CURRICULUM VITAE, RESEARCH WORK AND TEACHING STATEMENT

Dr. Giorgos A. Demetriou

5/11/2013

SUMMARY – SHORT CV

Dr. Giorgos A. Demetriou received his Ph.D. in computer science-robotics and his M.S. in computer engineering from the Center for Advanced Computer Studies at the University of Louisiana at Lafayette, Lafayette, Louisiana, USA in 1998 and 1994, respectively. His Ph.D. specialization is in Robotics. His B.S. degree is in Electrical and Computer Engineering from the University of Louisiana at Lafayette, Lafayette, Louisiana, USA. Since 2006 he has been with the Computer Engineering and Computer Science Department of Frederick University, Lemesos, Cyprus. At Frederick University he is the director of the Robotics and Automated Systems Lab (RAS Lab) and the co-director for the Akadimia Rompotikis (Robotics Academy). Before that he was with the Computer Engineering Department of Purdue University, Fort Wayne, Indiana, USA and with the Computer Science department of the University of Southern Mississippi-Gulf Coast (USM-GC), Long Beach Mississippi, USA. At Purdue University he was an assistant professor of computer engineering. At USM-GC, he served as an assistant professor, as the director of the Robotics and Graphics Laboratory and as the coordinator for the computer science graduate and undergraduate programs. He received funding and was involved in numerous research projects funded by the EU, the National Research Foundation of Cyprus (ΙΠΕ), the National Science Foundation and other organizations. He has published book chapters and several journal and conference papers. He was the co-editor for several international conference proceedings and the chair for many international conferences. He was in the organizing committee of a number of international conferences. He served as an evaluator for the IEEE Journal of Intelligent and Robotic Systems, the European Union, the Research Promotion Foundation of Cyprus, the Greek government, many conferences and others.

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1. GENERAL INFORMATION

1.1. Personal Information

Dr. Giorgos A. Demetriou
Assistant Professor
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Personal Website:	http://staff.frederick.ac.cy/com.dg
RAS LAB:	http://staff.frederick.ac.cy/com.dg/robotics
Akadimia Rompotikis:	http://akrob.frederick.ac.cy

1.2. Education

- **Ph.D. in Computer Science, May 1998**
  University of Louisiana at Lafayette (ULL)
  Center for Advanced Computer Studies
  Lafayette, Louisiana, USA

  Ph.D. Dissertation Title: "*Hybrid Control Architecture for an Autonomous Underwater Vehicle (AUV)*"

- **M.S. in Computer Engineering, May 1994**
  University of Louisiana at Lafayette
  Center for Advanced Computer Studies
  Lafayette, Louisiana, USA

- **B.S. in Electrical Engineering (Computer Engineering Option), December 1990**
  University of Southwestern Louisiana
  Lafayette, Louisiana, USA

1.3. Research Interests

Robotic Systems

- Underwater Robots
- Autonomous Surface Robots
- Information / sensor fusion, control and coordination of multisensory robotic systems
- Guidance, navigation, control and collision avoidance of robotic systems
- Design and testing of controllers for autonomous robot vehicle navigation

Intelligence Systems

- Modeling, control and coordination, integrated control and diagnostics of intelligent systems / robotic systems
- Modeling, control, coordination and performance evaluation of distributed systems (including multi-operational production systems)

Applications

- Unmanned Ground Vehicles (UGV), Unmanned Aerial Vehicles (UAV), Autonomous Underwater Vehicles (AUV), and Remotely Operated Vehicles (ROV)
- Sensor based navigation of mobile robots
- Virtual environment based modeling, control and simulation of robotic manipulators, mobile robots, AUVs and CIM systems
- Embedded Systems
- Controller Design

1.4. Awards

- Conference Best Paper: G. A. Demetriou, A. Vystavkin, S. Anastasiou, A. Theofilou, C. Giannopoulos, D. Yerolemou. “Indoor Mobile Robot Localization Using a Wireless Network: WiFiBot Case Study,” in The 2008 International Conference on Artificial Intelligence (ICAI'08), Las Vegas, Nevada, July 14-17, 2008.
- Achievement Award: The 2007 World Congress in Computer Science, Computer Engineering and Applied Computing (WORLDCOMP’07), Las Vegas, Nevada, 2007.
- Achievement Award: The 2006 World Congress in Computer Science, Computer Engineering and Applied Computing (WORLDCOMP’06), Las Vegas, Nevada, 2007.
- SILMA Inc. National Award: Simulation of manufacturing cells with realistic constraints using the SILMA CimStation packages, 1998.

1.5. Organizations

- Active member of the Institute of Electrical and Electronics Engineers (IEEE)
- Active member of the Association of Computing Machinery (ACM)
- Elected Member of Province Secretariat of Dimokratikos Synagermos of Lemesos (Επαρχιακή Γραμματεία ΔΗΣΥ Λεμεσού)
- Member of the Education Committee of Dimokratikos Synagermos (Επιτροπής Παιδείας ΔΗΣΥ)

- Elected member of Committee of the Nautical Club of Lemesos (NOL), 2010 - Present
- Elected Vice President of the Association of the Green Berets Reserves of Cyprus, 2012 - Present

2. PROFESSIONAL EXPERIENCE

2.1. Teaching Experience

- **Frederick University,** 2006 - Present
  Lemesos, Cyprus
  Assistant Professor of the Department Computer Science and Engineering

- **Purdue University, Fort Wayne (IPFW),** 2004 – 2005
  Fort Wayne, Indiana, USA
  Assistant Professor of the Department Computer Engineering

- **University of Southern Mississippi (USM),** 2000 – 2004
  Long Beach, Mississippi, USA
  Assistant Professor of the Department Computer Science
  Computer Science Department Coordinator
  Computer Science Graduate Coordinator

