhry and C. Batur “ A Neural Network Inverse Model for A Shape Memory Alloy Wire Actuator” , Journal of Intelligent Material System and Structures, Vol. 14, No: 6, pp.331-404, June 2003
55. W.M.B. Duval, C. Batur., H. Zhong, “Transient Mixing Driven by Buycancy Flows”, In submission to Phys. of Fluids.
56. Ergungor Z., Batur C, .Cakmak M., "On line Measurement of Crystallinity of Nylon-6 Nanocomposites by Laser Raman Spectroscopy and Neural Networks”, Journal of Applied Polymer Science, Vol., 92 Issue: 1, 5 April 2004. pp. 474 - 483., 2004.
57. Srinivasan, A., Batur, C., Duval, W., “Limitations on Steady Stae Trackability of Distributed Parameter Systems”, Transactions on Dynamic Systems Measurement and Control, accepted, 2005.
58. Batur, C., Sreeramreddy, T., K. Qais, “ Sliding Mode Control of a Simulated MEMS Gyroscope, ISA Transactions, 44, pp. 99-108, 2006.
59. Z. Gubinyi, C. Batur, A. Sayir and F. Dynys; Electrical properties of PZT piezoelectric ceramic at high temperatures. .Journal of Electroceramics, Article 9364, November 2007, on-line first.
60. M. Cakmak, Z. Erginger, C. Batur “ Molecular origins of toughnening mechanisim in uniaxially stretched nylon-6 films with clay nano particles “ Polymer, accepted POLYMER-07-2531R.
61. J. Fei, C. Batur, "Robust Adaptive Control for A MEMS Vibratory Gyroscope" International Journal of Advanced Manufacturing Technology, accepted.
62. S. Chandra and C. Batur, “Contact Angle Manipulation for Micro Gripping”, In Review for Journal of Microfluid Nanofluid.
-
63. J. Fei, C. Batur, “Adaptive sliding mode control with sliding mode observer for a MEMS vibrating gyroscope,” Proceedings of the Institution of Mechanical Engineers, Part I, Journal of System and Control Engineering 2008, 222(I8), 839-849. [DOI: DOI 10.1243/09596518JSCE565], also in <http://journals.pepublishing.com/jsce>.
64. J. Fei, C. Batur, Robust adaptive control for a MEMS vibratory gyroscope, International Journal of Advanced Manufacturing Technology , (in press), also in <http://dx.doi.org/10.1007/s00170-008-1591-5>.
65. J. Fei, C. Batur "A Novel Adaptive Sliding Mode Control for a MEMS Gyroscope" has been accepted for publication in ISA Transaction after first round revision, Ref. ISATRANS- 2009
64. Batur, Celal, Cakmak, Miko; Yalcin, Baris; Druesedow, Charles “Pressure Control System for Electrospinning Process “ Journal of Polymer Engineering and Science, in

print, also published on line in Wiley Interscience (www.interscience.wiley.com) DOI 10.1002/pen.21587, 2009

65. Fei, J. and Batur, C. A class of adaptive sliding mode controller with proportional–integral sliding surface. *Proc. IMechE, Part I: J. Systems and Control Engineering*, 2009, **223** (I7), 989-999. DOI 10.1243/09596518JSCE712

66. Chandra Santanu, Batur Celal. “Contact Angle Manipulation for Micro Gripping” In print, *Journal of Engineering Applications of Computational Fluid Mechanics*, Number 2 of Volume 4 of the journal, May, 2010.

67. Duval Walter, Batur Celal, Z. Hui, “Dynamics of Buoyancy Driven Flows”, NASA Technical Report, NASATM-2010-216322, in print 2011.

B. REFEREED CONFERENCE PUBLICATIONS

1. Batur C., Parmaksizoglu C., "Optimum Control in Air Conditioning", Proc. of 11. National Symposium on Heat Transfer, Istanbul Turkey. Vol. 1, pp. 378-384, 1979.

2. Batur, C., Kaya, A., "Microprocessor Controlled Robot Arm", 1981 ASEE Annual Conf. Proceedings, pp. 582-587. Published by the American Society of Engineering Education.

3. Batur, C., "Updating the Box and Jenkins Control System by Correlation Analysis", Proc. of the 1981 Joint Automatic Control Conference. Paper FA-8A, 1981. Published by JACC.

4. Batur, C., "Teaching the Analytical and Experimental Techniques on Microprocessor Based System Identification", Proceedings of the ASEE pp. 197-202, 1981. Published by the American Society of Engineering Education.

