

Koç University

FRONTIER



ISSUE 9 YEAR 2014



KOÇ UNIVERSITY'S RESEARCH MAGAZINE

Towards the Construction of the Future:

Interdisciplinary perspectives for the sustainability of life





Welcome to the 2014 issue of Frontier, Koç University's research magazine! A new Editorial Board has taken over the Frontier's mission to inform the general public about the research conducted at Koç University, as well as the research opportunities our university offers.

This issue brings you a special report, **in Focus**, on environment and sustainability research conducted at Koç University. Human activities have been shown to be causally responsible for the multitude of environmental problems that confront us today. For example, an overwhelming majority of climate scientists, 97% to be more specific, now agree that human activities have most probably caused the global warming observed in the last century.*

In addition to the mind boggling global ecosystem changes such as global warming, environmental concerns brought about by more local social dynamics such as urbanization and migration; force us to recognize the problematic relationship human beings have formed with nature. The relevant articles in this issue stress, in varying degrees, how our anthropocentric view of nature underlies many problems we face today.

Our report on environment and sustainability begins with an article by Hakan Orer from the Medical School. He proposes that the problematical human-nature relationship has led the way to a new trans-disciplinary science. Called the "planetary medicine", this emerging field brings together public health and environmental sciences. In her article, Meliz Ergin, from the Department of English Language and Comparative Literature, questions the contribution of Social Ecology and Ecopoetics traditions to our understanding of the current ecological and social problems. She also examines how the way these research streams viewed the human-nature relationship has changed over time. Next, Sanem Özdural from the Law School discusses the implications of anthropocentric understanding of nature in the law making processes. She explains in detail how the laws in the United States were bent in favor of the hydraulic fracturing technology used in extracting rock gas (as in the American Safe Drinking Water Act). She also informs us that Turkey might also have to deal with the well-known environmental consequences of this technology in the very near future.

Researchers are also in pursuit of new technologies to minimize the damage human activities incur on the environment. You will find two articles from Koç University faculty members contributing to this field. Deniz Aksen, from the Department of Operations and

Information Systems, explains his research on the optimization of the waste vegetable oil collection process for recycling, in which he mathematically modeled the periodic routing charts. In a follow-up article, Kaan Güven, from the Department of Physics, explains the recent developments in the field of green photonics that are expected to considerably reduce the carbon dioxide emissions. He emphasizes that consumers should be more flexible about changing their behaviors, and they may start doing so by substituting lumen for watt.

This issue of our magazine covers other research areas as well. In our **Profile** section Hakan Ürey from the Department of Electrical and Electronics Engineering answered our questions about the Wear3D project which is supported by the European Research Council (ERC). Wear3D project combines mobility and large screen experience on eyeglasses. You can also read in this section about another ERC granted project. Özgür Barış Akan from the Department of Electrical and Electronic Engineering wrote about his project titled "MINERVA: Communication Theoretical Foundations of Nervous System Towards Bio-Inspired Nanonetworks and ICT-Inspired Neuro-Treatment". Finally in this section, you can find our interviews with the model young researcher profiles from our university. These interviews explain the point Koç University has arrived at training the scientists of the future, which is one of the important missions of a research university.

In our **Spotlight** section, Özgür Yılmaz, from the Department of Economics has written about how economic theory provides solutions for the resource scarcity problem in the domain of kidney transplants. Even though this field does not operate through the market and price mechanism, the potential contribution of economic theory has been recognized by a Nobel Prize in 2012, which was awarded to two economists pioneering this field. Again on this section Işık Öney from the Faculty of Law has discussed the research he has done at the Max Planck Institute for Comparative Public Law and International Law within his thesis titled "Renewal in the Turkish Law of Obligations".

Finally, you can follow the other developments in relation to the research done at the Koç University on our **News** section.

We hope that you will enjoy reading this issue of the Frontier magazine. Please feel free to contact us at frontier@ku.edu.tr if you have any questions and comments.

*W. R. L. Anderegg, "Expert Credibility in Climate Change," *Proceedings of the National Academy of Sciences* Vol. 107 No. 27, 12107-12109 (June 21, 2010); DOI: 10.1073/pnas.1003187107.
P. T. Doran & M. K. Zimmerman, "Examining the Scientific Consensus on Climate Change," *Eos Transactions American Geophysical Union* Vol. 90 Issue 3 (2009), 22; DOI: 10.1029/2009E0030002.
N. Oreskes, "Beyond the Ivory Tower: The Scientific Consensus on Climate Change," *Science* Vol. 306 No. 5702, p. 1686 (December 3, 2004); DOI: 10.1126/science.1103618.

CONTENTS

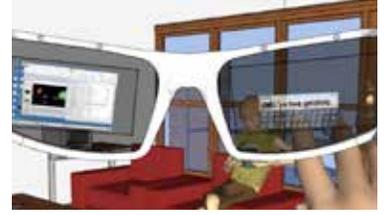
4

PROFILE

Miracle of 3D Glasses: As the screens get smaller, the field-of-view will get larger

> **Hakan Ürey**, Professor, Department of Electrical and Electronics Engineering, Koç University

Hakan Ürey answered our questions about the Wear3D project, which combines mobility and large screen experience on eyeglasses.



6

SPOTLIGHT

Novation from a Historical and Comparative Perspective

> **Işık Önay**, Assistant Professor, Law School, Koç University

Işık Önay evaluates the research he conducted in Max Planck Institute for Comparative and International Private Law for his thesis titled "Novation in Turkish Private Law".



8

SPOTLIGHT

Can Economic Theory Save Lives?

> **Özgür Yılmaz**, Assistant Professor, Department of Economics, Koç University

It is well known that kidney transplantation can be done from a deceased or live donor to a kidney patient. Unfortunately, the number of kidney patients waiting for transplantation is much higher than the number of donors. A less well-known fact is that economic theory provides solutions for this "scarce resource" problem. Özgür Yılmaz explains economic approach and its contributions in this context.



10

PROFILE

MINERVA

> **Özgür Barış Akan**, Professor, Department of Electrical and Electronics Engineering at Koç University

Özgür Barış Akan told us all about his project "MINERVA: Communication Theoretical Foundations of Nervous System Towards Bio-Inspired Nanonetworks and ICT-Inspired Neuro-Treatment", which has been awarded the European Research Council's (ERC) consolidator grant.



25

PROFILE

Future Scientists Flourish at Koç University

With a mission to be a world-class research university, Koç University contributes to the scientists who will shape the future through its interdisciplinary approach and research opportunities. Kaan Akşit, Gülen Saral Abi, Ayşe Eda Sayın and Yasemin Özarslan, doctoral students and graduates of Koç University answered our questions.

Summer Research
Programs at Koç
University

30

News

33

Research Projects at
Koç University

36

Awards

37

Towards the Construction of the Future: Interdisciplinary perspectives for the sustainability of life

13

Preserving the Nature and Lowering the Costs in Fuel Production

> **Deniz Aksen**, Associate Professor, Department of Operations and Information Systems, Koç University

Waste vegetable oil collection for biodiesel production: A selective and periodic inventory routing problem



16

Genetic Intervention, to What Extent?

> **Hakan Orer**, Professor, School of Medicine, Koç University

Towards a new and broader bioethical understanding...



18

Ecocriticism

> **Meliz Ergin**, Assistant Professor, Department of English Language and Comparative Literature, Koç University

How did the ecological thought emerge in contemporary literature? What has changed in our perception of the relationship between nature and culture? Meliz Ergin, who is writing a book on ecocriticism, clarifies the role of Social Ecology and the tradition of Ecopoetics in analyzing the tangle of ecological and social problems in contemporary literature.



20

Fracturing Our Future

> **Sanem Özdural**, Law School, Koç University

As Turkey seeks its own version of the "Shale Revolution," what can it learn from the example of the United States where growing evidence points to the negative impacts of fracking on human and environmental health?



22

Photonics Glows Green

> **Kaan Güven**, Associate Professor, Physics Department, Koç University

Advancements in photonic technologies aid us to become more eco-friendly by efficient transformation of energy between light and electricity, by laser assisted fabrication, even by optical communication and computing. Yet, the technology is not sufficient alone.



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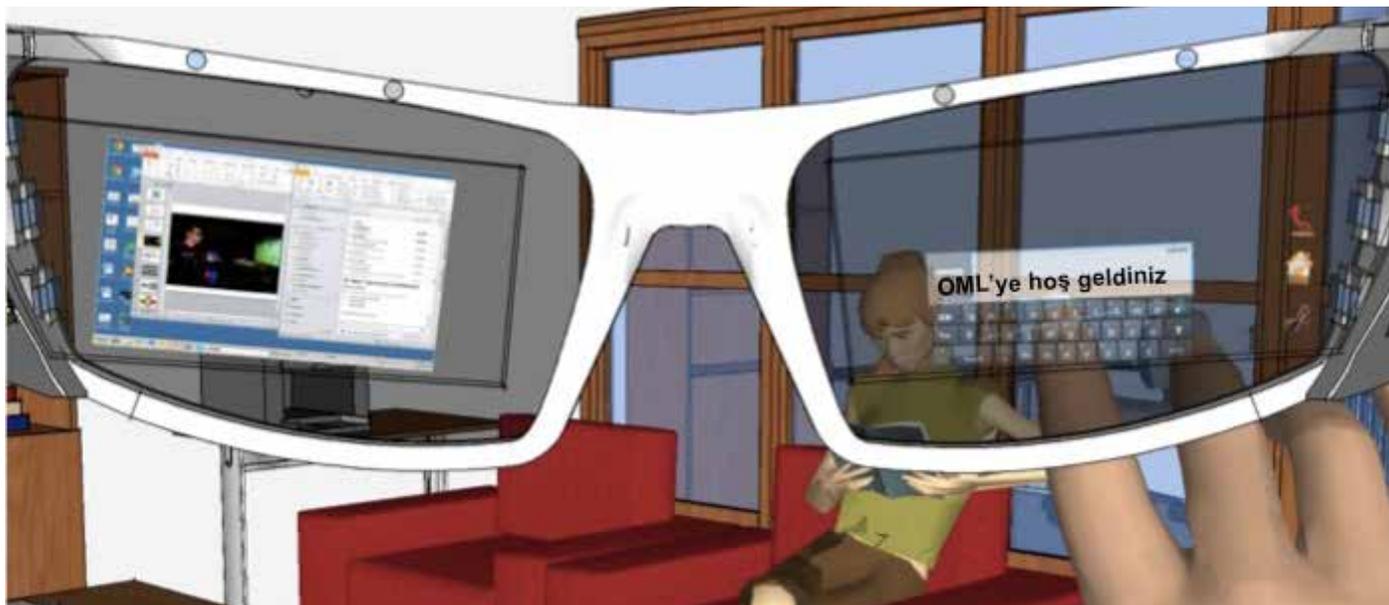
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Gezegen Printing Co.
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Miracle of 3D Glasses:

As the screens get smaller, the field-of-view will get larger

Professor Hakan Ürey answered our questions about the Wear3D project, which combines mobility and large screen experience on eyeglasses.



Professor Hakan Ürey has been qualified for the Advanced Grant of the Europe's leading and most prestigious scientific institution, European Research Council (ERC). His project titled "Wear 3D: Wearable 3D and Augmented Reality Display" is the first project in Turkey to receive an ERC Advanced Grant in the field of engineering. At the Koç University Optical Microsystems Laboratory (OML) a team of 10 scientists are working on the Wear3D project to customize three-dimensional viewing and display technologies for personal use. Professor Ürey answered our questions about his project which he expects to find applications in the field human-computer interfaces and the entertainment industry.

What are the challenges with today's mobile device displays?

Display technologies play a crucial

role in human-computer interaction. Research has shown that people work more efficiently when they work with large screens. However, recent developments in mobile technologies have encouraged people to use and work with small-screen devices such as smartphones and tablets. We can say that the mobility offered by the miniaturized devices has won over the productivity offered by the desktop computers and monitors.

