

Murat Ozbayoglu

Curriculum Vitæ

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Areas of Interests

- Applied Computational Intelligence (for Finance, Manufacturing, Chemical Processes, Materials Science)
- Machine/Deep Learning and Pattern Recognition
- Data Science, Big Data Analytics, Internet of Things
- Computer Vision and Image Processing
- Evolutionary Computation

Employment History

- 2019 **Visiting Scholar**, *E. L. Ginzton Laboratory*, Spilker Engineering and Applied Science Bldg. Stanford University, Stanford, CA 94305-4088
- 2005 **Faculty**, *Faculty of Engineering*, Department of Computer Engineering. TOBB University of Economics and Technology (TOBB ETU), Ankara, Turkey
- 2001 **Senior Programmer/Analyst**, *Manufacturing MIS Department*, St. Peters Plant. MEMC Electronic Materials, Inc., St. Louis, MO, USA
- 2001 **Software/Database Engineer**, *Vizyonsoft*, contracted to ARIA Mobile Services. Istanbul, Turkey
- 1997 **Software Engineer/Consultant**, *Beyond Inc.*, contracted to MEMC Electronics. St. Peters, MO, USA
- 1996 **Product Development Engineer**, *Beyond Inc.*, St. Peters, MO, USA.
- 1995 **Industrial Engineer**, *Marathon Electric Co.*, West Plains, MO, USA.
- 1992 **Graduate Research Assistant**, *Smart Engineering Systems Lab*. University of Missouri-Rolla, Rolla, MO, USA
- 1991 **Technical Department Manager**, *Apple Center Senkron*, Ankara, Turkey.
- 1990 **Intern Electrical Engineer**, *Vega Electric*, Ankara, Turkey.
- 1989 **Intern Electrical Engineer**, *Gold Fields of South Africa*, Johannesburg, RSA.

Education

- 1993 **PhD Engineering Management**, *Missouri University of Science & Technology*, formerly known as University of Missouri-Rolla, **GPA: 3.82/4.0**, Rolla, MO, USA. **Thesis:** Hierarchical Fingerprint Identification based on an Unsupervised Neural Network
- 1992 **M.S. Engineering Management**, *Missouri University of Science & Technology*, **GPA: 3.91/4.0**, Rolla, MO, USA. Emphasis on Information Technology, also completed 5 courses in Computer Science.
- 1987 **B.S. Electrical Engineering**, *Middle East Technical University*, Ankara, Turkey. Emphasis on Telecommunications and Computer

Research Activities

2007

Financial Forecasting, Options, Algorithmic Trading, Strategy Optimization, *Principal Investigator*,
Description: Machine/deep learning and evolutionary computation in financial forecasting, trend detection and algorithmic trading. In addition, options strategies are also studied and integrated into trading models.,
Keywords: Deep learning, financial markets, stock and option trading, trend detection, multi-agent systems, evolutionary computation, options strategy optimization.

Achievements: 1 NSF-Turkey grant, 1 PhD thesis, 6 MSc theses, 2 journal, 11 conference publications

2014
2016

ATM Menu Optimization based on User Profiles, *Principal Investigator*,
Description: User profiling based on user transactions, Customized efficient ATM menu for specific user profiles so that the users will finish their transactions in less user clicks (and time) ,
Keywords: Menu optimization, ETL, clustering, machine learning, evolutionary computation, computational intelligence, Hadoop Mapreduce, transaction forecasting.

Achievements: 1 Ministry of Technology grant, 1 MSc thesis, 1 journal submission, 4 conference publications

2008
2016

Computational Intelligence based Multiphase Flow Analysis, *Principal Investigator*,
Description: Analysis of multiphase gas-liquid-cuttings flow in eccentric annuli for extracting flow characteristics using image processing and computational intelligence techniques ,
Keywords: Gas-liquid-cuttings flow, image processing, machine learning, computational intelligence, liquid holdup estimation, pressure drop estimation, horizontal or inclined annuli.

Achievements: 1 NSF-Turkey grant, 1 PhD thesis, 2 MSc theses, 10 journal, 12 conference publications

2008
2016

Multi-agent Systems, Ontology Development, Partner Selection for Virtual Enterprises, *Researcher*,
Description: Creating an application that utilizes multi-agent models and ontology for forming Virtual Enterprise consortiums for manufacturing high end products. ,
Keywords: Virtual Enterprise, ontology, multi-agent systems, partner selection, high value added products manufacturing.