5. Batur, C., "On Line Identification of an Electrically Heated Liquid Delivery System", 12th Conference on Modeling and Simulation, ISA and IEEE publication, pp. 26-31, 1981.

6. Kaya, A., Batur, C., "Microprocessor Controlled Electric Process Heater", Proceedings of 1981 Joint Automatic Control Conference, JACC Vol. 11. Paper TP-2A.

7. Kaya, A., Dinibutun, T.A., Batur, C., Hizal, A., "Modeling of a Test Chamber for the Optimal Control of Environmental Conditions", Modeling and Simulation, Vol. 11, pp. 661-665, 1980. Published by ISA and IEEE.

8. Batur, C., "A Modified Algorithm for the Least Squares Identification", The ASME Winter Annual Meeting, paper no: 82-WA/DSC-9, 1982.

9. Batur, C., "How to Stabilize the Smith Control Scheme Despite Modeling Errors", 13th Conference on Modeling and Simulation. Modeling and Simulation, published by ISA and IEEE, pp. 127-129, 1982.

10. Batur, C., "Teaching Experimental Techniques for Microprocessor Based Digital Control", Proc. of the ASEE, pp. 99-102, 1982.

11. Batur, Celal., "A New Self-Tuning Controller for Dead Time Systems", 16th Conference on Modelling and Simulation. Modelling and Simulation, 1985, Vol. 16, pp. 639-645, Published by ISA and IEEE.

12. Batur, Celal., "Prediction of Stationary Disturbances of Unknown Mean Value", 16th Conference on Modelling and Simulation. 1985, Vol. 16, pp. 645-649. Published by ISA and IEEE.

13. Batur, Celal., Savage, Michael., "Introducing Micro-Computers into Conventional Measurement Laboratories", Proc. of the ASEE-North Central Section, Oct. 10-12, Vol. 1 pp. 240-243, 1985.

14. Batur, Celal., "Practical Robust Self Tuning Controllers", ISA International Conference. Conf. proceed., paper 86-2684, Vol.41, Part 1, pp. 567-574, Houston Texas, 1986, published by ISA.

15. Batur, Celal., "Stable Sub-optimum Controllers for the Smith Dead Time Compensation", American Control Conference (ACC), June 18-20 1986, Seattle, Washington, Proceedings of ACC, pp. 1354-1358. Paper No: 86CH2336-6.

16. Batur, Celal., Braun, M.J., "Microprocessor Implemented Sub-Optimum Smith Controllers for Temperature Control", IFAC Symposium on Microcomputer Application in Process Control, Conf. Proceed. pp. T7/1-5, July 22-25, 1986. Series editor E. Adali. Istanbul, Turkey.

17. Batur, Celal., "Application of Robust Self-Adaptive Control Strategies by Personal Computers", 17th Modelling and Simulation Conference. Modelling and Simulation, Vol.17, pp. 913-918, 1986, Published by ISA and IEEE.

18. Batur, C., Braun, J.M., Shaffer, T., Rose, B., "Computer Based Flow Visualization as an Instructional Tool for Fluid Dynamics", Proceedings of the 1987 Annual ASEE Conference, pp. 1-6. Published by the American Society of Engineering Education.

19. Padovan, J., Choy, F.K., Batur, C., "Seismic Induced Impeller/Blade Rubs in Rotating Power Plant Components", 5th National Congress, ASME PVP Conference, San Diego, 1987. Published in PVP Vol. 127, Book No. G00374.

20. Braun, M J., Batur, C., Ida, N., Rose, B., Hendricks, R.C., Mullen, R.L., "A Non Evasive Laser Based Flow Analysis for Thin Film Flows at Low Reynolds Numbers", ASME/JSME Heat Transfer Conference, March 1987, Hawaii, Conference Proceedings Vol. 2, pp.71-78, Therm-2C.

21. Batur, C., Braun M.J., "An Expert Image Processing System to Quantify Fluid Dynamics", Session EIS-3 of International Electronic Imaging Conference, Nov. 2-5, Boston, 1987.

22. Batur Celal., "Robust Self Tuning Control Strategy for Pressure Control", Proceedings of the ISA/Mid-America Conference, March 17-19, 1987, pp. 156-161, published by ISA.

23. Batur, Celal., "Self Tuning Based Identification and Control of Smith Control Systems", ASME Winter Annual Meeting, Miami Beach Florida. 85-WA/DSC, Vol. 1 pp. 185-188, published by ASME, 1985.