- **University of Louisiana at Lafayette (ULL),** January 1998 - May 1998
  Electrical Engineering and Computer Engineering Department (EECE)
  Lafayette, Louisiana, USA
  Adjunct Professor of the Department Computer Engineering

- **University of Louisiana at Lafayette, Learning Center,** 1991 – 1993
  Lafayette, Louisiana, USA
  Tutor of Mathematics, Computer Science, Computer Engineering and Physics

2.2. University, Department and Laboratory Administrative Experience

- **Akadimia Rompotikis of Frederick University,** 2013 – Present
  Frederick University, Lemesos, Cyprus
  Director of Akadimia Rompotikis (http://akrob.frederick.ac.cy)

- **Robotics and Automated Systems Lab,** 2012 – Present
  Frederick University, Lemesos, Cyprus
  Director of the Robotics and Automated Systems Lab (staff.frederick.ac.cy/com.dg/robotics)

- **University of Southern Mississippi – Gulf Coast (USM-GC),** 2000 – 2004
  Long Beach, Mississippi, USA
  Coordinator of the Computer Science Graduate and Undergraduate Department.
  Director for the Robotics and Computer Graphics Laboratory.

2.3. Industry Experience

- **US Test, Inc.,** November 1998 - December 1999
  Broussard, Louisiana, USA
  Systems Engineer - Designed and developed testing equipment for underground gas tanks. The systems use ultra sound to perform the tests.

- **Computer Consultant,** 1995 – 1998
  Lafayette, Louisiana, USA
  Computer Upgrades/Repairs, Software Installation, Networking, Systems Analysis.

2.4. Military

- **Ethnici Froura (Cyprus Military),** 1983 – 1985
  First Lieutenant (Green Berets - Special Forces)

2.5. Other Experience

- **University of Louisiana at Lafayette,** 1996 – 1997
  Center for Advanced Computer Studies (CACS)
  Lafayette, Louisiana, USA
  Computer/Systems Administrator

- **University of Louisiana at Lafayette,** 1994 – 1996
  Apparel and Computer Integrated Manufacturing Center
  Lafayette, Louisiana, USA
  Computer/Systems Administrator

3. PROFESSIONAL CONTRIBUTION

3.1. Evaluations

- Evaluator for the Information Society Technologies (IST) 2005-06 Work Programme in Advanced Robotics, May 29th – June 2nd, 2006, Brussels, Belgium
- Evaluator for the Research Promotion Foundation of Cyprus

3.2. Reviewer

- IEEE Journal of Intelligent and Robotic Systems.
- International Journal on Artificial Intelligence Tools (IJAIT)
- The IEEE Mediterranean Conference on Control and Automation (MED) – 2011, 2012, 2013
- The World Congress in Computer Science, Computer Engineering and Applied Computing (WORLDCOMP) – 2006, 2007, 2008
- The International Conference on Artificial Intelligence (ICAI) - 2006, 2007, 2008
- The IEEE International Inference in Robotics and Automation (ICRA) - 2004
- The Multi Conference in Computer Science and Computer Engineering - 2003, 2004
- The Florida Artificial Intelligence Research Society (FLAIRS) - 2001, 2002

3.3. Conference Activities

Section Chair / Conference Chair

- Chair, “Education and Training”, The 21st Mediterranean Conference on Control and Automation (MED’13), Chania, Crete, Greece, June 25-28, 2013
- Chair, “Unmanned Ground Vehicles”, The 2008 International Conference on Artificial Intelligence (ICAI'08), Las Vegas, Nevada, USA
- Chair, “Unmanned Ground Vehicles”, The 2007 International Conference on Artificial Intelligence (ICAI'07), Las Vegas, Nevada, USA
- Chair, “Sensor Based Navigation and Control of Unmanned Ground Vehicles”, The 2006 International Conference on Artificial Intelligence (ICAI'06), Las Vegas, Nevada, USA
- Chair, The 2004 International Conference on Modeling, Simulation and Visualization Methods, Las Vegas, Nevada, USA
- Chair, 2004 IEEE International Inference in Robotics and Automation (ICRA 2004), New Orleans, Louisiana, USA
- Chair, The 2003 Multi Conference in Computer Science and Computer Engineering, Las Vegas, Nevada, USA, 2003
- Chair, The 2002 Florida Artificial Intelligence Research Society (FLAIRS), Pensacola, Florida, USA
- Chair, The 2001 Florida Artificial Intelligence Research Society (FLAIRS01), Key West, Florida, USA

Program Committee

- The 21st Mediterranean Conference on Control and Automation (MED'13), Platanias, Chania, Greece, 2013
- The 2008 World Congress in Computer Science, Computer Engineering and Applied Computing (WORLDCOMP'08), Las Vegas, Nevada, USA, 2008
- The 2007 World Congress in Computer Science, Computer Engineering and Applied Computing (WORLDCOMP'07), Las Vegas, Nevada, USA, 2007
- The 2006 World Congress in Computer Science, Computer Engineering and Applied Computing (WORLDCOMP'06), Las Vegas, Nevada, USA, 2006
- The 2002 Florida Artificial Intelligence Research Society (FLAIRS), Pensacola, Florida, USA, 2002

4. SERVICE TO THE UNIVERSITY AND COMMUNITY

4.1. Service to the University

Frederick University (FU)

At FU Dr. Demetriou established the Robotics and Automated Systems Lab (RAS LAB) and the Akadimia Rompotikis (Robotics Academy).