Despite various outstanding developments in recent years, mobile device displays suffer from two problems: limited miniaturization and light inefficiency. While all the electronic components are increasingly getting smaller and more powerful, smart phones cannot be (or not preferred to be) miniaturized further due to the

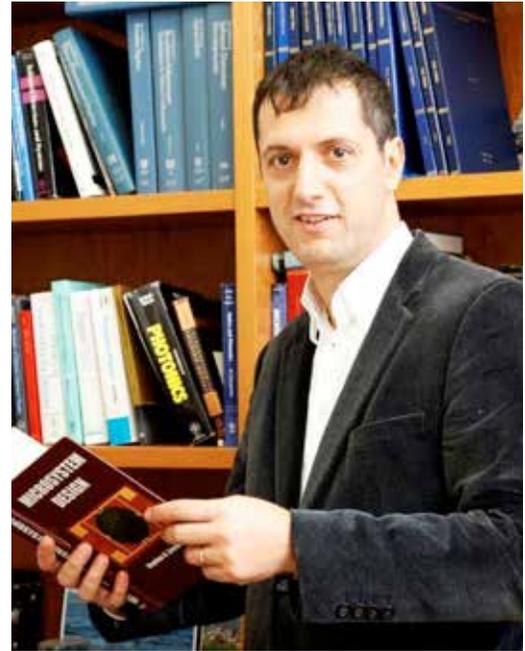
user concerns related to the screen size (and keyboard size). Although the display consumes more than half of the energy of a mobile device, less than %0,1 of the light emitted by the screen enters into the eye pupil and forms an image on the retina. The remaining light is lost to surroundings. While only several hundred microwatts of light power would be adequate to see a bright image, the amount of power consumed by typical display backlight units is about 2-4 Watts. As the size and the field-of-view of the display increase, battery power consumption also increases, which makes the light efficiency problem even more serious.

Can wearable displays address those problems?

Yes, a good way to increase the light efficiency and decrease the battery

About Hakan Ürey

Prof. Hakan Ürey graduated from İzmir Science High School in 1987 and received the BS degree from Middle East Technical University, Electrical and Electronics department in 1992. He received the MS and Ph.D. degrees from Georgia Institute of Technology in 1996 and in 1997, all in Electrical Engineering. He worked for Bilkent University-Ankara and Georgia Tech Research Institute-Atlanta as a graduate research assistant, and Call/Recall Inc.-San Diego as a consultant during his graduate studies. After completing his Ph.D., he joined Microvision Inc. (USA) as Research Engineer and he played a key role in the development of the Retinal Scanning Display technology. He joined Electrical Engineering Department at Koç University in 2001. He was promoted to Associate Professor in 2007 and Professor in 2010. He was a visiting Professor at Boğaziçi University, Turkey and Cambridge University, UK during 2013. He has more than 35 issued and pending patents, which have been licensed to five companies for commercialization and resulted in 2 spin-off companies. He published about 160 papers in international journals and conferences. He received the Werner Von Siemens faculty excellence award in 2006, TÜBA (Turkish Academy of Sciences) Distinguished Young Scientist award in 2007, Encouragement award from the Turkish Scientific and Technical Research Council (TÜBİTAK) in 2009, Outstanding Faculty award from Koç University in 2013, and European Research Council Advanced Grant (ERC-AdG) in 2013 to develop next generation wearable and 3D display technologies.



power consumption would be to use wearable displays such as displays integrated on eyeglasses or contact lenses. When the display panel is close to the eye, it is inherently more efficient. Besides, use of passive or active micro-optical components to direct the light towards the eye pupil can dramatically increase the light efficiency.

Ensuring a larger field-of-view in a wearable display requires complicated optical design and lenses. Currently, displays that can be worn just like spectacles, such as Google Glass, provide a small field-of-view. Helmet-mounted displays, such as those used by pilots, can provide a larger field of view, but they are heavy and large in their current forms.

Can you tell us about the Wear 3D project?

My team and I propose to use new imaging technologies to develop lighter and more comfortable eyeglasses-

type displays that also provide a larger field of view. These innovative glasses will in addition allow an enhanced 3D view without the conflict between the accommodation and convergence, and less perception errors, for instance in evaluating objects' distance.

Our first aim is to develop non-conventional optical systems in order to reduce the bulk of the optics used in existing smart glasses and open the door to further miniaturization. We hope to be able to take full advantage of micro-technologies and micro-opto-mechanical systems to reduce the size of the devices while providing a wide field-of-view.

If successfully implemented, I expect the improved smart glasses to find applications in the field human-computer interfaces and the entertainment industry. They could also form a basis for effective visual aids for patients with low-vision due to age-related macular

degeneration (AMD) and partial cataracts, for instance.

Another problem we aim to address is related to 3D vision. In stereoscopy based 3D TV and cinema, eyes are forced to view 3D in an unnatural way, causing visual discomfort and headache. We proposed some novel solutions to eliminate such viewing discomfort and enable true depth perception.

What is the importance of the project for Turkey?

In Wear3D Project, the aim is to train highly qualified M.Sc. and Ph.D. graduates and human resources with experience in cutting-edge optical design and wearable devices, which should help the already established Turkish display industry. In addition, it is envisioned that the project will have a leading role in the establishment of a domestic research center that will pursue research on advanced display technologies in the future.

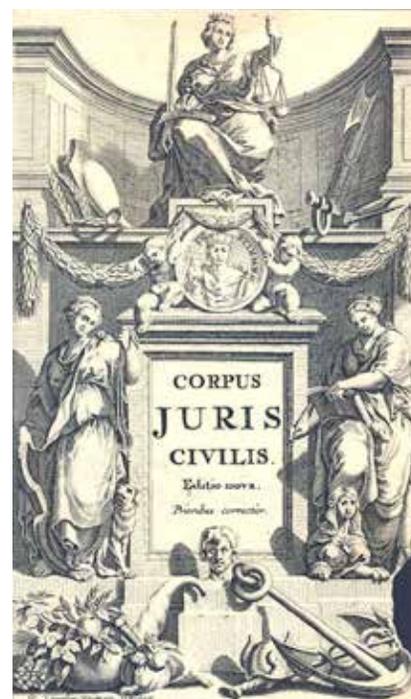
About ERC and Wear3D Project

The European Research Council (ERC) funds are regarded as the most prestigious research funding in Europe and have been awarded to outstanding scientists, including several Nobel Laureates, to conduct ground-breaking research projects. Prof. Ürey's grant is the first ERC Advanced grant received from Turkey in the field of engineering and the research will be conducted at the Optical Microsystems Laboratory in Koç University. OML currently has 23 researchers and about 1/3 is engaged in the ERC project. Prof. Ürey's project has been qualified for the support in the "Advanced" investigator category.

Novation from a Historical and Comparative Perspective

Assistant Professor Işık Öney evaluates the research he conducted in Max Planck Institute for Comparative and International Private Law for his thesis titled “Novation in Turkish Private Law”.

Işık Öney, Assistant Professor, Law School, Koç University



Turkey's adoption of the Swiss Civil Code and the Code of Obligations in 1926 rendered Turkish private law a member of the continental European legal family. As is the case with most of legal systems belonging to the continental European legal tradition, the roots of Turkish private law can be traced back to Roman law. Some of the legal institutions developed by Roman lawyers almost two thousand years ago are still used in modern legal systems. One of these legal institutions is novation, which was the topic of my doctoral research. An inquiry pertaining to such an institution requires understanding of its historical progress and therefore a literature review on Roman law and the writings of German speaking scholars of the Pandect law. Considering the influence of Swiss and German legal systems on Turkish law, an extensive analysis of contemporary Swiss and German legal literature is inevitable for any advanced legal study on Turkish private law. I therefore spent a year of my research period in Hamburg, where I benefited from the extensive library of Max Planck Institute for Comparative and International Private Law. The following is a brief summary of my research on novation.

Novation can shortly be defined as the replacement of an existing obligation by a newly created one. Having its roots in Roman law, novation is still regulated by many codifications drafted under the influence of continental European tradition, including the Turkish Code of Obligations (TCO). TCO regulates

novation under articles 133 and 134 under the title “Extinction of obligations”.

In spite of being an indispensable institution under Roman law, novation's significance is increasingly questioned in modern law of obligations. The discussions surrounding its legal nature in *ius commune* rendered novation an inscrutable concept. The dissertation, aiming at shedding light on this obscure concept, examines in its first chapter, novation's historical background starting from the classical period of Roman law and enquires into novation's functions under modern legal systems. The second chapter deals with novation's legal nature, its conditions and legal consequences. In the final chapter of the dissertation, novation is compared and contrasted with other institutions such as the amendment of the obligation, settlement, contracts affecting a change in parties, discharge of obligation and performance in lieu of fulfilment (*datio in solutum*). The final chapter also points out legal transactions falsely characterized as novation and examines the legal nature of those. In light of the issues discussed throughout the dissertation, the dissertation concludes with observations on novation's role and function in law of obligations.

Historical development of Novation

The analysis of novation from a historical and comparative perspective in the first chapter concludes that novation in

modern law of obligations is not as important as it used to be under Roman law. This is mostly due to the fact that party autonomy was not as prevalent in Roman law as it is today. For example parties of a contractual relationship were not free to change the content of an obligation. Such a change was only possible by extinguishing the existing obligation and creating a new one instead, in other words novation. This restriction also extended to change of parties, rendering novation the only way to affect such a change.

Novation in contrast to the amendment of an obligation

Today, most of the legal systems allow the parties to change the content or the parties of an obligation (amendment, assignment of claims, assumption of debts etc.). The fact that novation is also preserved in those legal systems raises the question as to their difference in nature. From a theoretical point of view, this distinction is not a difficult one. Novation results in the extinguishment of the existing obligation, whereas in amendment, assignment of claims or assumption of debts, the obligation remains the same, albeit with a different content. In other words novation implies a discontinuity whereas the other contracts imply continuity. This theoretical difference has also practical consequences. Novation leads to the

extinguishment of ancillary rights (most importantly certain securities) and bars the defences associated with the former obligation against the new obligation; whereas after a mere amendment these ancillary rights and defences are retained. However it is argued in the dissertation that the extinguishment of securities is not an inevitable consequence of novation. Novation results in the extinguishment of the securities, only in the absence of an agreement to the contrary. In other words, parties to the securities contract (e.g. suretyship, pledge) may transfer the security for the prior obligation to the new one.



The above described dichotomy raises the following question: Do parties of a contractual relationship, agreeing on a new content, novate the obligation, or

do they merely amend the existing one? The parties are free to resort to both methods; thus the question is one of interpretation of parties' intention. Almost every legal system requires the clear intention to novate (*animus novandi*) for novation (see TCO Art. 133 for Turkish law; Art. 116 OR for Swiss law; § 364/II BGB for German law and CC Art. 1273 for French law). The clear intention is not necessarily an explicit one. The intention to novate may be implicit, but it must be clear in the sense that there should be no doubt about the parties' intention to extinguish the existing obligation.

In certain cases the intention to novate is directly derived from the content of the "new obligation". In other words if the new content, on which parties agree, is not reconcilable (incompatible) with the old content, parties are deemed to have the intention to novate. This is for example the case, when parties to a sales contract decide to lease the good instead. A lease contract cannot be regarded as an amended sales contract; ergo parties have ended the sales contract by agreement and created a lease contract instead. It must be noted that a change in the type of contract per se is not sufficient for the irreconcilability (incompatibility). An additional requirement is the change of economic purpose. A sales contract can be amended to a barter agreement, but not to a lease.



Işık Önay is an assistant professor of Law at Koç University Law School since May 2014. Born in 1984, Önay graduated from Sankt Georg Austrian High School in 2003. He completed his undergraduate studies at Koç University Law School in 2007, where he started to work as a research assistant. Önay obtained an LL.M. in intellectual property law at Queen Mary University of London in 2008. He received his Ph.D. degree in Private Law from Istanbul University in January 2014. A part of his Ph.D. research was conducted at Max Planck Institute for International and Comparative Law in Hamburg, where Önay was a visiting research fellow for a year. His dissertation is on the evolution and the current application of a classical concept of Roman law, novation.

Can Economic Theory Save Lives?



Özgür Yılmaz, Assistant Professor, Department of Economics, Koç University

It is well known that kidney transplantation can be done from a deceased or live donor to a kidney patient. Unfortunately, the number of kidney patients waiting for transplantation is much higher than the number of donors. A less well-known fact is that economic theory provides solutions for this 'scarce resource' problem. Özgür Yılmaz explains economic approach and its contributions in this context.

