



Halûk Gümüşkaya
Professor of Computer Engineering

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1. Personal Data

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Facebook: <https://www.facebook.com/2haluk.gumuskaya/>
Birth Date : 27-04-1964, Bursa, Turkey
Marital St. : Married and having three children

2. Professional Experience

Full Time

Title : **Professor, Head of Department**
Institution : Gediz University, Computer Engineering Department, İzmir, Turkey
Dates : September/2010 – July/2016
Services :

- Served as Head of Department, Computer Engineering, 9/2010 – 7/2016.
- Served as a member of
 - Engineering Faculty: Executive Board, 1/2011 – 10/2014; Board, 9/2011 – 7/2016.
 - Institute Executive Board, The Institute for Graduate Studies in Sciences and Engineering, 12/2010 – 6/2013, and Institute Board, 9/2010 – 7/2016.
- Served to open 30% English and 100% English undergraduate programs in 2010 and 2011 respectively. The first program was closed later.
 - The program was primarily designed to meet the curriculum requirements of IEEE/ACM Joint Curriculum Committee. ABET, ECTS, and Europe Bologna process requirements, and Turkish Industry were also taken into consideration. The program had a balanced mixture of courses from 3 major areas of Computer Engineering.
- Served to open a joint System Engineering Graduate Program with Industrial Engineering Department in 2011.
- Served to open 100% English Computer Engineering Graduate Program that was started in 2014.
- Founded 3 Computer Hardware Engineering Laboratories between 9/2011 – 9/2013: Logic and Computer Design Lab, Microprocessors and Embedded Systems Lab, and Computer Networks Lab. Developed the first contents of lectures and laboratories, and taught the lectures based on these laboratories.
- Taught 26 (15 different) undergraduate, and 10 (8 different) graduate courses on Software Engineering, Cloud Computing, Big Data, Data Mining and Machine Learning, Computer Networking, and Computer Hardware Engineering in 6 years.
- Supervised 1 master thesis and 3 senior design projects.
- Worked as primary investigator and researcher in the NetSE (Networking and Software Engineering) Lab.
- Served as Consultant to the Institute Director and Project Teams at TÜBİTAK BİLGEM between 1/2012 – 12/2014.
- Served as Consultant as Executive Committee Member at TÜBİTAK-TEYDEB BİLTEG, 6/2012 – 6/2014.
- Served as Referee and Inspector for industry projects at TÜBİTAK TEYDEB.

: **Professor, Head of Department**
: Haliç University, Computer Engineering Department, İstanbul, Turkey
: September/2008 – September/2010

- : • Served as Head of Department, 3/2009 – 9/2010.
- Served as a member of
 - Engineering Faculty Executive and Faculty Boards, 9/2008 – 9/2010.
 - Institute Board, The Institute for Graduate Studies in Sciences and Engineering, 3/2009 – 9/2010.
- Served to open 30% English undergraduate program.
- Taught 6 (5 different) undergraduate, and 3 graduate courses on Software Engineering and Computer Networking.
- Worked as primary investigator and researcher in the NetSE Lab.
- Supervised 7 master theses and 2 senior design projects.
- Consulted the General Manager and Project Teams at Metro Istanbul, 9/2008 – 4/2009.
- Served as Referee and Inspector for industry projects at TÜBİTAK TEYDEB.

: **Associate Professor**

: Fatih University, Computer Engineering Department, İstanbul, Turkey

: August/2002 – August/2008

- : • Served as a member of
 - Engineering Faculty Executive and Faculty Boards, 10/2002 – May 2007.
 - Information Technologies Committee, 6/2006 – 7/2008.
- Founded a Computer Networks Lab.
- Taught 32 (9 different) undergraduate, and 12 (6 different) graduate courses on Software Engineering, Computer Networking, Distributed Systems, and Computer Hardware Engineering in 6 years.
- Supervised 2 master theses and 9 senior design projects.
- Worked as primary investigator and researcher in the NetSE Lab.
- Consulted the Project Teams at BELBİM, 7/2006 – 10/2006.
- Served as Consultant and Referee for KOSGEB Projects, 6/2004 – 8/2008.
- Consulted the General Manager and Project Teams at İSBAK, 8/2005 – 3/2006.
- Consulted the General Manager and Project Teams at Europe Software, İstanbul, January/2004 – February/2005.
- Consulted the Project Teams at BELBİM, 5/2003 – 12/2003.
- Served as Referee and Inspector for industry projects at TÜBİTAK TEYDEB, 8/2005 – 8/2008.

: **Chief Researcher (Başuzman Araştırmacı), Project Manager, Associate Professor**

: TÜBİTAK – UEKAE (The Scientific and Technical Research Council of Turkey – National Research Institute of Electronics and Cryptology)

: May/1997 – July/2002

- : • Worked as Project Manager and System Architect in the IP Crypto Devices Management System Project, 5/1999 – 7/2002.
- Worked as Project Manager in various institute process improvement teams, 8/2000 – 12/2001.
- Worked as Project Member and System Architect in the TAFICS (Turkish Armed Forces Integrated Communication System) Electronic Key Management System (TELAYS), 5/1997 – 5/1999.
- Served as part-time Instructor for graduate and undergraduate courses in the Department of Computer Engineering, at Marmara University, 9/1997 – 1/2002.

: **Instructor (Öğretim Görevlisi)**

: Uludağ University, Electronics Engineering Department

: March/1990 – May/1997

- Taught 9 different undergraduate courses on Electronics / Computer Hardware Engineering and Computer Programming in 7 years.
- Founded the BilDET (Computer Aided Electronics Design) Lab, and formed a student research team.
- Supervised about 15 senior design projects.
- Worked as System Architect and Electronics Engineer in a joint-project developed by MİSTAŞ A.Ş., 3/1992 – 9/1992.
- Worked as Consultant to Project Teams and Software Developer at TÜBİTAK – Marmara Research Center, Electronics Dept., Gebze, Kocaeli, 9/1992 – 12/1995.
- Worked as Co-founder, Software Projects Manager and System and Software Architect at ELKOSİS (Electronic Control Systems), Gebze, Kocaeli, 9/1995 – 6/1997.

Part Time

Title : **Referee and Inspector for Industry Projects**
Institution : TÜBİTAK–TEYDEB*, Ankara, Turkey, <https://eteydeb.tubitak.gov.tr/>
Dates : August/2005 – Present
Services : Reviews project proposals, interviews with project teams at their locations, and prepares reports for the TÜBİTAK-TEYDEB decision process for funding national and international projects submitted by industry companies.

 * TÜBİTAK (The Scientific and Technological Research Council of Turkey) is the leading government organization for management, funding and conduct of research in Turkey. It operates under the fold of the Prime Ministry with adequate administrative and financial autonomy. It has more than a workforce of 4500 R&D personnel with an annual budget of \$1+ billion.

TEYDEB+ (Technology and Innovation Grant Programs Directorate) within TÜBİTAK supports research and technology development for projects proposed by national companies in Turkey. (+ Teknoloji ve Yenilik Destek Programları Başkanlığı, in Turkish)

Consultant to the Institute Director and Project Teams
 : TÜBİTAK-BİLGEM*, Gebze, Kocaeli, Turkey, <http://bilgem.tubitak.gov.tr>
 : January/2012 – December/2014, (4 days/week, in 2014, 2 days/week, in 2012-2013)
 :

- Consulted the Institute Director and Project Teams on cloud computing, software engineering and project management at TÜBİTAK BİLGEM-BTE.
- Consulted the Institute Director and Project Teams on software engineering management, research and development organization structures and processes suitable for TÜBİTAK-BİLGEM during the reorganization process of TÜBİTAK-BİLGEM Institutes in 2012

* BİLGEM (Informatics and Information Security Research Center) within TÜBİTAK, mainly conducts research and develops scientific and technological solutions in many fields ranging from information technologies, software technologies, information security, cyber security to communications, microelectronics, optoelectronics and advanced electronics.

BİLGEM provides innovative technological solutions for civilian needs apart from contributing to the national security of the country. BİLGEM, as being the largest R&D of Turkey (consisting of more than 1800 staff, more than 80% of whom are R&D staff), mainly involves in many high technology projects, thereby contributing to the technology development and implementation. Additionally, BİLGEM, as Turkey's competitive power in the international markets, has engaged in some high-tech projects especially with NATO and its member countries. BİLGEM consists of 6 institutes, namely being National Research Institute of Electronics and Cryptology (UEKAE), Information Technologies Institute (BTE), Advanced Technologies Research Institute (ILTAREN), Cyber Security Institute (SGE) and Software Technologies Institute (YTE), and Fundamental Sciences Research Institute (TBAE).

: **Executive Committee Member**

: TÜBİTAK TEYDEB-BİLTEG*, Ankara

: July/2014 – May/2014

: Worked to evaluate IT projects proposed by companies in Turkey, decide funding the projects and assign referees and inspectors from universities and industry to accepted projects in the TEYDEB-BİLTEG* Executive Committee for 2 years.

* BİLTEG (Information Technologies Group) within TÜBİTAK-TEYDEB supports research and technology development in IT projects proposed by national companies in Turkey. (BİLTEG: Bilişim Teknolojileri Grubu, in Turkish).

: **Consultant to the General Manager and Project Teams**

: Metro Istanbul (Istanbul ULAŞIM A.Ş.) (Istanbul Transportation Company),

<http://www.metro.istanbul>

: September/2008 – April/2009

- Served as consultant to the General Manager and Project Teams at Metro Istanbul*.
- Built the first R&D research and development infrastructure (railway signalling literature and information infrastructure, railway signalling lab requirements, development team, team processes and dynamics, ...).
- Produced the first road map, technical blue prints, requirements analysis and system design documents, and railway signalling simulator programs.