24. Batur, Celal., "Teaching Statistical Process Identification with Low Cost Computers", Proc. of ASEE-North Central Section, Oct. 10-12, Vol. 1, pp. 19-22, 1985, published by ASEE.

25. Batur, Celal., "Identification Techniques for Smith Predictor Controllers", Paper 86-WA/DSC-28. Winter Annual Meeting of ASME, Dec. 1986, published by ASME.

26. Shaffer, T.M., Batur, C., Braun, M.J., "An Application of Computer Vision to Fluid Dynamics", 18th Modelling and Simulation Conference, 1987, Modelling and Simulation, Vol. 18, Part 2, pp. 741-747, Published by ISA and IEEE.

27. Batur, Celal., Braun, M. J., "An Expert System to Identify the Steady State Performance Characteristics of Journal Bearings Through Non-Intrusive Image Processing Techniques", Proceedings of American Control Conference, 1988, pp. 632-636. This paper received the best presentation award.

28. Braun, M.J, Batur, C., Karavelakis, G., "An application Oriented Image Processing System for Non-intrusive Velocity measurements ", International Electronic Imaging Exposition and Conference, Anaheim, California, April 1988, Conf. Proceed. pp. 819A-819F.

29. Braun, M.J., Batur, C., Karavelakis, G., "Non-Intrusive Flow Measurements in Hydrostatic Journal Bearings", Instrument Society of America Conference, Houston, Texas 1988, Conf. Proceedings , paper 88-1443, pp. 277-288, published by ISA.

30. Braun, M.J., Batur C., Karavelakis, G., "Digital Image Processing Through Full Flow Field Tracing (FFFT) in Narrow geometries at Low Reynolds Numbers ", First National Fluid Dynamics Congress, Cincinnati, Ohio, July 24-28,1988. Paper # AIAA- 88-3781-CP, pp. 1965-1975.

31. Batur, C., Braun, M. J., Mudry, K., Kellackey, K., "Implantable self contained artificial bladder and sphincter", 19th Modelling and Simulation Conference of IEEE and ISA, May, 1988, Modelling and Simulation, pp. 1717-1721, Published by ISA and IEEE.

32. Batur, C., Braun, M.J. "Flow measurement with non-intrusive machine vision", Instrument Society of America Conference, Houston, Texas 1988, Conf. Proceedings, paper 88-1441, pp. 261-266, published by ISA. This paper received the second best paper award.

33. Mussivand, T., Navarro, R.P., Chen, J., Batur, C., McMillin, C.R., "Artificial heart instrumentation for fluid dynamic analysis", ISA/88 Proc of the International Conf. of the ISA. Published in conf. proceedings. Paper 88-1442, pp. 267-276, 1988.

34. Batur, C., Braun, M J., "Flow Measurement with Non-intrusive Machine Vision", Proc. of the ISA-88, pp. 261-266. Published by the Instrument Society of America 1988.

35. Batur, C., Kasparian V.S., "Model Based Self Tuning Expert Control " Proceedings of the Robex 89, the annual workshop on robotics and expert systems. ISA Vol 4. pp 177-183, 1989, ISA Paper #89-0382.

36. Batur, C., Kasparian V.S., " Application of a fuzzy expert controller to speed regulation", Modelling and Simulation Vol. 20 Part 5. pp: 2205-2209. Published by IEEE and ISA, 1989.

37. Batur, C., Kasparian V.S. , " Self-organizing model based expert controller", Proceedings of the IEEE International Conference on Systems Engineering. TCH 2767-2-89 IEEE, pp. 411-415. IEEE Catalog No: 89CH2767-2, 1989.

38. Batur, C., Kasparian V.S., " Intelligent Fuzzy Expert Control", Dynamic Systems and Control, DSC-Vol. 16, pp. 1-6. The American Society of Mech. Eng., 1989.

39. Batur, C., Kasparian V.S., "Application of a self-tuner using fuzzy control technique", Proceedings of the Second International Conf. on Industrial Engineering Applications. Vol. 1, pp. 235-244, 1989. Paper 1989 ACM, 0-89791-3205.

40. Batur, C., Kasparian, V.S., " A Real Time Self-Tuning Fuzzy Control", Proceedings of the 1989 American Control Conference, pp 1810-1815, Volume 2. Published by the American Control Council. IEEE Catalog number 8984415.

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45. Batur, C., Kasparian V.S., "Stable Self-tuning Fuzzy Expert Controller", Proceedings of the 3rd annual conference on Expert Systems. Solutions in Manufacturing, pp. 297-308. Published by ESD 1989.