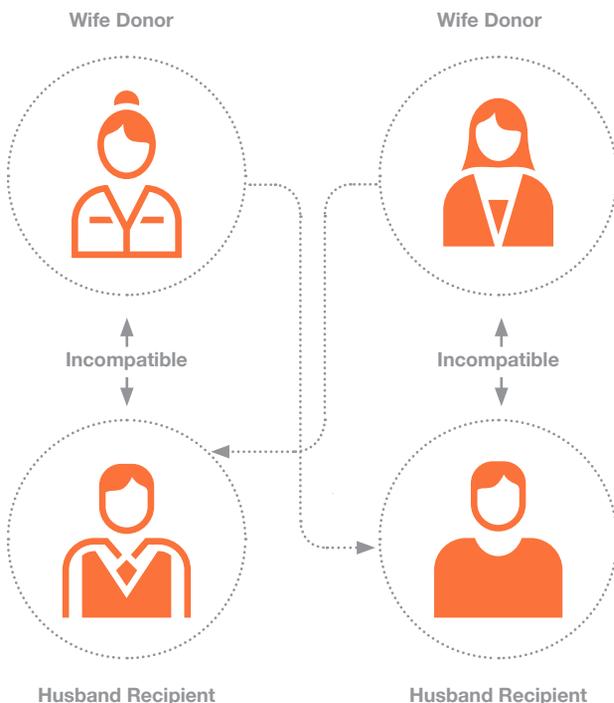
Buying and selling organ is illegal and unethical. Not only monetary transactions, but also anything like incentive, gift, prize, etc. that might evoke the idea of monetary value is considered ethically unacceptable for donation. Thus, as opposed to the common belief, economic approach and its applicable solutions to the scarce resources problem in the context of kidney transplantation are not about market or price mechanism.

The deceased donor organs are considered as national resources and they are transplanted to patients in the national waitlist according to priorities fixed by law. Thus, for these donor types, there is no room for alternative solutions. But, it is not the case for live donors.

Because healthy adults can donate one of their kidneys and remain healthy on one, a patient with a live-donor can receive a transplant from his/her donor. However, there may be blood-type or immunological incompatibilities between the patient and his/her donor. In case of such an incompatibility, the practice used to be that the donor's kidney is not utilized and the patient has to enter the deceased-donor kidney waitlist. To avoid such losses of live-donor kidney resources, medical professionals proposed paired kidney donation between two incompatible pairs in case each donor's kidney can be transplanted to the patient of the other pair.

How is paired kidney donation possible?

We need to explain blood-type and tissue-type compatibility, two necessary conditions for feasibility of kidney transplantations. According to the well-known ABO blood-type compatibility, there are four blood-types, A, B, AB, and O and a patient may not receive the kidney from a donor whose blood contains one of the A or B proteins that the patient does not have. Thus, patients with blood-type O can receive a kidney only from an O donor, type A patients can receive A or O kidneys, B patients B or O kidneys, and AB patients can receive a kidney from a





Assistant Professor Özgür Yılmaz graduated from Bilkent University Industrial Engineering Department. He completed his Ph.D. on matching and resource allocation theory at University of Rochester. Currently, his research focuses on the design and theoretical analysis of mechanisms for the resource allocation problems where monetary transfers, therefore price mechanisms are not allowed and the resources have to be allocated via centrally. These problems include allocation of school seats to students, and matching kidney patients with donors.

donor of any blood type. Tissue-type incompatibility (“positive crossmatch”), on the other hand, is much less structured and has to do with the patient having preformed antibodies against one of the donor’s proteins. Antibodies can arise from exposure to foreign proteins, e.g. through prior transplants, blood transfusions, or even childbirth.

The following example demonstrates a case for paired kidney donation. Let’s consider a donor-patient pair, with A and O blood types respectively, and another such pair with O and A blood types respectively. The first pair does not have blood-type compatibility, therefore transplantation can not be made. Suppose the second pair is tissue-type incompatible, but the first patient is tissue-type compatible with the second donor, and the second patient is tissue-type compatible with the first donor. In this case, although both pairs are incompatible, there is cross-compatibility: the first patient can receive a kidney transplantation from the second donor (note that they are of O blood type, and tissue-type compatible) and the second patient can receive a kidney transplantation from the second donor (note that they are of A blood type, and tissue-type compatible).

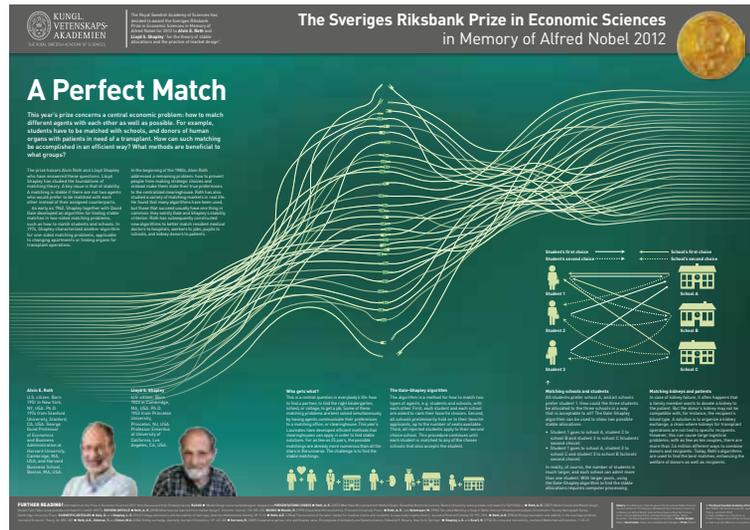
Matching and resource allocation theory

Thus, the pairs can ‘exchange’ donors and be in a paired kidney donation. But, not only there are many such possible exchanges, but also paired kidney donations usually intersect, meaning that two different feasible exchanges might have

a common pair of incompatible donor and patient. Thus, it is not clear which exchanges should be carried out, and according to which criteria. This is exactly where matching and resource allocation theory (subfields of microeconomic theory) have provided solutions. According to these theories, when resources have to be allocated via a central mechanism and monetary transactions are not allowed, allocation or matching rules should\can be designed based on intuitive axioms

regarding efficiency (e.g. maximization of the number patients receiving a live donor kidney transplant) or fairness. Actually, economists have successfully developed such matching rules applicable to real-life: In 2000, transplantation community in the United States issued a consensus statement declaring that kidney exchange is ethically acceptable. In the 2000-2004 period,

such exchanges were sought in an unorganized way in several hospitals in the United States, as a result just 5 such exchanges were made. Since 2004, centralized clearinghouses for kidney exchange such as the New England Program for Kidney Exchange (NEPKE) -the first kidney exchange program in the United States- or the Alliance for Paired Donation (APD) have been formed as a result of the collaboration between economists¹ and medical professionals, the idea being that the impact of kidney exchange can be improved substantially if exchange is organized. These exchange programs have been very successful: in 2013, the number of paired kidney donations was 583. This alone, I hope, convincingly answers the question in the title.



¹ The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel was awarded in 2012 to Alvin E. Roth and Lloyd S. Shapley “for the theory of stable allocations and the practice of market design”. In the scientific background document, the Nobel Committee emphasized kidney exchange problems as a very significant application of matching and mechanism design theory with a big impact on real-life and also on scientific research. It should also be emphasized that Alvin Roth’s collaborators are Tayfun Sönmez and Utku Ünver who worked at Koç University before.

MINERVA



Professor Özgür Barış Akan of the Department of Electrical and Electronics Engineering at Koç University, told us all about his project “MINERVA: Communication Theoretical Foundations of Nervous System Towards Bio-Inspired Nanonetworks and ICT-Inspired Neuro-Treatment”, which has been awarded the European Research Council’s (ERC) consolidator grant.

“There’s Plenty of Room at the Bottom.” This statement was made by Nobel laureate physicist Richard Feynman in his famous speech describing his vision on the possibility of manipulating individual atoms and molecules to realize increasingly tinier, and yet powerful, practical man-made devices in the future. Indeed, incredible improvements in the field of nanotechnology have yielded integrated functional devices consisting of nanoscale components, i.e., nanomachines. Nanomachines used in applications today typically operate independently and accomplish tasks ranging from computing and data storing to sensing and actuation. However, enabling nanomachines to communicate with each other, and thus, form nanonetworks will help realize envisioned nanotechnology



applications demanding more than the capabilities of a single device. At this point, with the encouragement of the progresses in nanotechnology, we dare to ask the question “is the room down there sufficient for a communication network?” Then, we turn to nature again, and hence, become motivated to start a quest for an answer to this profound question, which defines the main framework of the MINERVA Project and sets its objectives beyond visual boundaries.

Some applications of nanonetworks, among others, are: a number of nanomachines communicating for intelligent drug delivery; multiple nanosensors deployed on the human body to monitor glucose, sodium, and cholesterol; detecting the presence of different infectious agents. However, realization of these applications mandates addressing the unique challenges posed by the physical characteristics of nanomachines, e.g., dimensions, scarce memory and processing capabilities, and their operating environment, on the nanoscale communications.

Several communication paradigms are considered for use in nanonetworks,

but the most promising is molecular communications, where molecules are used to encode, transmit and receive information. It is promising because: (i) molecular communication between nanoscale entities occurs in nature, thus, such natural phenomena offers a readymade studying ground both to model nanonetworks and to develop solutions; and (ii) several of the aforementioned applications require bio-compatibility which therefore necessitates properties that are readily offered by natural molecular nanonetworks.

The answers are in the human body

The realization of molecular nanonetworks, however, demands novel engineering solutions, i.e., identification of the existing molecular communication mechanisms, development of architectures and networking techniques for nanomachines. Luckily, these engineering skills and technology have been prepared for us by the natural evolution in the last several billion years. Thus, the answers that we seek in this project are already inside us.

Indeed, the human body is a large-scale heterogeneous communication

network of molecular nanonetworks as it is composed of billions of nanomachines, i.e., cells, whose functionalities primarily depend on nanoscale molecular communications. Human body systems, e.g., nervous, cardiovascular, endocrine systems, the five senses, are connected to each other and communicate primarily through molecular communications. Among the intra-body systems, the most advanced and complex one is the nervous system, which is the ultra-large scale communication network of nerve cells, i.e., neurons. The nervous nanonetwork transmits the external stimulus to the brain and enables communication between different systems by conveying information with electro-molecular impulse signal known as spike. As a complex network of nanonetworks spanning the whole body, the nervous system is the most vital communication network of human body. Any communication failure that is beyond the recovery capabilities of this network leads to serious neural diseases; e.g., multiple sclerosis (MS), Alzheimer’s disease, and paralysis. Thus, sustaining effective communication capabilities in the nervous nanonetwork is imperative for the functional and metabolic efficiency

The interdisciplinary objectives of the MINERVA project are realistically modeling the nervous molecular communication channels, analyzing and understanding its network and communication theoretical capabilities and shortcomings, and ultimately contributing to the development of bio-inspired solutions for nanonetworks and ICT-inspired solutions for neural diseases.

of the human body. Furthermore, understanding disorders caused by communication failures paves the way for the possible development of a new generation of information and communication technology (ICT)-inspired treatment techniques. In addition, identifying the existing nervous molecular communication mechanisms, establishing the communication and information theoretical foundations of these communication channels, will be a giant step towards developing real implementable architectures, e.g., bio-inspired communication techniques for emerging applications of nanonetworks and ICT-based prosthetic systems with neural communication capabilities.

Why has MINERVA focused on nervous nanonetwork?

In the MINERVA project, that

has been awarded the European Research Council's (ERC) consolidator grant, which constitutes Europe's most prestigious research funding programme, and has previously been received by many Nobel Award winning scientists, we primarily focus on nervous nanonetwork because: (i) it is the most vital and the largest intra-body nanonetwork spanning the entire body with the most advanced intrinsic communication functionalities, (ii) although extensive research efforts are directed towards understanding the mechanism of nervous system from the perspectives of physiology and neuroscience; information and communication theoretical fundamentals of the nervous nanonetwork and extraction of its intrinsic design principles to be used in future nanonetwork applications are overlooked, and (iii) there

exists a vast amount of results in neurophysiology, which could be exploited by the elegant theories and tools of ICT domain.

Thus, realistically modeling the nervous molecular communication channels, analyzing and understanding its network and communication theoretical capabilities and shortcomings, and ultimately contributing to the development of bio-inspired solutions for nanonetworks and ICT-inspired solutions for neural diseases are the interdisciplinary objectives of the MINERVA project. The project will bridge the gap between communication engineering and life sciences, and create important collaboration opportunities. With the parallel progress of medical sciences and communication engineering, a major breakthrough can be expected from this exceptionally interdisciplinary approach.