Achievements: 1 Ministry of Technology grant, 1 PhD thesis, 2 MSc theses, 4 journal, 3 conference publications

2013
2016

Clean Production and Industrial Symbiosis, *Researcher*,
Description: Creating a software application that will assist the companies to increase their cleaner production capabilities within their organization and investigate industrial symbiosis opportunities within an Industrial zone by sharing company, supplier and production data through an intelligent online platform with a common database,

Keywords: Clean Production, Industrial Symbiosis, software development, database, GIS.

Achievements: 1 LEAD ERA FP7 EU project grant (with Swiss partners), 1 MSc thesis, 1 conference publication

2015
2018

Crop Yield and Quality Estimation with Machine Learning, *Researcher*,
Description: Estimation of the wheat crop yield from NDVI information extracted from satellite images through remote sensing, meteorological, land and soil properties. Also, in a similar project, UAV data is used in identifying grapes through pictures/videos and check product quality and existence/lack of diseases with automated image processing and machine learning models.,

Keywords: Crop information system, computational intelligence, field yield estimation, GIS, NDVI, remote sensing, disease detection from UAV images.

Achievements: 1 NSF-Turkey grant

2014
2017

Smart Energy Awareness System, *Consultant*,
Description: Developing an ontology based smart-grid framework for the producer-consumer energy market which was tested on a controlled micro-grid environment,

Keywords: Smart Grid, Energy Efficiency, ontology, pattern recognition.

Achievements: 1 H2020 EU project grant, 1 conference publication

2008
2013

Estimation of Coal Properties and Gasification Optimization with Machine Learning, *Researcher*,
Description: Through machine learning, estimating the coal properties and choosing the correct type of coal for the corresponding processes result in effective usage of the resources. In another study, we developed models to identify the optimum operating characteristics of coal gasification process for a given coal type.,
Keywords: Coal properties, HGI estimation, GCV estimation, machine learning, Coal gasification, process optimization.

Achievements: 1 Turkish Coal Industries project grant, 4 journal, 7 conference publications

2016

Internet of Things Framework Development, Researcher,

Description: Lately, we have started working on developing big data processing and analytics models to be used within an Internet of Things framework for different implementation areas. Our aim is to construct a configurable framework and software platform to be used by the domain experts.,

Keywords: Internet of Things, ETL, cyber-physical systems, sensors, clustering, big data analytics.

Achievements: 1 MSc thesis, 1 journal, 4 conference publications

2016

Intelligent Traffic Management, Researcher,

Description: Using traffic flow data including lane speed and occupancy to detect highway real-time accidents (or anomalies). In another study, we provided a model for real-time classification of motorcycles vs. cars entering into an underground tunnel.,

Keywords: real-time accident detection, traffic flow, anomaly detection, vehicle classification, image processing, object recognition, clustering, big data analytics.

Achievements: 1 industrial research grant, 1 MSc thesis, 3 conference publications

2016

Computational Intelligence for Manufacturing Process Optimization, Researcher,

Description: Using empirical data and neural networks for parameter estimation (energy, scrap metal, etc) for machining processes. We have also developed optimization models based on evolutionary algorithms that can detect the best operating parameters for the given machining process. Another aim is to develop deep learning based prediction models between process control and monitoring parameters and process consequences such as tool wear, tool breakage, and chatter for preventive maintenance. In the future, we are planning on developing models that will integrate Big Data, Deep Learning, Internet of Things and Industry 4.0 concepts in such a way that we might achieve plant-wide manufacturing process control and preventive analytics.,

Keywords: Deep learning, advanced process monitoring, computational intelligence, tool condition monitoring, process optimization, evolutionary algorithms, Industry 4.0.

Achievements: 1 NSF-Turkey grant, 2 MSc theses, 1 journal, 4 conference publications

2015

Text mining and Social Network Analysis, Researcher,

Description: Clustering Twitter data from a sentiment analysis point of view for a given topic and analyzing the results. In another study, we tried to identify duplicate Quora query entries using text mining techniques. Also, writer or blogger classification is implemented using deep learning based text mining techniques.,

Keywords: user profiling, social network analysis, deep learning, text mining, doc2Vec, clustering, big data analytics.

Achievements: 1 MSc thesis, 1 journal, 2 conference publications

2013
2016

Archeological Tablet Processing, Researcher,

Description: Working on identifying certain symbols on tablets through image processing techniques.,

Keywords: image processing, Cuneiform tablet classification.

Achievements: 1 MSc thesis, 1 journal, 2 conference publications

2016
2018

Radar-based Indoor Human Activity Recognition with Deep Learning, Researcher,

Description: Identification of several indoor human activities (like walking, crawling, etc) from micro-doppler radar data using deep learning models.,

Keywords: image processing, human activity recognition, anomaly detection, deep learning, radar, micro-doppler.