* Metro İstanbul is an affiliate company of Istanbul Metropolitan Municipality operating the tramway, metro, light rail, funicular and aerial cable cars in Istanbul.

: **Consultant and Referee**

: KOSGEB Projects

: June/2004 – August/2008

: Served as Consultant and Referee to companies on their projects supported by KOSGEB.

: **Consultant to Project Teams**

: BELBİM (Istanbul Municipalities Data Processing Industry & Trade Inc.),

<http://www.belbim.com.tr>

: July/2006 – October/2006

: Consulted the Project Teams on project management, administrative and technical management processes at BELBİM*.

* BELBİM (Istanbul Municipalities Data Processing Industry & Trade Inc.) is an affiliate company of Istanbul Metropolitan Municipality providing electronic money and payment infrastructure and services for tramway, metro, light rail, funicular and aerial cable cars in Istanbul.

: **Consultant to the General Manager and Project Teams**

: ISBAK (Istanbul Municipalities Transportation Maintenance Industries and Trade Inc.,

Istanbul, <http://www.isbak.com.tr/>)

: August/2005 – March/2006

- Consulted the General Manager and Project Teams at ISBAK.
- Worked on the design, and processor and software tools selection problems for a new generation microprocessor-based traffic junction control unit which would replace old PLC-based control units in Istanbul.
- Gave seminars on object-oriented analysis, design, and programming using Java and UML.

* ISBAK is an affiliate company of Istanbul Metropolitan Municipality providing project design and implementation services through traffic and system engineering in the field of Intelligent Transportation Systems with traffic signalization being the top major task.

: **Consultant to the General Manager and Project Teams**

: Europe Software, Istanbul, Turkey

: January/2004 – February/2005

- Served as Consultant to the General Manager and Project Teams on organization structure and processes, technologies, project management and software development processes, enterprise system architectures for ERP applications such as Supply Chain Management, Human Resources and Product Management, and Banking applications.
- Gave seminars on object-oriented analysis and design using Design Patterns, UML and Java.

: **Consultant to Project Teams**

: BELBİM (Istanbul Municipalities Data Processing Industry & Trade Inc.,

<http://www.belbim.com.tr>)

: May/2003 – December/2003

- Consulted the Project Teams for system architecture, technologies and software development processes for two projects (Automatic Sales Machine, Ticket Sales Machine, and Data Transfer and Automatic Integration) of the AKBİL (Smart Ticket) System at BELBİM.
- Gave seminars on object-oriented analysis and design using Design Patterns, UML and Java.

: **Lecturer**

: Marmara University, Computer Engineering Department, Istanbul, Turkey

: September/1997 – January/2002

: Taught 2 graduate courses and 1 undergraduate course, supervised 1 master thesis and several undergraduate theses.

: **Co-founder: Software Projects Manager, System and Software Architect**

: ELKOSİS (Electronic Control Systems), Gebze, Kocaeli, Turkey

: September/1995 – June/1997

- Worked as Co-founder, Software Projects Manager, System and Software Architect at ELKOSİS.
- A new electronic electricity meter device prototype having prepayment feature with its smart card and its PC program were developed for Federal Elektrik for the Turkish market.

: **Consultant to Project Teams and Software Developer**

: TÜBİTAK – Marmara Research Center, Electronics Department, Gebze Kocaeli,

<http://mam.tubitak.gov.tr/>

: September/1992 – December/1995

- Developed a block diagram based object oriented Digital Signal Processing (DSP) software environment.
- A hardware debugger program was developed for a dual-processor parallel DSP (TMS32C25) system.
- Worked in various projects on hardware and software engineering, digital signal/image processing. Different microprocessors, microcontrollers, special purpose processors like TMS 320C25/30 DSP processors, PC data acquisition and I/O boards were used.

: **Member of the Galaxy CAD Environment Project Team**

: University of Wisconsin-Madison, Electrical and Computer Eng. Dept.

: September /1987 – December /1989

- : • Developed the Galaxy Hardware Description Language (GHDL) as part of his master study. GHDL was one of the tools of the Galaxy CAD Environment which was developed by Prof. John F. Beetem and his students. Galaxy was developed for digital circuit simulation.
- GHDL as part of the Galaxy CAD Environment was used in the University of Wisconsin-Madison and in many US universities, and also become a commercial product.

3. Education and Titles

Professor : February/2009 – Present
 Branch : Computer/Software Engineering

Assoc.Prof : 24-11-1999
 Branch : Computer Engineering Sciences, Software Engineering

Ph.D. : September/1990 – July/1995
 University : Istanbul Technical University, Control and Computer Engineering Department, Istanbul, Turkey
 Advisor : Prof. Dr. Bülent Örencik
 Thesis : *A Parallel Hardware and Software Architecture for Digital Signal Processing*

M.S. : September/1987 – December/1989
 University : University of Wisconsin-Madison, Electrical and Computer Engineering Department, Wisconsin-Madison, USA
 Advisor : Dr. John F. Beetem
 Thesis : *Galaxy Hardware Description Language*

B.S. : September/1981 – June/1986
 University : Middle East Technical University, Electrical and Electronics Engineering Department, Ankara, Turkey
 : Middle East Technical University, English Preparation School (1981-1982)

4. Theses

Ph.D. Thesis *A Parallel Hardware and Software Architecture for Digital Signal Processing*
Istanbul Technical University, Control and Computer Engineering Department
Advisor: Prof. Dr. Bülent Örencik
September /1990 - July/1995

Dr. Gümüşkaya's Ph. D. thesis proposes a general hardware and software framework for the parallelization and implementation problems of a wide range of DSP algorithms for a parallel pipelined architecture which is suitable for the target algorithms. The proposed architecture is an SSIMD or MIMD machine depending on the algorithms implemented and the programming methodologies. The architecture and its six network configurations were partly implemented as an experimental DSP system, AdEPar (Advanced Educational Parallel), using printed circuit boards as processing elements based on TMS320C25 DSP processors. The two-dimensional block processing and DSP processors-based scheduling implementation techniques are proposed for atomic data flow graphs. The simulation and implementation blocks columnization scheduling technique for large grain data flow graphs is proposed. The concurrency in the proposed scheduling algorithms is both temporal and spatial concurrency. The third level of concurrency can be also achieved by using input and output synchronized circular buses. The AdEPar visual object-oriented DSP environment based on theoretical work presented in this thesis was developed to serve as a test bed for various scheduling, simulation and code generation problems.

Master Thesis *Galaxy Hardware Description Language*
University of Wisconsin-Madison, Electrical and Computer Engineering Department
Advisor: Dr. John F. Beetem
September/1987 – December/1989

Dr. Gümüşkaya, as part of his graduate study, developed a hardware description language, GHDL (Galaxy Hardware Description Language) of the Galaxy CAD Environment which was developed by Dr. Beetem and his students. Galaxy was developed especially for digital circuit simulation and it was also the name of a high level programming language developed by Dr. Beetem. Digital circuits in the Galaxy CAD Environment are described as hierarchical by using Dr. Gümüşkaya's program. The output of the program is a file having circuit components and a netlist. The structure of this file is in the Galaxy common data structure representation form and can be used by other simulation programs in the Galaxy CAD Environment. The user describes signals and their timing for circuits by using another Galaxy program after describing his circuit by GHDL

5. Areas of Interest (1986 – Present)

5.1. Current Areas of Interest

Software Engineering and Project Management

1. Software development and project management: Agile and Plan-and-Document Processes
2. Object oriented analysis, design and programming techniques
3. Software architecture, frameworks and design patterns for communication systems and enterprise applications
4. Computer programming (more than 10 high level / 5 assembly programming languages)

Cloud Computing, Big Data and Data Science

1. Computer Clustering, Virtualization, Data Centers, Big Data Processing Techniques and Systems (MapReduce, Hadoop Ecosystem, ...), Internet of Things, ...
2. Data Mining and Machine Learning: Data Preprocessing, Association Analysis, Classification, Clustering, Outlier Analysis, Data Science Tools: WEKA, RapidMiner, ...

Computer Networking

1. Cloud Computing, Distributed Systems, Pervasive Computing
2. Computer Networking, Mobile and Wireless Networking

5.2. Previous Areas of Interest

Hardware Engineering

1. Computer Architecture, Microprocessors, Logic Design and Circuits, Embedded Systems, Microcontrollers

Other Special Areas

1. Network management, management of crypto devices and network security (5/1999 – 8/2002)
2. Mobile agents (1998 – 2001)
3. Distributed software tools for collaborative work over Internet (1999)
4. Programming environments for DSP based hardware systems (1993 – 1997)
5. Digital signal processing applications using DSP processors (1993 – 1997)

6. Abilities Summary

Teaching : Gave courses in universities (1990 – present).

Software Engineering and Project Management : Object-Oriented Analysis, Design and Programming techniques using Java, Ruby/Rails, UML, Design Patterns, agile and plan-and-document based software development and management techniques and processes, frameworks and design patterns for communication systems and enterprise applications (1997–Present).

Cloud Computing : Computer Clustering, Virtualization, Data Centers, Big Data Processing Techniques and Systems (MapReduce, Hadoop Ecosystem, ...), Internet of Things, ... (2013 – present).

Data Science : Data Mining and Machine Learning: Data Preprocessing, Association Analysis, Classification, Clustering, Outlier Analysis, Tools: WEKA, RapidMiner, ... (2012 – present).

Distributed Systems : Cloud Computing, Distributed Systems, Mobile and Pervasive Computing, Internet and Java technologies (1997 – present).