About Özgür Barış Akan

Prof. Akan completed his B.Sc. and M.Sc. degrees in 1999 and 2002, in the Electrical and Electronics Engineering Departments of Bilkent University and Middle East Technical University (METU), consecutively. Akan received his Ph.D. degree within the exceptionally short period of two years in electrical and computer engineering from the Broadband and Wireless Networking Laboratory, Georgia Institute of Technology. In 2004, Akan returned to Turkey and accepted a position at METU, receiving his Associate Professorship in 2006. Akan has been continuing his career at Koç University since 2010, and in 2012, he has achieved the honor of being the youngest full professor in his research field.

Koç University's Next-generation and Wireless Communications Laboratory (NWCL), coordinated by Prof. Özgür Barış Akan, conducts highly advanced theoretical and experimental research on a broad array of subjects such as the fundamentals of nanoscale, molecular and quantum communications, cognitive radio and wireless sensor networks, 4G and 5G wireless communication systems, green communications and networks, and intrabody networks. These research activities are supported by numerous organizations such as TÜBİTAK, TÜBA, IBM, Intel, Lockheed-Martin, the European Union, Türk Telekom and Koç University.

Prof. Akan is appointed as IEEE Communications Society (ComSoc) Distinguished Lecturer (2011-2013). He received Kadir Has University Promising Scientist Award 2014; Young Scientist Award 2014 (BAGEP 2014), Science Academy; the Outstanding Faculty of the Year Award 2012, Koç University; IBM Shared University Research (SUR) Award 2011; IEEE Communications Society 2010 Outstanding Young Researcher Award for Europe, Middle-East and Africa Region (as runner-up); IBM Faculty Award 2008 and 2010; and TUBA-GEBIP Distinguished Young Scientist Award 2008. Dr. Özgür Barış Akan is the author of more than 125 articles in the field of next-generation communications. Dr. Akan is an Associate Editor for IEEE Transactions on Communications, IEEE Transactions on Vehicular Technology and the Nano Communication Networks Journal (Elsevier).



Waste vegetable oil collection for biodiesel production: A selective and periodic inventory routing problem

Preserving the Nature and Lowering the Costs in Fuel Production

Deniz Aksen, Associate Professor, Department of Operations and Information Systems, Koç University

There is an ever growing demand for alternative sources of petroleum-based fuel due to the depletion of the world's petroleum reserves and the increasing environmental concerns. Biodiesel, a renewable biofuel, can be used in any compression ignition engine without the need for modification. Therefore it has recently been considered as the best diesel substitute. Vegetable oils are renewable in nature, and can be produced on a large scale and environmentally friendly. These features make them promising feedstocks for biodiesel production. Vegetable oils include edible and non-edible oils. More than 95% of biodiesel production feedstocks come from edible oils since they are produced in many regions in large quantities (Gui et al. [7]). Used or waste cooking oil is not suitable for human consumption but is a feedstock for biodiesel production. Its usage significantly reduces the cost of biodiesel production.

Since the cost of raw materials accounts for about 60–80% of the total cost of biodiesel production, choosing a right

feedstock is very important (Singh and Sing [9], Gui et al. [7]). Recovery of **waste vegetable oil (WVO)** plays an essential role in both the environmental and economic sustainability of biodiesel. A total of 108 billion liters of WVO is estimated to be generated annually worldwide, but still, out of this quantity only 6 billion liters are collected and used in biodiesel production (Albiyobir [3]). In addition to the economical savings, collecting WVO also benefits the environment by decreasing the contamination of rivers, lakes or oceans. WVO along with waste animal fat is an ecotoxic agent, and accounts for 25% of waste water pollution. One liter of WVO poured down the drain can contaminate one million liters of water and cause serious damage to the ecological life (Albiyobir [4]).

Albiyobir, Cemre, Deha, Ezici Biyoelektrik, Kolza, Nevbio and Tayaş are among the few companies in Turkey that have been licensed to collect WVO. According to the Environmental Law No. 2872 dated to 9/8/1983 and the WVO Control Regulations No. 25791

issued on 19/04/2005, businesses and institutions producing WVO are obliged to turn in their WVOs to the licensed collection companies (Deha Biodizel [5]). Turkey consumes approximately 1.5 million tons of vegetable oil every year. This consumption generates an estimated amount of 350,000 tons of WVO, only 15,000 tons of which is collected by licensed companies. The rest (335,000 tons) is discharged to drains damaging sewer systems and the nature (Deha Biodizel [6]).

The WVO collection problem: a selective and periodic inventory routing problem

Predojević [5] states that collecting and using WVO costs almost half the price of using virgin vegetable oil in the production process of biodiesel. This constitutes the actual motivation for our research. We started in 2010 working on the mathematical modeling of WVO collection. We contacted **Ezici Oil Industry, Biodiesel and Energy Production, Inc.** which collects and converts WVO into biodiesel (Aksen et al. [1]). The source nodes of WVO include businesses that consume cooking oil



For future research, we will address the question of where to open one or more additional depots as waste vegetable oil collection increases to much higher levels than today.

in large volumes, such as restaurants, hotels, and catering companies. Ezici makes an agreement with the selected source nodes, and specifies on which days of the week they will be visited for WVO collection. The biodiesel production facility of Ezici in **Gebze** has a predetermined daily production plan, and needs to procure vegetable oil as raw material input to follow the plan. This creates the daily input requirements. Ezici can satisfy its vegetable oil need either from collection or from virgin oil purchases. The latter has a high marginal cost, but also the former carries a significant cost due to vehicle dispatching, driver wages, fuel consumption, etc.

Operational constraints: The company Ezici operates a homogeneous vehicle fleet. There is no limit on the number of collection vehicles that can be acquired for this job. There is no maximum tour duration or tour length constraint on the routes, either. However, there are several constraints to be fulfilled during the collection operations.

- (i) Each vehicle must start and complete its tour at the production facility (depot) of Ezici in Gebze.
- (ii) Vehicles can be dispatched from the depot not more than once a day.
- (iii) A vehicle must collect the entire WVO accumulated at the visited source node since the last visit. Partial collection is not allowed.
- (iv) The amount of WVO accumulation at a visited source node cannot be split between multiple vehicles. This implies that a source node cannot be visited by more than one vehicle on any day.
- (v) The uncollected WVO inventory at a given source node or the depot by the end of a day becomes the beginning inventory of the next day. No WVO accumulation is allowed for disposal.

A threefold decision problem: The amount of WVO accumulating at the source nodes might be more than the capacity of the collection vehicle or the amount needed for production. In such cases visiting all source nodes is not necessary or not feasible. Hence, the facility manager is faced with the following threefold decision problem:

1. Which of the source nodes to select for the collection program.

- 2. How many vehicles to use each day and which periodic (weekly) routing schedule to repeat over an infinite planning horizon so as to collect the WVO accumulating at the selected source nodes.
- 3. How much virgin oil to purchase on each day.

The objective is to minimize the total collection, inventory and purchasing costs while meeting the production requirements and operational constraints. We defined this considerably hard routing and scheduling problem as the **Selective and Periodic Inventory Routing Problem (SPIRP)** in 2012 (Aksen et al. [1]). We introduced a commodity flow-based **mixed integer linear programming (MILP)** formulation, and solved it with the commercial solver Cplex v12.2 for 36 test instances, each with 25 hospitals which were treated as WVO accumulation nodes. In our latter paper (Aksen et al. [2]), we proposed an **Adaptive Large Neighborhood Search (ALNS)** method to solve large size SPIRP instances in less than one hour.

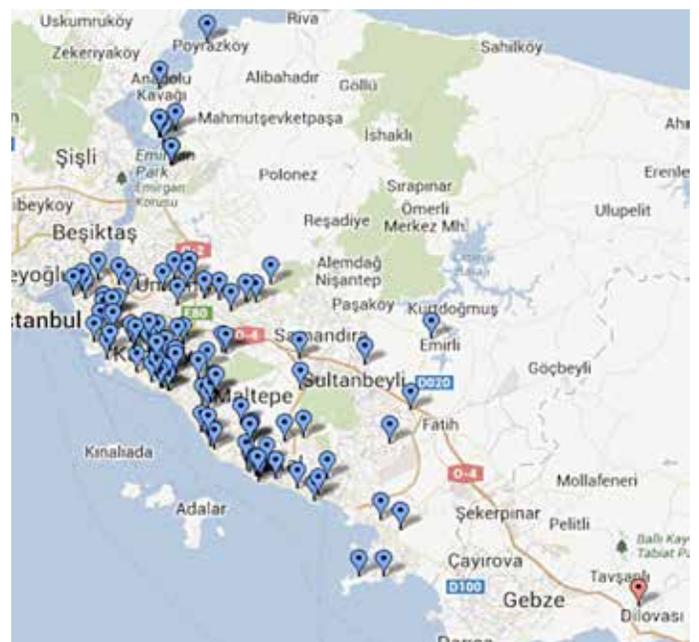


Figure 1: The geographical locations of the restaurants and the recycling facility.

Acquisition of the problem data

We picked up to 100 restaurants on the Asian side of Istanbul as candidate source nodes. The restaurants and the recycling facility (depot) constitute a complete collection network (see Fig. 1). The asymmetric shortest path distances between each



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Deniz Aksen teaches in the areas of MIS, e-commerce, Internet security, and business spreadsheet applications. Since 2011 he has been also supervising KU student teams participating at the Google Online Marketing Challenge.

His research interests include distribution and collection logistics, vehicle routing, and facility location and interdiction problems. His papers have been published in the *European Journal of Operational Research*, *Computers & Operations Research*, *International Journal of Production Economics*, and *Transportation Research Part C*, among others.

pair of nodes have been obtained from Google Maps. Besides the distances, there are several other input parameters such as the costs of inventory holding, transportation, purchasing, and vehicle operating; the vehicle capacity, the daily WVO accumulation rates at each restaurant, and the daily WVO requirement of the facility.

For the daily accumulation rates we prepared a simple questionnaire to estimate realistic values. Answers to the questionnaire show that large size restaurants accumulate approximately 50 liters of WVO per day, medium size restaurants around 30 liters and small size restaurants about 15 liters. These values are taken into account to generate relevant daily accumulation rates which are derived from a normal distribution with means 15, 30 and 50 with variances 5, 15 and 25, respectively. The facility policy is to adopt a uniform vehicle type for its collection operations. We used the cost data of the light commercial vehicle Fiat Fiorino Cargo inquired in August 2013. The purchasing price p is at most the wholesale price of virgin vegetable

oil, which is around 3.50 TL per liter. The cost of storing one liter of WVO, namely inventory holding cost h is equal to the daily interest rate times p . This results in $h = 0.02$ TL/day.

Results and discussion

In our first paper using the cost data of 2010, we found that vehicle operating costs have the biggest share in the objective function, and using the vehicle type with the higher capacity (Fiat Doblo Cargo maxi) decreases the objective function significantly. In our second paper we developed an adaptive large neighborhood search (ALNS) algorithm for SPIRP. Overall 54 test instances have been generated of size 20 to 100 source nodes. We can summarize our findings as follows:

- (i) When there are less than 30 source nodes, ALNS cannot perform as well as MILP.
- (ii) For instances with 40 source nodes, ALNS improves the MILP solutions by 15.4% on average. In these instances, the maximum CPU time spent by ALNS is six minutes, while the Cplex solution

of the MILP model cannot match the respective ALNS solution even at the end of four hours.

