**Curriculum Vitae**

**NAME: THEODORE PACHIDIS**

**HOME ADDRESS: AGION ANARGIRON 10, 65403 KAVALA.**

**TEL: 2510-462281 (office), 6977-405604 (mobile)**

**FAX: 2510-462281 (office)**

**E-MAIL: pated@teikav.edu.gr, pated@otenet.gr, tpachidis@sch.gr, tpachidis@gmail.com**

**URL: http://users.otenet.gr/~pated**

**NATIONALITY: GREEK**

**YEAR & PLACE OF BIRTH: 1962, DRAMA, GREECE.**

**MARITAL STATUS: MARRIED**

I am married to Mrs. Theofani Gakou working as a teacher in Kavala.

**EDUCATION - TRAINING**

1. **Bachelor in Physics,** Faculty of Sciences, Aristotle University of Thessaloniki (1980-1985). (Grade "Very Good, 7.82").
2. **Master Degree in Electronic Physics (Radioelectronics),** Faculty of Aristotle University of Thessaloniki (1986-1989). (Grade "Very Good, avg course grade 7.19").
3. **Ph.D.**, Department of Electrical and Computer Engineering, Democritus University of Thrace (1998-2005). (Grade: "Excellent, avg course grade 9.44").
4. Diploma in English Language Level LOWER (1977).
5. Shorthand (75 words / minute) (1980).
6. French Language Certificate (CERTIFICAT) (1982).

7. Certificate of participation in IT training course lasting 60 hours, held by the Department of Informatics, Aristotle University of Thessaloniki with the following curriculum: "**Operating Systems: DOS and NOVEL 2.2, Word Processing: WORD for WINDOWS, spreadsheet: EXCEL, Database: MS-WORKS / DATABASE**", (1994, Kavala, Greece).
8. Participation to the nationwide three-day seminar of Directors and Deputy Directors of Institutes for Vocational Training (IEK), organized by the Vocational Education and Training Organization (OEEK) to update the issues related to **management, education, training and education reform** (1998, Loutraki , Greece).
9. Participation to the intensive learning mandatory training course of 6 hours for "**Technical Education**" (1998).
10. Participation in a training course lasting 14 days (60 hours) within the mobility program of Operational Programme "Education and Initial Vocational Training" (EPEAEK) entitled "**Multimedia - Internet - School Activities**" (1999, Kavala).
11. Participation in the seminar of teachers of Secondary Education to support the project "Development of the High School Laboratories" entitled "**Evaluators Training Program for Electronic Devices**" (1999, Corfu, Greece).
12. Participation in the seminar of teachers of Secondary Education to support the project "Development of the High School Laboratories" entitled "**Coordinators Training Program for the Evaluation of Physical Sciences Devices and Audiovisual Media**" (2000, Athens, Greece).
13. Participation in the seminar of teachers of Secondary Education to support the project "Development of the High School Laboratories" in the OP, Action 1.2D on "**Practical Evaluation Program for Natural Sciences Instruments**" (2000, Athens, Greece).
14. Training in operations 2.3.2ιβ' entitled: "**Training of teachers in the TEE and TEC to meet the new realities of the planned upgrade of the institution**" and 2.3.2θ' entitled: "**Evaluation of the pilot TEE**" (2003, Kavala Institute of Technology).
15. Skills and Knowledge Certification in Information and Communication Technologies. (2008).

**MILITARY SERVICE**

I served in the Greek army on Telecommunications with the specialty of "Multichannel Operator" (1985 – 1986).

**JOBS**

1. As a trainer in wireless telecommunication systems "Very High Ground Frequencies, L.Y.S.E.)" and "Ultra High Ground Frequencies, Y.Y.S.E – multichannel" in the Greek army (Telecommunications Training Center 1985 to 1986).
2. Customer support and service to the INFONORTH Ltd. computer company at Thessaloniki (1986 –1987).
3. Practice in Hellenic Telecommunications Organization (OTE) as a graduate student (1988).
4. As a teacher in Secondary Education (1989 to 2010).
5. As a Deputy Director of Public Vocational Training Institute (IEK) of Kavala (1996-1998).
6. As a coordinator of Practical Training in public Vocational Training Institute (IEK) of Kavala (1997 –1998).
7. As a designer and manufacturer of prototype electronic circuits and applications in my company (applications for universities, schools and enterprises), (1996 –1998).
8. As a qualified scientist in the Department of Petroleum and Natural Gas Technology, Kavala Institute of Technology (TEI), Kavala, (2005 –2008).
9. As an adjunct assistant professor in the department of Industrial Informatics, School of Applied Technology of TEI Kavala (2005 - June 2010).
10. As an assistant professor in the Computer and Informatics Engineering Department (Old Industrial Informatics), School of Applied Technology of the Eastern Macedonia and Thrace Institute of Technology (TEI) (July 2010 to date).

**TEACHING**

1. Teaching "**Information Technology**" and "**Computer Programming**" in a Lyceum (EPL), Kavala (1992-1996).

2. As a trainer in the Institute for Vocational Training (IEK) at Kavala teaching the 42 hours course: "**Word Processing**", (1996 –1997).
3. As a trainer in the Institute for Vocational Training (IEK) at Kavala teaching the 28 hours course: "**Computer Use**" (1998 ).
4. As a trainer in the Institute for Vocational Training (IEK) at Kavala teaching the course "**Computerized Bank Accounting**", lasting 42 hours, (1998).
5. Teaching (assist) the laboratory course "**Digital Systems and Computers I**" (3 hours / week) to undergraduate students of sixth semester of the Electrical and Computer Engineering Department, D.U.TH, (1999-2002).
6. Teaching (assist) the laboratory course "**Digital Systems and Computing II**" (3 hours / week) to undergraduate students of the seventh semester of the Electrical and Computer Engineering Department, D.U.TH, (2001-2002).
7. Teaching (assist) the laboratory course "**Electronics III**" (3 hours / week) to undergraduate students of sixth semester of the Electrical and Computer Engineering Department, D.U.TH, (2000-2002).
8. Teaching (as posted by the Secondary Education) the laboratory courses "**Electric Circuits**" of the second semester (4 hours / week), "**Plant Automatic Control Systems I**" of the third semester (4 hours / week), "**Plant Automatic Control Systems II**" of the fourth semester (4 hours / week) to students of Petroleum and Natural Gas Technology Department, Kavala Institute of Technology, (2005-2008).
9. Teaching (as an adjunct assistant professor) the course "**Robotics Laboratory**" (4 hours / week) and the course "**Robotics, Practice Exercises**" (1 hour / week) to students of the seventh semester of the Industrial Informatics Department, Kavala Institute of Technology, (2005-2009).
10. Teaching (as an adjunct assistant professor) the course "**Robotics Laboratory**" (2 hours / week) to students of the seventh semester and the course "**Software Project Management - Software Quality**" (2 hours / week) of the sixth semester of the Industrial Informatics Department, Kavala Institute of Technology, (2009-2010).
11. Teaching (as an assistant professor, at Industrial Informatics Department and now at Computer and Informatics Engineering Department of TEI EMT) the following courses: a) "**Electric Circuits**" of the first semester (**2L** + **1PE** + **2LE** hours / week), b) "**Electronic Circuits**" of the second semester (**2L** + **1PE** + **2LE** hours /

week), c) "**Introduction to Software Engineering**" of the third semester (**2L** + **2PE** hours / week), d) "**Digital Image Processing**" of the forth semester (**2L** + **1PE** hours / week), e) "**Computer Graphics**" of the sixth semester (**2L** + **1PE** hours / week), f) "**Software Project Management - Software Quality**" of the sixth semester (**2L** + **2PE** hours / week), g) "**Robotics Laboratory**" of the seveth semester (**2LE** hours / week), h) "**Mobile Robotics and Applications**" of the seveth semester (**2L** + **1PE** hours / week), (2010 up to date).

12. Teaching (as an assistant professor, at Industrial Informatics Department and now at Computer and Informatics Engineering Department of TEI EMT) the following course: a) "**Image Processing**" of the second semester (**26** hours / semester), in the master of science program with title: "**Innovation in Technology and Entrepreneurship**" at Electrical Engineering Department of TEI EMT. (2012 up to date).

**SUPERVISION OF UNDERGRADUATE STUDENTS' THESES**

Undergraduate students' theses in which I have contributed in an important way without to be the supervisor:

1. Theodorou Konstantinos, "**Software application development, based on a computer vision system mounted on the end effector of a robotic manipulator, for monitoring the position of an object**", Electrical and Computer Engineering Department, D.U.TH, Xanthi, July 2001.
2. Aristos Dimitrios, "**Software application development for trajectory control of a two-dimensional cutting system, in real time**" Electrical and Computer Engineering Department, D.U.TH, March 2002.
3. Skotida Chrysanthi, "**Automatic control applications development by using a PLC**", Electrical and Computer Engineering Department, D.U.TH, March 2002.
4. Poulakis Pantelis, "**Object oriented software application development for the bidirectional serial communication with the industrial control systems of a PUMA robotic manipulator**", Mechanical Engineering Department, National Technical University of Athens, 2003.

5. Ziarras Nicholas, "**Control of a PUMA 761 robotic manipulator through the Accessory port**", Electrical and Computer Engineering Department, D.U.TH, July 2006.

**Undergraduate students' theses in which I was the supervisor:**

1. Ntimenos Pantelis, "**Design and development of a software application based on a vision system for the protection and security in a robotic arm's environment**" Department of Industrial Informatics, Kavala Institute of Technology, Kavala, May 2008.
2. Krousti Katerina and Nasou Katerina, "**Study and development of a software application to control a robotic system using voice commands**" Department of Industrial Informatics, Kavala Institute of Technology, Kavala, November 2009.
3. Aountatala Dimitrios and Kotzageorgiou Savvas, "**Study, design and development of software to manage customer orders in fast food chains**", Department of Industrial Informatics, Kavala Institute of Technology, Kavala, December 2010.
4. Theodorou Christos, "**Configuring the behavior of a robot to detect the mood of a person using a vision system and the study of his facial expressions**", Department of Industrial Informatics, TEI of Kavala, Kavala, Greece, June 2011.
5. Grammatikopoulos Nikolaos, Katsikas Athanasios, "**Study, design and development of software for automatic recording of students attendance by means of their fingerprints and verification with the their images and personal data**", the Department of Industrial Informatics, TEI of Kavala, Kavala, January 2012.
6. Chatziioannidis Christos, "**Design and construction of an autonomous robotic camera mounting base with two degrees of freedom and development of a software application to control the system according to a selected variable**", Department of Industrial Informatics, TEI of Kavala, Kavala, March 2012.
7. Xenitidis Paraskevas, "**Analysis, design and development of software to detect random objects with the help of images captured by a vision system**", Department of Industrial Informatics, TEI of Kavala, Kavala, April 2012.