Robotics and Automated Systems Lab (RAS LAB)
The RAS LAB (http://staff.frederick.ac.cy/com.dg/robotics) was created using internal funds from the University and equipment received from other companies (i.e. Lego Hellas, Engino Toy Systems, and other private companies). RAS LAB currently houses several mobile robots (a WifiBot, 3 Lego Mindstorms, 1 VEX robot and 2 Engino ERP robots), an underwater Remotely Operated Vehicle (ROV), several controllers (i.e. Beaglebone, Arduino) and programming and simulation environments for robotics. The lab is involved in a number of funded and non-funded projects. It has developed applications and equipment that are used in industry and research (see Section 6.1).

Akadimia Rompotikis (Robotics Academy)
The Robotics Academy (http://akrob.frederick.ac.cy) was developed to offer robotics courses to students from the community, such as students and teachers from the K12 levels of education and other adults interested in the field of robotics. The Academy offers courses for various robotics packages (i.e. Lego Mindstorms, VEX Robotics Systems), robot building, robotics programming, using robotics as an educational tool at the K12 levels of education, and preparing students to participate in local and international robotics competitions. The courses are offered at the campus of Frederick University in Lemesos. In addition to the courses offered, the website of the Robotics Academy offers online curriculum material for teachers that want to introduce robotics at their schools, online documentation for learning basic robotics concepts, mobile robotics building instructions, robotics programming documentation, and other material for anyone interested in the field of robotics.

University of Southern Mississippi – Gulf Coast (USM-GC)

At USM-GC I served as the director of the Robotics and Graphics Laboratory and as the coordinator for the computer science graduate and undergraduate programs. As a coordinator of the department, I managed the organization and functionality of the department in collaboration with the Chair of the department at the main campus of USM in Hattiesburg. I chaired the committee that established the M.S. in Computer Science degree of USM at Stennis Space center in Long Beach, Mississippi, established the Robotics and Graphics Laboratory from funds we received from local organizations/companies and USM funds, developed the Robotics and Graphics courses at the campus of USM-GC, restructured the curriculum of the Computer Science Department at USM-GC, and established the local ACM chapter.

Summary of Services to the University

- Established the "*Akadimia Rompotikis*" of Frederick University (http://akrob.frederick.ac.cy)
- Established the "*Robotics and Automated Systems Lab*" of Frederick University (http://staff.frederick.ac.cy//com.dg/robotics)

- Member of the *Promotions Committee* of the Department of Computer Science and Engineering of Frederick University
- Participated in *Βραδιά του Ερευνητή (Science Rocks)* in behalf of Frederick University (2012 and 2013)
- Workshops in Mobile Robotics for Private Schools in Cyprus
- Workshops in Mobile Robotics for Public Schools in Cyprus
- Working with the Ministry of Education of Cyprus, to introduce Robotics as an elective course for high schools
- Organized seminars/workshops for the "Association for Gifted Children Cyprus"
- Organized seminars/workshops for robotics for the local high schools in Lemesos, Cyprus
- Restructured the computer science curriculum for the Computer Science Department at the University of Southern Mississippi-Gulf Coast (USM-GC)
- Chair of the Committee of the University of Southern Mississippi-Gulf Coast (USM-GC) that started the computer science Master's program at Stennis Space Center, St. Louis, Mississippi, USA
- Established the Graphics Laboratory at USM-GC, Long Beach, Mississippi, USA
- Established the Robotics Laboratory at USM-GC, Long Beach, Mississippi, USA
- Developed the graduate and undergraduate courses in Robotics at USM-GC, Long Beach, Mississippi, USA
- Developed the graduate and undergraduate courses in Computer Graphics, at USM-GC, Long Beach, Mississippi, USA
- Founded the local ACM Chapter at USM-GC, Long Beach, Mississippi, USA
- Created and Facilitated High School Programming Competitions for the coastal counties of Mississippi, USA
- Member of several other University Committees.

4.2. Service to the Community

- Elected Member of Province Secretariat of Dimokratikos Synagermos of Lemesos (Επαρχιακή Γραμματεία ΔΗΣΥ Λεμεσού), 2013 - Present
- Member of the Education Committee of Dimokratikos Synagermos (Επιτροπή Παιδείας ΔΗΣΥ), 2011 - Present
- Elected member of the Committee of the Nautical Club of Lemesos (NOL), 2010 - Present
- Elected Vice President of the Association of the Green Berets Reserves of Cyprus, 2012 - Present
- Judge for the World Robotics Olympiad (WRO)
- Workshops in Mobile Robotics for Private Schools in Cyprus
- Workshops in Mobile Robotics for Public Schools in Cyprus
- Working with the Ministry of Education of Cyprus, to introduce Robotics as an elective course for high schools
- In cooperation with the "Association for Gifted Children Cyprus", seminars/workshops for robotics were organized for the "Association for Gifted Children Cyprus"
- Organized seminars/workshops for robotics for several local high schools in Lemesos, Cyprus
- Created and Facilitated High School Programming Competitions for the coastal counties of Mississippi, USA

5. PUBLICATIONS

5.1. Doctoral Thesis

D1. "Hybrid Control Architecture for an Autonomous Underwater Vehicle (AUV)", University of Louisiana at Lafayette, 1998.

5.2. Book Chapters

B1. N. Eteokleous, G. A. Demetriou, A. Lambrou, "The Pedagogical Framework for Integrating Robotics as an Interdisciplinary Learning - Cognitive Tool," in ***Information and Communications Technology: New Research***, Nova Science Publishers, Inc., 2013, ch. 7, pp. 141-158.

B2. G. A. Demetriou, "Mobile Robotics in Education and Research," in ***Mobile Robots***, InTech Publications, 2011, Rijeka, Croatia, ch. 2, pp. 27-48.

5.3. Journal Publications

J1. G. Demetriou, N. Eteokleous, A. Lambrou, "Design and Implementation of the Engino Robotics Platform," Submitted: **Journal of Intelligent and Robotic Systems**, to be published in 2014.