- Networking* : Computer Networking, Mobile and Wireless Networking, Pervasive Computing (1997–present).
- Network Management and Security* : Network management protocols, standards, technologies, and platforms, information and network security (1997–Present).
- Microprocessors and Computers* : Intel 80x86 family (8088/86–Pentium microprocessors), Intel 8051 microcontroller family, Intel 8085, embedded systems, IBM PC architecture, PC based data acquisition and control, Intel MCS96 family and 80C196KC, TMS 320C25/30 DSP processors, Transputer, Motorola 68000 and 6809, Z80.
- Programming Languages* : *High Level Languages*: Ruby/Rails (2013–present), Java (1997–present), C++ (1992–present), C (1987–present), Dephi (1995–1997), Occam (1991), Pascal (1988–97), Galaxy (1988–90), Ada (1988), Basic (1982–86), Fortran (1982–85).
- Assembly Languages*: x86 Family: 16, 32 and 64-bit processor and programming, 8051 Family, TI DSP Processors: TMS320 16 and 32-bit Family, Motorola 6802, 680X0, ...).

7. Projects

TÜBİTAK-TEYDEB Projects

TÜBİTAK–TEYDEB, Ankara, Turkey, <https://eteydeb.tubitak.gov.tr>

Referee and Inspector for Industry Projects

08/2005 – Present

Works as referee and inspector for industry projects. Reviews project proposals, interviews with project teams at their locations, and prepares reports for the TÜBİTAK-TEYDEB decision process for funding national and international projects submitted by industry companies including Aselsan, Vestel, Beko, Koç.net, Karel, Sampaş, İnnova, ITD, RDlab, Telekurye, Pozitron, ... (37 projects refereed, 8 projects inspected, as of 9/2016)

Cloud Computing and Big Data Research Laboratory and National Search Engine Projects

TÜBİTAK-BİLGEM-BTE, B3Lab: <http://b3lab.org>

Consultant to the Institute Director and Project Teams (4 days / week, in 2014)

3/2013 – 12/2014

Consulted the Institute Director and Project Teams on cloud computing, software engineering and project management at TÜBİTAK BİLGEM-BTE. New parallel distributed systems development paradigms and technologies such as map reduce programming model, Hadoop and its ecosystem for big data processing and search engine technologies. Worked, advised, gave seminars on research and development problems for the construction of the national data center, and IaaS and PaaS infrastructures in these projects.

TÜBİTAK-BİLGEM Institutes Reorganization

TÜBİTAK-BİLGEM, Gebze, Kocaeli, Turkey, <http://bilgem.tubitak.gov.tr>

Consultant to the Institute Director and Technical Teams (2 days / week)

1/2012 – 2/2013

Consulted the Institute Director and Project Teams on software engineering management, research and development organization structures and processes suitable for TÜBİTAK-BİLGEM during the reorganization process of TÜBİTAK-BİLGEM Institutes in 2012. Helped to discover new ways to improve product development processes in this era of faster, cheaper and better.

Interviewed with project teams, wrote reports for advising and giving recommendations to upper management, developed knowledge areas maps for domain experts in CS, CENG, and SENG fields in Information Technologies Institute and Turkey.

TÜBİTAK-TEYDEB-BİLTEG Projects

TÜBİTAK-TEYDEB, Ankara, Turkey, <https://eteydeb.tubitak.gov.tr>

Executive Committee Member

6/2012 – 6/2014

Worked to evaluate IT projects proposed by companies in Turkey, decide funding the projects and assign referees and inspectors from universities and industry to accepted projects in the TEYDEB-BİLTEG* Executive Committee for 2 years. The committee come together about 2 times, and evaluated about 40 projects per month. Totally about 1000 projects were assessed within 2 years.

Research Projects at NetSE Lab

Networking and Software Engineering (NetSE) Lab

Primary Investigator and Researcher

9/2002 – 7/2016

Worked as primary investigator and researcher at NetSE Lab in 3 universities since 2002. The NetSELab research team's projects span cloud computing, data science, distributed systems, mobile and wireless systems, pervasive computing, new networking paradigms, and software engineering. The outcomes of this NetSE Lab were senior design projects, master theses, projects, academic journal papers and conference proceedings. NetSE web site:

<http://www.gumuskaya.com/Research/NetSE.htm>

Design and Construction of Fundamental Computer Hardware Engineering Laboratories

Gediz University, Department of Computer Engineering, İzmir

Founder

9/2011 – 9/2013

Founded 3 *Fundamental Computer Hardware Engineering Laboratories*, and developed the first contents of lectures and laboratories, and taught the lectures based on these laboratories.

Logic Circuits and Computer Design Lab allows students to design and construct logic circuits and components using discrete integrated circuit, FPGAs and CAD tools in the COM 251 Logic Design and Circuits and COM 252 Computer Organization courses. The laboratory work in COM 251 is performed using multiple platforms. The first platform is to use breadboards and simple digital ICs. The second platform is circuit simulation environments such Logisim and NI Multisim. The third platform is to use a HDL such as Verilog or VHDL to describe logic designs and then synthesize the HDL code on the Digilent FPGA card BASYS 2. The students design a 32-bit microprocessor in the COM 252 using design, simulation and implementation tools, Logisim, ModelSim, SPIM: A MIPS32 simulator, Xilinx tools, and a Digilent FPGA card.

Microprocessors and Embedded Systems Lab is used to teach the fundamentals of microprocessor-based systems in the COM 353 Microprocessors course. The experiments provide the students to learn the assembly programming of the 16-bit and 32-bit Intel x86 Family and Pentium Microprocessors, including addressing modes, instruction types, and the applications and interfacing of microprocessor systems. The COM 320 Embedded Systems course provides students with hands-on experience with building, programming, testing, and debugging microprocessor, microcontroller and FPGA-based systems. UNI-DS6 educational boards are used to teach 8051, PIC and ARM processors and their interfacing.

Computer Networks Lab is used to teach TCP/IP protocols and data communication to students, and to give them hands-on experience on networking. The lab has a modular Internet rack having 2 x Cisco Catalyst 2960-24 Port Layer-2 Switch, 2 x Cisco Catalyst 3560-24 Port Layer-3 Switch ve Cisco 2900 Router.

Design, Implementation and Performance Analysis of High Performance Telerobotic Systems Using Real Time Communication Protocols on Wireless Networks

TÜBİTAK Project, EEEAG 108E091

Fatih University, Department of Computer Engineering, Istanbul

Researcher (with Prof. Dr. Onur Toker, Project Manager)

9/2008 – 9/2010

Worked as researcher with Prof. Dr. Onur Toker in the TÜBİTAK, EEEAG 108E91 project. The main goal of this project was to design, implement and performance analysis of high performance telerobotic system architectures using real time communication protocols on wireless networks.

Telerobotics can be defined as the control of robot arms from a remote location. In a telerobotic system, there is a robot arm to be controlled which is identified as the “slave arm”, and a remote operator at a distant location using a robotic manipulator which is called the “master arm”. In control system measurements actuator delays do degrade system performance. Therefore, communication delays between the master and slave arms and their minimization are of extreme importance in telerobotics.

We first developed a new wireless communication protocol, Lightweight Wireless Protocol (LWP), designed on top the 802.11 MAC layer. This low-delay wireless LWP protocol was implemented on an embedded system (Airdrop-LWP) without an operating system and its associated overhead. Finally, two Airdrop-LWP embedded systems running this low-delay wireless LWP protocol were used to build a telerobotic system with a Mitsubishi RV-2AJ industrial robot. The LWP protocol was also tested on a robot car controlled by an AirDrop-LWP card as a slave arm and a standard PC as a master arm. The key features of LWP are reduced packet size, simple protocol stack, predictive compression of operator movements, and prediction of lost data packets. The LWP protocol was compared with TCP/IP suite of protocols, and when compared with UDP significant performance improvements are observed: Up to 50% reduced delay, and an additional 20% lower delay via compression. Variation in packet delay times is also an important parameter for the wireless control system. As the standard deviation of packet delay times increase, and become less and less predictable, the resulting telerobotic system will be more and more difficult to operate. We measured the standard deviation of packet delays, and observed that it increases with the packet size, and this increase is faster than the increase in mean packet delay.

National Railway Signalling Solutions for Istanbul Urban Rail Transportation Systems

Metro Istanbul (İstanbul ULAŞIM A.Ş.) (Istanbul Transportation Company)

Consultant to the General Manager and Project Teams

9/2008 – 4/2009

Served as consultant to the General Manager and Project Teams at Metro Istanbul. Railway Signalling is a complex and fascinating research and development area in railways. The purpose of a signalling system is to facilitate the safe and efficient movement of trains on the railway. Two major worldwide markets in railways are Main Line Railways and Urban Rail Transportation Systems (Metro, LRT (Light Rail Transit), Tramway). This project investigates all aspects of railway signalling systems for İstanbul Urban Rail Systems to design and develop national signalling solutions. The initial target of the project is to build the research and development infrastructure (signalling literature and information infrastructure, railway signalling lab requirements, development team, team processes and dynamics, ...) and to produce the first road map, some technical blue prints, requirements analysis and system architecture design documents, and railway signalling simulator programs.

Framework for Context-Aware Pervasive Systems (FCAPSYS)

Fatih University-Research Fund Project, P50050702

Project Manager

6/2007 – 6/2008

Worked as project manager (primary investigator and researcher) in this funded research project. A framework for a context-aware system over pervasive wireless networks was developed for a university campus. The basic aim was the development of a real-time distributed system architecture, based on novel protocols and applications targeted for indoor and outdoor context-aware computing. In this project, we explored new ways of enabling and exploiting new pervasive wireless connectivity and positioning solutions for a university campus. The pervasive wireless networks were constructed with small wireless devices, real-time indoor and outdoor location-infrastructures such as 802.11 access points and GPS (Global Positioning System). GPS gives the outdoor position

information for mobile users having GPS-enabled handheld Pocket PCs. The 802.11 infrastructure, besides wireless network access, was also used for finding locations of mobile users in the campus area.