8. Stefanis Vassilis, Tsaousi Anastasia, "**Analysis, design and development of a software for the proportional remote control of devices**" Department of Industrial Informatics, TEI of Kavala, Kavala, May 2013.
9. Mpantavi Panagiota, Ouzounsavvidis Ioannis**, "Human emotions detection by means of a vision system and the study of faces expression",** Department of Industrial Informatics, TEI of Kavala, Kavala, June 2013.
10. Kelektsoglou Ioannis, Raftopoulos Aggelos**, "Simulation of a Fuzzy logic based robot navigation to detect a $CO_2$ source**" Department of Industrial Informatics, TEI of Kavala, Kavala, June 2013.
11. Karatzia Sofia, Mauromati Zoe, **"Online information portal of Industrial Informatics Department"** Department of Industrial Informatics, TEI of Kavala, Kavala, July 2013.
12. Pantos Laertis, **"Study, design and development of a software for the entrance control of a protected area based on the recognition of the face and of the fingerprint of a person",** Department of Computer and Informatics Engineering, TEI of Eastern Macedonia and Thrace, Kavala, October 2013.
13. Nakou Ifigeneia, Chapsoula Olga, **"Study, design and development of a software for the selection and the presentation of a number of important images from a set of images or video in a security system",** Department of Computer and Informatics Engineering, TEI of Eastern Macedonia and Thrace, Kavala, May 2014.
14. Zounis Aggelos, **«Study, design and development of a software system for the management of a store for electronic components",** Department of Computer and Informatics Engineering, TEI of Eastern Macedonia and Thrace, Kavala, May 2014.
15. Merkouris Spiros, Vigani Nensi, **"Study, design and development of a software for the simulation of electronic circuits",** Department of Computer and Informatics Engineering, TEI of Eastern Macedonia and Thrace, Kavala, July 2014.
16. Kormouli Euanthia, Menziltsidou Stella, **"Study, design and development of a software to execute laboratory exercises in the frame of course of computer graphics and to learn OPENGL",** Department of Computer and Informatics Engineering, TEI of Eastern Macedonia and Thrace, Kavala, November 2014.
17. Margaritiadis Dimitrios, **"Study, design and development of a system for the wireless control of an electric vehicle by means of hand movements",**

Department of Computer and Informatics Engineering, TEI of Eastern Macedonia and Thrace, Kavala, November 2014. (1st prize at the 5th Pan-Hellenic festival in industrial informatics)

18. Panagiotou Andreas, **"Study, design and development of a software for localizing and collecting of a moving ball from a robotic manipulator by means of a vision system",** Department of Computer and Informatics Engineering, TEI of Eastern Macedonia and Thrace, Kavala, May 2015.
19. Tatakis Aggelos, **"Study, design and development of a mobile robot and its control by voice commands",** Department of Computer and Informatics Engineering, TEI of Eastern Macedonia and Thrace, Kavala, May 2015.
20. Fardellas Achilleas, **"Study, design and development of a software to serve customers in a self-service restaurant with the aid of mobile phones",** Department of Computer and Informatics Engineering, TEI of Eastern Macedonia and Thrace, Kavala, July 2015.

**I participated in many other undergraduate student theses as a member of a three-member committee, while more than 20 theses are found in progress.**

**COMMITTEE MEMBER - RESPONSIBILITIES**

- Public Vocational Training Institute, Kavala (Kavala IEK), in three-member committees hiring trainers (1996 - 1998).
- Public Vocational Training Institute, Kavala (Kavala IEK), in a committee of students trained certification (1996 - 1998).
- In TEI of Kavala (EMT), in Industrial Informatics Department (Computer and Informatics Engineering Department), **responsible for the final examinations' program** (2009 – 2014).
- In TEI of Kavala (EMT), in Industrial Informatics Department (Computer and Informatics Engineering Department), **as a member of the three-members committees to exam the theses of students** (2010 – to date).
- In TEI of Kavala, as a **member of the evaluation committee for the recruitment of adjunct teachers of the department** (2011 – 2012).

- In TEI of Kavala (EMT), as **head** of the section "**Study - Planning and Promotion of new products**" in Technological Research Center (TRC) EMT (2011 to date).
- In TEI of Kavala, as a **member of the central committee** of the europeen program (ESPA, NFSR), ETEIK: Supply of new or upgrade of high technology laboratory hardware & software in TEI of Kavala, Operational Programme "Macedonia - Thrace 2007 – 2013", priority 9, "SUSTAINABLE DEVELOPMENT AND QUALITY OF LIFE IN THE REGION EMT" (2011-2012). I have redacted and configured in its final form the proceedings of the technical data evaluation for all groups of the competition (684 pages, August 2011).
- In TEI of Kavala (EMT), as a **regular member of the electoral board** (2011), to fill a teaching faculty position of Assistant Professor level in the field of "**Physics focusing on microelectronic technology**".
- In TEI of Kavala, as a committee member of the Board of qualifying examinations in the Department of Industrial Informatics (2011- until now).
- In TEI of Kavala, as a committee member of receiving the new equipments in the Department of Industrial Informatics (2012-2013).
- In TEI of Kavala, as a member of the evaluation committee of requests for part-time students (2012-2013).
- In TEI of Kavala, member of the three-member scientific committee **Ideas to Life (I2L)** which focuses on the development of a series (portfolio) of original and innovative products and software, which will have the necessary conditions for immediate commercialization (November 2012 to present).
- In TEI of Kavala, in the program, ETEIK: Supply of new or upgrading laboratory and technological equipments and software in the TEI of Kavala, OP "Macedonia - Thrace 2007 – 2013" Priority 9 "SUSTAINABLE DEVELOPMENT AND QUALITY OF LIFE IN THE REGION EMT (2011-2012) where I was responsible for the coordination, delivery and functionality restore (software installation) of the computer systems for all of TEI of Kavala Departments, (2012).
- In TEI E.M.T., **Member** of the committee for the conduct and the evaluation of open, international, regular competitions (budget over 60.000,00 € VAT excluded) for the needs of TEI E.M.T. (2015)

- In TEI E.M.T., **Chairman** of the committee for the conduct and the evaluation of handy competitions for procurement of goods and services (budget up to 60.000,00 € VAT excluded) for the needs of TEI E.M.T. (2015)
- In TEI of Kavala, **Head** of Production Systems Sector in the Department of Industrial Informatics (2013).
- In TEI of E.M.TH., **Director** of Production Systems Sector, in the Computer and Informatics Engineering Department (2014 – 2015 ).
- Member of **program committee** in Conferences **HAIS2010, HAIS2012, HAIS2013, HAIS2014, HAIS2015,** (International Conferences on Hybrid Artificial Intelligence Systems) and **NABIC 2011** (World Congress on Nature and Biologically Inspired Computing).
- Member of **Editorial Board, topics: Human Robot/Machine Interaction, Vision Systems** και **Robot Sensors**) of Journal "**International Journal of Advanced Robotic Systems**" (2013 – to date).

**EUROPEAN PROJECTS (As a Teacher in Secondary Education)**

1. **TECHNOMATHEIA I (GSRT).** Program for the development of young people's inventiveness. The title of the proposal was "Device to study mechanical and optical phenomena by means of a PC". The program duration was 10 months, funded by the General Secretariat for Research and Technology with budget 2,498,000 drachmas (1995-1996) and with project leader the teacher of the lyceum Mr. Theodore Pachidis.
2. **SOCRATES / COMENIUS Action I** Participation of four countries (Greece, Italy, Hungary and Finland). The English title of the program was "Science and Technology in Everyday Life - A Multimedia Project" with project leader the Headmaster of the Technical Lyceum of Chrysoupoli, Mr. Theodore Papoulidis (1998-1999).
3. **Mobility - Action II**. Working with the school in Venice, Italy IPSIA Sanudo where the Coordinator Mrs. Androniki Saringelou was with the Technical Lyceum of Chrysoupoli, (1999).

**EUROPEAN RESEARCH PROGRAMS**

**(Democritus University of Thrace, D.U.TH)**

1. In the project: "**Countermeasure system against pulsed Doppler Radar**", funded by the Research Com. at the Democritus University of Thrace, with project leader the Assist. Professor George Kyriacou.
2. In the research project: "**Autonomous Underwater Vehicle for Subsea Intervention-FREESUB**", project code KE-831, funded by the European Union (EU) and the General Secretariat for Research and Technology (GSRT ) and project leader the Associate Professor at the Democritus University of Thrace Mr. John Lygouras (2000 – 2004).
3. The research project "**Improvement of infrastructure of the Digital Systems Laboratory**" with code KE-884 project, funded by the TSMEDE and project leader the Associate Professor at the Democritus University of Thrace Mr. John Lygouras (2001 – 2002).
4. The research project "**Development of infrastructure for the Microprocessors and Applications course"** with code project KE-886 and project leader the Associate Professor at the Democritus University of Thrace Ioannis Andreadis (2002).
5. In the research project: "**Strengthening the infrastructure of the Electronics Laboratory**" with code project KE-1035 and project leader the Associate Professor at the Democritus University of Thrace Ioannis Andreadis (2002 – 2003).

**(In the Eastern Macedonia and Thrace Institute of Technology)**

1. In the European project: "**Training & Certification of women with initial professional Training in IT business case - positive action for women**" with project leader the Associate Professor of TEI Kavala Elias Sarafis, as a remote trainer for asynchronous learning (2007).
2. The operational program: "**INTERREGIIIA / PHARE CBC**" the project entitled "**Hybrid Separation Technologies**" funded by the European Union and the Greek public and project leader the Professor of TEI Kavala Athanasios Mitropoulos (2007 – 2008).

3. In the research program of the Technological Research Center (KTE) of Eastern Macedonia and Thrace the project entitled: "**D. Sidiropoulos & Co. - Measurements in oven manufacturing nuts**" with project leader the Professor of TEI Kavala Mr. Vassilis Kaburlasos (2007).
4. In a research project funded by the ELKE of TEI Kavala entitled "**Optical recognition of geometric features of grape leaves using computer vision**" and project leader the assistant professor in the Mechanical Engineering department of the TEI Kavala Mr. Sarafis Elias (2008 – 2009).
5. In the technology transfer project (innovation coupon), following the decision of the Technological Research Center (KTE), entitled "**Developing and implementing innovative manufacturing processes and improving quality characteristics of beverage products**" and project leader the Professor of the Industrial Informatics Department of TEI Kavala, Mr. Vassilis Kabulasos (2009).
6. In the OP "Digital Convergence" on "**Virtual laboratories**" in package "**Simulation of Flexible Production Process**", and project leader the Professor of Mechanical Engineering Department of the Kavala Institute of Technology Sarafis Elias (2011 – 2012).

**SOFTWARE**

1. Software for measurements, recording, calculation and graphical representation of the results from the "**Device for the study of Mechanical and Optical pnenomena with a computer**" developed under the program TECHNOMATHEIA I. The software was developed in GWBASIC and assembly language for the Microchip's microprocessor PIC16C57. Reference paper → D10.
2. **Integrated Robotic Application *HumanPT***. The application enables real-time control of the robotic manipulator PUMA 761 via the ALTER serial port. **HumanPT** based architecture has been developed in Microsoft's Visual C + + (75000 lines of code). It is free software and can be used with minor alterations to any robotic system (Url: http://users.otenet.gr/ ~ pated). Refer to operations C1, C2, C3, C4, C5, C7, D4, D5, D7, D11, E1, E2.
3. Control of PUMA 761 robotic manipulator through the **accessory** port. The application has been developed in Microsoft's Visual C + +.

4. **Robotic Application to control a Gantry robotic system via the Internet**. It has been developed in Microsoft's Visual C + +.
5. **Software application recording measurements through Internet using the IDAC** card of LAMDA company. The application has been developed in Microsoft's Visual C + +. IDAC card references can be found in papers D8, D9.
6. **Software application that controls the SCORBOT-ER Vplus robotic workspace** using a camera to minimize the security problems in the robotic space from the entry of persons or objects. It has been developed in Microsoft's Visual C + +. Can be used with small modifications to control any area.
7. **Software for the visual recognition of geometric features of grape leaves in real time**, using artificial vision. It has been developed in Visual C++ of Microsoft. Reference is made to the work C11 and D12.
8. Software for the technology transfer project (innovation coupon), with the title: **"Development and implementation of innovative production process and improving quality characteristics of distillery products"** The application was developed in Labview. Reference is made to work C12.
9. **Development of a software for the recording of data of a laboratory active suspension device**. The application was developed in the LabView environment.
10. **Development of a software for the recording of data of a laboratory Venturi flowmeter device**. The application was developed in LabView.
11. **Software development system to remotely control power devices**. The high level application developed in Visual C ++ (Microsoft VS 2013) and the open source Arduino platform used.
12. **Software application development to control via a PC a mobile robot** based on the open source platform Arduino. The high level application developed in Visual C++ (Microsoft VS 2013).

**LECTURES - SEMINARS - PARTICIPATION IN CONFERENCES**

- As a multiplier, informing colleagues - engineers of Secondady Education for the teaching of Technology course in Junior and Senior High Schools (a single day).
- Presentation of the project within the program TECHNOMATHEIA I in the National Research Foundation, June 1997.