J2. G. Demetriou, N. Eteokleous, "Mobile Robotic Kits for Education", Submitted: **International Journal of Emerging Technologies in Learning**, to be published in 2014.

J3. G. Demetriou, G. Simmons, "VisiLogic: Digital Logic Education Through Interaction," **The Cyprus Journal of Science and Technology**, Vol. 5, No. 3, 2007.

J4. G. Demetriou, A. Lambert. "Virtual environments for robotics education: an extensible object-oriented platform," **IEEE Robotics and Automation**, Vol. 12, No 4, pp. 75-91, December 2005.

J5. G. Demetriou, C. Brown. "An Algorithm for Geolocation: Marine Buoys in a Fully Immersive Three Dimensional Bathymetric Environment", **Journal of Mississippi Academy of Science**, Vol. 49, No. 1, January 2004.

J6. K. P. Valavanis, D. Gracanin, M. Matijasevic, R. Kolluru, G. A. Demetriou, "Control Architectures for Autonomous Underwater Vehicles," **IEEE Control Systems**, Vol. 17, No. 6, pp. 48-64, December 1997.

5.4. Conference Publications

C1. G. A. Demetriou, A. Lambrou, N. Eteokleous, C. Sisamos, "The Engino Robotics Platform (ERP) Controller for Education," in **21st IEEE Mediterranean Conference on Control and Automation (MED '13)**, Platanias, Chania, Crete, Greece, 2013.

C2. G. A. Demetriou, "Robotic Wheel Chairs," in **9th IEEE International Conference on Information Technology and Applications in Biomedicine (ITAB2009)**, Larnaca, Cyprus, November 5-7, 2009.

C3. G. A. Demetriou, A. Vystavkin, S. Anastasiou, A. Theofilou, C. Giannopoulos, D. Yerolemou. "Indoor Mobile Robot Localization Using a Wireless Network: WiFiBot Case Study," in **The 2008 International Conference on Artificial Intelligence (ICAI'08)**, Las Vegas, Nevada, July 14-17, 2008.

C4. G. Demetriou. "A Survey of Sensors for Localization of Unmanned Ground Vehicles (UGVs)," in **The 2006 International Conference on Artificial Intelligence (ICAI'06)**, Las Vegas, Nevada, June 26-29, 2006.

C5. G. Demetriou, G. Simmons. "Visual Transistors: An Intelligent Tutorial for Teaching Transistor Functionality for Digital Logic Students," in **The 2005 International Conference on Machine Learning; Models, Technologies and Applications**, Las Vegas, Nevada, June 23-26, 2005.

C6. C. Brown, G. Demetriou, L. Perkins. "Geolocating Marine Buoys in a Fully Immersive Three Dimensional Bathymetric Environment," in **The 2004 International Conference on Modeling, Simulation and Visualization Methods**, Las Vegas, Nevada, June 21-24, 2004.

C7. G. Demetriou, G. Simmons. "VisiLogic: An Intelligent Visual Tool for Teaching Digital Logic," in **The 2004 International Conference on Machine Learning; Models, Technologies and Applications**, Las Vegas, Nevada, June 21-24, 2004.

C8. G. Demetriou, A. Lambert. "VROBO: Virtual Robotics Development Platform for Use in Robotics Education and Research," in **Hawaii International Conference on Computer Sciences**, Honolulu, Hawaii, January 15-18, 2004.

C9. G. Demetriou, G. Simmons. "Visual K-Map: An Intelligent Tutorial for Solving Karnaugh Maps," in **The 2003 International Conference on Machine Learning; Models, Technologies and Applications**, Las Vegas, Nevada, June 23-26, 2003.

C10. G. Demetriou, K. P. Valavanis, "A State Configured Sensor Based Control Architecture for an Autonomous Underwater Vehicle," in **the 5th IEEE Mediterranean Conference on Control and Systems**, Paphos, Cyprus, July 1997.

C11. D. Gracanin, K. P. Valavanis, G. Demetriou, R. Kolluru, "Development of a Virtual Reality Testbed and AUV Control Architecture for Coastal / Shallow Water Environments," in **Proceedings of COSU'97 Coastal Ocean Space Utilization**, Vol. 2, Singapore, May 1997, pp. 305-320.

C12. G. Demetriou, M. Talley, D. Gracanin, K. P. Valavanis, "A Virtual Reality Environment for Real-Time Tele-Robot Control: The AdeptOne/AdeptThree Case Study," in **Proceedings of the Fourth IEEE Mediterranean Symposium on New Directions in Control and Automation**, Chania, Crete, Greece, June 10 - 13, 1996, pp: 370-374.

5.5. Edited Conference Proceedings

P1. Associate Editor for the proceedings of The 21st Mediterranean Conference on Control and Automation (MED'13), Vol. I, June 2013, Platanias, Chania, Greece, 2013

P2. Associate Editor for the Proceeding of the 2008 International Conference on Artificial Intelligence (ICAI'08), Vol. I and II, June, 2008, Las Vegas, Nevada, USA

P3. Associate Editor for the Proceeding of the 2007 International Conference on Artificial Intelligence (ICAI'07), Vol. I and II, June, 2007, Las Vegas, Nevada, USA

P4. Associate Editor for the Proceeding of the 2006 International Conference on Artificial Intelligence (ICAI'06), Vol. I and II, June, 2006, Las Vegas, Nevada, USA

6. RESEARCH GRANTS

6.1. Funded Research Grants

- **2012-2014**: **Cyprus Research Promotion Foundation Research Program: "*Development of a 3d Design Software for Children*" (ΕΠΙΧΕΙΡΗΣΕΙΣ/ΠΡΟΪΟΝ/0311), amount: 206.940€.**