46. Batur, C., Srinivasan, A., "Automated Rule Based Model Generation for Uncertain Complex Dynamic Systems", 1991 IEEE International Symposium on Intelligent Control. Aug. 13-15,1991, Arlington Virginia, paper CH3019-7/91/000. IEEE pp 275-280.

47. Batur, C., Sharpless, R.B., Duval, W.M.B, Rosenthal, B.N., "Self-tuning Multivariable Pole Placement Control of Multizone Crystal Growth Furnace", ASME WAM 1991, Proceedings pp. 87-93. Publication DSC-Vol 28, PED-Vol. 52.

48. Duval, W.M.B., Rosenthal, B.N, Batur, C., Sharpless, R.B., Singh, N.B., "Parametric Effects of External Variables on Interface Morphology of Lead Bromide Crystals", Gourdon Research Conference, June 1991.

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55. Srinivasan, Arvind., Batur, Celal., " Projective Control Design for Multi-zone Crystal Growth Furnace" 1993 American Control Conference, IEEE 93CVH3225-0 pp. 3018-3022.
56. Batur, Celal., Srinivasan, Arvind., Chan C-C., " Inverse Fuzzy Model Controllers" 1993 American Control Conference, IEEE 93CVH3225-0 pp. 772-776.
57. Batur, Celal., Srinivasan, Arvind., "Control of Thermal System through finite element based state-space model", Proceedings of the American Control Conference, IEEE Catalog # 94CH3390-2, pp: 2655-2660, 1994.
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60. Srinivasan, Arvind., Batur, Celal., Rosenthal Bruce. "Interface Shape Control in Solidification," 1994 ASME Winter Annual Meeting, Transport Phenomena in Solidification, HTD-Vol. 284, AMD-Vol. 182, ISBN 0-7918-1392-4, page 265-277.
61. Srinivasan, Arvind., Batur, Celal., Rosenthal Bruce. "Solid-Liquid Interface Shape Control During Crystal Growth Control", Proceedings of the American Control Conference, IEEE Catalog # 95CH35736, pp: 12701275, 1995
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74. Walter M. B. Duval., Celal Batur., Robert J. Bennett., “ The Design of a Transparent Vertical Multizone Furnace: Application to Thermal Field Tuning and Crystal Growth”, NASA /TM- 1998-207412.

75. Batur, C., Vhora, M. H., Cakmak, M., Serhatkulu, T. “ On line crystallinity measurement using laser Raman spectrometer and neural network”, ASME. 1998. Presented in the symposium for Phase Transitions in Polymer Processing.

76. Batur, C., Duval, W.M.B., Bennett, R., "Performance of Bridgman furnace operating under projective control" , American Control Conference, ISBN 0-7803-4990-6/99@ACC, 4101-4105, 1999.

77. Batur, C., Srinivasan A., Duval, W. M. B, Singh, N. B., Golovaty, D., " On line control of solid liquid interface by state feedback, ASM Materials Solution, pp. 30 (abstract and presentation). 1999.

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80. Walter Duval, Celal Batur, " Stereo Imaging Velocimetry of Mixing Driven by Buoyancy Induced Flow Fields", Fifth Microgravity Fluid Physics and Transport Phenomenon Conference, Aug. 9-11 , 2000.

78. Z. Ergungor., M. Cakmak., **C. Batur** " Effect of Processing Conditions on the Development of Morphology in Clay Nanoparticle Filled Nylon 6 Fibers", ANTEC, May 2002.

79. Ergungor Z., Cakmak M., Batur C., " Basic Studies on Uniaxial deformation of Nylon-6 Clay Nanocomposite films", in SPE Antec Proceedings, Vol. 2- Materials, pp: 1579-1583, 2002

80. Ergungor Z., Cakmak M., Batur C., Conditions on the Development of Morphology in Clay Nanoparticles Filled Nylon-6 Fibers", in SPE Antec Proceedings,, Vol. 2, Materials, pp:2280-2284, 2002.

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82. Batur, Celal., Tawfik, M. "Projective Control of Electro Hydraulic Servo Systems", Proceedings of the 2001 American Control Conference, ISBN 0-7803-6495-3/01@2001ACC, pp:576-581.

83. W.M.B. Duval, C. Batur., H. Zhong, "Transient Mixing Driven by Buoyancy Flows", Proceedings of the ASME IMECE, Paper Number IMECE2002-33280.

84. Celal Batur, Ling Zhou Chien-Chung Chan, "Support Vector Machines for Fault detection", Proceedings of the 41st IEEE Control Design Conference, ISBN# 0-7803-7516-5@2002IEEE, , pp: 1355-1356, 2002.