- Presentation of two papers in the National Conference with International Participation “Microcomputer Systems Applications” (Research, Industry and Education), Patra, 3-5 October 1988 (Papers D1, D2).
- Paper presentation in “IEEE Instrumentation and Measurement Technology Conference”, Anchorage, Alaska, 2002 (Paper D3).
- Paper presentation in “2nd WSEAS Int. Conf. on Signal Processing and Computational Geometry and Vision”, Rethymnon, Crete, Greece, 2002 (Paper D4). Paper presentation in “WSEAS ICRODIC”, Skiathos, Greece, 2002 (Paper D5).
- Three Papers presentation in “IEEE International Conference on Virtual Environments, Human - Computer Interfaces and Measurement Systems (VECIMS)”, La Coruna, Spain, 2006 (Papers D9, D10, D11).
- Participation in the 6th National Physics Conference, 18 - 21 March 1993.
- Participation in the 12th National Physics Conference, 20 - 23 March 2008.
- Participation in EUCOGII Members’ Conference (2nd European Network for the Advancement of Artificial Cognitive Systems, Interaction and Robotics), with title: “Challenges for artificial cognitive systems”, Hamburg, Germany, 10 – 11 October, 2009.
- Participate in 4th EUCOGII Members’ Conference (2nd European Network for the Advancement of Artificial Cognitive Systems, Interaction and Robotics), with title: “Embodiment - Fad or Future?”, Thessaloniki, Greece, 11 – 12 April 2011.
- Participation in the International Conference on ECONOPHYSICS, Kavala, Greece, 2-3 June 2011.
- Participation in 2th EUCOGIII Members’ Conference (3rd European Network for the Advancement of Artificial Cognitive Systems, Interaction and Robotics), with title: “Soft Robotics”, Odense, Denmark, 25-26 August 2012.
- Participation in 3$^{rd}$ EUCOGIII Members’ Conference (3rd European Network for the Advancement of Artificial Cognitive Systems, Interaction and Robotics), with title: “Learning”, Palma de Mallorca, Spain, 10-11 of April 2013.
- Participation in 5$^{th}$ EUCOGIII Members’ Conference (3rd European Network for the Advancement of Artificial Cognitive Systems, Interaction and Robotics), with title: “Embodied Communication”, Bochun, Germany, 19-20 of March 2014.

- Participation in 6th EUCOGIII Members' Conference (3rd European Network for the Advancement of Artificial Cognitive Systems, Interaction and Robotics), with title: "Cognitive Systems: Present and future in the research, industry and funding landscape", Genoa, Italy, 18-19 October 2014.

**REVIEWER IN INTERNATIONAL SCIENTIFIC JOURNALS AND CONFERENCES**

**Journal papers:**

- IEEE Transactions on Instrumentation and Measurement, IEEE Instrumentation and Measurement Society, Prof. Reza Zoughi (zoughi@mst.edu).
- Journal of Intelligent and Robotic Systems, Springer Science + Business Media B.V. (services@springer-sbm.com).
- Journal of Intelligent Manufacturing, Springer Science + Business Media B.V. (services@springer-sbm.com).
- Journal of Electronics and Electrical Engineering, Kaunas University of Technology (danielius.eidukas@ktu.lt)
- Journal of Engineering Science and Technology Review, Kavala Institute of Technology (editor@jestr.org).
- Information Sciences Informatics and Computer Science Intelligent Systems Applications (Rolf van der Sanden, Journal Manager at Elsevier Science, Vassilis Kaburlasos Editor).
- Information Sciences, Elsevier http://ees.elsevier.com/ins/
- Journal of Engineering, Hindawi Editorial Office: je@hindawi.com
- IEEE Transactions on Circuits and Systems for Video Technology, Editor-in-Chief Hamid Gharavi tcsvt@tcad.polito.it .
- Machine Vision and Applications, Editor Jean-Marc Odobez mva-ec@eecs.ucf.edu.
- Neural Computing and Applications, Springer, Editor-in-Chief: John MacIntyre.
- International Journal of Advanced Robotic Systems, Editor-in-Chief: Antonio Fernadez-Caballero.

- Computers and Electronics in Agriculture, International Journal, Elsevier, Editors-in-Chief: S. Fountas, N.H. Hancock, N. Kondo, J.K. Schueller, He Yong, Q. Zhang

**Conference papers:**

- International Symposium on Robotics and Automation (ISRA2002), September 2002, Toluca, Mexico, Prof. Rene V. Mayorga (Rene.mayorga@uregina.ca).
- 2007 IEEE/RSJ International Conference on Intelligent Robots and Systems, Oct 29 - Nov 2, 2007, Sheraton Hotel, San Diego, CA, USA (ras@papercept.net).
- 5th International Conference on Hybrid Artificial Intelligent Systems 2010 (HAIS' 10, escorchado@ubu.es ).
- 7th International Conference on Hybrid Artificial Intelligent Systems 2012 (HAIS' 12, escorchado@ubu.es ).
- 8th International Conference on Hybrid Artificial Intelligent Systems 2013 (HAIS' 13, escorchado@ubu.es ).
- 9th International Conference on Hybrid Artificial Intelligent Systems 2014 (HAIS' 14, escorchado@ubu.es ).
- 10th International Conference on Hybrid Artificial Intelligent Systems 2015 (HAIS' 15, isantos@deusto.es, enrique.onieva@deusto.es).
- Third World Congress on Nature and Biologically Inspired Computing (NaBIC2011, NaBIC 2011 - Organizing Chairs http://www.mirlabs.org/nabic11
- 2011 International Joint Conference on Neural Networks (IJCNN 2011 Ali Minai, ijcnn2011@inns-conf.org).
- 2012 International Joint Conference on Neural Networks (IJCNN 2012 Cesare Alippi, cesare.alippi@polimi.it).
- 2013 International Joint Conference on Neural Networks (IJCNN 2013 Plamen Angelov, Daniel Levine, dlevine@uark.edu).
- 2015 International Joint Conference on Neural Networks (IJCNN 2015 De-Shuang Huang, dshuang@tongji.edu.cn).
- FLINS 2012 Conference Special Session entitled "Logic Algebra, Algebraic Logic and Their Applications" organized by Yang XU, Vassilis Kaburlasos, Jun LIU.

- IEEE Symposium Series on Computational Intelligence 2013 (SSCI2013), Ponnuthurai Nagaratnam Suganthan, EPNSugan@ntu.edu.sg
- IEEE Symposium Series on Computational Intelligence 2014 (SSCI2014), Haibo He, he@ele.uri.edu.

**AWARDS**

- STATE SCHOLARSHIP FOUNDATION (I.K.Y.): Honorary scholarship at the Physics Department of Aristotle University of Thessaloniki (1982 – 1983).
- Pronunciation of the oath in the Physics Department of the Faculty of Sciences, Aristotle University of Thessaloniki at the bacheror receiving ceremony (1985).
- TECHNOMATHEIA I: Top rated in Greece of the proposed project title (1996).
- Pronunciation of the oath in the Electrical and Computer Engineering Department, Polytechnic School of Xanthi, Democritus University of Thrace at my PhD diploma receiving ceremony (2005).

**OTHER ACTIVITIES**

- As a Vice President of the Coverning Committee of the Union of Greek Physicists, of Kavala's Annex, in collaboration with the other members of the committee and / or the TEI of Kavala, organization and support lectures by eminent speakers and design by myself of the related posters (D. Nanopoulos - 20/5/2009, S. Trachanas – 14/4/2010, E. Gazis - 31/3/2011 and 01/04/2012, S. Theodosiou – 23/02/2013).
- As a Vice President of the Coverning Committee of the Union of Greek Physicists, of Kavala's Annex, in collaboration with the other members of the Committee and the TEI of Kavala, organization of the exhibition of CERN in Kavala (10-29 Φεβρουαρίου 2012) at the amphitheater of the TEI of Kavala.
- As a President of the Coverning Committee of the Union of Greek Physicists, of Kavala's Annex, in collaboration with the other members of the committee, organize and support events of the Annex, lectures by eminent speakers and design by myself of the related posters (Ch. Petridou - 13/2/2015).
- Participation in the 3rd Industrial Informatics Festival with four theses (17-21 October 2012).

- Participation in the 4th Industrial Informatics Festival with theses (15-21 Οκτωβρίου 2013). Organizer and Coordinator of the one day meeting of the Festival (19/10/2013) with title "Modern Trends in Robotics" and the speakers Professor Doulgeri Zoe, Professor Kaburlazo Vasilio, Professor Lygoura John and Assoc. Professor Gasterato Antonio.
- Participation in the 5th Industrial Informatics Festival with theses (12-18 Οκτωβρίου 2014). The thesis of my student Margaritiadis Dimitrios "Study, design and development of a system for the wireless control of an electric vehicle by means of movements of the hand" awarded with the first prize.
- Creation and maintenance of my personal website, of the seven websites of my courses in Industrial Informatics Department of TEI of Kavala (now Computer and Informatics Engineering of TEI EMT) and of the website of Kavala's Annex of the Greek Physicists Union.

  http://users.otenet.gr/~pated/

  http://195.130.93.18/pachidis//HLKY/index.html

  http://195.130.93.18/pachidis/HLEK/index.html

  http://195.130.93.18/pachidis/etl/index.html

  http://195.130.93.18/pachidis/dip/index.html

  http://195.130.93.18/pachidis/comgraph/index.html

  http://195.130.93.18/pachidis/spm_sq/index.html

  http://195.130.93.18/pachidis/robotiki/index.html

  http://www.eef-kavalas.eu/
- Participation in the creation of the postgraduate curriculum program (MSc) of the Computer and Informatics Engineering Department with title "Advanced Technologies in Informatics and Computers". The first Steering Committee (SC) of MSc consists of the Professor Tsinakos August (Director of SC), the Assist. Professor Moussiades Eleftherios (Member of SC) and the Assist. Professor Pachidis Theodore (Member of SC), (2015).

**EXPERIENCE - KNOWLEDGE**

- In programming assembly and high level languages (Z80, 6502, 68HC11, PIC of Microchip company, AVR (Arduino), Visual C + +, Basic, Fortran, Cobol, Val II, ACL, etc.).
- To design and process by means of a computer (Autocad, Orcad, Protel, Corel Draw, Paint Shop Pro, Visio Technical, etc.).
- In simulation and programming by means of a computer (Matlab, LabView).
- In design by using a computer theoretical and printed circuits, as well as the final construction of printed circuit boards using a photographic or a silkscreen based method.
- In manufacturing step by step final electronic products and electromechanical devices.
- In robotic systems and artificial vision.

**ADMINISTRATIVE EXPERIENCE**

- As a Deputy Director in the Public Institute of Professional Training (I.E.K.) of Kavala.
- Responsible in student's practical training of Public Institute of Professional Training (I.E.K.) of Kavala.
- Coordinator of evaluators in the “Project for the Practical Evaluation of organs in Physical Sciences”.
- As a Sector Director in the Computer and Informatics Engineering Department of TEI EMT.
- As a member or chairman in an important number of Committees in TEI EMT.

**REST OF PROFESSIONAL EXPERIENCE**

- Maintenance and repair of “Very High Ground Frequencies, L.Y.S.E.” and "Ultra High Ground Frequencies, Y.Y.S.E. (multichannel)” equipments in the Greek army (1985 - 1986).
- Repair of electronic circuits in Hellenic Telecommunications Organization (O.T.E.) during my practice (1988).

- Maintenance, computer repair and customer support and sales in INFONORTH Ltd. company at Thessaloniki (1987 – 1988).
- Development, design and construction step by step of final electronic and electromechanical devices in my P-T ELECTRONICS company, http://users.otenet.gr/ ~ pated, (1996 – 1998).