  Project Description

  The goal of this project is to develop a three-dimensional CAD application. The target users of this application are students at the K12 level of education. This application that will allow students to present their ideas and to create virtual three-dimensional structures using virtual Engino Toy Systems contruction parts. The program will have libraries of virtual components and users will be able to build complex structures using these virtual components. Libraries will have Engino construction parts and other existing parts that are currently used in the Design and Technology courses at the K12 level of education. [**B1, B2, J1, J2, C1, C3, C4**]

- **2009-2012: Cyprus Research Promotion Foundation Research Program: "*Robotic Models for Teaching "Control Systems" in Design and Technology*" (ΕΠΙΧΕΙΡΗΣΕΙΣ/ΕΦΑΡΜ/0308/60), amount: 170.000€.**

  Project Description

  Frederick University in collaboration with Engino Toy Systems has developed a new robotic system as an extension to the Engino construction toy. The system consists of 2 parts: the Engino Robotics Platform (ERP) box with its peripherals and the Engino Graphical Programming Interface (EGPI). The main objective of the ERP system is to provide effective tool not only for teaching robotics, control systems and technology course but also to be integrated as an instructional tool within the teaching and learning process, aiming to achieve instructional goals. The ERP system is suitable to be used by pre-primary to higher education students.

- **1995-1998**: **National Science Foundation: "*Object Identification, Classification and Avoidance in 3-D Underwater Automated Surveillance*", (BES 95-06771); Amount: $270.717.**

  Project Description

  The central objective of this work was: object identification, classification and avoidance in 3-D underwater automated surveillance. The motivation behind this objective is monitoring and safeguarding wetlands, coastal fisheries and deep water polluted environments, which are among the most valuable national resources. The specific application domain, directly related to the proposed work, is surveying and monitoring Louisiana's wetlands and shallow water fisheries in collaboration with the Southern Science Center (SSC) - previously known as the National Wetlands Research Center - and the National Marine Fisheries Services (NMFS), both located at the University of Southwestern Louisiana's (USL's) research park. The end result was: a detailed methodology / approach for the real-time sensor based autonomous control and navigation of an underwater vehicle, capable of automated surveillance in sensitive environments. The three specific objectives that were accomplished: (a) Development of a detailed architecture for underwater vehicle motion control, (b) Implementation and experimental verification of an already derived total color difference (TCD) measure and total color difference tolerance (TCDT) thresholds for underwater object identification, (c) Enhancement and verification of a recently derived potential based panel method for autonomous vehicle motion planning in a 3-D environments. [**D1, J6, C10, C11**]

7. A STATEMENT OF CURRENT, PREVIOUS AND FUTURE RESEARCH WORK

7.1. Research

My educational background includes both electrical/computer engineering and computer science. My undergraduate and master's degrees are in electrical/computer engineering. My Ph.D. is in computer science. I have extensive knowledge on the hardware as well as the software end of computer systems. This background, especially the extensive training I received in electrical engineering, provided me with the foundation and the tools necessary to make a unique contribution to computer science.

My research mainly focuses on these areas:

Robotic Systems

- Underwater Robots
- Autonomous Surface Robots
- Information / sensor fusion, control and coordination of multisensory robotic systems
- Guidance, navigation, control and collision avoidance of robotic systems
- Design and testing of controllers for autonomous robot vehicle navigation

Intelligence Systems

- Modeling, control and coordination, integrated control and diagnostics of intelligent systems / robotic systems
- Modeling, control, coordination and performance evaluation of distributed systems (including multi-operational production systems)

Applications

- Unmanned Ground Vehicles (UGV), Unmanned Aerial Vehicles (UAV), Autonomous Underwater Vehicles (AUV), and Remotely Operated Vehicles (ROV)
- Sensor based navigation of mobile robots
- Virtual environment based modeling, control and simulation of robotic manipulators, mobile robots, AUVs and CIM systems
- Embedded Systems
- Controller Design

7.2. Current and Future Work

Development of a Small Remotely Operated Vehicle (ROV) for Sea Exploration

A local private company in collaboration with the Robotics and Automated Systems Lab of Frederick University are developing a small inexpensive underwater Remotely Operated Vehicle (ROV). This is partly a continuation of my PhD dissertation, which was in designing the control architecture for an Autonomous Underwater Vehicle (AUV).

Work has started and we already have developed a small prototype ROV that is based on the Beaglebone Single Board Computer and the Ubuntu Linux operating system. All the electronics are fully functional and we are in the final stages of designing the chassis of the vehicle. The ROV will

have the abilities to be remotely controlled via a surface station and will give live video feedback using a HD tilt camera with wide-angle lens. The ROV houses four motors: two for forward and backward propulsion, one for vertical movement and one to control the tilt of the camera. An off-the-shelf motor controller is used to control the four motors. Plans are, however, in order to design a custom made controller that will replace the off-the-shelf motor controller.

Custom made software is being developed that will allow remote control operation of the ROV. The software will have an easy-to-use web browser user interface that will allow access to the ROV from a number of today's platforms such as PCs, tablets and smartphones. Tests first in a small pool and later in the sea, will start as soon as the remote control software will be finalized.

This work is under development at the Robotics and Automated Systems Lab of Frederick University and is fully funded by the private company.

Four undergraduate students are working on this application: one doing his last year project and three doing their third year software engineering project.

Status of Project: The ROV prototype has been developed. A web based remote control application is underdevelopment.
Start Date: September of 2013

Development of an All-Terrain Outdoor Mobile Robot for Surveillance

This work is also fully funded by a private company. The company wants to develop an all-terrain outdoor mobile robot to use for surveillance. The electronics and chassis of the robot have all been completed. The robot has 4 motors controlling the four off road wheels. The robot's controller is the Beaglebone Black single board computers running the Ubuntu Linux operating system. A motor controller cape is used to control the motors.