85. G. Song, V. Chaudhry, and C. Batur, " A New Approach to Precision Tracking Control of Shape Memory Alloy Actuators Using Neural Networks and Sliding Mode Based Robust Controllr", 2001 International Conference on Shape Memory and Superelastic Technology and Shape Memory Materials, September 2001.

86. W.M.B. Duval, C. Batur., H. Zhong, "Flow Field Measurement of Mixing Driven by Buoyancy", Proceedings of the 41st AIAA Aerospace Sciences Meeting, AIAA 2003-1158, 6-9 January 2003.

87. Khasawneh, Q. A., Batur, C., " Adaptive Control of a Simulated MEMS Gyroscope", 2003 ASME Congress, November 15-21, 2003, IMECE2003-42140.

88. Batur, C., Duval, M. B., "Active Control of Interface Shape During Crystal Growth of Lead Bromide", ASM Materials Solutions Conference and Exhibition, 13-16 October, 2003.

89. W.M.B. Duval, C. Batur., H. Zhong, "Transient mixing driven by buoyancy flows" Gordon Research Conference on Gravitational Effects in Physico-Chemical Systems, Connecticut College, New London, CT, July 27-August 1, 2003.

90. C. Batur, L. Zhang " Sliding mode observer and controller design for hydraulic control sytems" 0-7803-7896-2/03/ ©2003 IEEE 1721, Proceedings of the American Control Conference, Denver, Colorado June 4-6, 2003.

- 91.S. Jalal, C. Batur., " Modeling and Sliding Mode Control of a Pneumatic Servo System", Proceedings of the MED04, IEEE Conference on Control and Automation, 2004.

92. K., Qais, C. Batur,” Design and Control of a Vibrating Gyroscpe”, pp. 2505-2510. 0-IEEE # 04CH37538C, ISBN: 0-7803-8336-2, Proceedings of the American Control Conference, June 30-July 2, 2004.

93. Batur, C., Syed Shah Jalal, “ Sliding Mode Control of a Pneumatic Cylinder”, IMECE2004-60266, ASME International Meeting, 2004.

94. Batur, C., Sreeramreddy, T., K. Qais, “ Sliding Mode Control of a Simulated MEMS Gyroscope, pp 4160-4165, Proceedings of the American Control Conference, 2005, Portland, Oregon ISBN: 0-7803-9099-7, IEEE # : 05CH37668C..

95. Batur, C., Fei, Juntao, “ Adaptive Vibration Control of Flexible Structure with Sliding Mode Compensator”, Proceedings of IMECE2005, 2005 ASME International Mechanical Engineering Congress and Exposition November 5-11, 2005, Orlando, Florida USA IMECE2005-79987. ISBN:0-7918-3769-6

96. Batur, C., Fei, Juntao, “ADAPTIVE SLIDING MODE CONTROLLER WITH PROPORTIONAL AND INTEGRAL SLIDING SURFACE” IMECE 2006 Paper Number: IMECE2006-13274

97. Batur, C., Fei, Juntao, “Adaptive Sliding Mode Control of MEMS Vibrational Gyroscope”, Paper Number: IMECE2006-13273 IMECE 2006

98. Santanu Chandra, Celal Batur, “Manipulation of Capillary Force by Electrowetting for Micromanipulation”, Nano Science Technology Institute (NSTI) Conference, MEMS Device Modeling, Boston, May 7-11, 2006

99. Santanu Chandra, Celal Batur , “Liquid Bridge Based Microgripper” , Proceedings of the ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference , IDETC/CIE September 4-7, 2007, Las Vegas, Nevada

100. J. Fei and C. Batur “A Novel Adaptive Sliding Mode Controller for MEMS Gyroscope”, Proceedings of the 46th IEEE Conference on Decision and Control

New Orleans, LA, USA, Dec. 12-14, 2007 IEEE Catalog Number: 07CH37933C ISBN: 1-4244-1498-9 Library of Congress: 79-640961, ISSN: 0191-2216