**RESEARCH INTERESTS**

1. Construction and control of robotic systems (robotic arms, mobile robots, gantry) with emphasis on control with the help of vision systems (visual servo control).
2. Control of robotic systems through voice commands.
3. Research and implementation of integrated behaviors of robotic systems (mainly mobile robots) to support people with disabilities and / or older.
4. Development of artificial intelligence systems with application to robotic systems.
5. Design and construction of prototype computer vision systems with application to robotic systems.
6. Design and prototyping of novel analog and digital circuits and electromechanical systems, generally, in control and automation applications and the use of single sensors or network of sensors.
7. Internet of Things (IoT), generally, with emphasis on the design, the construction and the communication of the related units (electronic boards).
8. Digital image processing with emphasis on segmentation of objects, finding the coordinates of feature points in three dimensional space to control robotic systems.
9. Monitor and control of systems via a wired or wireless network and the use of sensor networks.
10. Study, design and development of software applications to manage automatic control systems.
11. Recognition and identification of fingerprints and the creation of integrated software applications to control any kind of systems through them and in general control using biometrics.
12. Detection and identification of faces and of the emotions that appear to them as facial expressions and control of systems through the data collected.
13. Control of systems with gestures.

**TEACHING INTERESTS**

- Software Engineering
- Computer Programming
- Robotics
- Artificial Vision
- Image Processing
- Computer Graphics
- Control Systems
- Automatic Control Systems
- Electric Circuits
- Analog / Digital Electronics
- Analog and digital electronic systems
- Sensors and Measurements

**MEMBERSHIP**

- Member of the Union of Greek Physicists, Kavala's Annex, President in the Governing Committee.
- Member of the Institute of Electrical and Electronics Engineers, IEEE.
- Member of the IEEE Computer Society.
- Member of the IEEE Robotics and Automation Society.
- Member of EUCOGII (2nd European Network for the Advancement of Artificial Cognitive Systems, Interaction and Robotics)
- Member of EUCOGIII (3rd European Network for the Advancement of Artificial Cognitive Systems, Interaction and Robotics).
- Member of MIR LABS (Machine Intelligence Research Labs, Scientific Network for Innovation and Research Excellence).

**PUBLICATIONS**

**MASTER THESIS**

**A1.** Title of my Master thesis:

"**Construction of a Control Unit with Microprocessor for a Local Area Network**"

**PhD THESIS**

**B1.** Title of my PhD thesis:

"**Trajectory Control of a Robotic Manipulator in Real Time, Based on a Pseudo-stereovision System**"

**OTHER PUBLICATIONS**

**REFEREED PAPERS IN JOURNALS**

**C1. Pachidis T.**, Tarchanidis K., Lygouras J. and Tsalides P., "Robot Path Generation Method for a Welding System Based on Pseudo Stereo Visual Servo Control," EURASIP Journal on Applied Signal Processing**,** Vol. 14, 2005, pp. 2268-2280. **(E:2)**

**C2. Pachidis T.** and Lygouras J., "Pseudo Stereovision-based Path Generation Method for a Robotic Arc-Welding System," WSEAS Transactions on Systems, Vol. 4, No. 1, January 2005, pp. 1-9.

**C3. Pachidis T.** and Lygouras J., "Pseudo Stereo Vision System: A Detailed Study," Journal of Intelligent and Robotic Systems, Vol. 42, No. 2, 2005, pp. 135-167. **(E:16)**

**C4. Pachidis T.** and Lygouras J., "Vision-based Path Generation Method for a Robot-based Arc-Welding System," Journal of Intelligent and Robotic Systems, Vol. 48, No. 3, 2007, pp. 307-331. **(E:7)**

**C5. Pachidis T.**, Lygouras J., "Pseudo Stereo Vision System: A Monocular Stereo Vision System as a Sensor for Real-time Robot Applications," IEEE Transactions on Instrumentation and Measurement, Vol. 56, No, 6, 2007, pp.2547-2560. **(E:19)**

**C6.** Lygouras J., Kodogiannis V., **Pachidis T.**, Tarchanidis K. and Koukourlis C., "Variable Structure TITO Fuzzy Logic Controller Implementation for a Solar Air-conditioning System," Applied Energy, Vol. 85, 2007, pp.190-203. **(E:28)**

**C7. Pachidis T.**, Lygouras J. and Tarchanidis K., "HumanPT: An Open-Source, HumanPT Architecture-based, Robotic Application for Low Cost Robotic Tasks,**"** Journal of Intelligent and Robotic Systems, Vol. 55, No. 4, 2008, pp.385-420.

**C8.** Lygouras J., **Pachidis T.** and Tarchanidis K., "Adaptive High-Performance Velocity Evaluation Based on High Resolution Time-to-Digital Converter," IEEE Transactions on Instrumentation and Measurement, Vol. 57, No. 9, 2007, pp.2035-2043. **(E:14)**

**C9.** Lygouras J., Kodogiannis V., **Pachidis T.** and Liatsis P., "Terrain-based Navigation for Underwater Vehicles Using an Ultrasonic Scanning System," Advanced Robotics, Vol. 22, No. 11, September 2008**. (E:3)**

**C10.** Lygouras J. N., Kodogiannis V., **Pachidis T. P.**, Sirakoulis G. Ch., "A New Method for Digital Encoder Adaptive Velocity/Acceleration Evaluation Using a TDC with Picosecond Accuracy," Microprocessors and Microsystems, Vol. 33, 2009, pp. 453–460. **(E:2)**

**C11.** **Pachidis T. P.**, Sarafis I. T., Lygouras I. N., "Real time feature extraction and Standard Cutting Models fitting in grape leaves," Computers and Electronics in Agriculture, Vol. 74, 2010, pp. 293–304. **(E:1)**

**C12.** Kaburlasos V. and **Pachidis T.**, "A Lattice-Computing Ensemble for Reasoning Based on Formal Fusion of Disparate Data Types, and an Industrial Dispensing Application," Information Fusion, Vol. 16, 2014, pp.66-83. **(E:10)**

**C13.** Kodogiannis V.S., **Pachidis T.**, Kontogianni E., "An intelligent based decision support system for the detection of meat spoilage," Engineering Applications of Artificial Intelligence Vol. 34, 2014, pp. 23-36. **(E:1)**

**C14.** Tarchanidis K.N., **Pachidis Th.**, Lygouras J.N. and Tarchanidis J.N., "PUMA Internet Task Logging Using the IDAC-1," Journal of Engineering Science and Technology Review, Vol. 7, No. 3, 2014, pp. 188 – 191.

**PAPERS IN REFEREED CONFERENCE PROCEEDINGS**

**D1.** Dragonas K., **Pachidis T.**, Aggianidou E., Linardis P., "Design of a Microprocessor Based LAN Controller," *Conference of Technological and Educational Institute of Patra*, Patra, 1988, pp.201-214.

**D2.** Varsamis A., **Pachidis T.**, Linardis P., "Design of a low cost logic analyser," *Conference of Technological and Educational Institute of Patra*, Patra, 1988, pp.450-466.

**D3. Pachidis T.**, Lygouras J., "A Pseudo Stereo Vision System as a Sensor for Real Time Path Control of a Robot," in *Proc. IEEE Instrumentation and Measurement Technology Conference*, 2002, pp.1589-1594. **(E:8)**

**D4. Pachidis T.**, Lygouras J., Petridis V., "A Novel Corner Detection Algorithm for Camera Calibration and Calibration Facilities," in *Proc. 2nd WSEAS Int. Conf. on Signal Processing and Computational Geometry and Vision*, 2002, pp.6911-6916.

**D5. Pachidis T.**, Lygouras J. and Tsalidis P., "A Graphical User Interface for the Initial Path Generation of a Robotic Manipulator for an Arc Welding System," *WSEAS ICRODIC*, 2002, pp. 1601-1607.

**D6.** Aristos D., **Pachidis T.**, Lygouras J., "Robot Path Generation by Viewing a Static Scene from a Single Camera," *in Proc. IEEE Int. Symposium on Robotics and Automation*, 2002.

**D7. Pachidis T.** and Lygouras J., "Pseudo Stereo Vision System: Modifications for Accurate Measurements in 3-D Space Using Camera Calibration," in *Proc Sensors for Industry Conference (IEEE/ISA),* Houston, 2002, pp. 66-70. (Invited Paper) **(E:1)**

**D8.** Tarchanidis K., **Pachidis T.**, Lygouras J. and Koutras J., "Remote Robot Task Monitoring Using the IDAC-1," in *Proc. IEEE Instrumentation and Measurement Technology Conference (IMTC)*, 2006, pp. 1296-1300.

**D9.** Tarchanidis K., Lygouras J., **Pachidis T.**, Kodogiannis V. and Chatziandreoglou C., "pH Neutralization Through Internet," in *Proc. IEEE International Conference on Virtual Environments, Human - Computer Interfaces and Measurement Systems (VECIMS)*, 2006, pp. 19 - 23. **(E:1)**

**D10. Pachidis T.**, Tarchanidis K. and Lygouras J., "Apparatus - Based Experimental Study of Physics Phenomena," in *Proc. IEEE International Conference on Virtual Environments, Human - Computer Interfaces and Measurement Systems (VECIMS)*, 2006, pp. 102 - 107.

**D11. Pachidis T.**, Lygouras J., Tarchanidis K. and Kodogiannis V., "HumanPT: Architecture for Low Cost Robotic Applications," in *Proc. IEEE International Conference on Virtual Environments, Human - Computer Interfaces and Measurement Systems (VECIMS)*, 2006, pp. 154 - 159.

**D12. Pachidis T. P.**, Sarafis I. T., Lygouras I. N., " Vision System-based, Grape Leaves Processing, in Real Time," 2010 IEEE International Conference on Imaging Systems and Techniques (IST), 1-2 July 2010, Thessaloniki, Greece, pp. 472 – 477.

**D13. Pachidis T.**, Kaburlasos, V.G. "Person Identification Based on Lattice Computing k-Nearest-Neighbor Fingerprint Classification," in 16th International KES Conference on Advances in Knowledge-Based and Intelligent Information and Engineering Systems, M. Grana et al. (Eds.), IOS Press, San Sebastian, September 2012, pp. 1720 – 1729.

**D14.** Kaburlasos Vassilis, **Pachidis Theodore**, Papakostas George, Papadakis Stelios, "Intervals' Numbers (Ins) for Statistical Learning and Classification Applications," Third EUCogIII Members Conference, Palma de Mallorca, Spain, 10 – 11 April 2013.

**D15.** Papakostas G. A., Kaburlasos V. G., **Pachidis Th.**, "Thermal Infrared Face Recognition Based on Lattice Computing (LC) Techniques," 2013 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE 2013), Hyderabad, 7-10 July 2013, pp. 1 – 6. **(E:2)**

**D16.** Kaburlasos V. G., Papakostas G. A., **Pachidis Th.**, Athinellis Alex., "Intervals' Numbers (Ins) Interpolation/Extrapolation," 2013 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE 2013), Hyderabad, 7-10 July 2013, pp. 1 – 8. **(E:1)**

**WORK IN REFEREED BOOKS**

**E1. Pachidis T.** and Lygouras J. and Petridis V., "A Novel Corner Detection Algorithm for Camera Calibration and Calibration Facilities," Recent Advances in Circuits, Systems and Signal Procesing, WSEAS, 2002, pp. 338-343.

**E2. Pachidis T.**, Lygouras J. and Tsalidis P., "A Graphical User Interface for the Initial Path Generation of a Robotic Manipulator for an Arc Welding System," Advances in Simulation, System Theory and Systems Engineering, WSEAS Press, 2002, pp. 322-328.

**E3. Pachidis T.**, "Pseudo Stereovision System (PSVS): A Monocular Mirror-based Stereovision System," Scene Reconstruction, Pose Estimation and Tracking, I-Tech Education and Publishing, Vienna, Austria, 2007, pp. 305-330. **(E:3)**

**E4.** Kodogiannis V., Lygouras J. and **Pachidis T.**, "An Intelligent Decision Support System in Wireless- Capsule Endoscopy," Intelligent Techniques and Tools for Novel System Architectures, Special post-conference volume published by Springer-Verlag, Vol. 109, 2008, pp.520-535.