KOSGEB Projects

Fatih University, Istanbul

Consultant and Referee

6/2004 – 6/2008

Consulted the following companies:

- Birinci Bilgi Sistemleri, *Printing House Management System Automation*, 12/2005 – 4/2006
- Nilaccra, *Design and Development of a Framework for ERP*, 9/2004 – 3/2005
- Pozitron, *Fax Automation*, 6/2004 – 10/2004
-

Project Management Processes Improvement at BELBİM

BELBİM (Istanbul Municipalities Data Processing Industry & Trade Inc.), <http://www.belbim.com.tr>

Consultant to Project Teams

7/2006 – 10/2006

Consulted the Project Teams on project management, administrative and technical management processes at BELBİM. Organization structure and processes, development team models, software development and project management processes, standards and documents.

New Generation Microprocessor-Based Traffic Junction Control Unit

ISBAK (Istanbul Municipalities Transportation Maintenance Industries and Trade Inc., Istanbul, Turkey, <http://www.isbak.com.tr>)

Consultant to the General Manager and Project Teams

8/2005 – 3/2006

Consulted the General Manager and Project Teams at ISBAK. Worked on the design, and processor and software tools selection problems for a new generation microprocessor-based traffic junction control unit which would replace old PLC-based control units in Istanbul. The following processor families and their development tools were studied and evaluated for the target control unit design: Ubicom 2K and 3K processors, Dallas TINI Chip Set and ARM processors. He also gave lectures on object-oriented analysis, design, and programming using Java and UML.

Design and Construction of a Network Lab

Fatih University, Department of Computer Engineering

Founder

4/2005 – 8/2005

Founded the first hardware lab in the Department of Computer Engineering at Fatih University. The Network Lab has two main labs: Computer Networks Lab and Wireless Networks Lab. The Network Lab is mainly for undergraduate students but it is also used for some advanced network research studies by graduate students and researchers. This is the first university network lab in its class in Turkey.

The Computer Networks Lab is a miniature version of the Internet. The available equipment is sufficient to emulate many traffic scenarios found on the real Internet and to teach TCP/IP protocols and data communication to students, and to give them hands-on experience on networking. The lab has modular Internet rack equipment. Each rack has 4 Cisco 2811 Integrated Services Routers, a 24-port 3Com (or CISCO) switch, 4 computers as internet hosts in experiments, 4 Ethernet hubs, 1 KVM switch and its set (LCD monitor, keyboard, and mouse), cables and connectors. There are also 4 Internet computers with each rack equipment unit. One set of rack equipment is used by 4 students in lab experiments. There are 6 racks in the lab; and since the design of the lab is modular and scalable, it can be easily extended if it is needed in the future.

The Wireless Networks Lab has 2 Internet racks, 8 Internet computers, 3 notebooks, indoor and outdoor Access Points (such as Cisco Aironet 1100) and antennas, an ADSL network connection and an USRobotics ADSL wireless modem supporting 802.11 abg/n, mobile devices supporting GSM, GPRS, EGDE, UMTS, GPS,

802.11abg/n and Bluetooth wireless technologies. Some of the mobile devices: Pocket PCs (IPAQs, hw6515, hw6915, h6340), Asus MyPal A636N, smart mobile phones (2 SonyEricsson P990), Sensors Networks Teaching Lab Equipment (Crossbow Mote Sensor Kits), Dallas DS80C400 (DSTINIm400) Networked Microcontroller Evaluation Kits, wireless development kits...

Enterprise Resource Planning (ERP) Project

Europe Software, Istanbul

Consultant to the General Manager and Project Teams

1/2004–2/2005

Served as Consultant to the General Manager and Project Teams. Consultant and mentor on organization structure and processes, technologies, project management and software development processes, enterprise system architectures.

He made contributions to the following main areas for a new start-up company from the beginning: Organization structure and processes, interviews, technologies and tools, team models, software life cycle activities, software development and project management processes, standards and documents. He also gave seminars on object-oriented analysis and design using Design Patterns, UML and Java.

Consultancy on Enterprise and ERP applications such as Supply Chain Management, Human Resources and Product Management, and Banking applications. The following were the general problems in these applications: How to layer an enterprise application, how to organize domain logic (i.e.: Security Layer, Service Layer, Data Model), how to tie that logic to a relational database, how to design a web based presentation, decisions in distributed design, and handling transactions. JSF, Hibernate, and Spring Framework are some of the new technologies used at Europe Software.

Automatic Sales Machine and Ticket Sales Machine Projects

BELBİM (Istanbul Municipalities Data Processing Industry & Trade Inc.), <http://www.belbim.com.tr>

Consultant to Project Teams

5/2003–12/2003

Consulted the project teams for system architecture, technologies and software development processes at BELBİM. The AKBİL (Smart Ticket) System developed by BELBİM for public transportation is the biggest *integrated* electronic ticket system in the world. It has become possible more than 5.000.000 habitants of Istanbul to travel with only one single ticket in 15 separate organizations and 19 kinds of different vehicles. This project was entirely designed and produced by Turkish engineers without getting any loan and know-how.

This is a reengineering project which re-designs and re-implements the existing *Automatic Sales Machine (ASM)* and *Ticket Sales Machine (TSM)* parts of the AKBİL system using Java technologies, new development tools and processes. These two systems are basically ticket loading systems and do the similar jobs. The ASM has no sales person; it uses a banknote acceptor to get the user's cache, whereas the TSM is used by a sales officer and has many complicated operations for ticket loading.

The ASM system has a personal computer (PC), a banknote acceptor (BNA), a TOM (Touch On Memory) Read/Write circuit, a monitor, a Vacuum Fluorescent Display (VFD), a printer, other hardware components and a power supply. The BNA, TOM R/W circuit, and VFD are connected to the serial ports of the PC. The TSM system has all these hardware components except BNA.

The analysis, design, and implementation of the new system were started and completed using UML and an agile software development process. The Java programming language and Borland JBuilder development platform were used in the implementation. The Borland Together was used as the UML modeling and documentation tool.

Data Transfer and Automatic Integration Projects –

BELBİM (Istanbul Municipalities Data Processing Industry & Trade Inc.), <http://www.belbim.com.tr>

Consultant to Project Teams

5/2003 –12/2003

Consulted the project teams for system architecture, technologies and software development processes at BELBİM. The AKBİL data (like sales reports) produced by many different vehicles in Istanbul transportation are collected by modems and processed at the BELBİM Data Processing Center every day. The statistical and financial reports are produced and sent to many organizations of Istanbul at a daily basis.

The data transfer program basically gets and writes *raw reports* (files collected by modems from different sources) to database tables and related directories on the file servers according to their file types. The automatic integration program reads preprocessed files from their directories and start further processing and database operations.

These two projects are reengineering projects which re-design and re-implement the existing data transfer and file processing units of the AKBİL system using new technologies, development tools and processes. The analysis, design, and implementation of the new systems were started and completed using UML and an agile software development process. The C# programming language, Visual Studio.NET development platform, and MS SQL Server were used in the implementation. The Borland Together was used as the UML modeling and documentation tool.

IP Crypto Devices Management System

TÜBİTAK-UEKAE, Gebze, Kocaeli, Turkey, <http://bilgem.tubitak.gov.tr>

Project Manager, System Architect

5/1999 – 7/2002

Worked as Project Manager and System Architect at TÜBİTAK-UEKAE. A management center and special agent software for IP crypto devices were designed and developed. These devices are the products of the National Research Institute of Electronics and Cryptology (UEKAE) and used to form VPNs (Virtual Private Network). The management center software is based on Java RMI technology and runs on the HP OpenView network management platform. The management agent was developed using the C programming language. The communication between the management center and the crypto devices is performed by SNMP messages. The five management functions of network management (Fault, Configuration, Account(Asset), Performance and Security (FCAPS) management) were implemented for IP crypto devices.

Dr. Gümüşkaya was the chief software architect on network management and Java network programming technologies. He also made contributions to the representation of Turkey in the NATO INFOSEC Working Group during this project.

Institute and Project Management Processes Improvement at TÜBİTAK-UEKAE

TÜBİTAK-UEKAE, Gebze, Kocaeli, Turkey, <http://bilgem.tubitak.gov.tr>

Project Manager

8/2000 – 12/2001

Worked in various institute process improvement teams as Project Manager at TÜBİTAK-UEKAE. Research on administrative and technical management processes which would be applied in an R&D institution, active participation to UEKAE process improvement meetings, preparation long presentations and process documents which would be used in the institute. In this scope, research studies were conducted on various software development and project management processes, starting from CMM, IEEE, SPICE, and present new “agile” methodologies like XP (Extreme Programming). Some processes and documents which could be used especially in software projects were produced.

TAFICS (Turkish Armed Forces Integrated Communication System) Electronic Key Management System (TELAYS)

TÜBİTAK-UEKAE, Gebze, Kocaeli, Turkey, <http://bilgem.tubitak.gov.tr>

Project Member, System Architect

5/1997 – 5/1999

Worked as project member and system architect at TÜBİTAK-UEKAE. TCP sockets-based large distributed network software which run on a Turkish military TCP/IP network having SUN Enterprise/Ultra Solaris/UNIX and PC Windows NT computers in a large geographical area in Turkey was developed by a very large project team. This was the first large software development project in many aspects in Turkey. The main system at the

crypto key production and distribution center was built on top of Java and SDL technologies. This system produces electronic keys and distributes these keys to the remote crypto equipment in a wide area network located in Turkey. Dr. Gümüşkaya was the chief software architect on Java network programming technologies. This project lasted about 7 years and employed more than hundred software and hardware developers.