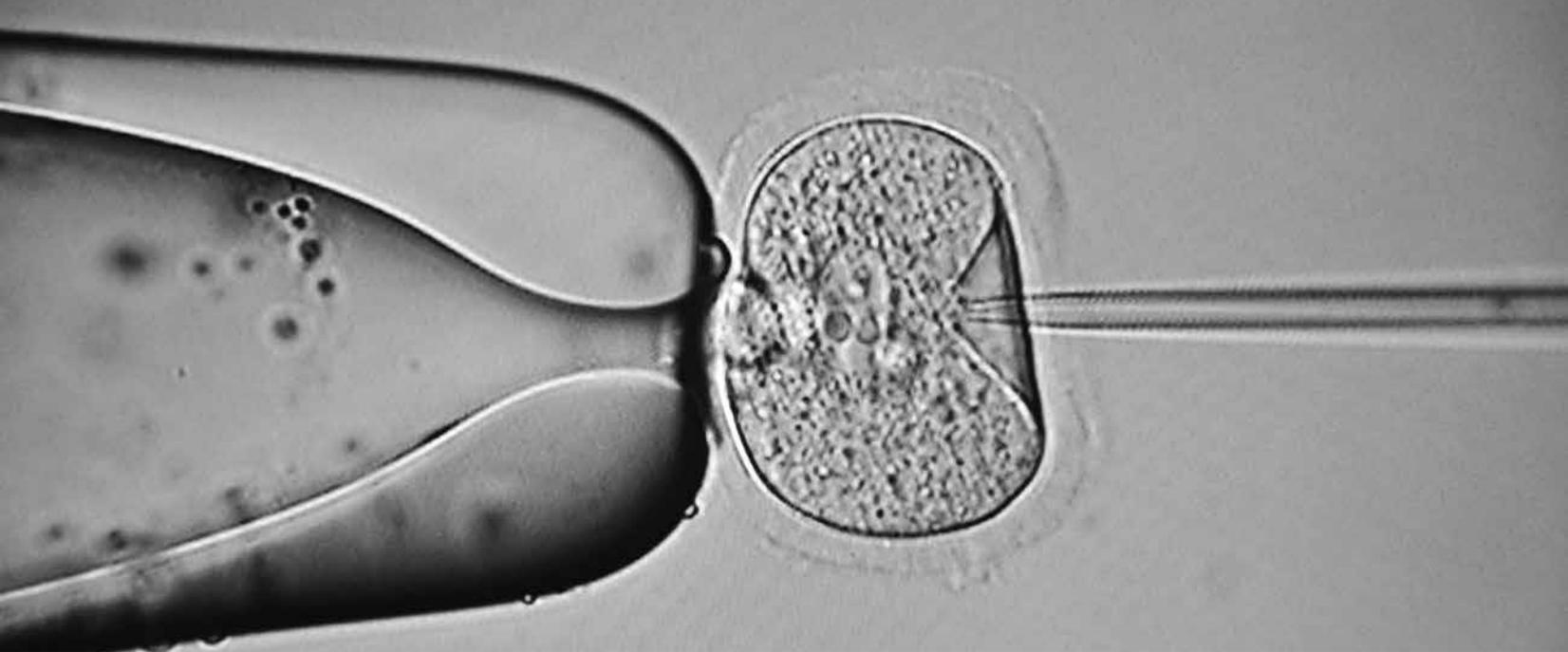
(iii) For larger instances which have 50 to 100 source nodes, we evaluate the performance of ALNS on the basis of the lower bounds obtained from three models, namely MILP, PLR (**P**artial **L**inear **R**elaxation of the MILP model) and RR (**R**elaxation without **R**outing). Among the three, RR yields the highest, hence the best lower bounds in all 24 large size instances.

(iv) Our proposed heuristic ALNS achieves an average gap of 7.14% (4.15%) between the best lower bounds, and an average solution time of 484 seconds (40 seconds) for large size (small size) instances. The longest solution time remains under 1 hour.

For future research, we wish to look into a location routing version of the SPIRP. The extended problem will address the question of where to open one or more additional depots as WVO collection increases to much higher levels than today.

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Genetic Intervention, to What Extent?

Towards a new and broader bioethical understanding...

Hakan Orer, Professor, School of Medicine, Koç University

Last April, following the annual meeting of the IPCC (Intergovernmental Panel on Climate Change) in Germany, an annual report has been issued on mitigating the impact of the climate change. The report points out that the previously alarming level of global warming has reached an almost irreversible stage and an immediate action plan is needed to limit the damage to the environment. Although it is still difficult to nudge the general public to react against the dangers of the climate change, governments worldwide have increasingly become sensitive to that issue at last. Most experts reiterate the necessity of limiting the human activity-based interventions on the current climate system.

Planetary medicine is emerging

The ailing earth needs a remedy and a new transdisciplinary science, coined as “planetary medicine”, is emerging by linking public health to environmental sciences. Only a radical paradigm shift on how modern humans exploit

the nature can reverse this trend. Unfortunately there is no sign that this can be achieved in the foreseen future. Collectively, the world economic system is such that all nations devour natural resources in a fierce competition, with an insatiable hunger. Individually, wellness expectations are so high that individuals, blinded by the technological progress, are ready to accept anything that may supposedly promote their wellbeing. The sheer power of our technical ability has reached to such a level that saving the nature has rather become purely an ethical issue. The extent of human intrusion to the environment is not limited to its economic activity. There are seemingly more insidious threats that may unwillingly affect the natural environment in an indirect way. Biotechnological techniques may interfere with the biodiversity while trying to solve the mysteries of human diseases. Obviously, the consequences of such a “collateral damage” will be dreadful. Anthropocentric views need

to be reviewed and a sustainable development strategy has to be adopted.

Need for a more comprehensive understanding of bioethics

Based upon criticism of Nazi medical experiments and clinical trials, bioethics were first understood as a field covering mostly individual rights and autonomy of patients, however, as genomic techniques improve, it becomes clear that it has implications with human ecosystem and biodiversity as well. Future generations may be affected. Therefore, bioethics, once a product of the asymmetric relationship between “weak and submissive” individual and “omnipotent and authoritarian” medical establishment, has become an issue of biological philosophy which takes the human being in the context of biodiversity. In that sense, bioethics should be revised to include far reaching implications of medical interventions into human life and natural environment.



A graduate of Galatasaray Lycée, Hakan S. Orer received an MD degree from Hacettepe University Medical School (Ankara, Turkey) in 1986, then, he completed his Ph.D. thesis at INSERM U 288 (Paris, France), as a recipient of French Government scholarship (1989–91) and received a Ph.D. degree in pharmacology in 1992 from Hacettepe University. He spent two years (1993–95) as a post-doctoral research fellow at Michigan State University (E. Lansing, Michigan) and joined the Department of Pharmacology at Hacettepe University Medical School in 1995. From 2003 to 2012 he served as the director (dean) of the graduate studies in allied health sciences at Hacettepe University. He joined Koç University School of Medicine in 2013. He is currently the chairman of Koç University Institutional Review Board, a member of the National Ethics Committee for Animal Experiments and the UNESCO National Commission Expert Committee for Bioethics. His main research interests are the autonomic control of the blood pressure and the generation of sympathetic tone. Hakan S. Orer is recipient of Turkish Scientific and Technique Research Council (TÜBİTAK) Junior Scientist Award (1998). Other fields of interest include rational pharmacotherapy education, bioethics, bioinformatics and transgenic mice models.

UNESCO Bioethics Program was founded in 1993 to protect the integrity and human rights of the individuals who are subjected to experimental studies and issued the Universal Declaration of Human Genome and Human Rights in 1997. According to the declaration, human genome “underlies the fundamental unity of all members of the human family, as well as the recognition of their inherent dignity and diversity. In a symbolic sense, it is the heritage of humanity”. Genetic diversity is our richness that needs to be preserved and a person’s genetic information shall not be used against him or herself. Although the declaration accepts the conduction of scientific research on human genome, based on equity and human rights, it forbids human cloning. However, there is a lack of appraisal of the impact of the genomic research on the natural environment in which we live. Considering the staggering speed of progress made in gene-based technologies, a decade is a relatively long period of time.

Genetic games played with nature

Human-made ecosystems offer much less diversity compared to natural environments. Do we have the right to interfere with the natural processes

just because we have the means? The answer could be very different from where one is looking. Take the example of a family with a background history of a deadly genetic disease; they tend to accept all genetic manipulations to have a healthy child. In 2012, a British bioethics council accepted for the first time the procreation of a baby whose survival depends on the success of a series of multiple genetic manipulations to replace the defective mitochondria from her biologic mother with the healthy ones coming from another (a third) donor. This revolutionary approach rings the bell for those who have bioethical concerns including the council, which granted the permission because it alters the germline of the resulting child and have implications for the future generations.

Until now, people who are involved in these procedures are limited to those who are suffering from certain pathophysiologic conditions. Yet, molecular biologic discoveries provide not only with the new therapies for previously incurable conditions, but also allow modification of genetic material, hence open the door for the possible introduction of new species. Henceforth, transgenic animals consist the majority

of laboratory animals used in experimental studies. It is not easy to foresee the impact of these developments onto the natural environment. Caution should be exerted. Although most people are eager to accept genetic modifications as a therapy, they are much more reluctant to reconcile with the idea of genetically modified foods. It is inevitable to face bioethical problems as the gap between the pace of technological development and the pace of social development gets wider. Societies need time to digest and reflect upon new discoveries. That time is too short in today’s world.

A top item in the agenda of the humanity

The extent of interventions on human genome may attain a level that matches today’s global warming conundrum. There is a need at both global and national levels for a new manifesto based on ethical governance and the assessment of the scientific evidence to solve the problems created by the new scientific developments. Gene and stem cell based therapies are gaining ground fast; we have not yet started to discuss limiting the genetic manipulations on humans, but it is clear that in the future, mitigating genetic modifications will be one of the top items in the agenda of the humanity.

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Ecocriticism

How did the ecological thought emerge in contemporary literature? What has changed in our perception of the relationship between nature and culture? Assistant Professor Meliz Ergin, who is writing a book on ecocriticism, clarifies the role of Social Ecology and the tradition of Eco-poetics in analyzing the tangle of ecological and social problems in contemporary literature.

Meliz Ergin, Assistant Professor, Department of English Language and Comparative Literature, Koç University

Ecocriticism is the study of literature and the environment from an interdisciplinary perspective. It emerged as a subfield of literary and cultural studies in the 1990s. William Rueckert was the first critic to use the term ecocriticism in his 1978 article "Literature and Ecology" in reference to the application of ecology and ecological concepts to the study of literature. The boundaries of the field have since expanded to include a number of questions such as the following: What role has the imagination of nature played in literary and cultural history? What kinds of genres, narratives and metaphors has the interest in nature and the environment

translated to across different parts of the globe? How does literature shape our understanding of the interactions between human and nonhuman realms beyond an anthropocentric discourse? What are the implications of the back and forth traffic between natural sciences and cultural production?

Although an environmentally concerned literature existed before the emergence of ecocriticism, it was never systematically analyzed. As the initial birth place of ecocriticism was American and English literature departments, earlier scholarship focused mainly on American

nature writing, the British pastoral form, Romanticism, and the Deep Ecology movement. In the decade to follow, ecocriticism took on an expanding trajectory and gradually shifted its focus from an analysis of nature writing to an examination of environmental problems read in close relation to social and political issues revolving around race, class, ethnicity, and gender. Many researchers turned to previously discarded narratives from African American and ecofeminist writers, whereas others paved the path for studies in postcolonial and transnational ecocriticism. In its current





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state, ecocriticism is moving toward new research areas that fall under the umbrella of posthumanism. There is a growing interest in new materialism, animal studies, object-oriented ontology, and trans-corporeality. Overall, we witness a “materialist turn” that re-considers human and nonhuman bodies as material formations interconnected with various “bodily natures” (Alaimo) and active matter (such as minerals, toxic waste etc.).

Ecopoetics and Social Ecology

My research goals are twofold. In the first part, I develop a theoretical framework by examining the changing conceptions of the nature/culture divide and the emergence of ecological thought in contemporary literature. For example, in pastoral poetry, whose origins can be dated back to the Latin poet Virgil, or in the works of British Romantics such as William Wordsworth, typically the writer retreats from the society to the rural/the wilderness, presenting the latter as an idealized flight from culture, history and politics. Yet contemporary literature no longer has the privilege of portraying such a romantic flight. As the activist-writer Rebecca Solnit notes, denying that nature and culture are

inextricably interfused, by “imagining the woods or any untrameled landscape as an unsocial place,” often depends on erasing those who dwelt there (e.g., indigenous homelands), or on holding on to a myth of nature as an outside unaffected by human intervention.

Contemporary literature confronts the task of reconfiguring both such inside/outside dichotomies and the permeable boundaries between natural and social, material and discursive, by questioning the place of the human within the ecosystem. Many writers remind us what the biologist Barry Commoner declared to be the first principle of ecology in his 1971 statement: “Everything is connected to everything else.” However, the metaphor of connectivity that writers borrow from ecology should not be confused with holism or the idea of a harmoniously balanced earth. Connectivity is embedded with relational difficulties. Defined variably as interaction, disconnection, and forced intimacy, it has both constructive and destructive implications. It is a useful metaphor in exploring the tangle of natural and social systems –biological, ecological, linguistic, economic, political– that affect

our relationship with the environment and nonhuman agencies.