A library is being developed that will control the robots basic movements (forward, backwards, turn, etc.). This library will later be enhanced and will allow the robot to house a HD pan-tilt camera, a Wi-Fi transmitter/receiver, a series of sonar or laser distance sensors, a GPS receiver and more as needed. The robot will be controlled via Wi-Fi and will be capable of sending back live video. The system will be equipped with 2 cameras (a HD camera and a night vision camera) for real time video feedback.

Custom made web based software is also developed to control the robot via Wi-Fi. The software will allow capturing live video coming back from the cameras of the robot and to control the robot in real time remotely.

Currently four undergraduate students are working on this project: one computer engineering student doing his last year project and three computer science students doing their third year software engineering project.

Status of Project: The hardware of the prototype has been developed and a library of the control functions is under development. A web based remote control application is under development.
Start Date: February of 2013

Robotic Models for Teaching Control Systems in Design and Technology Courses

This is a 2 year project in collaboration with the company Engino Toy Systems. The goal of this project is to develop a three-dimensional CAD application. The target users of this application are students at the K12 level of education. This application that will allow students to present their ideas and to create virtual three-dimensional structures using virtual Engino Toy Systems contruction parts. The program will have libraries of virtual components and users will be able to build complex structures using these virtual components. Libraries will have Engino construction parts and other existing parts that are currently used in the Design and Technology courses at the K12 level of education.

This project is funded by the Research Promotion Foundation (RPF) of Cyprus.

Status of Project: The system is now at the final stages of development and testing will start in the next few months at local schools. Engino is planning to have this product in the market by 2015.
Start Date: October of 2012

Electronic Device for Measuring Sea Currents

This project is a request of Pavlos Kontides, the Cyprus Olympic champion in Sailing: to develop an Electronic Measuring System to measure the direction and speed of sea currents.

Sailors need to know the sea currents in order to develop their race strategy. The current method is performed manually. The measurements have to be repeated many times, as the tracks usually are long and have different currents at different areas.

With the Electronic Measurement of Sea Currents, we aim to develop and establish a new method. Our main objectives are: (a) measure automatically at fixed intervals the direction and speed of sea currents at several spots of the sailing track,(b) inform the sailors with the readings at real time and (c) establish a more accurate, more reliable, time-saving and simpler method, compared to the currently used one.

The prototype has already been developed. Initial tests have been performed in water containers. Final tests in the sea are planned in the beginning of 2014. The system consists of a GPS receiver, an Arduino Single Board Computer and a digital display to show the results. A waterproof floating device will house all the parts.

Currently, one student is working on this application as part of his final year project. The student completes his project in December 2013. Other students are currently getting involved in this project and they will continue the work until completion under my guidance.

Status of Project: The prototype has been completed and sea tests are expected to start early in 2014.
Start Date: January of 2013

7.3. Previous Work

Engino Robotics Platform (ERP) Controller

[B1, B2, J1, J2, C1]

In collaboration with the company Engino Toy Systems, we developed a new robotic system as an extension to the Engino construction toy. The Engino Robotics Platform Controller is a control box intended for primary and early secondary education students. It is used to teach basic control, robotics and technology based courses. Along with the controller a series of external sensors have been developed that can be directly connected to the controller. The controller and the sensors allow students to build robots and other automated or interactive systems, using the Engino components.

The system consists of 2 parts: the Engino Robotics Platform (ERP) box with its peripherals (sensors, motors and LEDs) and the Engino Graphical Programming Interface (EGPI). The product is the result of three year's research project funded by the Research Promotion Foundation (RPF) of Cyprus. The main objective of the ERP system is to provide effective tool not only for teaching robotics, control systems and technology course but also to be integrated as an instructional tool within the teaching and learning process, aiming to achieve instructional goals. The ERP system is suitable to be used by pre-primary to higher education students.

The system's controller was designed from scratch around the ARM 32-bit MCU with flash memory. On top of the MCU runs a Real Time Operating System (RTOS) [13] which allows multi-tasking operations, such as controlling multiple outputs in parallel. The MCU flash memory is used to store programs, in order for the system to run autonomously. The rest of the peripherals (analog and digital inputs, microphone, USB, LED's and motors) were also designed from scratch. The peripherals connect at the various ports of ERP box.

Engino is now at the final stages of manufacturing this product and bringing it to the international market. This is expected to be done in early 2014.

VisiLogic: An Intelligent Tutorial for Teaching Logic Design

[J3, C5, C7, C9]

VisiLogic is a tutorial, designed to assist students in understanding Digital Logic Design. Particularly useful for studies involving Computers or Circuit Design. The VisiLogic interface is written in Java and uses an expert system that is written in C++ and Clips. The application utilizes an attractive user-friendly Graphical User Interface (GUI) to direct the students step-by-step through the process of learning Digital Logic Design. VisiLogic provides users with many options. The program includes teaching, testing and evaluation of the material that is presented. The material is presented in an entertaining, non-intimidating way, by using graphics and animation.

The Logic Design classes of the University of Southern Mississippi and University of South Alabama have used this application in their classes.

VROBO: A Virtual Robotics Platform for use in Robotics Education and Research

[J4, C8]

VROBO is an application that can be used in robotics education and research. It allows users to develop offline programs for a series of robotic arms and other articulated figures with realistic constraints. A common robotic language was developed that allows programming of all robotic arms and articulated figures that are part of this system. The application is available through the Internet and was created using various Java APIs including Java 3D. It was designed to keep up with the demand of institutions of higher learning for Robotics Education, while overcoming spatial, temporal, and budget limitations. This application was mainly used in my robotics class, and steps are being taken to have it used by other universities as well.

