

CURRICULUM VITAE

Costas Tzafestas

Athens, October 2002

General Information

Birth Date and Place 24 June 1969, Athens

Home Address El .Venizelou 91, Holargos 15561, Athens, GREECE.
Tel. (30) 210- 65 24 000

Current Position Lecturer
National Technical University of Athens (NTUA)
School of Electrical and Computer Engineering
Division of Signals, Control, and Robotics
15773 Zografou Campus, Athens, GREECE
Tel. (30) 210 - 772 3687 Fax. (30) 210 - 772 2490
E-mail: ktzaf@softlab.ntua.gr

Education

Engineering Degree

Electrical and Computer Engineering Department, National Technical University of Athens (NTUA), Greece, July 1993. Thesis title: *Dynamic modeling and robust control of biped robots*.

D.E.A.

Diplôme d'Etudes Approfondies (M.Sc. equivalent), Robotique d'Intervention et de Service, Laboratoire de Robotique de Paris (LRP), Université Pierre et Marie Curie (Paris 6), Paris, France, September 1994. Thesis Title: *Commande en impédance adaptative appliquée à une patte d'un robot quadrupède*. Grade: 15.65 - Bien.

Ph.D.

July 1998. Laboratoire de Robotique de Paris, Université Pierre et Marie Curie (Paris 6), Paris, France. UFR Informatique, Spécialisation: Robotique.
Title: *Synthèse de retour kinesthésique et perception haptique lors de tâches de manipulation virtuelle*. Mention: très honorable avec les félicitations du Jury.

Work and Research Experience

Univ. Pierre et Marie Curie (Paris VI)

Member of the research team CAR-TRV (Commande et apprentissage des robots – Téléopération et Réalité Virtuelle) of the Laboratoire de Robotique de Paris (LRP), in direct collaboration with the STR (Service de Téléopération et de Robotique) of the CEA (Commissariat à l'Energie Atomique), in the framework of the relevant research action line of the CNRS (Centre National de Recherche Scientifique). Paris, France. January 1994 - July 1998. Research Topics:

- *Telerobotics and Virtual Reality.*
- *Modeling and Control of mobile robots.*

Participation in the project TWE - Telepresence World Experiment, in cooperation with the following Institutions: MEL (Mechanical Engineering Laboratory – Tsukuba – Japan), GRAVIR - INRIA Rhône-Alpes (Grenoble, France) as well as Ecole des Mines de Nantes (France). Research Topic :

- *Parallel multi-robot long-distance teleoperation of robotic manipulators.*

IUT (Institut Universitaire de Technologie) de l'Université de Versailles (UVSQ, France)

Teaching a laboratory course on circuit electronics: Academic Year 1994-95.

M.I.T. (Boston, Cambridge, Massachussets)

Diploma thesis within the Legged Robots Group, Artificial Intelligence Laboratory, (Professor M.Raibert). January - June 1992. Research Topic:

- *Robust Control of Legged Robots*

I.C.C.S (Institute of Communications and Computer Systems) – NTUA

Member of the research group of the Intelligent Robotics and Automation Laboratory. Research Topic: *Modeling and Control of Robotic Mechanisms.* Athens, September 1991 - September 1993.

Participation as an external research associate in the following R&D programs:

- AUTONOMY (Intelligent Wheelchair Navigation System): Contribution to the design of the proposed system architecture.
- SENARIO (Sensor Aided Intelligent Wheelchair Navigation): Contribution to the development of the navigation and control algorithm of the mobile platform using neuro-fuzzy methodologies.

Institute of Informatics and Telecommunications, NCSR Demokritos (Athens)

Research Associate from February 2000 – May 2002.

Participation in the following research programs:

- « HygioRobot: Navigation and Control of a Service Robot for Health-Care Applications », ΠΕΝΕΔ'99. Contribution: Development of the web-based teleoperation platform using Virtual Reality techniques.
- WIN (Wireless Internet Network), IST 2000. Contribution to the definition of added-value services concerning e-learning and other Internet applications.

Research and Academic Interests

- Telerobotics - Teleoperation
- Virtual and Augmented Reality human-machine interfaces – Haptics
- Internet applications – web robotics
- Dexterous manipulation and multi-fingered robot hands. Multiple cooperating robots
- Motion planning, modeling and control of walking and mobile machines - Service and intervention robotics.
- Robust and adaptive control with applications to robotic systems.

Other Academic and Professional Activities

- Member of the Institute of Electrical and Electronic Engineers (IEEE). Member of the Greek Technical Chamber.
- Reviewer in the following International Scientific Journals: Journal of Intelligent and Robotics Systems, IEEE Transactions on Robotics and Automation, IEEE Transactions on Systems, Man, and Cybernetics.
- Member of the International Advisory Committee of the:
IEEE International Workshop on Robot and Human Cooperation, Bordeaux and Paris, 16-18 September 2001.