Electronic Electricity Meter

ELKOSİS-Federal Elektrik, Gebze-Kocaeli

Co-founder, Software Projects Manager, System and Software Architect

9/1995 – 12/1996

Worked as Co-founder, Software Projects Manager, System and Software Architect at ELKOSİS. A new electronic electricity meter device prototype having prepayment feature with its smart card and its PC program were developed for Federal Elektrik for the Turkish market. The design and the development of the electricity meter requirements and analysis of existing systems in terms of hardware and software solutions were performed. The TI MSP 430 based hardware including current and voltage sensors, infrared communication, smart card interface, keyboard, LCD display were implemented. A Windows GUI application and a database program were developed using Delphi and Interbase for electricity meter user accounts and operations. The user and electricity usage information which were entered on the PC was downloaded to the smart card via a smart card interface circuit designed for the PC. The meter worked with this card.

AdEPar (Advanced Educational Parallel) DSP Software Environment

Uludağ University, Electronics Engineering Department

System Architect, Software Engineer

9/1994 – 4/1995

Worked as System Architect, Software Engineer in the Department of Electronics Engineering at Uludağ University. Dr. Gümüşkaya, as part of his Ph. D. study, developed a block diagram based object oriented Digital Signal Processing (DSP) software environment using Borland 3.1 OWL (Object Windows Library). The DSP algorithms which are in the form of LGDF (Large Grain Data Flow) graphs or ADF (Atomic Data Flow) graphs (digital filters) can be described in this environment. The algorithms are simulated using the program. The program distributes the tasks of a real-time DSP algorithm graph to the processing elements and generates a parallel C or assembly code for the target TMS320C25 processors.

Parallel Hardware Debugger for a Dual Processor Based DSP System Real-Time Control and Digital Signal Processing Applications

Uludağ University, Electronics Engineering Department – TÜBİTAK-Marmara Research Center (MAM), Electronic Department

System Architect, Software Engineer

9/1993 – 4/1994

Worked as System Architect, Software Engineer in the Department of Electronics Engineering at Uludağ University. A hardware debugger program was developed using the Borland 3.1 Turbo Vision C++ objects for the dual-processor parallel DSP (TMS32C25) system which was designed and produced at the Electronics Department of the Scientific and Technical Research Council of Turkey-Marmara Research Center (TÜBİTAK-MAM).

Development of Digital Signal/Image Processing Applications

TÜBİTAK-Marmara Research Center (MAM), Electronic Department

Consultant to Project Teams and Software Developer

9/1992 – 12/1995

Worked as Consultant to Project Teams and Software Developer at TÜBİTAK-Marmara Research Center, Electronic Department. Various projects on hardware and software engineering, digital signal/image processing. Different microprocessors, microcontrollers, special purpose processors like TMS 320C25/30 DSP processors, PC data acquisition and I/O boards were designed, constructed and used in various projects. C/C++ and assembly languages were used. The projects were for mostly academic purposes, and resulted in journal and conference papers.

Foundation of Computer Aided Electronics Design (BiDEET) Lab

Uludağ University, Department of Electronics Engineering

Founder and Mentor for BiDEET Students

9/1990 – 2/1995

Founded BiDEET (Computer Aided Electronics Design) Lab for undergraduate and graduate students, and formed a student research team. BiDEET students received many national prizes, found good jobs in high-tech companies, and some of them continued their education abroad getting scholarships and assistantships. BiDEET students also contributed to the national and international academic papers.

The prizes received by BiDEET students from TÜBİTAK student projects competition in engineering field were: an encouragement prize in 1990, the second prize in 1991, the first prize in 1992, and the project support money prize in 1993. The students also received some special prizes in the ceremony performed at the Faculty of Engineering and Architecture.

One of Dr. Gümüşkaya's BiDEET students received the big prize given by PC World magazine for the Electronics Circuit Simulation program running under Windows in 1994. The program was developed by his supervision. The prize was a trip to Microsoft facilities located at Seattle, USA. This BiDEET laboratory was closed by a *Professor* who was in the department in 1995...

Intel 196KC Microcontroller Based Electric Wending Machine

Uludağ University, Electronic Engineering Department – MİSTAŞ A.Ş., Bursa

System Architect, Electronics Engineer

3/1992 – 9/1992

Worked as System Architect and Electronics Engineer. An electronic wending machine control unit was developed with a joint work of the Electronics Department of Uludağ University and MİSTAŞ A.Ş. in Bursa. In the project, the 16-bit Intel 196KC microcontroller was used as the main processor in the control unit.

Galaxy Hardware Description Language

University of Wisconsin-Madison, Electrical and Computer Eng. Dept.

Software Engineer

9/1988 – 12/1989

Developed the Galaxy Hardware Description Language (GHDL) as part of his master study. GHDL was used in the University of Wisconsin-Madison and in many US universities, and also become a commercial product.

GHDL was one of the tools of the Galaxy CAD Environment which was developed by Dr. Beetem and his students. Galaxy was developed especially for digital circuit simulation and it was also the name of a high level programming language developed by Dr. Beetem. Digital circuits in the Galaxy CAD Environment were described as hierarchical by using Dr. Gümüşkaya's program. The output of the program was a file having circuit components and a netlist. The structure of this file was in the Galaxy common data structure representation form and could be used by other simulation programs in the Galaxy CAD Environment. The user described signals and their timing for circuits by using another Galaxy program after describing his circuit by GHDL.

8. Scholarship and Rewards

Date	January/1987 – January/1990 (3 years)
Subject	Full scholarship for graduate education in USA, National Ministry of Education of Turkey
Publication	
Rewards for	International Publication, Gediz University, 9/2013 International Publication, Gediz University, 9/2013 International Publication, Gediz University, 7/2012 International Publication, TÜBİTAK, 2/2012 International Publication, Gediz University, 12/2011 (1) International Publication, Gediz University, 12/2011 (2) International Publication, Gediz University, 12/2011 (3)

National Book Publication No. 2, Fatih University, 17/12/2007
National Book Publication No. 1, Fatih University, 17/12/2007
International Publication, Fatih University, 28/08/2007
International Publication, TÜBİTAK, 9/02/2007
International Publication, TÜBİTAK, 9/02/2007
International Publication, Fatih University, 24/01/2007
International Publication, TÜBİTAK, 01/02/1998
International Publication, TÜBİTAK, 01/09/1995

9. Publications

9.1. Books

1. *Java Ağ Programcılığı, (Ömer Boyacı ile)*, 720 sayfa, 1. Baskı: Haziran 2003, ALFA.
2. *Mikroişlemciler ve Bilgisayarlar, Intel Ailesi ve IBM PC*, 430 sayfa, 6. Baskı: Ekim 2011, 1. Baskı: Eylül 1999, ALFA.
3. *Mikroişlemciler ve 8051 Ailesi Donanım, Programlama ve Uygulamalar*, 345 sayfa, 6. Baskı: Ekim 2007, 1. Baskı: Şubat 1998, ALFA.
4. *Network Programming with Java (Lecture Notes)*, Marmara University, Computer Engineering Department, 493 pages, 1999.
5. *Lojik Devre Temelleri*, 150 sayfa, Uludağ Üniversitesi, 1990.

9.2. Book Chapters

1. U. Şimşek, H. Gümüşkaya, “Using PRINCE2 Project Management Methodology to Develop SOA Based Applications”, *Innovations in Computing Sciences and Software Engineering, Lecture Notes in Electrical Engineering Series*, Vol. 152, Springer, ISBN 978-1-4614-3534-1, August, August 2012.
2. H. Gümüşkaya, M. V. Nural, S. Doğan, “A Software Solution for Mobile Context Handoff in WLANs”, *Novel Algorithms and Techniques in Telecommunications and Networking*, Springer, pp. 305 – 309, January 2010.
3. H. Gümüşkaya, M. V. Nural, “Service-Oriented Context-Awareness and Context-Aware Services”, *Advances in Computer and Information Sciences and Engineering*, Springer, pp. 184 – 189, August 2008.
4. B. Yurday, H. Gümüşkaya, “A Service Oriented Reflective Wireless Middleware”, *Lecture Notes in Computer Science*, vol. 4294, pp. 545 – 556, 2006.
5. A. Atik, H. Gümüşkaya, Ö. Genç, S. Kazancı, “Java Mobile Agent System”, *Advances in Computer and Information Sciences'98, Concurrent Systems Engineering Series*, Volume 53, IOS Press, October 1998, pp. 490-497, ISBN: 90-5199-405-2.
6. *The Galaxy CAD System, Chapter 5: Galaxy Hardware Description Language (GHDL)*, J. F. Beetem, Jim Rose, H. Gümüşkaya, et. al., Electrical and Computer Engineering, University of Wisconsin-Madison, USA, December 1991.