C. SELECTED REPORTS AND PRESENTATIONS

1. Batur, C., "Crystal Growth Control", Westinghouse Research Center, Pittsburgh, April 23, 1991.
2. Batur, C., "Neural Networks for Process Identification", OAI Workshop on Trends and Application in System Identification, NASA Lewis Research Center, Aug. 9, 1991.
3. Batur, C., "Temperature and melt-solid interface control during crystal growth", final technical report to NASA. Cooperative agreement NCC 3-109, July 1990.
4. Choy, F.K., Padovan, J., Batur, C., "Rub in High-Performance Turbomachinery", A report in ASME International Gas Turbine Institute, pp. 150-151. Published by International GasTurbine Institute, 1990.
5. Padovan, J., Choy, F.K., Batur, C., "Analytical Simulation and Parametric Study of the Non-Linear Dynamics of High Performance Turbomachinery", published by ASME, International Gas Turbine and Aero Engine Technology Report, pp. 114, 1989.
6. Padovan, J., Choy, F., Batur, C., "Rub in High PerformanceTurbomachinery: Solution Methodology: Signature Analysis: Experimental Verification" 1987 ASME International Gas Turbine Technology Report, pp. 81-82 published by ASME.
7. Padovan J., Choy F.K., Batur C., Report for International Gas Turbine and Aerospace Technology, pp. 91, 1988, published by ASME. International Gas Turbine Institute.
8. Srinivasan A., Batur, C., " Adaptive Control for a Multizone Crystal Growth Furnace" The tenth Annual OSU Control Workshop, April 11 1992. The Ohio State University, Columbus, Ohio 43210.
9. Batur, C., Final technical report to NASA for Cooperative agreement, NCC 3-231, Aug. 1992
10. Seminar on Flow Quantification. October 1988, Digital Equipment Colorado Springs.
11. Seminar on Digital Image Processing Methods for Experimental Mechanics. March 1988, NASA Lewis Research Center.
12. Seminar on image processing for crystal growth. April 1988. Materials Processing Lab. NASA Lewis Research Center.
13. Seminar on bearing quality control by image processing. W.D.P Air Base Dayton, 1987.

14. Coordinated 1987 Mid-America ISA Spring Conference.
15. Organized a session on quantitative measurements through image processing for the International Conf. of the Instrument Society of America. October 1988.
16. Invited seminar on Expert Systems, funded by United Nations, 2 weeks, Istanbul, Turkey, June 1990.
17. Session Chairman on Neural Networks. American Control Conference, 1992.
18. Presentation on Adaptive Expert Systems. Industrial Control Engineering Workshop. The University of Akron, May 1, 1992.
19. Presentation on Neural Network Based Control Systems. Ohio Aerospace Neural Net Workshop. June 14 1993, Ohio Aerospace Institute.
20. Batur, C., Final technical report to NASA for Cooperative agreement, NCC 3-150, Aug. 1993.
21. Batur, C., "Control of Solid-Liquid Interface Shape Control During Crystal Growth", American Association for Crystal Growth, the Fifth Conference on Crystal Growth, Growth Process Modeling Session, October 6, 1994, Atlantic City.
21. Batur, C., "Mathematical Modeling of Crystal Growth", Mathematical Sciences, University of Akron, November, 1994.
22. Batur, C., "Control of Solid-Liquid Interface Shape Control During Crystal Growth", Polymer Engineering, University of Akron, December, 1994.
23. Batur, C., "Crystal Growth Control", Sawyer Research, Inc., Spring 1999.
24. Batur, C., "Crystal Growth Control", Bicron Inc., Spring 1999.
25. Islam, M. S., Husain, I., Veillette, R., Batur, C., "Design and Performance Analysis of Sliding Mode Observers for Sensorless Operation of Switched Reluctance Motors", DSP-136, Delphi Saginaw Steering Systems, July 2001.
26. Progress Reports to NASA on Stereo Imaging Velocimetry of Mixing Driven by Buoyancy Induced Flow Fields, October 200-2002.
25. Song, G., Chaudhry, batur, C., "Model Reference Control of a Magneto-Rheological Damper Using Neural Networks", 5th Asia Pacific Conference on Control and Measurement, 2002.

26. W.M.B. Duval., Batur, C., Zhong, H., “ Mixing Driven by Buoyancy Induced Flows “ Gordon Resaech Conference on Gravitational Effects in Physico-Chemical Systems, New London, CT, August 2003.

27. Numerous presentations in companies to represent the research capabilities of the department.

IV. ACTIVITY IN RESEARCH

EXTERNALLY FUNDED RESEARCH PROJECTS

Research on Optimum Control by Microprocessor to Save Energy in Buildings. Research supported by Inter University Research Council, Contract No. OBR-ER-2 May-Sept. 1981, (Co-PI).

\$ 22,000

Electronic drive and monitor system for the LVAD (=Artificial Heart), funded by the Cleveland Clinic Foundation, 1985, (Co - PI).