**THEORY AND LABORATORY NOTES**

**F1. Digital Systems and Computers I, Exercises**, Democritus University of Thrace, Department of Electrical and Computer Engineering, 2000.

**F2. Digital Systems and Computers II, Exercises**, Democritus University of Thrace, Department of Electrical and Computer Engineering, 2001.

**F3. Electric Circuits Laboratory**, Notes, TEI of Kavala, Department of Petroleum and Natural Gas (version: February 2008).

**F4. Automatic Control Systems Laboratory I (ACS I) Notes**, TEI of Kavala, Department of Petroleum and Natural Gas (version February 2008).

**F5. Control and Automation Devices Laboratory (ACS II) Notes,** TEI of Kavala, Department of Petroleum and Natural Gas (version February 2008).

**F6. Robotics Laboratory, Notes**, TEI of Kavala, Industrial Informatics Department (version October 2011).

**F7. Computer Graphics, Notes,** TEI of Kavala, Industrial Informatics Department (version February 2011).

**F8. Software Project Management - Software Quality, Notes,** Kavala Institute of Technology, Industrial Informatics Department (version February 2012).

**F9. Software Project Management - Software Quality, Laboratory Notes,** Kavala Institute of Technology, Industrial Informatics Department (version March 2012).

**F10. Introduction to Software Engineering**, **Notes,** TEI of Kavala, Industrial Informatics Department (version April 2013).

**F11. Electric Circuits, Notes,** TEI of Kavala, Industrial Informatics Department (version April 2013).

**F12. Electronic Circuits, Notes,** TEI of Kavala, Industrial Informatics Department (version April 2013).

**F13. Electronic Circuits, Laboratory Notes,** TEI of Kavala, Industrial Informatics Department (version February 2013).

**F14. Electronic Circuits, Laboratory Notes (Exercises with Pspice),** TEI of Kavala, Industrial Informatics Department (version April 2013).

**F15. Eletric Circuits Laboratory – Applied Physics, Notes,** TEI EMT, Department of Petroleum and Natural Gas Technology Engineering and Mechanical Engineering (version September 2013).

**F16. Measurement Systems Laboratory, Notes,** TEI EMT, Department of Petroleum and Natural Gas Technology Engineering and Mechanical Engineering (version September 2013).

**F17. Automatic Control Systems Laboratory, Notes,** TEI EMT, Department of Petroleum and Natural Gas Technology Engineering and Mechanical Engineering (version February 2014).

**F18. Software Project Management - Software Quality, Laboratory Notes,** TEI EMT, Computer and Informatics Engineering Department (version February 2014).

**F19. Software Project Management - Software Quality, Exercises Notes,** TEI EMT, Computer and Informatics Engineering Department (version February 2015).

**OTHER DOCUMENTS OF MYSELF**

**G1. Semiconductor Lasers a Study**, Anna Kotoula Theodore Pachidis, Instructor - Supervisor: Prof. N. A. Economou, Department of Solid State Physics, Physics Department, Faculty of Sciences, Aristotle University of Thessaloniki, November 1987, Thessaloniki.

**G2. Device to Study Mechanical and Optical Phenomena with a PC**, **project TECHNOMATHEIA I, Technical Study**, Theodore Pachidis, June 1996, Kavala.

**G3. Mechanics Experiments based on an Airline – Laboratory Exercises**, Theodore Pachidis, 1998.

**G4. DC and AC Circuits and Analog Electronics - Forms for laboratory exercises**, Theodore Pachidis, Technical School of Chrysoupolis, 1999.

**G5. Pulse amplitude modulation and Switching Power Supplies, Study**, Theodore Pachidis, Electrical and Computer Engineering Department, Faculty of Engineering, Democritus University of Thrace, 1999, Xanthi.

**G6. Principal Component Analysis, Study**, Theodore Pachidis, Electrical and Computer Engineering Department, Faculty of Engineering, Democritus University of Thrace, 1999, Xanthi.

**G7. Robust control of a Robotic manipulator, Study**, Theodore Pachidis, Electrical and Computer Engineering Department, Faculty of Engineering, Democritus University of Thrace, 2000, Xanthi.

**G8. Neural Networks: Solution of Selected Exercises (and using MATLAB)**, Theodore Pachidis, Electrical and Computer Engineering Department, Faculty of Engineering, Democritus University of Thrace, 2000, Xanthi.

**G9. Radon and Hough Transformations, Summary Presentation**, Theodore Pachidis, SEM & M.Y. Department, Faculty of Engineering, Democritus University of Thrace, 2000, Xanthi.

**G10. Electric Circuits Laboratory, Standard Forms of Written Work**, TEI of Kavala, Department of Petroleum and Natural Gas (version February 2008).

**G11. Automatic Control System of Speed and Position of a Motor's Load (Feedback 33-912 Digital Servo Fundamentals), Laboratory Exercises,** Dr. Theodore Pachidis, Adjunct Assist. Professor, TEI of Kavala, Mechanics Department, January 2010.

**G12. Proceedings of Technical Offers Evaluation** of the Companies that Participated in the Open Competition for the Project "ETEIK" (Equipment of TEI of Kavala ) TEI of Kavala, August 2011.

## APPENDIX I

## ABSTRACTS OF THESES

### A1. Master Thesis

Title of my Master thesis:

**"Construction of a Control Unit Microprocessor Based for a Local Area Network**"

The requirements to HARDWARE and SOFTWARE for each computational unit, despite the vertical development of technology, maintaining high installation costs of a Local Computer Network. This led us to the integration of the study and eventual construction of a control unit (CONTROLLER) of a low cost Local Computer Network, with the aim to link all of the Computers of Digital Systems and Microcomputers Laboratory of the Faculty of Sciences.

This unit can support different computers simultaneously, allowing the selection and use of a wide range of communication protocols.

Features - benefits of the unit are: a) low cost (around 10,000 drachmas) per connected computer system. b) Connection of computer systems in bus topology (Ethernet type) with a simple coaxial cable. c) Information transmission rate 250 kbits / sec. d) Great flexibility in the choice of protocols and modes of communication. e) Asynchronous operation of the system by packet switching (packet switching). f) easy adaptation to different types of computers. g) Reliability and scalability. h) Existence of an independent microprocessor (Z80A), qualified for the network and its own memory that makes the unit independent and flexible and the time burden on the host computer on the network is small.

In this work, a refer to networks in general and a concise definition of them is given, they are classified according to various characteristics and the purpose for which they developed is presented. Concepts of Gateways - Bridges - Routers are given and the most commonly used transfer media are presented. The following are the characteristics of local networks, the topologies used to, communication protocols, particularly the model ISO - OSI.

It is studying the construction of a Local Area Network. Select the most appropriate topology according to the objective pursued by the network under study. Shows the

shape of the package information and analysis of each field. Studied the general form of the CONTROLLER which will serve the network. Examine the communication with the HOST CPU CONTROLLER processor and its connection to the network. Discusses the control method of conflict and presents data for serial transmission unit - making and memory. Then consider the connection to the given CONTROLLER HOST computer AIM-65.

Includes all information relating to the construction of the control unit. Manufacture of printed circuit board, completion of construction, problems encountered and changes - improvements needed. Also presented were the controls for smooth operation at low speed communication. Efforts to achieve the highest possible speed under the conditions used in simulation with the help of integrated transmit and receive packets.

Presents the general flow charts of programs broadcast receivers, conflict, communication processors as well as the connection between them. Give detailed flow charts and the necessary programs with the necessary explanations. Finally summarizes the efforts made to minimize the execution time of programs leading to the achievement in terms of SOFTWARE, the highest possible speed communication network. It also shows the capability of the CONTROLLER in any other system. Then given a general block diagram of the CONTROLLER, the detailed block diagram, the diagram of the printed circuit board, photos of various signals during operation of the CONTROLLER as well as photos of himself CONTROLLER.

**B1. PhD THESIS**

**Title of my PhD thesis:**

**"Trajectory Control of Robotic Manipulator in real time, Based on a Pseudo-stereovision System**"

Industrial robots play a key roll to production systems. However the most of them, which are systems of closed architecture, do not use sensors and mainly vision systems. Moreover, communication with these systems is restricted. Thus, they are less flexible, reliable and less adapted to the requirements of an industrial environment.

In this thesis, systematic efforts are made to exploit the minimum communication facilities provided by a robotic system and at the same time, robotic control, in real

time, by means of personal computers (PCs) and Windows of Microsoft as operating system (OS) to be achieved. PCs are the most common computer platform while Windows are the most common OS. The objective of using the above hardware and software is to create robotic systems user friendly that will be possible to serve in smaller production units.

A novel architecture, called HumanPT, is presented. By means of this architecture, PC-based robot control is achieved by using sensors and particularly vision systems. In the frame of this thesis, a complete robotic application (*HumanPT*) in visual C++ based on the above architecture was developed. It is implemented on a Unimation PUMA 761 robotic manipulator. The objective was to create an arc-welding robotic system mainly by means of the Pseudo-Stereovision System (PSVS) proposed. The communication of a PC with the robot is achieved through PUMA ALTER serial port for first time at 38400 bps.

PSVS, which is composed of a camera and four mirrors, captures in one shot a complex image as result of the superposition of the left and right view of PSVS. Construction details and the related equations are provided, refraction phenomena due to the beam-splitter used are studied and equations giving coordinates of a 3D point, where refraction phenomena are taken into consideration, are recalculated. Separation methods of complex images are also studied (for color and gray-scale complex images). To reconstruct each pair of images generated by the separation, the meander method of reconstruction is proposed.

A novel corner detection method, implemented to 2D objects used by a camera calibration method, is presented. The algorithm is based on seeds, while corner detection is achieved by means of X-shape 11X11 templates. The related theory and the environment, part of *HumanPT* application, permitting camera calibration and hand-eye calibration, in a short period of time, by means of known calibration methods, are presented.

Two original path generation methods are also presented. The first of them is based on complex images captured from static scenes. By means of a number of original algorithms, the generation of simple or of more complicated paths is achieved. For path generation, objects edges (lines or curves) and lines designed on complex images by using the proper tools provided are utilized. Some of the original algorithms proposed

are, a correspondence algorithm for complex images, a successive color edge points algorithm and a thinning algorithm for color edges. The second method is based on pseudo stereovision visual servo-control (PS-VVSC) and an original target-object (TOB) constructed for the requirements of this method. The method permits path generation in the whole robot environment.

Finally, a novel control unit generation software mechanism from structure elements, and a methodology for the final desired path generation is presented. A real time control method, in which the desired path is optimized by means of PSVS, is also provided. Control schemes based on the corresponding control units are given and their operation is explained.

The whole system developed is extendible, easy adapted to other robotic systems and permits in an easy way to generate a desired path and then to drive the robot end-effector along this path for many different tasks or procedures. It can be also used in mobile robots.

## PAPERS

### Papers in International Scientific Journals

**Γ1. Pachidis T., Tarchanidis K., Lygouras J. and Tsalides P., "Robot Path Generation Method for a Welding System Based on Pseudo Stereo Visual Servo Control," EURASIP Journal on Applied Signal Processing, Vol. 14, 2005, pp. 2268-2280.**

**Abstract:** A path generation method for robot based welding systems is proposed. The method, that is a modification of the method “Teaching by Showing”, is supported by the recently developed Pseudo Stereo Vision System (PSVS). A path is generated by means of the Target-Object (TOB), PSVS and the pseudo stereo visual servo control scheme proposed. A part of the new software application, called HumanPT, permits the communication of a user with the robotic system. Here, PSVS, the robotic system, the TOB, the estimation of robot poses by means of the TOB and the control and recording algorithm are decribed. Some new concepts concerning segmentation and point correspondence are applied as a complex image is processed. A method for calibrating

the end-point of TOB is also explained. Experimental results demonstrate the effectiveness of the proposed system.