9.3. International Journal Publications (SCI, SCI-Exp)

1. O. Toker, H. Gümüşkaya, C. Ulaş, B. T. Yılmaz, “Lightweight Wireless Protocol Based on IEEE 802.11 for Delay Sensitive Telerobotic Systems”, *Turkish Journal of Electrical Engineering and Computer Sciences*, Vol. 21, pp. 1394-1410, 2013. (doi:10.3906/elk-1110-9) (SCI-E)
2. O. Karan, C. Bayraktar, H. Gümüşkaya, B. Karlık, “Diagnosing Diabetes using Neural Networks on Small Mobile Devices”, *Expert Systems with Applications*, Elsevier, Vol. 39, Issue 1, 2012, pp. 54-60, 2012. (SCI)
3. H. Gümüşkaya, “An Architecture Design Process Using a Supportable Meta-Architecture and Roundtrip Engineering”, *Lecture Notes in Computer Science*, vol. 4243, pp. 324-333, 2006. (SCI-E)
4. H. Gümüşkaya, B. Örencik, “AdEPar Integrated Simulation and Implementation Environment for DSP”, *Simulation*, Vol. 69, No: 6, pp. 335-349, December 1997. (SCI-E)

5. F. Kurugöllü, H. Palaz, H. Gümüşkaya, E. Harmancı, B. Örencik, “Advanced Educational Parallel DSP System Based on TMS320C25 Processors”, *Microprocessors and Microsystems*, pp. 147-156, April, 1995. (SCI-E)

9.4. International Journal Publications (Other Indexes)

1. D. Akbaş, H. Gümüşkaya, “Real and OPNET Modeling and Analysis of an Enterprise Network and Its Security Structures”, *Procedia Computer Science*, Elsevier, Volume 3, p.p. 1038-1042, 2011.
2. Ö. Önder, H. Gümüşkaya, “Architectural Platform: A Social Network Site for Architects”, *Procedia Computer Science*, Elsevier, Volume 3, p.p. 469-473, 2011.
3. C. Bayraktar, O. Karan, H. Gümüşkaya, “Diagnosing Internal Illnesses using Neural Networks and Pervasive Healthcare Computing”, *Procedia Computer Science*, Elsevier, Volume 3, p.p. 584-588, 2011.
4. C. Ulaş, H. S. Efendioğlu, O. Toker, H. Gümüşkaya, “Delay Sensitive Wireless Protocols for Telerobotics Applications”, *Journal of Networking Technology*, Vol. 1, No. 3, pp. 118-125, Sep. 2010.
5. B. Yurday, H. Gümüşkaya, “A Service Oriented Reflective Wireless Middleware”, *Lecture Notes in Computer Science (LNCS)*, Springer-Verlag, vol. 4294, pp. 545 – 556, 2006.
6. H. Gümüşkaya, H. Hakkoymaz, “WiPoD Wireless Positioning System Based on 802.11 WLAN Infrastructure”, *Enformatika*, Vol. 9, pp. 126-130, November, 2005.
7. H. Gümüşkaya, “Core Issues Affecting Software Architecture in Enterprise Projects”, *Enformatika*, Vol. 9, pp. 32-37, November, 2005.
8. H. Gümüşkaya, B. Örencik, “A Parallel Pipelined Computer Architecture for Digital Signal Processing”, *Elektrik, (Turkish Journal of Electrical Engineering & Computer Sciences)*, Vol. 6 No. 2, pp. 107-129, 1998.
9. H. Gümüşkaya, B. Örencik, “The Design of a Block Diagram Based Object-Oriented Graphical User Interface for a DSP Environment”, *The Journal of İstanbul Technical University*, Vol. 49, pp. 441-457, 1996.

9.5. National Journal Publications

1. H. Gümüşkaya, Y. Ulçay, “Development of a LAN System for Textile Computer Integrated Manufacturing”, *University of Uludağ Journal of the Faculty of Engineering and Architecture*, Vol. 8, No. 1, pp. 45-51, 2003.

9.6. International Conference Proceedings

1. U. Üntürk, S. Özcan, H. Gümüşkaya, “TweetCuriosity: A Simple Preprocessing and Analyzing Tool for Twitter Data”, *2014 International Joint Conferences on Computer, Information, and Systems Sciences, and Engineering*, December 12 - 14, 2014.
2. U. Üntürk, S. Özcan, H. Kusetoğulları, H. Gümüşkaya, “Hadoop Based Distributed Parallel System for Effective Face Recognition”, *3rd International Symposium on Computing in Science and Engineering (ISCSE 2013)*, pp. 108-113, Kuşadası, Aydın, October, 24-25, 2013.
3. G. Akyol, H. Gümüşkaya, “A Classification of Recent Approaches in Computer Networking Laboratories for Computer Engineering”, *3rd International Symposium on Computing in Science and Engineering (ISCSE 2013)*, Kuşadası, Aydın, October, 24-25, 2013.
4. B. T. Yılmaz, H. Gümüşkaya, O. Toker, “A Lightweight Wireless Protocol Based on IEEE 802.11 for Embedded Telerobotics Systems”, *2nd International Symposium on Computing in Science and Engineering (ISCSE)*, Kuşadası, Aydın, June, 1-4, 2011.
5. U. Şimşek, H. Gümüşkaya, “Using PRINCE2 Project Management Methodology to Develop SOA Based Applications”, *2010 International Joint Conferences on Computer, Information, and Systems Sciences, and Engineering*, December 3 - 12, 2010.
6. D. Akbaş, H. Gümüşkaya, “Real and OPNET Modeling and Analysis of an Enterprise Network and Its Security Structures”, *World Conference on Information Technology*, Istanbul, 06-10 October 2010.

7. Ö. Önder, H. Gümüşkaya, "Architectural Platform: A Social Network Site for Architects", *Procedia Computer Science*, Elsevier, *World Conference on Information Technology*, Istanbul, 06-10 October 2010.
8. C. Bayraktar, O. Karan, H. Gümüşkaya, "Diagnosing Internal Illnesses using Neural Networks and Pervasive Healthcare Computing", *World Conference on Information Technology*, Istanbul, 06-10 October 2010.
9. C. Ulaş, H. S. Efendioğlu, O. Toker, H. Gümüşkaya, "Delay Sensitive Wireless Protocols for Telerobotics Applications", *The Third International Conference on the Applications of Digital Information and Web Technologies (ICADIWT 2010)*, pp. 10-16, İstanbul, Turkey, July 12-14, 2010.
10. O. Karan, C. Bayraktar, H. Gümüşkaya, B. Karlık, "Diagnosing Illnesses using Neural Networks and Pervasive Healthcare Computing", *1st International Symposium on Computing in Science and Engineering (ISCSE)*, Kuşadası, Aydın, June, 3-5, 2010.
11. O. Toker, C. Ulaş, H. S. Efendioğlu, H. Gümüşkaya, "Embedded Systems for Delay Sensitive Wireless Protocol Development and Analysis for Telerobotics Applications", *Int. Conf. on Wireless Networks 2009 (ICWN'09)*, Las Vegas, NV, U.S.A., Jul. 2009.
12. H. Gümüşkaya, M. V. Nural, S. Doğan, "A Software Solution for Mobile Context Handoff in WLANs", *Fourth International Conference on Telecommunications and Networking (TeNe 08)*, 5-13 December 2008.
13. H. Gümüşkaya, A. V. Gürel, M. V. Nural, "Architectures for Small Mobile Communication Devices and Performance Analyses", *First IEEE International Conference on the Applications of Digital Information and Web Technologies*, Ostrava, Czech Republic, 4-6 August 2008.
14. H. Gümüşkaya, M. V. Nural, "Service-Oriented Context-Awareness and Context-Aware Services", *Third International Conference on Systems, Computing Sciences and Software Engineering (SCSS2007)*, 3-12 December, Live Internet Presentation, 2007.
15. O. Davulcu, H. Gümüşkaya, "A Secure Mobile Agent Architecture for E-Commerce Applications", *International Symposium on Computer and Information Sciences XVI (ISCIS'16)*, pp. 336-343, November 5-7, 2001, Antalya.
16. İ. Levent, H. Gümüşkaya, "Distributed Project Management with Java Mobile Agents on the Web", *International Symposium on Computer and Information Sciences XV (ISCIS'15)*, Oct., 11-13, 2000, İstanbul.
17. H. Gümüşkaya, O. Davulcu, E. Akbaş, T. Dursun, "A CORBA and Java Mobile Agents Based Network Management Architecture", *International Symposium on Computer and Information Sciences XIV (ISCIS'14)*, pp. 975-982, October 18-20, 1999, Kuşadası, İzmir.
18. H. Gümüşkaya, E. Akbaş, T. Dursun, O. Davulcu, "Utilization of CORBA, Mobile Agents, Java, and Web Technologies for Network Management", *Regional Conference on Military Communication and Information Systems '99*, Vol. 3, pp. 25-34, Oct. 6-8, 1999, Zegrze, Poland.
19. H. Gümüşkaya, B. Örencik, "Networks Analysis and Comparison of a Parallel Pipelined Architecture for DSP", *International Symposium on Computer and Information Sciences X (ISCIS'10)*, Vol 2, pp. 621-628, October 30-November 1, 1995, Kuşadası, İzmir.
20. H. Gümüşkaya, B. Örencik, F. Kurugöllü, H. Palaz, "Automatic Scheduling of Real-Time Digital Filtering Algorithms onto Processors", *5th Int. Conference on Signal Processing Applications and Technology*, Vol.1, pp. 606-611, Oct. 18-21, 1994, Dallas, Texas, USA.
21. H. Gümüşkaya, H. Palaz, F. Kurugöllü, B. Örencik, "Practical Scheduling of Real-Time Digital Filtering Algorithms onto Multiprocessors", *Euromicro 94*, Sep. 5-8, 1994, Liverpool, England.
22. H. Gümüşkaya, J. F. Beetem, "Galaxy Hardware Description Language", *International Symposium on Computer and Information Sciences VII (ISCIS'7)*, pp. 487-490, November 2-4, 1992, Kemer, Antalya.
23. N. Beşli, H. Gümüşkaya, A. Sürmen, "Automation of a Gasoline Engine Test Bed", *IFAC Workshop on Automatic Control for Quality and Productivity Symposium*, Vol. 1, pp. 88-95, June 3-5, 1992, İstanbul.