\$ 9,000

A totally implanted, self-contained, prosthetic bladder. Funded by the Akron City Hospital and the University of Akron, RG-925 \$2,855. Additional contributions: \$2,000 Akron City Hospital, \$2,000 College of Engineering ,with M.J. Braun, K. Mudry, J. Summers, 1986.

\$ 6,885

Equipment grant from the Department of Energy, Grant No: OR-62, 1987.

\$ 6,990

A non-intrusive flow visualization method for thin film technology. NAG3-675 (Co-PI). For the period 12/29/86 through 12/28/87.

\$ 70,693

Equipment grant for robotics laboratories, Nordson Corporation, Ohio, 1988.

\$ 55,000

Equipment grant from NASA, 1988.

\$ 7,619

A non-intrusive flow visualization method for thin film technology, NASA Grant 3-675. \$71,276. University of Akron matching fund \$15,000. December 87-December 88 (Co-PI).

\$ 86,276

Temperature and melt/solid interface control during crystal growth, NASA Grant, PI, 1988.

\$ 41,382

Support for the Motion and Control Lab. from Parker 1999-2001

\$40,000

Equipment grant for machine vision components and software for the robotics Lab. True Vision Company, 1988.

\$ 2,000

Adaptive control of interface by temperature and interface profile feedback in transparent multi-zone crystal growth furnace NASA, PI, 1989.

\$ 18,920

Further study on adaptive control of interface by temperature and interface profile feedback in transparent multi-zone crystal growth furnaces . NASA PI, 1990.

\$ 15,655

Westinghouse control system donation from Ohio Edison Company

\$ 70,000

Stereo imaging of interface shape during crystal growth in transparent furnaces, NASA, PI, 1991.

\$ 44,743

Multivariable adaptive control of interface for programmable multizone crystal growth furnace, NASA, PI 1991.

\$ 32,593

Data acquisition equipment, private donation April, 1991.

\$ 5,000

Stereo Imaging Based Particle Velocimeter, NASA Grant NCC3-231, PI, September 1991.

\$ 15,800

Program Excellence Grant. Computational Mechanics Group **\$ 340,000**
(A member of Computational Mechanics Group, first year funding).

Parker Hannifin Fluid Power Laboratory Support (Co-PI), 1992.

\$ 70,000

A Nasa Grant on, On-line Quantification of Crystal Surfaces by Stereo Imaging. June 1992, PI.

\$ 11,633

An Intelligent Control Methodology for Programmable Multizone Crystal Growth Furnaces, a supplemental fund, NASA 1992.

\$ 1,000

A Nasa Grant on, An Intelligent Control Methodology for Crystal Growth, 1/28/92, PI.

\$ 33,112

A Nasa Grant on, Crystal Growth Control, 2/28/93, PI.

\$ 36,498

A Nasa Grant on, Crystal Growth Control, 8/16/94, PI.

\$ 10,000

Hierarchical Structure Control of Polymer Sheet Casting Process Through Adaptive Control, Co-PI, US Army, 1994.

\$ 117,500

A Nasa Grant on Crystal Growth and Mixing Control, 1996, PI.

\$ 35,000

A Nasa Grant on, Crystal Growth Control, July 1996, PI.

\$ 9,700

A Nasa Grant on, Crystal Growth Control, June 1997, PI.

\$ 3,999.00

A Nasa Grant on, Crystal Growth Control, June 1997, PI.

\$ 30,000.00

A Nasa Grant on, Crystal Growth Control, April 1997, PI.

\$ 28,010.00

“Acquisition of a Pulse Excimer Laser for Polymer Engineering and Crystal Growth Research” (Co-principal investigators: Dr. J. L. White, Dr. C. Batur) funded by the NSF, October 1997 to October 1999, **\$204,093** (\$61,228 in cost share from Univ. of Akron).

Acquisition of NuralWare, neural network training software package
NeuralWare Inc. , Co-PI April, 1998