Achievements: 1 MSc thesis, 1 journal, 2 conference publications

2005

Other miscellaneous studies, as Principal Investigator, Researcher or Advisor.

- **Wireless Sensor Network Optimization:** 1 PhD Thesis, 1 journal publication;
- **Cybersecurity Vulnerability Analysis with Machine Learning:** 1 industrial research grant, 1 conference publication;
- **Sound, Music and Speech Processing:** 2 conference publications;
- **Forest fire damage estimation:** 1 MSc thesis, 1 conference publication;
- **Estimation of the number of participants in government tenders:** 1 conference publication;
- **Moment based image classification models:** 2 conference publication;
- **Indoor localization models:** 1 MSc thesis, 1 conference publication;
- **Estimation of foam characteristics with image processing and neural networks:** 1 MSc thesis, 1 conference publication;

Teaching Experience

Undergraduate courses at TOBB ETU

BIL 001	Introduction to Computer Engineering	Fall '05
BIL 102	Programming with Java	Fall '05, Spring '06,'07,'08
BIL 106	Database Management	Spring '18
BIL 114	Programming with C/C++	Spring '12, Summer '12
BIL 132	Discrete Mathematics	Spring '07,'08,'09,'14,'15,'16, '17, '18, '19, Summer '14,'15,'16,'17, '18
BIL 331	Analysis of Algorithms	Fall '07,'08,'09, Spring '10,'11,'13,'14, Summer '11,'12
BIL 441	Artificial Intelligence	Fall '07,'08, Spring '10, Summer '13
BIL 442	Artificial Neural Networks	Summer '16
BIL 443	Pattern Recognition	Fall '06,'09, Spring '09,'12, Summer '14,'17, '18
BIL 467	Image Processing	Fall '10, Spring '08

Graduate courses at TOBB ETU

BIL 531	Design and Analysis of Algorithms	Fall '07, Spring '06
BIL 574	Computational Intelligence in Finance	Spring '12,'15,'17
BIL 587	Computer Vision	Spring '19

Online courses (for Ahmet Yesevi University)

TBIL 403	Database Design and Management	Fall '12, Spring '13
TBIL 503	Graduation Design Project	Fall '12
	Artificial Intelligence (for Kazakhstan campus)	Fall '12

Invited talks / Tutorials / Short courses

2018	Deep Learning and Evolutionary Optimization Models for Algorithmic Trading , Nazarbayev University, Astana, Kazakhstan, 23 November 2018.
2018	Evolutionary Optimized Options Trading Strategies , Ankara University, Ankara, 21 November 2018.
2018	Algorithmic Trading Models , Capital Markets Board of Turkey, SPK., Istanbul, 14 November 2018.
2018	Technical Analysis Optimization and Deep Learning based Algorithmic Stock Trading , IDEA Technology Solutions, Inc., Istanbul, 23 October 2018.
2018	Algorithmic Trading with Evolutionary Algorithms and Deep Learning , TOBB University, Ankara, 18 January 2018.
2017	Machine Learning & Pattern Recognition Course , STM Inc., Ankara, 15-22 November 2017.
2017	Open Data Analytics with Deep Learning , National Workshop on Big and Open Data, Ministry of Telecommunications, Ankara, 23 May 2017.
2016	Evolutionary Algorithms in Finance , Department of Computer Engineering Seminars, TOBB University of Economics & Technology, Ankara, 16 November 2016.
2016	Data Science in Cyber Environments , 3 rd Int. Cyber Security Workshop, Gelisim University, Istanbul, 10-14 October 2016.
2016	Data Science with Big Data , Data Science Meetup, Bilkent Univ., Ankara, 25 January 2016.
2015	Design and Development of an Ontology based Multi Agent Virtual Enterprise (OMAVE) System , Engineering Management and Systems Engineering Webex seminars, Missouri University of Science and Technology, Rolla, MO, USA, 13 February 2015.
2014	Pattern Recognition Course , Baskent Elektrik, ENERJISA Inc., Ankara, 4 September 2014.
2012	Applications of Neural Networks , Department of Mathematics Seminars, Ankara, 15 May 2012.

Industrial Experience

2001
2005

Senior Programmer/Analyst, *MEMC Electronics Inc.*, St.Louis MO, USA.

Worked as a member of the Data Automation and Manufacturing MIS Group. Responsibilities include project leading, software development, maintaining and reporting for the plant-wide data collection and automation systems.