Awards / Distinctions

- 2nd rank during the National Qualifying Exams for Admittance at the Electrical and Computer Engineering Department of NTUA (1987).
- Awarded by NTUA (National Technical University of Athens) and TEE (Technical Chamber of Greece) for *best student performance*, during the final year of studies at the Electrical and Computer Engineering Department of NTUA (1993).
- Best student performance (1st rank) during the “DEA de Robotique”, Université Paris 6 (Paris, September 1994).
- *Allocation de Recherche (Research Fellowship)* of the French Ministry for Research and Technology (1994-1997).
- *Research grant* by the National Scholarship Foundation of Greece (IKY) for post-graduate studies in France (1995-1998).
- Ph.D. Degree (Doctorat) with *Distinction* (Mention: *Très Honorable avec les Félicitations du Jury*), Université Pierre et Marie Curie (Paris 6), July 1998.
- Selection of the research work on multi-robot teleoperation, as well as of the demonstration performed during a Forum organized by the French Academy of Sciences at Poitiers/France (October 98), among the 100 most significant scientific achievements by the French National Center for Scientific Research (CNRS) (Télétravail International, *Les Cents Faits Marquants*, Département des Sciences pour l’Ingénieur, Centre National de la Recherche Scientifique, SPI-CNRS). (<http://www.spi.cnrs-dir.fr/100/technolo/telectr.htm>)

PUBLICATIONS

Journals

1. S.G. Tzafestas, M. Raibert, **C.S. Tzafestas**, "Robust Sliding Mode Control Applied to a 5-link Biped Robot", *Journal of Intelligent and Robotic Systems*, 15: 67-133, 1996.
2. **C.S. Tzafestas**, N. M'Sirdi, N. Manamani, "Adaptive impedance control applied to a pneumatic legged robot", *Journal of Intelligent and Robotic Systems*, 20: 105-129, 1997.
3. S.G. Tzafestas, A.E. Krichochoritis, **C.S. Tzafestas**, "Robust-Adaptive Gait Control of a 9-Link Biped Robot", *Systems Analysis Modelling Simulation (SAMS)*, Vol. 31, No. 4, pp. 247-304, 1998.
4. S.G. Tzafestas, F.V. Hatzivassiliou, **C.S. Tzafestas**, "Robotic Object Recognition using a Worktable Tactile-Sensor Information Processing System", *Image Processing and Communications*, vol.3, no.3-4, pp.51-62, 1997.
5. **C.S. Tzafestas**, P.A. Prokopiou, S.G. Tzafestas, "Path Planning and Control of a Cooperative Three-Robot System Manipulating Large Objects", *Journal of Intelligent and Robotic Systems*, 22: 99-116, 1998.
6. **C.S. Tzafestas**, G.G. Rigatos and S.G. Tzafestas, "Design of Fault Tolerant Control Systems: Passive and Active Approaches", *Systems Science*, vol.24, no.4, pp.5-28, 1998.
7. A. Kheddar, **C. Tzafestas**, P. Coiffet and K. Kotoku, K. Tanie, "Multi-robot teleoperation using direct human-hand actions", *Advanced Robotics*, vol. 11, no. 8, pp. 799-825, 1998.
8. **C. S. Tzafestas** and S.G. Tzafestas, "Recent Algorithms for Fuzzy and Neurofuzzy Path Planning and Navigation of Autonomous Mobile Robots", *Systems Science*, vol. 25, no.2, 1999.
9. **C.S. Tzafestas**, P. Coiffet, "Dextrous Haptic Interaction with Virtual Environments: Hand-Distributed Kinesthetic Feedback and Haptic Perception", *Systems Analysis Modelling Simulation (SAMS)*, vol. 1, no. 7, pp. 1-44(44), July 2000.
10. **C.S. Tzafestas**, P.A. Prokopiou, and S.G. Tzafestas, "A differential motion planning algorithm for controlling multi-robot systems handling a common object", *Control and Cybernetics*, vol. 29, no. 2, 567-584, 2000.
11. **C.S. Tzafestas**, "Whole-hand kinesthetic feedback and haptic perception in dexterous virtual manipulation", submitted to the *IEEE Transactions on Systems Man and Cybernetics*, May 2000.
12. G.G. Rigatos, **C.S. Tzafestas**, and S.G. Tzafestas, "Mobile Robot Motion Control in Partially Unknown Environments Using a Sliding-Mode Fuzzy Logic Controller", *Robotics and Autonomous Systems*, vol.33, no.1, pp.1-11, 2000.
13. **C.S. Tzafestas** and S.G. Tzafestas, "Full-State Modeling, Motion Planning and Control of Mobile Manipulators", *Studies in Informatics and Control*, vol.10, no.2, June 2001.
14. S.G. Tzafestas, P.A. Prokopiou, and **C.S. Tzafestas**, "A New Partitioned Robot Neurocontroller: General Analysis and Application to Teleoperator Modeling Uncertainties Compensation", *Machine Intelligence and Robotic Control*, (in press, 2001).