**Γ2. Pachidis T. and Lygouras J., "Pseudo Stereovision-based Path Generation Method for a Robotic Arc-Welding System," WSEAS Transactions on Systems, Vol. 4, No. 1, January 2005, pp. 1-9.**

**Abstract:** In this paper a vision-based path generation method for a robotic arc welding system, is presented. The vision system used is the Pseudo Stereovision System (PSVS) that captures a complex image in a single shot. A part of the recently developed *HumanPT* robotic software application permits to implement the algorithms proposed. A desired welding path can be generated, not using a "Teaching by Showing" like method, but using a complex image captured by means of PSVS from a scene of the robotic environment. From this complex image, one or more edges or parts of them, lines manually designed and or a combination of lines of the previous cases, as well as lines in complex images of successive scenes can be used to generate the path that a torch follows. By means of the graphical user interface (GUI) provided, a user can initially process images selecting from pull down menus a variety of filters, edge detection methods and operations. Then the desired path as a combination of lines is selected. The correspondence algorithm proposed can be implemented in complex images and it is based on seeds. Finally, a successive number of equidistant path point locations are calculated by means of the path points calculation algorithm also proposed. In on line operation, PSVS mounted on the end-effector can capture complex images with the desired best view (welding view) of a scene permitting this way to calculate the desired path point locations with better accuracy (smaller distance, better slope of an edge). The application is developed in Visual C++, it runs in personal computers under Windows as operating system and communicates with PUMA 761 robot through ALTER communication port at 38400 bps.

**Γ3. Pachidis T. and Lygouras J., "Pseudo Stereo Vision System: A Detailed Study," Journal of Intelligent and Robotic Systems, Vol. 42, No. 2, 2005, pp. 135-167.**

**Abstract:** In this paper, a new stereovision system based on mirrors is presented. It is composed of three mirrors, a beam-splitter and a camera. It is called Pseudo Stereo Vision System (PSVS) and can be used in real time applications. Two parallel virtual cameras are created with the geometric properties and parameters of the real camera. PSVS captures, in one shot, a complex image, created by the superposition of the left and right views of the system. The apparatus has no moving parts, low cost and double resolution compared with other monocular systems based on mirrors. It can be constructed in any dimension covering any type of camera, length of baseline and accuracy of depth measurements. The design and construction details of the system as well as the appearing refraction phenomena to the apparatus are analytically presented. Analytical expressions are derived for the calculation of mirrors dimensions, minimum common view distance and minimum length of baseline. Mirrors alignment method is also described. Equations providing the Cartesian coordinates of a point in space, taking into consideration refraction phenomena to beam-splitter and camera calibration parameters, are proved. Two new methods for the separation of complex images to pairs of left and right images using gray scale or color cameras are explained and the first real experimental results are illustrated. Finally, experimental results, where the PSVS is mounted on the end effector of a PUMA 761 robotic manipulator are presented.

**Γ4. Pachidis T. and Lygouras J., "Vision-based Path Generation Method for a Robot-based Arc-Welding System," Journal of Intelligent and Robotic Systems, Vol. 48, No. 3, 2007, pp. 307-331.**

**Abstract:** In this paper a vision-based integrated method intended for path generation for a robot-based arc welding system, is presented. The described system is composed of the recently developed Pseudo Stereovision System (PSVS) or an ordinary stereovision system and the related software. A desired path can be generated, using a part or the entire edge of an image captured from a scene of the robotic environment, a

line manually designed in the image, a combination of lines of the previous cases or lines belonging in successive images captured from different scenes. A user can initially process images selecting by means of pull down menus a variety of filters, edge detection methods and operations. Then the desired path as a combination of lines is selected from images. Applying our correspondence algorithm, corresponding edges can be found. Finally, a number of successive path points are calculated by means of the proposed path point calculation algorithm. In on line operation, the vision system mounted on the end-effector can capture images with the desired best view (welding view) of a scene by moving or rotating (using push buttons) the end effector of the robotic manipulator PUMA 761. Other facilities of the described system are the selection of a variety of colors and shapes, histogram view, desired magnification, system information and automatic execution of user-selected operations. The graphical user interface is developed in Visual C++, it runs in a personal computer and communicates with the robotic manipulator (PUMA 761) through ALTER communication port.

**Γ5. Pachidis T. and Lygouras J., "Pseudo Stereo Vision System: A Monocular Stereo Vision System as a Sensor for Real Time Robot Applications," IEEE Transactions on Instrumentation and Measurement**, **Vol. 56, No. 6, 2007, pp.2547-2560.**

**Abstract:** In this paper, the design and the construction of a new system for stereovision using planar mirrors and a single camera are presented. Equations giving the coordinates of a point in space are provided. In these equations, refraction phenomena due to the beam-splitter used have been taken into consideration. Two virtual cameras are created from this pseudo stereovision system (PSVS) with exactly the same geometric properties, parameters and angular Field of View (FOV) of the real camera. Two superimposed stereo images are received simultaneously as a complex image. This vision system has no moving parts, its construction is quite simple and it is mechanically robust and cheap. It can be used for accurate measurements in the same way as binocular stereovision systems. It is easy to mount this system on the end effector of a robotic manipulator or on a mobile robot for real time applications. Using

fast algorithms for point correspondence and depth calculation in a simple personal computer, it can be used in high speed, low cost and high accuracy applications.

**Γ6. Lygouras J., Kodogiannis V., Pachidis T., Tarchanidis K. and Koukourlis C., "Variable Structure TITO Fuzzy Logic Controller Implementation for a Solar Air-conditioning System," Applied Energy, Vol. 85,2007, pp.190-203.**

**Abstract:** The design and implementation of a Two-Input/Two-Output (TITO) variable structure fuzzy-logic controller for a solar-powered air-conditioning system is described in this paper. Two DC motors are used to drive the generator pump and the feed pump of the solar air-conditioner. The first affects the temperature in the generator of the solar air-conditioner, while the second, the pressure in the power loop. The difficulty of Multi-Input/Multi-Output (MIMO) systems control is how to overcome the coupling effects among each degree of freedom. First, a traditional fuzzy-controller has been designed, its output being one of the components of the control signal for each DC motor driver. Secondly, according to the characteristics of the system's dynamics coupling, an appropriate coupling fuzzy-controller (CFC) is incorporated into a traditional fuzzy-controller (TFC) to compensate for the dynamic coupling among each degree of freedom. This control strategy simpli.es the implementation problem of fuzzy control, but can also improve the control performance. This mixed fuzzy controller (MFC) can effectively improve the coupling effects of the systems, and this control strategy is easy to design and implement. Experimental results from the implemented system are presented.

**Γ7. Pachidis T., Lygouras J. and Tarchanidis K., "HumanPT: An Open-Source, HumanPT Architecture-based, Robotic Application for Low Cost Robotic Tasks," Journal of Intelligent and Robotic Systems, Vol. 55, No. 4, 2008, pp.385-420.**

**Abstract:** In this paper, first HumanPT architecture for low cost robotic applications is presented. HumanPT architecture differs than other architectures because it is implemented on existing robotic systems (robot + robotic controller) and exploits the minimum communication facilities for real-time control that these systems provide. It is

based on well-known communication methods like serial communication (USB, RS232, IEEE-1394) and windows sockets (server-client model) and permits an important number of different type of components like actuators, sensors and particularly vision systems to be connected in a robotic system. The operating system (OS) used is Microsoft Windows, the most widely spread OS. The proposed architecture exploits features of this OS that is not a real-time one, to ensure - in case that the robotic system provide such a facility- control and real time communication with the robotic system controller and to integrate by means of sensors and actuators an important number of robotic tasks and procedures. As implementation of this architecture, *HumanPT* robotic application and experimental results concerning its performance and its implementation in real tasks are provided. *HumanPT* robotic application, developed in Visual C++, is an integrated, but simultaneously an open-source software that can be adapted in different types of robotic systems. An important number of robotic tasks or procedures including sensors and particularly vision systems can be generated and executed. Small enterprises by means of the proposed architecture and the open source software can be automated at low cost enhancing in this way their production.

**Γ8. Lygouras J., Pachidis T. and Tarchanidis K. and Kodogiannis V., "Adaptive High-Performance Velocity Evaluation Based on High Resolution Time-to-Digital Converter," IEEE Transactions on Instrumentation and Measurement, Vol. 57, No. 9, 2008, pp.2035-2043.**

**Abstract:** In this paper, an improved method is presented to derive the velocity information in an M/T-type (pulse number Measurement/Time duration) digital tachometer by processing its pulse train. The method incorporates encoder pulse counting and very accurate time measurement. The velocity sampling interval is not constant but it is continuously modified. An adaptive algorithm provides a wide-range velocity evaluation with very good accuracy. The adaptation of the next sampling period, according to the instant velocity, results in better response times at low speeds and very high accuracy at medium and high speeds. In comparison to currently known methods, the time measurement resolution and consequently the velocity accuracy is improved using the proposed method, due to the inclusion of high-resolution time-to-

digital converters (TDC) in the design. The proposed configuration can be implemented in specific hardware, using Field Programmable Gate Arrays (FPGA), saving thus the computational power of the Digital Signal Processor (DSP) supervising the system for higher-level control tasks.

**Γ9. Lygouras J., Kodogiannis V., Pachidis T. and Liatsis P., "Terrain-based Navigation for Underwater Vehicles Using an Ultrasonic Scanning System," Advanced Robotics, Vol. 22, No. 11, September 2008, pp.1181 - 1205.**

**Abstract:** In this paper an approach to the field of outdoor robotic navigation with a focus on underwater simultaneous localization and mapping (SLAM) method is proposed that utilizes ultrasonic scanning images. Experimental results from the implementation of a SLAM algorithm with real data are presented. The projected landmark detection process constructs a map of the environment and generates navigation estimates based on an adaptive delayed nearest-neighbor algorithm. The feature extraction and validation process are resolved at the sensor level using a simple local maximum level detection algorithm on the range data. This paper presents experimental results from our research efforts in the above area, using data from water tank trials and an ROV operating in shallow water environment.

**Γ10. Lygouras J. N., Kodogiannis V., Pachidis T. P., Sirakoulis G. Ch., "A New Method for Digital Encoder Adaptive Velocity/Acceleration Evaluation Using a TDC with Picosecond Accuracy," Microprocessors and Microsystems, Vol. 33, 2009, pp. 453-460.**

**Abstract:** In this paper, a new methodology for deriving the velocity and the acceleration information of a digital encoder through processing its pulse train, is presented. The proposed method is based on accurate time measurement (with picosecond accuracy) as well as encoder pulse counting in adaptively changing time intervals, providing thus a wide-range velocity evaluation with very good accuracy. The method offers better response times at low speeds and very high-accuracy at the full range of measured velocities. By using the proposed method, the velocity measurement

accuracy is improved compared to currently known methods, since high-resolution time-to-digital converters (TDC) are included in the design. The increased accuracy in velocity measurement allows the application of the simple arithmetic differentiation method on the velocity information in order to derive the acceleration, which in other cases would not be suggested due to accumulated quantization noise. A digital signal processor (DSP) also allows the implementation of numerous other methods to calculate acceleration. The proposed configuration has been implemented in specific hardware (FPGA), reserving thus the computational power of the system controlling DSP for high-level control tasks.

**Γ11. Pachidis T. P.**, **Sarafis I. T., Lygouras I. N., "Real time feature extraction and Standard Cutting Models fitting in grape leaves," Computers and Electronics in Agriculture, Vol. 74, 2010, pp. 293–304.**

**Abstract:** In food industry, a continuous effort is made to automate the production lines and, in many cases, it is desired to automate the plant leaves processing. In this paper we present a real-time vision-based system for main features extraction of grape leaves and for positioning and fitting of Standard Cutting Models (SCMs) onto leaves' profiles. The system comprises of a real-time software application connected to a fixed camera that captures still images of grape leaves, as they are moving on a conveyor belt. Our research focused on combining existing and novel, application specific, algorithms for image processing and developing the software application in visual C++. The aim was to create a reliable system that would process grape leaves automatically and in real time, reducing the wastage and enabling the optimization of the whole process in an industrial production line. Experimental results are also presented, in order to verify and confirm the efficiency and effectiveness of the proposed system.