\$95,000.00

Stereo Imaging Velocimetry of Mixing Driven by Buoyancy Induced Flow Fields NASA Glenn 5/15/2000-1/30/2003	\$135,000
Support for Parker Motion Control Lab., 2000,Parker Hannifin.	\$12,500
Support for Parker Motion Control Lab., 2004,Parker Hannifin.	\$12,500
OBR award for Polymer-Based Nanotechnology, Co-Pi, (a group of twenty faculty), 2002	\$175,000.
Gas Service Line Riser – leakage Research, Co-Pi, 2005 Public Utilities Commision of Ohio	\$67,530
Characterization of High Temperature Ceramics, PI, 2005 CWRU/Nasa Glenn	\$130,000
Stereo Imaging Velocimetry of Mixing Driven by Buoyancy Induced Flow Fields. Ohio Board of Regents, PI, 2004,	\$20,000
Support for Parker Motion Control Lab., 2005,Parker Hannifin.	\$7,000
Directionally Solidified Multifunctional Ceramics, Ohio Board of Regents, PI., 2006,	\$6,090
Support for Parker Motion Control Lab., 2006,Parker Hannifin.	\$2,000
Support for Parker Motion Control Lab., 2007,Parker Hannifin.	\$12,000
Support for Parker Motion Control Lab., 2008,Parker Hannifin.	\$5,000
Support for Parker Motion Control Lab., 2009,Parker Hannifin.	\$37,000
Support from Delphi for ME Department	\$642,550
Software Support (NX5) from Siemens for ME Department, 2008-2009	\$2,000,000
NSF, I-UCRC Planning, 2010	\$10,000

B. INTERNALLY FUNDED RESEARCH PROJECTS

Advanced control of heat exchangers by micro-processor and simple algorithms. Funded by the University of Akron, 1981 (Co-PI).

\$ 3,500

Optimization of energy use in existing buildings by self-adaptive control strategies. Funded by the University of Akron, PI.

\$ 2,400

Life extending design through artificial intelligence . October 1989- January 1991, PI. The University of Akron

\$ 2,100

Neural network based fault diagnosis for turbomachines, \$8,500 and a departmental match of \$4,250. 1990, PI. Research Challenge Enhancement Award.

\$ 12,750

Durability improvement of high performance machinery under extreme operating conditions, \$8,500 and a departmental match of \$4,250, Co-PI. 1990. Research Challenge Enhancement Award.

\$ 12,750

Determination of fractal measure by image processing and application to crystal growth. October 1990, PI.

\$ 2,100

Faculty Research Grant and OBR Research Challenge Award for Tuning Fuzzy Logic Controllers. April, 1994.

\$ 3,500

Internal Faculty Grant, Crystallinity Control and Measurement
March 1998

\$ 3,500

Teaching Excellence Grant, 1998

\$ 5,000

V. ACTIVITY IN PROFESSION

A member of Editorial Advisory Board for ISA Transactions 2004-
Associate Editor of the ISA Transactions 2001-2004

Elected as the secretary for the Automatic Control Division of the Instrument Society of America, 1988-1990.

Panel member of the Identification Committee on the System Identification for the ASME, 1986- 1990.
 Editor of the newsletter for the Automatic Control Systems Division of the Instrument Society of America, 1986 -1988.
 Reviewer for the Trans. of the ASME System Dynamics Measurement and Controls.
 Reviewer for the IFAC, International Federation of Automatic Control. Reviewer for the Control Systems Magazine of the IEEE.
 Reviewer for the West Educational Publishing.
 Elected to coordinate 1991 ISA International Spring Conference.
 Consultant to the Instrument Society of America, 1990-.
 Technical Review Chairman for American Control Conference and ISA Conference for the Instrument Society of America, 1992-.
 A judge for the American Control Conference, Control Engineering Heritage Award, 2000.
 Editor of Intelligent Control and Automation, ICA, ISSN Print: 2153-0653
 ISSN Online: 2153-0661, Website: <http://www.scirp.org/journal/ica> 2010-

ORGANIZATION MEMBERSHIPS

ISA, Instrument System Society of America
 ASME, American Society of Mechanical Engineers (senior member)
 IEEE, Institute of Electrical and Electronics Engineering
 American Associations of Crystal Growers

AWARDS

Best presentation award. 1988 American Control Conference.
 United Nations Award for a two-week seminar in Turkey on Expert Systems.
 Second best paper award. 1988 Instrument Society of America Conference.
 Collateral Faculty to Ohio Aerospace Institute 1990- .
 Faculty research associate to polymer engineering, 1988-.
 Exceptional performance and accomplishment award. NASA Lewis Research Center, March 15, 1991.
 Dean Louis A. Hill Jr. Award, College of Engineering , 1992.
 Teaching excellence grant, 1998.

PATENTS

US Patent Number 6, 176,924B1 - Control of Transparent Multizone Crystal Growth Furnace, W. Duval,., C. Batur., R. J. Bennett, 2001.

US Patent Number 6, 139,627, Transparent Multi-zone Crystal Growth Furnace and Method for Controlling the same, W. Duval,., C. Batur., R. J. Bennett , October 2000.