15. **C.S. Tzafestas** and P. Maragos, "Shape Connectivity: Multiscale Analysis and Application to Generalized Granulometries", submitted to the *Journal of Mathematical Imaging and Vision*, Special Issue on Shapes and Textures, vol. 17, pp.107-127, 2002.

Book Chapters

16. S.G. Tzafestas and **C.S. Tzafestas**, "Fuzzy and Neural Intelligent Control: Basic Principles and Architectures", in: *Methods and Applications of Intelligent Control* (S.G. Tzafestas, ed.), Kluwer, Dordrecht/Boston, 25-67, 1997.
17. **C.S. Tzafestas**, S.G. Tzafestas, "Intelligent Robotic Assembly and Disassembly: General Architecture and Implementation Case Studies", in: *Advances in Manufacturing: Decision, Control and Information Technology* (S.G. Tzafestas, ed.), Springer, 267-282, 1999.
18. **C.S. Tzafestas**, and S.G. Tzafestas, "Fuzzy and Neurofuzzy Approaches to Mobile Robot Path and Motion Planning Under Uncertainty", in: *Soft Computing in Systems and Control Technology* (S.G. Tzafestas, ed.), World Scientific, 223-300, 1999.
19. T.E. Krikochoritis, **C.S. Tzafestas**, and S.G. Tzafestas, "Dynamic Modeling and Locomotion Control of Biped Autonomous Robots", in: *Advances in Intelligent Autonomous Systems* (S.G. Tzafestas, ed.), Kluwer, Dordrecht/Boston, 381-406, 1999.
20. **C.S. Tzafestas**, A. Kheddar, P. Coiffet, "Kinesthetic Feedback on the Human Hand Interacting with Virtual Environments: Design, Control and Haptic Perception Issues", in: *Progress in System and Robot Analysis and Control Design*, (S.G. Tzafestas and G. Schmidt, eds.), Springer, Berlin/London, 397-422, 1999.

Conference Proceedings

21. S.G. Tzafestas, M. Raibert, **C.S. Tzafestas**, "Comparative Simulation Study of three Control Techniques applied to a Biped Robot", *Proceedings 1993 IEEE International Conference on Systems Man and Cybernetics (SMC'93)*, LeTouquet, France, 1993.
22. **C.S. Tzafestas**, M. Guihard, N.K. M'Sirdi, "Two-stage Adaptive Impedance Control Applied to a Legged Robot", *Proceedings 1995 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'95)*, Pittsburgh, USA, 1995.
23. **C.S. Tzafestas** and P. Coiffet, "Real-Time Collision Detection Using Spherical Octrees", *Proceedings IEEE International Workshop on Robot and Human Communication (ROMAN'96)*, pp.500-506, Tsukuba, Japan, 11-14 November, 1996.
24. **C.S. Tzafestas** and P. Coiffet, "Computing Optimal Forces for Generalized Kinesthetic Feedback on the Human Hand during Virtual Grasping and Manipulation", *Proceedings 1997 IEEE International Conference on Robotics and Automation (ICRA'97)*, pp. 118-123, Albuquerque, New Mexico, 20-25 April, 1997.
25. S.G. Tzafestas, T.E. Krikochoritis and **C.S. Tzafestas**, "Robust and Adaptive Control of Biped Robot Walking", Proc. *1st MobiNet Symp. on Mobile Robotics Technology for Health Care Services (MOBINET'97)*, Athens, Greece, May 15-16, 271-286, 1997.