9.7. National Conference Proceedings

1. G. Akyol, H. Gümüşkaya, "Çevik Yazılım Geliştirmede BDD/TDD Yöntemlerinin ve Yazılım Kalite Araçlarının Kullanılması: Bir Yazılım Mühendisliği Dersindeki Tecrübe", *10. Ulusal*

- Yazılım Mühendisliği Sempozyumu, Çanakkale, CEUR-WS, Vol-1721, Ekim 24-26, Sayfa: 219-230, 2016.*
2. C. Bayraktar, O. Karan, H. Gümüşkaya, B. Karlık, “Diyabet Hastalığının Teşhisinde Yaygın Hesaplamanın ve Yapay Sinir Ağlarının Kullanılması”, *ELECO'2010, Elektrik Elektronik Bilgisayar Mühendisliği Sempozyumu*, Bursa, 2-6 Aralık 2010.
 3. D. Akbaş, H. Gümüşkaya, “Bir Kurumsal Ağın ve Güvenlik Yapılarının Modellenmesi”, *ELECO'2010, Elektrik Elektronik Bilgisayar Mühendisliği Sempozyumu*, Bursa, 2-6 Aralık 2010.
 4. H. Gümüşkaya, A. V. Gürel, M. V. Nural, “Ortamdan-Haberdar Bir Sistem İçin Mobil Ağ Yazılım Mimarileri”, *2. Ulusal Yazılım Mimarisi Konferansı (UYMK 2008)*, Ege Üniversitesi, İzmir, 11-12 Eylül 2008.
 5. H. Gümüşkaya, A. V. Gürel, M. V. Nural, “Küçük Mobil Cihazlarda Kablosuz Ağlar Üzerinde SOAP, RMI ve TCP Performans Analizi”, *2. Ulusal Yazılım Mimarisi Konferansı (UYMK 2008)*, Ege Üniversitesi, İzmir, 11-12 Eylül 2008.
 6. M. Bilgi, H. Gümüşkaya, “Design Issues for Supportable Enterprise Web Architecture using Frameworks”, *Turkish Software Architecture Design Workshop (TSAD)*, September 24, 2005, ODTÜ Kültür ve Kongre Merkezi, Ankara.
 7. İ. Levent, H. Gümüşkaya, “Distributed Project Management Using Mobile Agents”, *Bilişim 2000*, 6-9 Eylül 2000, İstanbul.
 8. O. Adalier, H. Gümüşkaya, “Centralized Policy-Based Management of VPN Devices Using SNMPv3”, *5th Computer Networks Symposium (BAS2000)*, pp. 113-121, Ankara, Bilkent University, 15-16 Haziran 2000.
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 11. H. Gümüşkaya, S. Çetin, “Sinyal ve Görüntü İşleme İçin Web ve Java Tabanlı Bir Mimari”, *IEEE 1999 Sinyal İşleme ve Uygulamaları Kurultayı (IEEE SİU'99)*, Sayfa: 493-498, 16-19 Haziran 1999, Bilkent, Ankara.
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 14. H. Gümüşkaya, Y. Ulçay, “Tekstil Dokuma İşlemleri için bir LAN ve Barkodlu Üretim Takip Sisteminin Geliştirilmesi”, *Elektrik-Elektronik-Bilgisayar Mühendisliği 7. Ulusal Kongresi*, 31 Ağustos - 6 Eylül 1997, Ankara.
 15. A. Babaev, H. Gümüşkaya, Y. Ulçay, “Development of an Expert System for Diagnosis of Textile Fabric Defects”, *6th Turkish Symposium on Artificial Intelligence and Neural Networks (TAINN'97)*, May 21-23, 1997, Ankara.
 16. H. Gümüşkaya, C. Z. Tan, B. Örencik, “Bir Paralel Bilgisayar Mimarisinde DSP Uygulamalarının Başarım Analizi”, *5. Sinyal İşleme ve Uygulamaları Kurultayı (SİU'97)*, 1-3 Mayıs 1997, Sayfa: 667-672, Kuşadası, İzmir.
 17. H. Gümüşkaya, B. Örencik, “Sayısal İşaret İşleme için bir Donanım ve Yazılım Ortamı”, *4. Sinyal İşleme ve Uygulamaları Kurultayı*, Sayfa: 337-342, 5-6 Nisan 1996, Kemer, Antalya.
 18. H. Gümüşkaya, B. Örencik, “ADF Grafları ile Tanımlı Gerçek-Zaman Süzgeçleri için Paralel Mimariler ve Otomatik Program Üretimi”, *4. Sinyal İşleme ve Uygulamaları Kurultayı (SİU'96)*, Sayfa: 343-348, 5-6 Nisan 1996, Kemer, Antalya.
 19. H. Gümüşkaya, B. Örencik, “Sayısal İşaret İşleme için Paralel Mimariler”, *3. Sinyal İşleme ve Uygulamaları Kurultayı*, Cilt B, Sayfa:291-296, 26-28 Nisan 1995, Kapadokya, Nevşehir.
 20. D. Demir, İ. Avcıbaş, H. Gümüşkaya, E. Dilaveroğlu, “Nesneye Yönelik Bilgisayarla Görü Ortamı (MAMGÖR)”, *3. Sinyal İşleme ve Uygulamaları Kurultayı (SİU'95)*, Cilt A, Sayfa: 216-221, 26-28 Nisan 1995, Kapadokya, Nevşehir.

21. H. Gümüşkaya, B. Örencik, A. Akman, “Blok Diyagram Tanımlamalı ve Asenkron Veri Akışı Tabanlı bir Sayısal İşaret İşleme Ortamı”, 2. *Sinyal İşleme ve Uygulamaları Kurultayı (SİU’94)*, Sayfa: 276-281, 8-9 Nisan 1994, Gökova, Muğla.
22. İ. Avcıbaş, H. Gümüşkaya, D. Demir, B. Sankur, E. Anarım, “Nesneye Yönelik Alt Düzeyde Bilgisayarla Görme Ortamı”, 2. *Sinyal İşleme ve Uygulamaları Kurultayı (SİU’94)*, Sayfa: 59-64, 8-9 Nisan 1994, Gökova, Muğla.
23. H. Gümüşkaya, Y. Bacak, “Sayısal İşaret İşlemcilerin Yeni Teknolojilere ve Elektronik Mühendisliği Eğitimine Etkileri”, *Bursa 3. Elektromekanik Sempozyumu*, Sayfa: 336-343, 1-5 Aralık 1993, Bursa.
24. F. Kurugöllü, A. E. Harmancı, H. Gümüşkaya, “TMS320C25 Yongaları ile Gerçekleştirilmiş Çift İşlemcili Paralel Sayısal İşaret İşleme Sistemi”, 1. *Sinyal İşleme ve Uygulamaları Kurultayı (SİU’93)*, Sayfa: 198-202, 21-22 Nisan 1993, Boğaziçi Üniversitesi.
25. H. Gümüşkaya, “Gallium Arsenide’nin Bilgisayar Mimarisine Etkileri”, *Bursa 3. Bilgisayar ve Haberleşme Sempozyumu*, Sayfa: 39-49, 24-28 Nisan, 1991, Bursa.

9.8. Technical Reports and Other Publications

1. H. Gümüşkaya, *Ulusal Arama Motoru (Damla) Projesi Durum Raporu - Nisan 2013*, Teknik Rapor, 11 Sayfa, TÜBİTAK-BİLGEM, Nisan 2013.
2. H. Gümüşkaya, *Mevcut Durum Analizi ve Süreç İyileştirme İçin Teklif ve Tavsiyeler*, Teknik Rapor, 43 sayfa, TÜBİTAK-BİLGEM, Mart 2012.
3. H. Gümüşkaya, *First Topics, Technologies, and Scientific Background for Development of a Railway Signalling System*, Technical Report, 92 pages, İstanbul Ulaşım A.Ş., May 2009.
4. H. Gümüşkaya, *Demiryolu Sinyal Sistemi Geliştirme Süreci ve Yol Haritası için Öneriler*, Teknik Rapor, 31 sayfa, İstanbul Ulaşım A.Ş., Mayıs 2009.
5. H. Gümüşkaya, *IP Kripto Cihazları Yönetim Sistemi–Yönetim Dokümanı*, Sürüm 3, Sürüm 2 ve Sürüm 1, TÜBİTAK-UEKAE, Mart 2002, Eylül 2001 ve Mayıs 2001.
6. H. Gümüşkaya, *IP Kripto Cihazları Yönetim Sistemi (Son Taslak, Hazırlık Taslağı ve İlk Taslak)*, TÜBİTAK-UEKAE, Aralık, Eylül ve Temmuz 2000.
7. H. Gümüşkaya, *IP Kripto Cihazları Yönetim Sistemi-Teknik Altyapı*, TÜBİTAK-UEKAE, Ocak 2000.
8. H. Gümüşkaya, *NATO Security Management AHWG Mission Statement*, TÜBİTAK-UEKAE, Sep. 2001.
9. H. Gümüşkaya, “Requirements of a Management System for Security Devices”, TÜBİTAK-UEKAE, September 2001.
10. H. Gümüşkaya, *Ağ Yönetimi: Gelecek MEBS (Milli Elektronik Bilgi Sistemleri) Güvenlik Sistemleri*, TÜBİTAK-UEKAE, 38 sayfa, Kasım 1999.
11. H. Gümüşkaya, “Sayısal İşaret İşlemcilerin Bilgisayarlara Olan Etkileri”, *Byte*, Mayıs, 1994.