**Γ12. Kaburlasos V. and Pachidis T., "A Lattice-Computing Ensemble for Reasoning Based on Formal Fusion of Disparate Data Types, and an Industrial Dispensing Application," Information Fusion, Vol. 16, 2014, pp.66-83.**

**Abstract:** By ‘‘fusion’’ this work means integration of disparate types of data including (intervals of) real numbers as well as possibility/probability distributions defined over the totally-ordered lattice $(R,\leq)$ of real numbers. Such data may stem from different sources including (multiple/multimodal) electronic sensors and/or human judgement. The aforementioned types of data are presented here as different interpretations of a single data representation, namely Intervals' Number (IN). It is shown that the set F of INs is a partially-ordered lattice $(F,\preceq)$ originating, hierarchically, from $(R,\leq)$. Two sound, parametric inclusion measure functions $\sigma: F^N \times F^N \to [0,1]$ result in the Cartesian product lattice $(F^N,\preceq)$ towards decision-making based on reasoning. In conclusion, the space $(F^N,\preceq)$ emerges as a formal framework for the development of hybrid intelligent fusion systems/schemes. A fuzzy lattice reasoning (FLR) ensemble scheme, namely FLR pairwise ensemble, or FLRpe for short, is introduced here for sound decision-making based on descriptive knowledge (rules). Advantages include the sensible employment of a sparse rule base, employment of granular input data (to cope with imprecision/uncertainty/vagueness), and employment of all-order data statistics. The advantages as well as the performance of our proposed techniques are demonstrated, comparatively, by computer simulation experiments regarding an industrial dispensing application.

**Γ13. Kodogiannis V.S., Pachidis T., Kontogianni E., “An intelligent based decision support system for the detection of meat spoilage,” Engineering Applications of Artificial Intelligence Vol. 34, 2014, pp. 23-36.**

**Abstract:** In food industry, safety and quality are considered important issues world wide that are directly related to health and social progress. Meat spoilage is the result of decomposition and the formation of metabolites, caused by the growth and enzymatic activity of micro organisms, and it presents not only a health hazard but an economic burden to the producer. In this research work, we explore the potential of Fourier transform infrared (FTIR) spectroscopy in combination of principal components analysis and neuro-fuzzy modeling, to determine beef spoilage microorganisms during aerobic storage at chill and abuse temperatures. FTIR spectra were obtained from the

surface of beef samples, while culture microbiological analysis determined the total viable count (TVC) for each sample. The dual purpose of the proposed modeling approach is not only to classify beef samples in the respective quality class (i.e., fresh, semi-fresh and spoiled), but also to predict their associated microbiological population directly from FTIR spectra. The proposed neuro-fuzzy network model utilises a prototype defuzzification scheme, where as the number of input membership functions is directly associated to the number of rules, reducing thus, the "*curse of dimensionality*" problem. Results confirmed the superiority of the adopted methodology compared to other schemes such as multilayer perceptron and the partial least squares techniques and indicated that FTIR spectral information in combination with an efficient choice of a learning-based modeling scheme could be considered as an alternative methodology for the accurate evaluation of meat spoilage.

**Γ14. Tarchanidis K.N., Pachidis Th., Lygouras J.N. and Tarchanidis J.N., "PUMA Internet Task Logging Using the IDAC-1," Journal of Engineering Science and Technology Review, Vol. 7, No. 3, 2014, pp. 188 – 191.**

**Abstract:** This project uses an IDAC-1 board to sample the joint angle position of the PUMA 76 1 robot and log the results on a computer. The robot is at the task location and the logging computer is located in a different one. The task the robot is performing is based on a Pseudo Stereo Vision System (PSVS). Internet is the transport media. The protocol used in this project is UDP/IP. The actual angle is taken straight from the PUMA controller. High-resolution potentiometers are connected on each robot joint and are buffered and sampled as potential difference on an A/D converter integrated on the IDAC-1. The logging computer through the Internet acting as client asks for the angle set, the IDAC-1 responds as server with the 10-bit resolution sampling of the joint position. The whole task is logged in a file on the logging computer. This application can give the ability to the Internet user to monitor and log the robot tasks anywhere in the Word Wide Web (www).

**Papers in Conference Proceedings**

**Δ1. Dragonas K., Pachidis T., Aggianidou E., Linardis P.,"Design of a Microprocessor Based LAN Controller" Conference of Technological and Educational Institute of Patra, Patra, 1988, pp.201-214.**

**Abstract: A** control unit for a local computer network Ethernet type is presented, designed and built in our laboratory in order to lower manufacturing costs. The unit is based on the Z80 microprocessor and its peripherals. This design besides the low cost has the advantage that it creates little burden on the host computer and allows easy use of various communication protocols because the unit is externally programmable. Furthermore, the data transfer rate is quite satisfactory (250 kbits / sec) compared to the cost.

**Δ2. Varsamis A., Pachidis T., Linardis P., "Design of a low cost logic analyser", Conference of Technological and Educational Institute of Patra, Patra, 1988, pp.450-466.**

**Abstract**: An analyzer of digital signals is presented that was designed with purpose the low cost. Uses a) a ready-microcomputer system as the basic machine for the processing and display of the signals b) expansion cards that built specifically to enable recording signals that change rapidly and c) the necessary software to control the system and display signals. The existence of the required materials for construction of boards in the Greek market allows for easy construction and maintenance. Moreover the use of a microprocessor for analysis and presentation of the input signals gives to user the flexibility to choose through the software the most affordable way to study these signals.

**Δ3. Pachidis T., Lygouras J., "A Pseudo Stereo Vision System as a Sensor for Real Time Path Control of a Robot," in Proc. IEEE Instrumentation and Measurement Technology Conference, 2002, pp.1589-1594.**

**Abstract:** In this paper, the design and the construction of a new system for stereovision using planar mirrors and a single camera is presented. Two superimposed stereo images are received simultaneously as a complex image and using a proper algorithm, disparities and depth of objects of the scene can be obtained. Two virtual cameras are created from this pseudo stereovision system (PSVS) with exactly the same geometric properties, parameters and angular FOV of the real camera. This vision system has no moving parts, its construction is quite simple and it is mechanically robust. Thus, it is easy for this system to be mounted to the end effector of a robotic manipulator or to a mobile robot.

**Δ4. Pachidis T., Lygouras J., Petridis V., "A Novel Corner Detection Algorithm for Camera Calibration and Calibration Facilities," in Proc. 2nd WSEAS Int. Conf. on Signal Processing and Computational Geometry and Vision, 2002, pp.6911-6916.**

**Abstract:** A novel corner detection algorithm is presented which can be used to camera calibration methods where square corners are used as control points. Corners are detected with sub-pixel accuracy, using a segmentation method for separation of each square, based on seeds. These are pixels with a predefined color or gray value. An 11x11 proper developed template, including pixels of the predefined color or gray value, convoluted with the corresponding square gives pixels related with a corner. The mean value of this cluster of pixels provides with sub-pixel accuracy the co-ordinates of the specified corner. Corners co-ordinates are calculated with the specified sequence of the camera calibration method. Corners are found even in cases where the square slope is big or the barrel phenomenon distorts too much the image. The software interface was made in visual C++. Some of its features are the possibility to change the scanning area making the algorithm faster or more reliable, saving facilities for the converted binary image and for the final corners file, model file creation. This program is part of a software application where images can be easily captured using a camera mounted on the end effector of PUMA 761 robotic manipulator and calibration is made through Z. Zhang method using a novel easy selectable data files method which is provided with the same program.

**Δ5. Pachidis T., Lygouras J. and Tsalidis P., "A Graphical User Interface for the Initial Path Generation of a Robotic Manipulator for an Arc Welding System," WSEAS ICRODIC, 2002, pp. 1601-1607.**

**Abstract:** In this paper a novel, graphical user interface, is presented. This interface can be used to generate a desired path of the end effector of a robotic manipulator. The path is selected by a static scene of the robot environment, manually either on line using an image capturing system or off line using a stored pair of images or a complex image. On line the system captures a pair of images using a stereovision system with one or two cameras or our pseudo stereovision system. A desired path could be generated by an edge or part of it of the scene image, a line manually designed to the image or a combination of lines of the previous cases. A user can initially process a pair of images selecting from pull down menus a variety of filters, edge detection methods and operations. Then the desired path as a combination of lines is selected from images. Applying our correspondence algorithm, corresponding edges can be found. Finally, a successive number of path points are calculated by means of the stereo system equations, the camera calibration parameters and the hand-eye transformation. In on line operation the capturing system mounted on the end effector can capture images with the desired best view of a scene by moving or rotating, using push buttons, the end effector of the robotic manipulator PUMA 761. Other facilities of the above system are the selection of a variety of colors and shapes, histogram view, magnification, automatic execution of user selected operations and system information. The interface is developed in Visual C++, it runs in a personal computer and communicate with the robot PUMA 761 via ALTER communication port.

**Δ6. Aristos D., Pachidis T., Lygouras J., "Robot Path Generation by Viewing a Static Scene from a Single Camera," in Proc. IEEE Int. Symposium on Robotics and Automation, 2002.**

**Abstract:** In this paper a new method for robot path generation on a plane surface is proposed. As a sensor a single camera mounted on the end-effector of a robotic manipulator is used. Processing an image of a static scene of the environment of the manipulator, where the desired track is contained, the 3D path points are accurately calculated. The accuracy of the calculation is achieved by combining two well-known methods for camera calibration and hand/eye – robot/world calibration. The method was implemented in a PUMA 761 robotic manipulator using a proper program developed in C. Finally the accuracy of the calculation was checked in the same robot using a software application in Visual C++.

**Δ7. Pachidis T. and Lygouras J., "Pseudo Stereo Vision System: Modifications for Accurate Measurements in 3-D Space Using Camera Calibration," in Proc Sensors for Industry Conference (IEEE/ISA), Houston, 2002, pp. 66-70. (Invited Paper)**

**Abstract:** In this paper, first, a new method for mirrors alignment in Pseudo Stereo Vision System (PSVS) and a new user interface, which measures the quality of mirrors alignment, are described. Using this user interface the measurement of the length of the baseline in PSVS is possible. Then, a well-known method for camera calibration is implemented to each virtual camera of the PSVS and the modified equations giving the coordinates of a random point in 3-D space are recalculated. Using these modified equations and algorithms for point correspondence and robot path points calculation presented in our previous papers, higher accuracy experimental results are illustrated.

**Δ8. Tarchanidis K., Pachidis T., Lygouras J. and Koutras J., "Remote Robot Task Monitoring Using the IDAC-1," in Proc. IEEE Instrumentation and Measurement Technology Conference (IMTC), 2006, pp. 1296-1300.**

**Abstract:** This project uses an IDAC-1 board to sample the joint angle position of the PUMA 76 1 robot and log the results on a computer. The robot is at the task location and the logging computer is located in a different one. The task the robot is performing is based on a Pseudo Stereo Vision System (PSVS). Internet is the transport media. The protocol used in this project is UDP/IP. The actual angle is taken straight from the

PUMA controller. High-resolution potentiometers are connected on each robot joint and are buffered and sampled as potential difference on an A/D converter integrated on the IDAC-1. The logging computer through the Internet acting as client asks for the angle set, the IDAC-1 responds as server with the 10-bit resolution sampling of the joint position. The whole task is logged in a file on the logging computer. This application can give the ability to the Internet user to monitor and log the robot tasks anywhere in the Word Wide Web (www).