Highlights:

- Investigated hardware and software platforms to determine approved devices for special client needs and provided the appropriate requirements;
- Developed GUIs and APIs for wafer manufacturing and test equipments for engineers and technicians;
- Developed three-tier systems (Windows-Unix-Oracle) for client/server applications for data retrieval, querying and reporting tools for plant-wide usage;
- Developed low-level services for wafer manufacturing equipments and processes;
- Provided 24/7 technical assistance for the developed data automation systems;
- Implemented Software Development Life Cycle (SDLC) model in every stage of the software development process during the automation projects;

Noteworthy Projects and Tasks:

- Team Leader in Automated Label Printing System for Wafer Cassette Labels Project (VB, ActiveX, SQL, SAP)
- Team leader in Lasermark Verification Application Project for wafer mix prevention (CellWorks, SQL);
- Team leader in ADE Wafer Thickness and Resistivity Automated Data Collection and GUI development (CellWorks, SQL, VB);
- Tencor and CR80 Wafer Particle Count Data Collection System (Cellworks, SQL);
- Final Shipping Automated Shipment Verification Application (C);
- Automated SPC System and GUI Development in Etching, Lapping and Polishing Departments (VB, Cellworks, SQL);

2001

Software/Database Engineer, *Vizyonsoft*, contracted to *ARIA Mobile Serv.*, Istanbul, Turkey.

Worked as a member of the Infrastructure, Software and Database Technical Support team for the newly-formed third mobile telecom service provider in Turkey for a 4 month project

1997
2001

Software Engineer/Consultant, *Beyond Inc.* contracted to *MEMC Electronics Inc.*, St.Louis MO, USA.

Worked as a consultant/project manager in MEMC QRDAP (Quality Renewal Data Automation Project) and developed data collection / process control applications

1996
1997

Product Development Engineer, *Beyond Inc.*, St.Louis MO, USA.

Worked on developing specific hardware/software tools for enhancing wafer manufacturing data automation systems and also implemented various in-house software applications.

Highlights:

- Implemented the design and development (hardware and software) of Silicount (Wafer Counter) which is an automated wafer counting device using opto-electronic circuitry to provide the capability of touchless accurate wafer count in a cassette which is crucial in Silicon Wafer Manufacturing Industry. Several of them are being used on production floor in MEMC Electronics.
- Developed the software and database for Beyond Inc. Inventory Control and GUI;
- Developed an expert system for parts and components identification for wafer polishing equipments;

1995
1996

Industrial Engineer, *Marathon Electric Co.*, West Plains, MO, USA.

Worked as a co-op industrial engineer in electrical motor production facility. Responsibilities include the development of the production standards for various departments, MTM studies, process design and maintenance, factory layout, scheduling and routings

1991

Technical Department Manager, *Senkron Apple Center*, Ankara, Turkey.

Responsibilities include organizing the technical service and the distribution of Apple Computers to several private and government offices in Ankara. Management of technical support, presentations, developing in-house software, building systems and networks, installations and troubleshooting for Apple computer systems were also included in the job duties

1990

Intern Electrical Engineer, *Vega Electromech Systems Inc.*, Ankara, Turkey.

Worked on technical support and installation of biomedical systems, such as sterilizers, ECG systems, surgical instruments, etc.

1989

Electrical Engineering Summer Practice, *Gold Fields of South Africa*, Johannesburg, RSA.

Worked in the project group on planning and developing the power distribution of Kloof Gold Mine, one of the largest in the world

Computer Skills

Systems Windows, UNIX, Linux, Apple OS

Program Java, Python, C, C#, C++, Pascal, Fortran, Visual Basic, Prolog

Web HTML/XHTML, Javascript, PHP, ASP, FrontPage, Dreamweaver

Office	Word, Excel, Powerpoint, OpenOffice
Database	MS Access, MSSQL, MySQL, Post-GreSQL, SQLite, PL-SQL, Oracle
Scientific	Matlab, Mathcad, WEKA, R, Tanagra, Neurosolutions
Imaging	Coreldraw, Photoshop, Pagemaker, XView, GIMP
Automation	Cellworks, Factoryworks
Project M.	MS Project, Git
Source Ctr	SVN, Github
Other	Bibtex, L ^A T _E X, T _E X

Certificates and Achievements

- Published 27 indexed journal papers, 80 international conference papers, 1 book, 1 book translation and 1 book chapter: Full list can be accessed at <http://mozbayoglu.etu.edu.tr>
- Sun Java Programmer Certificate
- ACM (Association for Computing Machinery) Member
- IEEE (Institute of Electrical and Electronics Engineers) Member
- IEEE Computational Intelligence Society Member
- Placed in Top %0.1 in National Centralized University Entrance Exam in Turkey
- 3rd place in TUBITAK Mathematics Competition for Middle School Students
- 2nd place in TUBITAK Chemistry Competition for High School Students
- Licensed DJ in 89.7 FM KMNR-Rolla, MO, USA

References

- Available upon request