10. Supervised Master Theses

1. Gökhan Akyol, *Düşük Maliyetli ve Öğretim Açısından Verimli Bir Bilgisayar Ağları Laboratuvar Tasarımı ve Gerçekleştirilmesi*, Gediz Üniversitesi, Fen Bilimleri Enstitüsü, Sistem Mühendisliği Yüksek Lisans Programı, Haziran 2014.
2. Bora Tamer Yılmaz, *Kablosuz IEEE 802.11 Ağ Bağlantısı Üzerinden Elektronik Kontrol için Bir Ağ Protokolünün Geliştirilmesi*, Haliç University, Computer Engineering Department, September 2011.
3. Canan Bayraktar, *Yaygın Hesaplama Kullanılarak Hastalıkların Teşhisi*, Haliç University, Computer Engineering Department, July 2011.
4. Doruk Tolga Atasoy, *Hastalık Teşhisi için Kurumsal Uygulama Arayüzleri ve Performans Analizleri*, Haliç University, Computer Engineering Department, June 2011.
5. Orhan Tarikulu, *CMMI'in Bir Türk Bankacılık Sektöründe Uygulanması ve Analizi* Haliç University, Computer Engineering Department-Management Information Systems Program, June 2011.
6. Umut Şimşek, *CMMI Rehberliğinde PRINCE2 ile Servis Odaklı Mimari Tabanlı Uygulama Geliştirme*, Haliç University, Computer Engineering Department, February 2011.
7. Özerk Önder, *Mimarlara Yönelik Bir Sosyal Ağ Sitesinin Tasarımı ve Geliştirilmesi*, Haliç University, Computer Engineering Department, July 2010.
8. Deniz Akbaş, *Bir Kurumsal Ağın ve Güvenlik Yapılarının Modellenmesi ve Analizi*, Haliç University, Computer Engineering Department, Management Information Systems Program, July 2010.
9. Ahmet Volkan Gürel, *A Service Oriented Reflective Middleware for Pervasive Computing*, Fatih University, Computer Engineering Department, July 2008.
10. Bora Yurday, *Service Oriented Reflective Wireless Middleware*, Fatih University, Computer Engineering Department, September 2006.
11. Osman Davulcu, *Open Secure Mobile Agent System*, Marmara University, Computer Engineering Department, January 2002.

11. Courses Taught in Universities

Software Engineering

COM 401/302/531 Software Engineering, 10 times (2003 – 2015)
COM 101/102 Introduction to Programming (C programming) 5 times, since 1990
COM 102 Object Oriented Programming (Java), 4 times (2003 – 2011)
COM 217 Object Oriented Design (using UML, D. Patterns, and Java), 3 times (2002 – 2005)
COM 511/531 Advanced Software Engineering, 2 times (2007, 2009)
CENG 530 Software Design Methodology, 2 times (2003, 2005)
COM 570 Software Analysis and Design, 2015
CENG 535/410 Design Patterns, 2003
??? Advanced Programming Techniques (Windows Programming using C++), 199?
??? Data Structures (using C), 2 times, 199?, 2009

Cloud Computing and Data Science (Big Data, Data Mining, Machine Learning, ...)

COM 444/561 Cloud Computing, 4 times (2013 – 2015)
COM 451/535 Data Mining, 2 times (2012, 2016)
COM 521 Applied Data Science and Machine Learning, 2016
COM 448 Cloud Big Data Systems and Analytics, 2015

Networking Courses

COM 362 Computer Networks, 13 times (2004 – 2015)
CENG 465/567 Mobile and Wireless Networking, 4 times (2004 – 2009)
CENG 564/463 Network Programming, 4 times (2002 – 2008)
COM 5?? Open Systems Networking, 3 times (1997 – 1999)
COM ???/440 Distributed Systems, 2 times (1998, 2013)

COM 560 Computer Network Technologies and Applications, 3 times (2008 – 2011)

Computer Hardware Engineering Courses

COM 353 Microprocessors, 8 times, since 1991

EEE 251/??? Logic Design and Circuits, 4 times (2011, 1990 – 1997)

COM 252 Computer Organization, 2 times (2004, 2012)

SMY 533/??? Embedded Systems, 2 times, (2011, 1990 – 1997)

CENG 321 Computer Architecture, 2003

??? Advanced Microprocessors, 199?

??? Advanced DSP Applications, 199?

Gediz University, Computer Engineering Department
September/2010 – July/2016, Professor (Education in English)

Year	Semester	Course Name	Students
2015-2016	Fall	COM 401 Software Engineering	
		COM 444 Cloud Computing	
		COM 570 Software Analysis and Design	
	Spring	COM 362 Computer Networks	
		COM 451 Data Mining	
		COM 521 Applied Data Science and Machine Learning	

Year	Semester	Course Name	Students
2014-2015	Fall	COM 401 Software Engineering	
		COM 444 Cloud Computing	
		SMY 531 Yazılım Mühendisliği	
	Spring	COM 362 Computer Networks I	
		COM 448 Cloud Big Data Systems and Analytics	
		COM 561 Cloud Computing	

Year	Semester	Course Name	Students
2013-2014	Fall	COM 401 Software Engineering	
		COM 444 Cloud Computing	
	Spring	COM 362 Computer Networks I	

Year	Semester	Course Name	Students
2012-2013	Fall	COM 401 Software Engineering	
		COM 353 Microprocessors	
	Spring	COM 362 Computer Networks I	
		COM 440 Distributed Systems	

Year	Semester	Course Name	Students
2011-2012	Fall	EEE 251 Logic Design and Circuits	
		COM 353 Microprocessors	
		SMY 532 Embedded Systems	
	Spring	COM 252 Computer Organization	
		COM 362 Computer Networks I	
		SMY 535 Data Mining	

Year	Semester	Course Name	Students
2010-2011	Fall	COM 101 Introduction to Programming	
	Spring	COM 102 Object Oriented Programming	
		MBIL 102 Bilgisayar Programlama SMY 531 Yazılım Mühendisliği	

Haliç University, Computer Engineering Department
September/2008 – September/2010, Professor (Education in Turkish)

Year	Semester	Course Name	Students
2009-2010	Fall	BİM 411 Bilgisayar Ağları I	
		BİM 511 İleri Yazılım Mühendisliği	
		BİM/YBS 590 Seminer	
	Spring	BİM 411 Bilgisayar Ağları I	
		BİM 511 Bilgisayar Ağ Teknolojileri ve Uygulamaları	
		BİM/YBS 590 Seminer	

Year	Semester	Course Name	Students
2008-2009	Fall	BİM 411 Bilgisayar Ağları	
		BİM 441 Ağ Programlama	
		BİM/YBS 521 Bilgisayar Ağ Yapıları	
	Spring	BİM 494 İleri Yazılım Tasarımı	
		BİM 438 Mobil Hesaplama	

Fatih University, Computer Engineering Department
August/2002 – August/2008, Associate Professor (Education in English)

Year	Semester	Course Name	Students
2007-2008	Fall	CENG 401 Software Engineering	
		BILM 401 Yazılım Mühendisliği	
		CENG 465 Mobile and Wireless Networking	
		BILM 465 Gezin ve Kablosuz Ağlar	
	Spring	CENG 577 Advanced Software Engineering	
		CENG 362 Computer Networks (with Lab) (4 Credits)	
		BILM 362 Bilgisayar Ağları (Lab'lı) (4 Kredi)	
		BILM 112 BİLM 112 Bilgisayar Programlamaya Giriş CENG 102 Algorithms and Programming (Summer 2008)	

Year	Semester	Course Name	Students
2006-2007	Fall	CENG 401 Software Engineering	
		CENG 465 Mobile and Wireless Networking	
		CENG 567 Mobile Computing	
		CENG 577 Advanced Services in Communications	
	Spring	CENG 362 Computer Networks (with Lab) (4 Credits)	
		BILM 362 Bilgisayar Ağları (Lab'lı) (4 Kredi) CENG 531 Advanced Software Engineering	

Year	Semester	Course Name	Students
2005-2006	Fall	CENG 217 Object Oriented Design	
		BILM 217 Nesneye Yönelik Tasarım	
		CENG 535 Mobile Computing	
	Spring	CENG 401 Software Engineering	
		CENG 362 Computer Networks (with Lab) (4 Credits)	
		CENG 217 Object Oriented Design (Summer 2006)	

Year	Semester	Course Name	Students
2004-2005	Fall	CENG 463/564 Network Programming	
		CENG 535/465 Mobile and Wireless Networking	
		CENG 535 Mobile Computing	
	Spring	CENG 530 Software Design Methodology	
		CENG 302 Software Engineering	
		CENG 362 Computer Networks	

Year	Semester	Course Name	Students
2003-2004	Fall	CENG 463/564 Network Programming	
		CENG 535/410 Design Patterns	
		CENG 321 Computer Architecture	
	Spring	CENG 362 Computer Networks	
		CENG 252 Computer Organization	

Year	Semester	Course Name	Students
2002-2003	Fall	CENG 463/564 Network Programming	
		CENG 217 Object Oriented Programming	
		CENG 101 Computer Programming I	
	Spring	CENG 530 Software Design Methodology	
		CENG 302 Software Engineering	
		CENG 102 Computer Programming II	

Marmara University, Computer Engineering Department
September/1997 – January/2002, Instructor, (Education in English)
Open Systems Networking 1997, 1998 and 1999 Fall Semesters
Distributed Systems 1998 Spring
Microprocessors 1997 Fall

Uludağ University, Electronics Engineering Department
March/1990 – May/1997, Instructor (Education in Turkish)
Logic Circuits Fundamentals Basic logic design
Logic Circuits Introduction to microprocessors with Intel 8085 and 8051
Microprocessors I X86 family and IBM PC based data acquisition and control
Microprocessors II Applications of microprocessors, microcontrollers and PC
Computer Programming I Introduction to computer programming with C
Computer Programming II Data structures and algorithms with C
Adv. Programming Tech. C++ and Windows programming
DSP Applications TMS320 family and Digital Signal Processing Applications