**Δ9. Tarchanidis K., Lygouras J., Pachidis T., Kodogiannis V. and Chatziandreoglou C., "pH Neutralization Through Internet," in Proc. IEEE International Conference on Virtual Environments, Human - Computer Interfaces and Measurement Systems (VECIMS), 2006, pp. 19 - 23.**

**Abstract:** This project uses an IDAC-1 board to sample and control the pH level in a tank. The whole control is performed through the Internet. The experimental arrangement is placed on the task location and the controlling computer is located in a different one. Internet is the transport media. The protocol used in this project is UDP/IP. The pH level is measured by a pH meter and its output is sampled by an A/D converter integrated on the IDAC-1. To change the pH level ON-OFF valves control the free flow of light solutions acid and alkaline. The controlling computer through the Internet acting as client asks for the pH level, the IDAC-1 responds as server with the 10-bit resolution sampling pH meter. If pH is away from the set point the corresponding valve opens, neutralizing this way the solution. The whole procedure is logged in a file on the controlling computer. This application can give the ability to the Internet user to monitor and control the pH of a solution anywhere in the Word Wide Web (www).

**Δ10. Pachidis T., Tarchanidis K. and Lygouras J., "Apparatus - Based Experimental Study of Physics Phenomena," in Proc. IEEE International Conference on Virtual Environments, Human - Computer Interfaces and Measurement Systems (VECIMS), 2006, pp. 102 - 107.**

**Abstract:** Basic measurement concepts of a new apparatus for the experimental study of physics phenomena based on laser modules and detectors are presented in this paper. Construction details of the proposed apparatus are also described. Measurement time base is 100 ìsec (depending on the microprocessor used) and in each cycle, data coming from eight photo-detectors are stored. When an experiment is finished or corrupted by a user, data are transferred in a personal computer and with the aid of a software application (depending on the experiments) final values of variables are calculated. The results as well as graphical representations of them are displayed on the screen. The proposed apparatus can be used to study straight or circular movements with controlled friction or without friction, collisions, gravitation phenomena, to measure acceleration of gravity (g), reflection and refraction phenomena as well as to permit in a pupil or student to be experimented with digital gates.

**Δ11. Pachidis T., Lygouras J., Tarchanidis K. and Kodogiannis V., "HumanPT: Architecture for Low Cost Robotic Applications," in Proc. IEEE International Conference on Virtual Environments, Human - Computer Interfaces and Measurement Systems (VECIMS), 2006, pp. 154 - 159.**

**Abstract:** In this paper an architecture for low cost robotic applications as well as its implementation in a commercial robot is presented. HumanPT architecture differs than other architectures because it is implemented on existing robotic systems (robot + robotic controller) and exploits the minimum communication facilities for real-time control that these systems provide. It is based on well-known communication methods like serial communication (USB, RS232, IEEE-1394) and windows sockets (server-client model) and permits an important number of different type of components like actuators, sensors and particularly vision systems to be connected in a robotic system. The operating system (OS) used is Microsoft Windows, the most widely spread OS. The proposed architecture exploits features of this OS that is not a real-time one, to ensure - in case that the robotic system provide such a facility- control and real time communication with the robotic system controller and to integrate by means of sensors and actuators an important number of robotic tasks and procedures. The proposed

architecture provides the possibility in small enterprises to be automated enhancing in this way their production.

**Δ12. Pachidis T. P., Sarafis I. T., Lygouras I. N., " Vision System-based, Grape Leaves Processing, in Real Time," 2010 IEEE International Conference on Imaging Systems and Techniques (IST), 1-2 July, Thessaloniki, Greece, pp. 472 – 477.**

**Abstract**: In this paper, automatic grape leaves processing and preparation of them (fitting of the proper cutting shapes on leaves area) to cover food industry needs, are presented. In the experimental setup, images are captured by means of a single firewire camera and a LED-based lighting system, while grape leaves are moving on a conveyor belt. For image processing, a novel software application (called NtolcutPT) has been developed in visual C++. It is based on known and novel proposed in this paper image processing algorithms and methodologies that ensure automatic leaves processing in real time, with less wastage and more reliability. Adapting the proposed system in a food industry production line the whole process can be optimized. Experimental results prove the effectiveness of this system.

**Δ13. Pachidis T., Kaburlasos, V. G. "Person Identification Based on Lattice Computing k-Nearest-Neighbor Fingerprint Classification," in 16th International KES Conference on Advances in Knowledge-Based and Intelligent Information and Engineering Systems, M. Grana et al. (Eds.), IOS Press, San Sebastian, September 2012, pp. 1720 – 1729.**

**Abstract:** This work presents a novel Lattice Computing (LC) approach for person identification based on biometric data including fingerprints. In particular, this work, first, engages conventional techniques for fingerprint image preprocessing towards inducing distributions of fingerprint *minutiae*, moreover an induced distribution is represented by an Intervals' Number (IN). Second, it employs a *kNN* classifier in a metric lattice of INs. The effectiveness of the proposed approach is demonstrated

comparatively by computational experiments using a software developed for the needs of this work. The far reaching potential of the proposed approach is discussed.

**Δ14. Kaburlasos Vassilis, Pachidis Theodore, Papakostas George, Papadakis Stelios, "Intervals' Numbers (Ins) for Statistical Learning and Classification Applications," Third EUCogIII Menbers Conference, Palma de Mallorca, Spain, 10 – 11 April 2013.**

**Abstract:** The *Lattice Computing* (*LC*) paradigm has been introduced lately as an evolving collection of mathematical modelling tools that process lattice-ordered data *per se* including logic values, numbers, sets, graphs, symbols, etc. This poster focuses, in particular, on Intervals' Numbers (INs) in statistical learning and classification applications.

**Δ15. Papakostas G. A., Kaburlasos V. G., Pachidis Th., "Thermal Infrared Face Recognition Based on Lattice Computing (LC) Techniques," 2013 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE 2013), Hyderabad, 7-10, July 2013, pp. 1-6.**

**Abstract:** This work introduces a novel methodology for human face recognition based on lattice computing kNN classification techniques applied on thermal infrared images. Novel feature extraction and knowledge-representation engage populations of orthogonal moments represented by intervals' numbers, or INs for short. Preliminary experimental results compare well with the results by alternative classifiers as well as with alternative feature extraction techniques from the literature. We point out the far-reaching potential of the proposed techniques to big data applications.

**Δ16. Kaburlasos V. G., Papakostas G. A., Pachidis Th., Athinellis Alex., "Intervals' Numbers (Ins) Interpolation/Extrapolation," 2013 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE 2013) Hyderabad, 7-10, July 2013, pp. 1-8.**

**Abstract:** An Intervals' Number (IN) is a mathematical object known to represent either a probability distribution or a possibility distribution. The space of INs has been studied during the last years. After summarizing some instrumental mathematical results, this work demonstrates comparatively novel schemes for tunable fuzzy rule interpolation and extrapolation. Extensions to Type-2 fuzzy sets are straightforward. Finally, this work demonstrates a preliminary application, regarding the reconstruction of partially occluded human facial expressions, based on a neural network that may predict a data distribution from other ones. Far reaching extensions of the proposed techniques are discussed.

**Papers in Books**

**E1. Pachidis T. and Lygouras J. and Petridis V., "A Novel Corner Detection Algorithm for Camera Calibration and Calibration Facilities," Recent Advances in Circuits, Systems and Signal Procesing, WSEAS, 2002, pp. 338-343.**

**Abstract:** A novel corner detection algorithm is presented which can be used to camera calibration methods where square corners are used as control points. Corners are detected with sub-pixel accuracy, using a segmentation method for separation of each square, based on seeds. These are pixels with a predefined color or gray value. An 11x11 proper developed template, including pixels of the predefined color or gray value, convoluted with the corresponding square gives pixels related with a corner. The mean value of this cluster of pixels provides with sub-pixel accuracy the co-ordinates of the specified corner. Corners co-ordinates are calculated with the specified sequence of the camera calibration method. Corners are found even in cases where the square slope is big or the barrel phenomenon distorts too much the image. The software interface was made in visual C++. Some of its features are the possibility to change the scanning area making the algorithm faster or more reliable, saving facilities for the converted binary image and for the final corners file, model file creation. This program is part of a software application where images can be easily captured using a camera mounted on the end effector of PUMA 761 robotic manipulator and calibration is made through Z.

Zhang method using a novel easy selectable data files method which is provided with the same program.

**E2. Pachidis T. and Lygouras J. and Tsalidis P., "A Graphical User Interface for the Initial Path Generation of a Robotic Manipulator for an Arc Welding System," Advances in Simulation, System Theory and Systems Engineering, WSEAS Press, 2002, pp. 322-328.**

**Abstract:** In this paper a novel, graphical user interface, is presented. This interface can be used to generate a desired path of the end effector of a robotic manipulator. The path is selected by a static scene of the robot environment, manually either on line using an image capturing system or off line using a stored pair of images or a complex image. On line the system captures a pair of images using a stereovision system with one or two cameras or our pseudo stereovision system. A desired path could be generated by an edge or part of it of the scene image, a line manually designed to the image or a combination of lines of the previous cases. A user can initially process a pair of images selecting from pull down menus a variety of filters, edge detection methods and operations. Then the desired path as a combination of lines is selected from images. Applying our correspondence algorithm, corresponding edges can be found. Finally, a successive number of path points are calculated by means of the stereo system equations, the camera calibration parameters and the hand-eye transformation. In on line operation the capturing system mounted on the end effector can capture images with the desired best view of a scene by moving or rotating, using push buttons, the end effector of the robotic manipulator PUMA 761. Other facilities of the above system are the selection of a variety of colors and shapes, histogram view, magnification, automatic execution of user selected operations and system information. The interface is developed in Visual C++, it runs in a personal computer and communicate with the robot PUMA 761 via ALTER communication port.

**E3. Pachidis T., "Pseudo Stereovision System (PSVS): A Monocular Mirror-based Stereovision System," Scene Reconstruction, Pose Estimation and Tracking, I-Tech Education and Publishing, Vienna, Austria, 2007, pp. 305-330.**

**Abstract:** A system for stereovision based on mirrors and a beam-splitter, is presented. PSVS, as it is called, is a low cost system with well-located features (accuracy, stability, compact construction). Equations and relations, concerning its construction and calculation of point's coordinates in 3D space, taking into consideration refraction phenomena due to beamsplitter, were derived. Keeping always in mind the low construction cost and the possibility to easy constructed and used by anyone, new methods were introduced. These methods concern the correspondence algorithm used, complex images separation and stereoscopic images reconstruction. Some problems during separation and reconstruction of images were explained. However, more research for this issue is required (i.e. integration of a spatial filter on a beam-splitter). The PSVS, as it is obvious from the experimental results can be successfully used for robotic applications. It was successfully used in different tasks, methods for robot path generation and stereo visual servo control. Moreover, it can be used to measure in space (to measure big distances) or in underwater applications. Our future plans include implementation of PSVS in more robotic applications, the development of a new PSVS calibration method, the improvement of complex images separation method. They also include the construction of different in size PSVS devices that could accurately measure ultra small distances in the micro world or distances in space.

**E4. Kodogiannis V., Lygouras J. and Pachidis T., "An Intelligent Decision Support System in Wireless-Capsule Endoscopy," Intelligent Techniques and Tools for Novel System Architectures, Special post-conference volume published by Springer Verlag, Vol. 109, 2008, pp.520-535.**

**Abstract:** In this paper, a detection system to support medical diagnosis and detection of abnormal lesions by processing endoscopic images is presented. The endoscopic images possess rich information expressed by texture. Schemes have been developed to extract texture features from the texture spectra in the chromatic and achromatic

domains for a selected region of interest from each colour component histogram of images acquired by the new M2A Swallow-able Capsule. The implementation of advanced neural learning-based schemes and the concept of fusion of multiple classifiers dedicated to specific feature parameters have been also adopted in this paper. The test results support the feasibility of the proposed methodology.

## APPENDIX II – Recognition by Others Researchers

| 31/7/2015 | Google Scholar | Scopus | ResearchGate |
|---|---|---|---|
| Citations | 201 | 90 | 115 |
| h-index | 8 | 7 | --- |
| i10-index | 7 | --- | --- |