An Algorithm for Geolocation: Marine Buoys in a Fully Immersive Three Dimensional Bathymetric Environment

[J5, C6]

This C++/OpenGL application was designed to generate a fully immersive 3D environment, and to geolocate objects. This application models the Gulf of Mexico utilizing 5-minute bathymetric data on a beta-plane. The bathymetric data was provided by NAVO, and the Marine buoy location data was courtesy of NDBC. A geolocation algorithm was implemented, that uses simple transformation of physical latitude/longitude coordinates of an object into the world coordinates of the bathymetric scene. The target hardware for the application runs on a RAVE II visualization platform by Fakespace Systems driven by a cluster of Dell Precision 450 workstations.

Ph.D. Dissertation - Hybrid Control Architecture for an Autonomous Underwater Vehicle (AUV)

[J6, C10, C11]

This work was motivated by the challenge to provide the design foundations and implementation details for a modular, computationally efficient sensor-based hardware and software control architecture endowed with the proper intelligence (*machine* intelligence as opposed to *artificial* intelligence), suitable for the real-time navigation, guidance, and control of an Autonomous Underwater Vehicle (AUV). Important issues associated with the overall AUV control architecture include integration and coordination of the different subsystems/modules used to build the control architecture, as well as the design of integrated control and diagnostic mechanisms for error/failure detection, tracking, isolation, and accommodation purposes. The vehicle has sufficient on-board, built-in machine intelligence to perform the required tasks without human intervention and supervision. Valuable information has to be extracted and identified from massive signals through various sensors. This AUV is able to cope with unanticipated situations, supports automated reasoning in real-time to guide and control the vehicle.

It is able to operate in coastal and shallow water environments, and perform diverse missions therein, such as: oil-field platform and pipeline inspection and maintenance, wetlands gain/loss detection, shallow water fisheries monitoring, coastal studies, monitoring environmental pollution.

Derivation of Dynamic Equations of motion for the Puma Robot Arm Mark II Series

[C12]

Robot arm dynamics deal with the mathematical formulations of robot arm motion. The manipulator dynamic equations of motion are a set of mathematical equations describing the dynamic behavior of the manipulator. Such equations of motion are useful for computer simulation of the robot arm motion, real-time robot control, force, control, etc. This project derived the dynamic equations of motion (torque equations) for the PUMA, a six-join six-DOF (degrees of freedom) manipulator. The approach followed to develop the actual robot arm motion equations was the conventional Lagrange-Euler formulation.

Simulation of manufacturing cells with realistic constraints using the SILMA CimStation packages

This project involved the development of realistic robotic manufacturing cells in a virtual reality environment. The software that was used for modeling and simulation of these cells is the SILMA CimStation package. The forward and inverse kinematic equations of the robots were taken into consideration during the modeling and simulation. The System allows offline programming and testing of the manufacturing cells.

This project was awarded the “National Award” from SILMA, Inc. (see Section 1.4).

Tele-operation of the PUMA 560 and Adept robot arms using Virtual Reality models

[C12]

Alias Wavefront and Performer were used to create a Virtual Reality world that includes a PUMA 560 robotic arm, an Adept-II robotic arm, a conveyor belt, a vision system, and various parts that are manipulated by the robotic arms. All realistic constraints including all the kinematics equations of the two robotic arms were taken into consideration during the process. The virtual system is an exact copy of a real system that exists at the Robotics and Automation Laboratory of the University of Louisiana at Lafayette. The two systems were linked through the local area network of the University.

Using a cyber-glove and a head-set display, the user can immerse into the 3-dimensional virtual world and manipulate it, in order to perform proper improvements to the real system.

8. TEACHING PHILOSOPHY AND EXPERIENCE

8.1. Teaching Philosophy

Teaching at the graduate and undergraduate levels is one of the responsibilities I enjoy most and carry out very well. I have the ability to relate to students and I try to make the learning experience as enjoyable as possible. I believe that good communication and understanding between students and faculty is very important. I try to understand my audience, and communicate with them in a "common language".

I use technology (slide presentations, mathematical packages, videos, etc.) as needed and always as means to an end. The slides I use in my classes are always available online (on my university website and the University e-learning site) for the students. My slides are placed online before the beginning of the semester. The students are encouraged to print them and have them with them in class during the lecture. This frees the student from having to take notes and allows them to pay attention to the examples and all the other material that are presented in class. I promote both individual and group work inside and outside the classroom; the first makes the student independent, whereas the latter sparks collaboration.

I strongly believe that students learn the most when they apply their knowledge to real world problems. In my course and curriculum design, I take every opportunity to find applications of the technology taught in class and use these applications to create assignments and projects that challenge the students to "learn by doing." I am always available to help them with their projects, and I always take the time to troubleshoot with them any problems they face. I emphasize that a complete solution must take into account the full range of skills developed in a Computer Science and Engineering curriculum. A complete solution flows from modeling and design through implementation, evaluation and testing.

I have successfully used this approach in both undergraduate and graduate courses. The feedback I get from the students through evaluations is very positive, and especially strong, regarding my approach, accessibility, and enthusiasm. I help students achieve their goals by providing them with the skills they need and the opportunities to practice those skills.