In the second part of my research, I focus on the tangle of these systems as presented in the works of the American poet Juliana Spahr and the Turkish author Latife Tekin. At this stage, I benefit from the Social Ecology movement and the philosophy of Murray Bookchin, who asserted that our interaction with the nonhuman world is continuous with our interaction with one another. Bookchin argued that most of our ecological problems derive from deeply embedded social problems, and that economic, ethnic, cultural, and gender conflicts lie at the core of the most serious ecological dislocations we face today. My research offers a joint reading of these ecological and social issues, by combining a political reading of the environment with an ecological reading of the social life. Moreover I contextualize their work within the tradition of Ecopoetics, which explores the relations between ecology and writing (with an emphasis on poetry), paying special attention to formal experimentations and the linguistic embodiment of an ecological perception.

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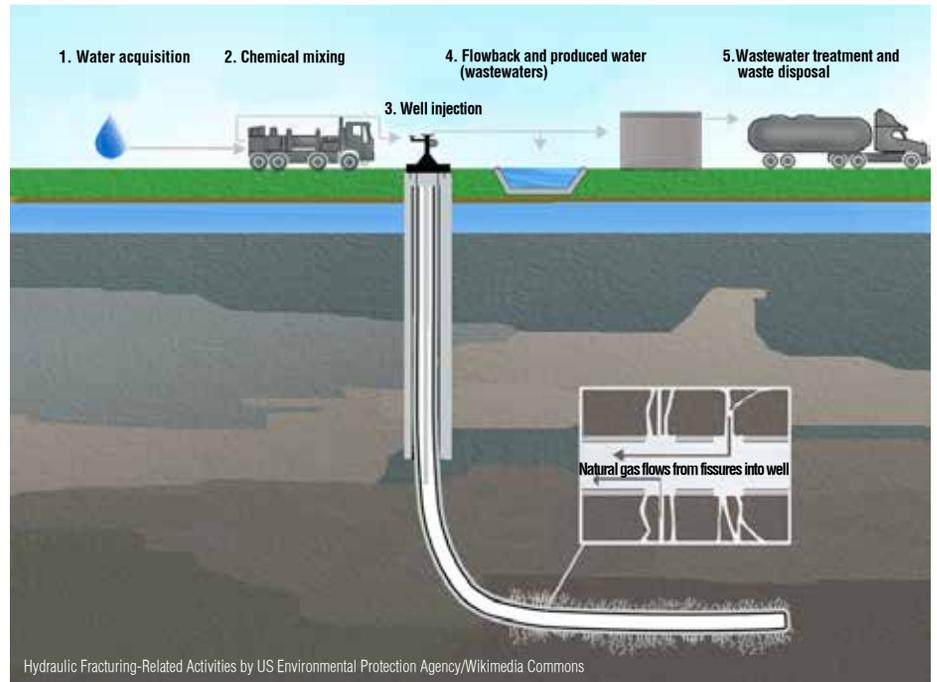
Fracturing Our Future

As Turkey seeks its own version of the “Shale Revolution,” what can it learn from the example of the United States where growing evidence points to the negative impacts of fracking on human and environmental health?

Sanem Özdural, Law School, Koç University

On August 23, 2011 the Hallowiches, a couple living in a ten-acre farm in rural Pennsylvania with their two young children, settled their lawsuit against certain shale gas development companies for \$750,000, and as part of the settlement, gave up their rights to the property and agreed to a life-long gag order (including the young children), prohibiting them from speaking about hydraulic fracturing (“fracking”) activity in the Marcellus Shale.¹ In the transcript of the once-sealed proceedings, the couple admitted that they had agreed to the settlement for the health of their children. “We needed to do this to get them out of this situation,” Mr. Hallowich told the court.²

Oil and natural gas trapped within subterranean rock or stone is known as shale, and the method of extracting it is known as hydraulic fracturing. A pressurized cocktail of water laced with sand and chemicals is injected into rock to crack (fracture) it to enable the trapped oil or gas to be pumped to the surface. The fracking boom, which began in earnest in the U.S. in 2003, “with more than 80,000 wells drilled or permitted since 2005,”³ has been touted as leading the U.S. to energy independence with cheap, abundant reserves of shale!⁴



Are the economic benefits exaggerated?

Fracking has also arrived in Turkey. Shell and Turk Petrol Anonim Ortaklığı (TPAO) are exploring and drilling for shale in two regions in Turkey: the Southeastern Anatolian Dadas Shale near Diyarbakir (Shell), and in the Hamitabat Shale in the Thrace region: both regions have active fault lines. Drilling has already started in Silvan in southeast Anatolia.⁵ The Minister of the Economy, Taner Yildiz has stated extraction of shale gas cannot be expected until 2020, and that reserves may be sufficient for 15 years,⁶ although

another report estimates the reserves to be sufficient for only ten years.⁷

It has been reported that the lack of consistency in estimating the amount of reserves is common (with US reserves commonly overestimated by 100% or even 400%), and the economic benefits appear to be seriously exaggerated.⁸

Harmful effects of fracking

On the other hand, several recent studies in the U.S. have raised alarms about the harmful effects of fracking on human health and the environment.

¹ <http://www.post-gazette.com/local/washington/2013/08/07/Hallowich-children-not-part-of-Marcellus-Shale-gag-order-agreement/stories/201308070133>

² http://www.slideshare.net/MarcellusDN/pg-settlementhearingtranscript?utm_source=slideshow02&utm_medium=ssemail&utm_campaign=share_slideshow_loggedout

³ <http://www.environmentamerica.org/reports/ame/fracking-numbers>

⁴ <http://www.bloomberg.com/news/2013-11-12/u-s-nears-energy-independence-by-2035-on-shale-boom-iea-says.html>

⁵ <http://www.milliyet.com.tr/ilk-kaya-gazi-kuyusu-bu-ay-aciliyor/ekonomi/detay/1774988/default.htm>

⁶ http://www.zaman.com.tr/ekonomi_bakan-yildiz-kaya-gazini-2020ye-kadar-cikaramayiz_2106071.html

⁷ <http://www.sabah.com.tr/Ekonomi/2013/02/21/turkiyede-424-milyar-metrekup-rezerv-var>

⁸ <http://shalebubble.org/wall-street/>

Sanem Özdural is an experienced trial attorney and an author. She is currently a member of the faculty at Koç University where she teaches international business law. Ms. Özdural obtained her J.D. from Boston University School of Law (1997) and B.A. in Economics from Princeton University (1993). Prior to moving to Istanbul in 2013, she was a partner with the law firm of Lewis Brisbois Bisgaard & Smith, LLP in New York City where she specialized in professional liability insurance defense. Ms. Özdural started her law career as a prosecutor at the Orleans Parish District Attorney's Office in New Orleans (1998-2001), where as a senior trial attorney in the Felony Trials Division, she prosecuted a wide variety of cases, from homicides to economic crimes. In addition, Ms. Özdural has substantial experience litigating insurance, commercial and real estate disputes in New York, Louisiana and Washington, D.C., and has tried over 150 cases to the bench and jury. Ms. Özdural's debut novel – a work of literary science fiction titled LiGa™ - was published by Elsewhen Press in the U.K. (2012).



For instance, an up to 30% increased likelihood of neural tube and heart birth defects in children born to women living within ten miles of fracking wells was noted.⁹ Furthermore, several of the chemicals used in fracking have been found to have endocrine-disrupting effects that have been linked to cancer, and issues with fertility, including decreased sperm quality.¹⁰ Dangerous levels of radioactivity were found in a shale gas waste disposal site in Pennsylvania,¹¹ while arsenic was found in wells near fracking sites in Texas,¹² and high levels of the global warming culprit, methane, was detected in the atmosphere near shale wells in Utah.¹³ Fracking has also been linked to increased seismic activity.¹⁴ In April Ohio state suspended fracking activity following two small earthquakes in a region that was not known for seismic activity.¹⁵

When the facts hide behind the law...

The laws that protect fracking activity and minimize accountability for harm inflicted are a major contributing factor

to the rise and proliferation of fracking throughout the U.S. For instance, the federal Safe Drinking Water Act (SDWA) contains an exemption for chemicals used in fracking activity from its provision regulating injection of hazardous materials into underground sources of drinking water.¹⁶

A law in Pennsylvania aimed at regulating fracking chemical disclosure requirements excludes trade secrets and confidential proprietary information from the disclosure requirement.¹⁷ A provision under the same law – popularly known as the ‘medical gag rule’ - requires any medical professional treating a patient for fracking-related injury to agree to keep confidential – even from the patient and other physicians/ researchers - any information obtained regarding the identity of the specific chemical causing the injury.¹⁸

Other countries such as France and Bulgaria have banned fracking citing dangers to human health and the environment.¹⁹ Even in the U.S., some

states – such as New York²⁰ - have opposed fracking, and in an interesting development, the Hallowich case was recently ordered unsealed.²¹ Moreover, for the first time in the U.S., this past April a family had the chance to tell their story of fracking-related injuries to a jury. The Parrs were awarded \$3 million for the health and property damages they suffered as a result of 22 fracking wells operated by Aruba Petroleum within two miles of their property.²² For the first time, fracking could not hide behind friendly laws and coercive settlements.

Important lessons for Turkey

There is a lesson in this for Turkey as it seeks to embark on its version of the ‘Shale Revolution’. Without full, transparent studies conducted by independent scientists, assessing the potential harms and benefits, we cannot, in good conscience, recklessly unleash this unconventional form of resource extraction on our country.

⁹ McKenzie, Lisa M., et al., (2014) Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado, Environmental Health Perspectives, Advance Publication January 28

¹⁰ Kassotis, Christopher D., et al., (2013) Estrogen and Androgen Receptor Activities of Hydraulic Fracturing Chemicals and Surface and Ground Water in a Drilling-Dense Region, Endocrinology, Early Release December 16, 2013

¹¹ Warner, Nathaniel R., et al. (2013) Impacts of Shale Gas Wastewater Disposal on Water Quality in Western Pennsylvania, Environ. Sci. Technol. 47, 11849-11857

¹² Fontenot, Brian E., et al., An Evaluation of Water Quality in Private Drinking Water Wells Near Natural Gas Extraction Sites in the Barnett Shale Formation, Environ. Sci. Technol., 2013, 47 (17), pp 10032–10040.

¹³ Karion, A., et al. (2013), Methane emissions estimate from airborne measurements over a western United States natural gas field, Geophys. Res. Lett., 40, 4393–4397; <http://cires.colorado.edu/news/press/2013/methaneleaks.html>

¹⁴ http://www.usgs.gov/blogs/features/usgs_top_story/man-made-earthquakes/

¹⁵ <http://www.dispatch.com/content/stories/local/2014/03/10/ODNR-shuts-down-fracking-operation-following-earthquakes.html>; <http://www.reuters.com/article/2014/04/11/us-ohio-fracking-earthquakes-idUSBREA3A1J620140411>

¹⁶ 42 U.S.C. §300h (d)(1)(B)(ii);

¹⁷ 58 Pa.C.S. §3222.1(d)(1)-(2)(i)

¹⁸ 58 Pa.C.S. §3222.1(b)(11)

¹⁹ <http://www.bbc.com/news/world-europe-16626580>

²⁰ <http://www.capitalnewyork.com/article/albany/2014/01/8539241/de-blasio-no-place-fracking-new-york>

²¹ <http://earthjustice.org/sites/default/files/Hallowich-Opinion-Order.pdf>

²² <http://www.msnbc.com/msnbc/texas-fracking-trial-3-million-verdict>

Photonics Glowes Green

Kaan Güven, Associate Professor, Physics Department, Koç University



Advancements in photonic technologies aid us to become more eco-friendly by efficient transformation of energy between light and electricity, by laser assisted fabrication, even by optical communication and computing. Yet, the technology is not sufficient alone.

Green photonics is a term coined to the advancements in photonic research for efficient generation or consumption of energy through opto-electronic processes in a broad range of applications and for reducing their environmental impact. Green photonics usually encompasses the following research areas:

- Solid state lighting (SSL) and displays
- Renewable energy generation: Photovoltaics and photocatalysis
- Optical communication/computing
- Laser assisted macro/micro fabrication.