26. S.G. Tzafestas, P.A. Prokopiou and **C.S. Tzafestas**, “Telemanipulator Neurocontrol Using Multiple RBF Networks”, Proc. *IEEE Intl. Symp. on Intelligent Control (ISIC'97)*, Istanbul, Turkey, July 16-18, 1997.
27. A. Kheddar, **C. Tzafestas**, P. Coiffet, “The Hidden Robot Concept - High Level Abstraction Telerobotics”, *Proceedings 1997 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'97)*, Vol.3, pp. 1818-1824, Sept. 7-11, Grenoble, France, 1997.
28. A. Kheddar, **C. Tzafestas**, P. Coiffet and T. Kotoku, K. Tanie, I. Mazon, C. Laugier & R. Chellali. “Parallel, Multi-Robot Long-Distance Teleoperation”, Proc. *1997 IEEE International Conference on Advanced Robotics (ICAR'97)*, pp.1007-1012, Monterey, CA, USA, July 7-9, 1997.
29. **C.S. Tzafestas**, S.G. Tzafestas, P.A. Prokopiou, “Incremental Control of Three Cooperating Robots in Large-Object-Transfer Operations”, Proc. *2nd MATHMOD: Mathematical Modeling IMACS Symposium*, Vienna, Feb.5-7, 1997.
30. S.G. Tzafestas, P.A. Prokopiou, **C.S. Tzafestas**, “Robust Telemanipulator Control Using a Partitioned Neural Network Architecture”, Proc. *1997 IEEE International Conference on Neural Networks (ICNN'97)*, Houston, Texas, USA, June 9-12, 1997.
31. A. Kheddar, **C. Tzafestas**, P. Blazevic, P. Coiffet. “Fitting teleoperation and virtual reality technologies towards teleworking”, *4th French-Israeli Symposium on Robotics (FIR'98)*, pp.147-152, Besançon, May 13-15, 1998.
32. **C.S. Tzafestas**, G.G. Rigatos and S.G. Tzafestas, “Design of Fault-Tolerant Control Systems: Passive and Active Approaches”, Proc. *Systems Science XIII Intl. Conf.*, Wroclaw, Poland, Sept. 15-18, 1998.
33. G.G. Rigatos, **C.S. Tzafestas** and S.G. Tzafestas, “Robust Fuzzy-Logic Velocity Control of a Mobile Robot for Moving Obstacle Avoidance”, Proc. *IMACS-CSC'98: 2nd IMACS Intl. Conf. On Circuits, Systems and Computers*, Piraeus, Greece, Oct. 26-28, 1998.
34. **C.S. Tzafestas**, P. Coiffet. “Dextrous Haptic Interaction with Virtual Environments: Hand-Distributed Kinesthetic Feedback and Haptic Perception”, Proc. *IARP First International Workshop on Humanoid and Human Friendly Robotics*, Tsukuba, Japan, October 26-27, 1998.
35. **C.S. Tzafestas** and S.G. Tzafestas, “Recent Algorithms for Fuzzy and Neurofuzzy Path Planning and Navigation of Autonomous Mobile Robots”, Proc. *1999 European Control Conference (ECC'99)*, Karlsruhe, Germany, Aug. 31-Sept. 3, 1999.
36. S.G. Tzafestas and **C.S. Tzafestas**, “Virtual Reality in Telerobotics: The State-of-the-Art”, Proc. *IEEE Intl. Symposium on Industrial Electronics (ISIE'99)*, Bled, Slovenia, July 12-16, 1999.
37. **C.S. Tzafestas**, “Multimodal Teleoperation Interface integrating VR Models for a Mobile Robotic Assistant”, Proc. *10th International Workshop on Robotics in Alpe-Adria-Danube Region (RAAD'2001)*, Vienna, Austria, May 16-18, 2001.
38. **C.S. Tzafestas** and S.G. Tzafestas, "Mobile Manipulators: Full-State Modeling, Motion Planning and Control", *17th Intl. Conference on CAD/CAM, Robotics and the Factories of the Future (CARS & FOF '2001)*, Durban, South Africa, July 2001.

39. A. Sofou, C. Tzafestas, and P. Maragos, "Segmentation of Soilsection Images using Connected Operators", *IEEE International Conference on Image Processing (ICIP'2001)*, Thessaloniki, Greece, October 7-10, 2001.
40. C.S. Tzafestas, "Teleplanning by Human Demonstration for VR-based Teleoperation of a Mobile Robotic Assistant", Proc. *10th IEEE International Workshop on Robot-Human Interactive Communication (ROMAN'2001)*, Bordeaux and Paris, Sept. 18-21, 2001.

Thesis - Technical Reports

41. K. Τζαφέστας. "Modeling and Robust Control of Biped Robots", Diploma Thesis, Electrical and Computer Eng. Dept. Τμήμα, NTUA, July 1993. (150p.)
 42. C. Tzafestas. "Commande en impédance adaptative appliquée à une patte d'un robot quadrupède", Rapport de Stage de DEA, LRP, Université Paris 6, Ιούνιος 1994. (80p.)
 43. C. Tzafestas. "Synthèse de retour kinesthésique et perception haptique lors de tâches de manipulation virtuelle", Thèse de Doctorat de l'Université Pierre et Marie Curie (Paris 6). Ιούλιος 1998. (160p.)
 44. C. Tzafestas, P. Maragos. "Multi-scale statistical image analysis", Technical Report, NTUA – Electrical and Computer Engineering Dept., October 2000.
 45. C.S. Tzafestas, D. Valatsos. "VR-based Teleoperation of a mobile robotic assistant: Progress Report", Technical Report, Institute of Informatics and Telecommunications, NCSR "Demokritos", DEMO-2000/13, October 2000. (23p.)
-