The following items are included in all of my courses

- An up-to-date textbook, serving as the back-bone of the subject being taught
- Supplemental readings, for discussing the current trends in the field
- Lectures, as the vehicle for accessing the material effectively
- Discussions, as a way of developing critical thinking
- Regular homework, small projects, and exams, as evaluative feedback and as a safeguard for having all students on the same page
- Where applicable, a final group project is given in my courses, as an exercise in collaboration with others

8.2. Courses Taught

Frederick University

Course	Semesters	Level
ACOE161 – Digital Logic	Fall 2008, 2013	Undergraduate
ACOE201 - Computer Architecture I	Spring 2006, Fall 2013	Undergraduate
ACOE251 - Assembly Language	Fall 2009	Undergraduate
ACOE 301 - Computer Architecture II	Fall 06, 07, 08, 09, 12, 13	Undergraduate
ACOE361 - Digital Systems Design	Spring 10	Undergraduate
ACOE401 - Parallel Processing	Spring 08, 11, Fall 09	Undergraduate
ACOE414 - Robotics	Fall 08, 10, 11, 12, 13	
ACOE422 - Wireless Computer Networks	Fall 13	Undergraduate
ACSC103 - Computer Application Packages	Fall 09	Undergraduate
ACSC183 - Programming Principles II	Spring 08, 13	Undergraduate
ACSC191 - Discrete Mathematics	Spring 09, 10, 11, 12	Undergraduate
ACSC330 - Computer Graphics	Spring 06, 07, 09, 10, 11, 12 Fall 07	Undergraduate
ACSC420 - Image Processing	Spring 06	Undergraduate
AMAT122 - Calculus II	Fall 08	Undergraduate
AMAT181 - Linear Algebra and Vectors	Fall 07, 08, 11, 12, 13	Undergraduate
AMEM413 - Mechatronics	Spring 12, 13	Undergraduate
ΚΕΗΥ105 - Χρήση Ηλεκτρονικού Υπολογιστή	Fall 10	Undergraduate
AUTO409 - Mechatronics	Fall 11	Undergraduate

Purdue University – Fort Wayne

Course	Semesters	Level
ECE202 - Linear Circuit II	Fall 04	Undergraduate
ECE363 - Microprocessors	Fall 04	Undergraduate
ECE382 - Feedback System Analysis	Spring 05	Undergraduate
ECE495 - Autonomous Agents	Spring 05	Undergraduate
ECE418 - Introduction to Computer Graphics	Spring 05	Undergraduate

University of Southern Mississippi – Gulf Coast

Course	Semesters	Level
CS425/525 - Computer Graphics	Fall 00, 01, 03, Spring 01, Summer 02	Graduate / Undergraduate
CS444/544 - Robotic Systems	Spring 01, 02, 03, 04	Graduate / Undergraduate
CS650 - Networks	Fall 02	Graduate
CS303 - Assembly Language	Fall 02	Undergraduate
CSC101 - C++ Programming	Fall 02, 03, Summer 02, 03, Spring 03, 04	Undergraduate
CSC204 - Digital Logic	Spring 04	Undergraduate
CSS331 - Visual Basic	Spring 03	Undergraduate

8.3. Partial List of Student Thesis Supervision

Master of Science Students

- **Christopher Brown**, M.Sc. in Computer Science, "An Algorithm for Geolocation: Marine Buoys in a Fully Immersive Three Dimensional Bathymetric Environment", University of Southern Mississippi, Spring 2004
- **Allan Lambert**, M.Sc. in Computer Science, "An Extensible Object Oriented Virtual Robotics Development Platform for use in Robotics Education and Research", University of Southern Mississippi, Summer 2003
- **Tony Vann**, M.Sc. in Computer Science, "The Harmful Algal Blooms Observing System Weather Tool (HABSOS-WT)", University of Southern Mississippi, Summer 2003
- **Michael Davide**, M.Sc. in Computer Science, University of Southern Mississippi, Spring 2003
- **Jack Summer**, M.Sc. in Computer Science, "Laboratory Information Management System For the Watson Electric Generating Plant", University of Southern Mississippi, Summer 2002
- **Mary Steelman**, M.Sc. in Computer Science, "OpenGL and Java", University of Southern Mississippi, Spring 2001
- **David Rodriguez**, M.Sc. in Computer Science, "Dry-docking Ballast Schedules Program", University of Southern Mississippi, Summer 2000

Bachelor of Science Students

- **Chrysostomos Gabriel**, B.S. in Computer Science, "Using GPS for Remote Tracking/Localization", Frederick Univeristy, Cyprus, Spring 2013
- **Marios Andreou**, B.S. in Computer Science, "Path Planning Algorithm for the Lego Mindstorms NXT Robot", Frederick University, Cyprus, Spring 2013
- **Manolis Panagi**, B.S. in Computer Science, "Database Management System for Nautical Club of Lemesos (NCL DBMS)", Frederick University, Cyprus, Spring 2011
- **Giorgos Spyrou**, B.S. in Computer Science, "Control Library for the WifiBot Lab for Education and Research", Frederick University, Cyprus, Spring 2011
- **Louis Kyriakou**, B.S. in Computer Science, "Motor Control with the Arduino Platform", Frederick University, Cyprus, Spring 2013
- **Androula Drakou**, B.S. in Computer Science, "Autonomous Omni Drive Robot (N.K.H) Using Mindstorms NXT", Frederick University, Cyprus, Spring 2010
- **Olga Pelekanou**, B.S. in Computer Science, "Creating of Water Fountain in Maya", Frederick University, Cyprus, Spring 2010
- **Lambros Georgiou**, B.S. in Computer Science, "Tic-Tac-Toe: Machine Vision Robotic Arm", Frederick University, Cyprus, Spring 2009
- **Maria Irakleous**, B.S. in Computer Science, "Autonomous Navigation of a Mobile Robot – WifiBot Lab", Frederick University, Spring 2009
- **Rondrell Flowers**, B.S. in Computer Science, Honor's Project for Bachelor of Science: "Visual K-Map: An Intelligent Tutorial for Solving Karnaugh Maps", University of Southern Mississippi, Spring 2003

8.4. Course Evaluations

Evaluations and feedback received from students indicate that my teaching is considered excellent. Compared to departmental peer teaching, my ratings are generally far above average. Some

comments frequently made are that "*he's one of the best instructors I've had*," "*he is very enthusiastic about the subject*," and "*he is very knowledgeable on the subject.*" Evaluations are available upon request.

9. REFERENCES

- **Dr. Ing. Kimon P. Valavanis, Fellow AAAS**
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