In this article, we introduce briefly the first two areas from a general perspective.

The solid state lighting involves semiconductor- (LED), organic- (OLED) or polymer light-emitting diodes (PLED) which convert electricity into light by electroluminescence. The operation of a typical LED is illustrated in Figure 1. Electrons are transferred from high energy to low energy levels through the active region, thereby emitting excess energy as light. This process is driven by an external voltage source. The incandescent bulbs use thermal radiation and compact fluorescent lamps (CFL) use plasma illumination to generate light.

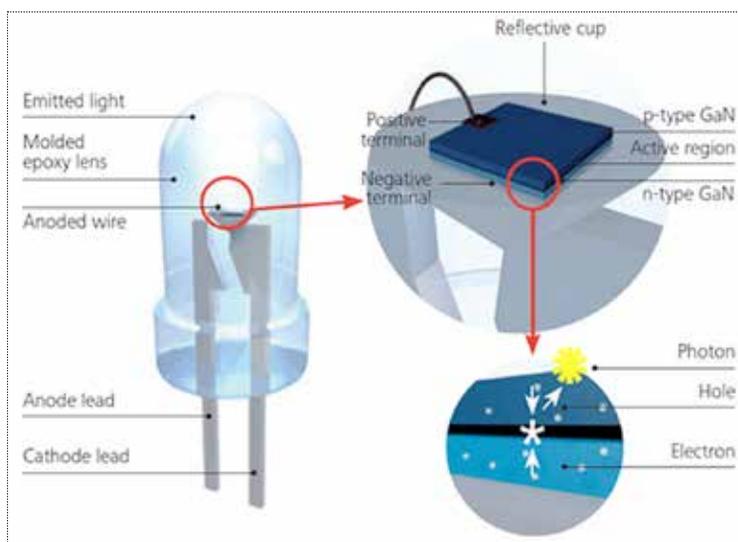


Figure 1: Basic operation of a LED lamp (Ref: http://www.logo.rs/en/LED_kakoradi.htm).

Driven by the superior efficiency of LEDs, developed countries have already paved their roadmap to replace the lighting infrastructure. In U.S., as a part of the Energy Independence and Security Act of 2007 (EISA) energy efficiency standards for light bulbs phased in gradually between the years 2012-2014, targeting the replacement of 40W to 100W light bulbs by more efficient alternatives. The second phase will apply by 2020 and require that most light bulbs be 70% more efficient than the incandescent. The present CFLs and LEDs can already meet this requirement.

The new standards will also shift the physical unit to rate the light source from watts to lumens. Lumens tell us how much light output (brightness) is available, whereas watts refer to the power input. For the LED and CFL, their illumination spectra and color rendition are also relevant properties in order to provide the most natural illumination.

Lighting Source	LED	Incandescent Bulb	CFL
Energy Efficiency and Energy Costs			
Average life span (hrs.)	50,000	1,200	8,000
Watts of electricity used (equivalence of 60W bulb)	6-8 Watts	60 Watts	13-15 Watts
Annual operating cost (30 bulbs per year equivalent)	\$32.85/year	\$328.59/year	\$76.65/year
Environmental Impact			
RoHS compliant	Yes	Yes	No (Contains 1-5mg Mercury)
CO ₂ emission (30 bulbs per year)	205 kg	2,043 kg	477 kg
Important Features			
Durability	High	Low	Low
Effect of rapid On/Off cycling	None	Yes (lifespans reduced drastically)	Some
Heat emitted	3.4 btu's/hour	85 btu's/hour	30 btu's/hour
Sensitive to ambient temperature	None	Some	May not work below -25° C or above +50° C
Sensitive to humidity	No	Some	Yes

Table 1: Comparison of lighting sources
(Ref: <http://www.designrecycleinc.com/led-comp-chart.html>)



Figure 2: Comparison of CFL and LED illumination and color rendition.

	LED	Incandescent Bulb	CFL
Light Output (Lumens)	Required Power Input (Watts)		
450	4-5	40	9-13
800	6-8	60	13-15
1,100	9-13	75	18-25
1,600	16-20	100	23-30

Table 2: Light output vs. power input for common light sources.

Photovoltaics and photocatalysis are two major research areas targeting renewable energy as well as reducing carbon emission. Photovoltaics develops materials converting light into electricity whereas photocatalysis involve chemical processes catalyzed by light, which reduce harmful carbon or nitrogen compounds to non-toxic compounds or generate hydrogen and oxygen in gas form (by splitting water).

Photocatalytic materials (such as TiO₂) are already employed as coating material for deodorization, anti-bacterial and self cleaning surfaces.

In these areas, photonics provide means of better utilization of the light-matter interactions at micro- and nanoscale. For instance, incorporating metallic nanoparticles helps in concentrating and localizing the light within the material at tailored wavelengths and enhances these reactions.

In photovoltaics and photocatalysis, photonics provide means of better utilization of the light-matter interactions at micro- and nanoscale.

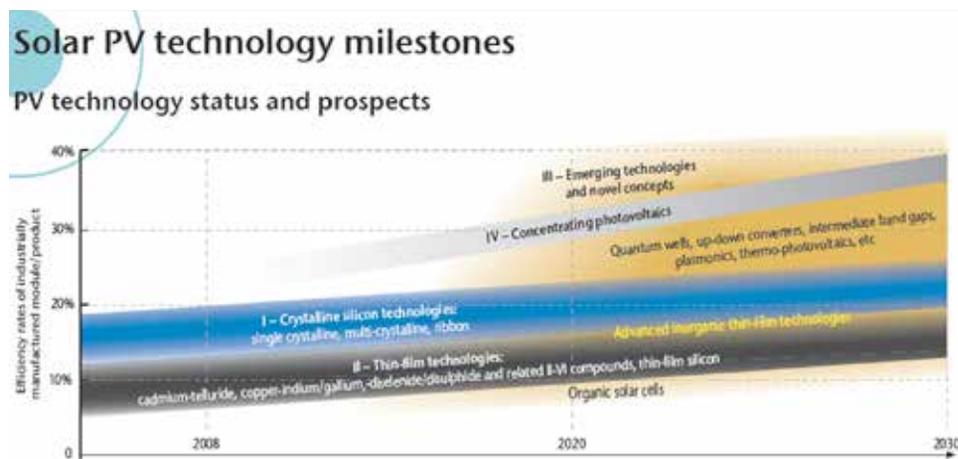


Figure 3: Photovoltaic technology milestones (Ref: <http://www.iea.org>)

The photovoltaic roadmap for the 2010 – 2050 period projected out by the International Energy Agency estimates that the present (2010 data) 0.2% share of global electricity generation by photovoltaics will expand to 1% by 2020, 5% by 2030 and 11% (about 3 TeraWatts) by 2050. This would also imply the reduction of CO₂ emission by 2.3 Gigatonnes per year.

Photovoltaic roadmap advances with single- and multi-crystalline semiconductor structures and aims to double the current ~10% conversion efficiency of thin film technologies by 2020. The role of photonics comes through plasmonics and quantum wells and concentrating structures to push the efficiency further above the 30% level.

Two research centers at Koç University, namely Surface Science and Technology Center (KUYTAM) and Koç University-Tüpraş Energy Center (KUTEM) are actively involved in the research fields of Green Photonics, in particular in Photocatalysis, Photovoltaics, and Laser development. Perhaps, one final word should point out the fact that these promising technologies would help only if we incorporate them to our living actively. This requires self-awareness, abandoning habits and reconsidering ourselves as a part of the ecosystem, rather than above and apart from it.



Kaan Güven was born in Izmir Turkey in 1971. He received his B.S. (1993) M.S. (1995) and Ph.D (1999) degrees in Physics in Bilkent University. He worked in Max-Planck Institute for Solid State Research in Stuttgart, Germany in 2000 - 2001 as a research associate in the group of Prof. Klaus von Klitzing. Between 2002–2009, he worked in the Nanotechnology Research Center in Bilkent University. In 2009, he joined the Department of Physics in Koç University. His research interests include electromagnetic metamaterials, plasmonics, nano-optics and condensed matter physics.

Future Scientists Flourish at Koç University

With a mission to be a world-class research university, Koç University contributes to the scientists who will shape the future through its interdisciplinary approach and research opportunities. Doctoral students and graduates of Koç University answered our questions.

Kaan Akşit, who completed his PhD studies in Prof. Hakan Ürey's Optical Microsystems Laboratory, carries on with his post-doctoral researches in Nvidia Research located at Santa Clara, USA.



Can you give us information about your academic background and the projects you're working on?

I finished my undergraduate studies in Electrical Engineering program at Istanbul Technical University. For my graduate studies, I moved to RWTH Aachen University in Germany. Later on, I continued my Ph.D. studies in Prof. Hakan Ürey's Optical Microsystems Laboratory, and finished my Ph.D. studies recently last June. During my undergraduate and graduate studies, I mainly worked on electrical machines, power electronics, and medical electronics instrumentation. Additionally, I finished my master thesis at Philips Research Campus located at the Netherlands. During my Ph.D. studies, I have conducted research on three dimensional displays technologies with and without eye-wears. Through collaboration with Prof. Özgür Çakmak, I had a chance to develop an electrical instrumentation that alleviate

the Parkinson's symptoms. I have conducted research in Disney Research Laboratory in Zurich, Switzerland, and Imagination Studios in Sweden as visiting researcher. Within the passing time period, I have published 5 journal papers, 15 conference papers, and I have filed 3 patents. Additionally, my research have been awarded with local and international awards many times.

"To me, having an infinite source to feed your understanding is an important parameter."

How has the work you pursued at Koç University contributed to your career?

There is this famous saying, which might be very familiar: if there isn't anybody who is smarter than you in your environment, then basically change it. Thanks to my supervisor Prof. Hakan Ürey, my co-workers at laboratory

and my other professors, I always felt that I am in the right environment. This was very important for my personal satisfaction in my work. To me, having an infinite source to feed your understanding is an important parameter. As I have explained earlier, I was working on a totally different subject. The change in my research path helped me to gain a valuable expertise and experience. The experience of Academia-Industry collaboration is a unique opportunity even in many places around the world. Thus, such an experience provided me two separate understanding on both worlds.

Can you tell us about your future plans and projects?

Starting from July, I will be working in Nvidia Research located in Santa Clara, USA as a post-doctoral researcher. My research subject will be directly related with my past research experience in my PhD studies: three dimensional displays and near-eye virtual reality display applications. ■

After completing her PhD in Business Administration at Koç University in June 2013, **Gülen Sarial Abi** pursues an academic career as an Assistant Professor of Marketing at the Marketing Department of Bocconi University in Milan, Italy.



Can you give us information about your academic background and the projects you're working on?

I had my PhD in Business Administration from Koç University in June 2013. Other than having my PhD from Koç University, Koç University has another special place in my life because I also had my BA in Business Administration from Koç University in 2003. After finishing my undergraduate studies, I got my MSc in Management Research degree from Oxford University, Said Business School in 2004. Afterwards, I worked at Siemens Healthcare in Turkey as Management Consultant until 2008, when my daughter Ceylin was born. When the PhD in Business Administration degree in Koç University was opened in 2008, I enrolled in the program. During my PhD studies, I worked at Stanford Business School as a visiting scholar for six months with the opportunities provided by Koç University. Since my graduation from Koç University in 2013, I've been working at the Marketing Department of Bocconi University, Milan, Italy as Assistant Professor of Marketing.

I investigate consumer behavior. More specifically, I investigate: (1) the effect of financial constraints on consumer behavior, (2) psychology of money, (3) how the restrictions of freedom influence

consumer behavior, and (4) effect of language on consumer behavior.

How has the work you pursued at Koç University contributed to your career?

Koç University has contributed to my career after both my undergraduate and the PhD study. As a result of my education at Koç University, I was able to pursue my MSc in Management Research in one of the most prestigious universities of the world, Oxford's Said Business School. Afterwards, Koç University has also played a significant role in my career working as a management consultant at Siemens Healthcare.

“Other than doing my research, I also would like to see the achievements of the students I teach and work with.”

The opportunities provided by Koç University during my PhD studies are above the average of the world's leading universities. First of all, Koç University provided me a full scholarship to pursue my work at Stanford Business School as a visiting scholar for six months. With the studies that I have conducted in my exchange year, I was able to publish

in one of the A+ journals of marketing, *Journal of Consumer Research*, when I was only a PhD student. Moreover, the opportunities provided to collect data, to present my work in international conferences contributed a lot to my career. I believe that I was able to start my career as an Assistant Professor of Marketing at Bocconi University with the opportunities that are provided to me by Koç University and my advisor Prof. Zeynep Gürhan-Canlı.

Can you tell us about your future plans and projects?

First of all, I would like to continue publishing my work in consumer behavior in the top academic journals. To do this, I need to do more research, collect more data, and write more papers. I would like to continue doing the work that I love to do as a good researcher and I would like to have a contribution to the enlightenment of consumer behavior.

Other than doing my research, I also would like to see the achievements of the students I teach and work with. Seeing my undergraduate and graduate students from Bocconi University to have an interest in marketing as a result of the marketing and the consumer behavior classes that I teach would increase the happiness that I experience in my career. ■



Ayşe Eda Sayın, who continues her studies in the marketing Ph.D. program at Koç University, aims to contribute to the marketing literature by examining unintuitive consumer reactions and understanding the effect of sensory cues in consumers' perceptions.

Can you give us information about your academic background, and the projects you're working on?

I have decided to pursue an academic career at a later stage. I have worked as a marketing manager in a multinational cosmetics company before I started my Ph.D. This transition from industry to academia has been a hard but a very satisfying one so far. I am about to graduate from the marketing Ph.D. program in Koç University. I am interested in two broad areas of research: (1) examining unintuitive consumer reactions toward strong brands following specific brand behaviors, and (2) understanding the effect of actual or imagined sensory cues (especially odors and sounds) in consumers' perceptions.

What is your doctoral dissertation about?

My dissertation contains three essays investigating consumers' associations with strong brands and the effect of these associations on consumers' perceptions, after a brand transgression. In my first essay, I investigate how consumers' evaluations of product performance for global and local brands differ within the context of product failures. I demonstrate that consumers have different performance expectations and hence use shifting standards when evaluating

the performance of global versus local brands. In my second essay, I propose that brands with strong meanings and dedicated customers may be vulnerable if customers perceive them as exploiting their relationship. Consumers feel attached to the brands whose expressive values help them incorporate meanings to their self-concepts. I argue that highly attached consumers of a brand may react more negatively when compared to consumers who are not as attached, if the brand extends to an incongruent category, diluting its meaning. My third essay is invited for publication at the *Review of Marketing Research*, where I identify four types of brand transgressions. Then I discuss the possible effects of attachment levels on consumers' reaction toward a brand within the context of each of these transgressions.

“The behavioral laboratory at Koç University improved the quality of my research as well as my speed of completion of projects.”

The stream of my dissertation studies contributes theoretically by demonstrating the conditions where being a strong

brand with a well established and aspired meaning might be disadvantageous. Additionally it provides recommendations to managers in their marketing strategies and about how to deal with possible consumer reactions. I have been working very closely with and got great support from my advisors Prof. Zeynep Gürhan-Canlı and Assist. Prof. Nilüfer Aydınoglu on my dissertation essays. I hope to defend my thesis this fall and graduate from the program.

What are your other areas of interest?

In addition to my doctoral dissertation, I do research on sensory marketing. I have one paper with Aradhna Krishna and Maureen Morrin, “Smellizing Cookies and Salivating: A Focus on Olfactory Imagery” which is published at the *Journal of Consumer Research* in June 2014. In this paper, the concept of olfactory imagery is introduced and the conditions under which imagining what a food smells like impacts consumer responses are explored. Another paper, “Sound and Safe: The Effect of Ambient Sound on Perceived Safety of Public Spaces” (with Aradhna Krishna, Caroline Ardelet, Gwenaëlle Briand Decré and Alain Goudey) is under review at the *International Journal of Research in Marketing*. ▶

In this paper, we investigate the effect of auditory input on perceived social presence and feelings of safety in public spaces and discuss how they are translated into consumer responses such as satisfaction with the public place or willingness to purchase a monthly usage card.

How has your education at Koç University contributed to your career?

Koç University is a very prestigious research school with many reputable professors. There is a large variety of high standard courses available for the Ph.D students. The professors are very supportive and easy to work with. Additionally, they are great researchers with global reputation which help students be exposed to research done around the world. Our professors have long standing relationships with other top-notch universities and professors around the world. With their help, I have worked with Aradhna Krishna on sensory marketing for a year at the Ross Business School, University of Michigan. My collaboration with her helped me publish papers in highly regarded journals.

The facilities in Koç University are excellent as well. In Koç University, we have a behavioral laboratory. I had the opportunity to use this facility frequently and managed to collect data for my experiments during my Ph.D. Availability of a behavioral laboratory improved the quality of my research as well as my speed of completion of projects. My advisors also provided me monetary aid to collect the data I need via specific online panels.

Moreover, I had the opportunity to teach Advertising and Promotion course during the summer semester this year. This experience will help me during the job market.

Can you tell us about your future plans and projects?

After graduation, I would like to join a reputable research university where I can continue my existing projects and start new ones. My plan is to continue working on branding and sensory marketing. I am excited to start teaching and transfer my knowledge to my students. ■



A Ph.D. candidate in the Department of Archaeology and History of Art, **Yasemin Özarслан's** future plan is to continue working in an academic environment where she can conduct interdisciplinary landscape research on Anatolia and neighbouring regions.

Can you give us information about your academic background and the projects you're working on?

I am currently a Ph.D. candidate in the Department of Archaeology and History of Art (ARHA) and am working on a dissertation about the Iron Age, roughly the first millennium BC, landscapes of central Turkey. Much of my graduate training and research has focused on Anatolian Bronze and Iron Ages, landscape archaeology, spatial theory and

practice, human spatial behaviour, archaeological survey methods, and mapping techniques. Having completed my B.A. degree in the Department of Translation and Interpreting Studies at Boğaziçi University, I decided to continue my career in archaeology. I received my M.Sc. degree in Settlement Archaeology from Middle East Technical University in 2010. I also received a yearlong training in Geographical Information Systems (GIS) and Remote Sensing applications

at University College London in 2009-2010 and conducted Historic Landscape Characterization (HLC) research at Newcastle University in Spring 2013. In the course of my graduate study, I participated in a wide range of national and international archaeological excavation and survey projects as well as related publication work. My fieldwork experience mainly includes the Çatalhöyük Research Project, Gordion Archaeological Project, Boeotia Survey Project, Gre Amer Salvage Excavations, METU Archaeological Surface Survey Project, Komana Archaeological Research Project, and Yalburt Yaylası Archaeological Landscape Research Project. Since 2007 I have been an active field and research member of the Kerkenes Dağ Project where I am the current field director.

What is your doctoral dissertation about?

My dissertation research on the Iron Age landscapes of central Turkey at Koç University, supervised by Assist. Prof. Carolyn Aslan, explores the ways in which Iron Age people interacted with their natural and socio-cultural landscapes. My work is based on three case-studies in central Anatolia, including the landscapes around the Phrygian Highlands, Gordion, and Kerkenes Dağ. I compare and contrast the use, transformation and perception of space by the Iron Age inhabitants of these three geographically distant but culturally related regions from environmental, ideological and experiential perspectives. More specifically, I examine how Iron Age people incorporated the landscape into their political ideology, religion, and social strategies on the basis of archaeological and environmental data ranging from rock-cut monuments, tumuli, settlement locations, hillforts, mountains, forests, rivers, and likely Iron Age transportation routes. How

Iron Age people made their natural habitat meaningful through monument construction, every day experiences and/or seasonal practices such as rituals and processions is one of my major concerns. My project places a special emphasis on the role and importance of visibility and movement in human spatial behaviour, social processes and complex human-landscape interactions. It also seeks new ways of combining and modelling these two concepts in GIS using archaeological data. By investigating such diverse examples, my project will contribute to our understanding of the diverse relationships between the people and the landscapes they inhabit and provide insights into the many different ways in which people communicate through the landscape.

“The Ph.D. program in ARHA at Koç University has allowed me to strengthen my skills in archaeological sciences, cultural heritage management, and ancient languages that are fundamental for any type of archaeological research.”

How has the work you pursued at Koç University contributed to your career?

The Ph.D. program in ARHA at Koç University has allowed me to strengthen my skills in archaeological sciences, cultural heritage management, and ancient languages that are fundamental for any type of archaeological research. The nature of the ARHA program and the expertise of the ARHA faculty have provided a dynamic academic atmosphere where I could extend my research into the later periods of human history, including the Ottoman times. I have also had the opportunity to gain

experience in archaeological material analysis ranging from petrography to archaeometallurgy using the archaeology lab facilities available at KU. Our program's affiliation with the KU Research Center for Anatolian Civilizations (RCAC) has also played a key role in my career by introducing me to a huge network of scholars and international community. Without the financial support and mobility granted for doctoral students at KU it would not have been possible for me to participate in international workshops, conferences, and research trips. I am also grateful to the ARHA faculty and the GSSSH for their moral support in any kind of research activity I take on at KU.

Can you tell us about your future plans and projects?

In the future I would like to continue working in an academic environment where I can conduct interdisciplinary landscape research on Anatolia and neighbouring regions. I strongly believe that there is great potential for research in landscape archaeology and related integrative approaches to the human use of space. One of my major goals is to bring together the diverse but closely related areas of archaeology, landscape and environment, by incorporating developing technologies including GIS and Remote Sensing. I also plan to study archaeological landscapes as a system from a long-term perspective, exploring social, political, economic, symbolic and cognitive aspects. For this purpose, I look forward to developing collaborative archaeological field projects that will allow me to collect the necessary field data for my research and create innovative methodologies for landscape archaeology. Moreover, I very much look forward to being able to teach in an academic institution and encourage students to contribute to archaeological research. ■

Summer Research Programs at Koç University

Summer Research Program for Undergraduates

The program offers the undergraduates the opportunity to gain research experience that helps them decide if they want to pursue graduate education or professional research career. The duration of the program is at least seven weeks. They work closely and intensely with faculty mentors and their research groups that include graduate students and PhD students.

For the summer 2014, 218 applications from the leading national and international universities of the world and Turkey, such as Koç University, Yıldız Technical University, University of California Irvine, Portland State University, Middle East Technical University, Bilkent University, Boğaziçi University, McGill University, Goldsmiths University of London, University of California Davis, University College London, California Institute of Technology, University of British Columbia and University of Sussex have been received. 105 students have been selected by our faculty members through a computer matching system. The program dates were between June 16 and August 29, 2014.

Summer Research Program for High School Students

This program aims to motivate high school students who want to sharpen their research skills and plan to attend research oriented universities. Students who have completed 10th grade with good academic standings, are recommended by their schools.

For the Summer 2014, 121 successful high school students have been recommended by their high schools and 51 of them have been replaced to the research projects to work with voluntary faculty members. The participant high schools are Robert College, Üsküdar American High School, Ankara Science High School, Vehbi Koç Foundation-The Koç School, Bornova Anatolian High School, İTÜ Ekrem Elginkan High School, İzmir Private Turkish Science High School, Kabataş Erkek Lisesi, TED Ankara College.

College of Science

Improved Air-Bag igniters via Nano-Bor enhanced Pirotechnics

Electrochemical Analysis of Hydrogen Storage in Metal Thin Films

Synthesis of Composite Armor Material ($MgAlB_{14} / TiB_2$) for Strength Improvement

Project Supervisor
Professor Mehmet Somer

Students
Antonio Medina, Çağla Akin,
Nurgül Seymen, Samet Aydın

Students participated in three projects. One of them is **Improved Air-Bag igniters via Nano-Bor enhanced Pirotechnics** where candidates were expected to prepare pyrotechnic igniter palettes from homogeneously mixed powders containing nano Boron. Thermal conditions were characterized via TGA/DTA analysis. This study was closely related with the air-bag, aero technology and defense related industries. The second project was **Electrochemical Analysis of Hydrogen Storage in Metal Thin Films** which focused on hydrogen being a promising energy carrier and should be stored in milder media such as metal/metal hydride systems. In this project, the storage capacities of metal thin films were measured electrochemically to monitor material dependency of the mechanism. The last project was **Synthesis of Composite Armor Material ($MgAlB_{14} / TiB_2$) for Strength Improvement** where armors were expected to be as strong and force resistive as possible. This could be achieved by improving the composite raw materials' chemistry. Specifically, candidates worked on solid-state powder calcination reactions of $MgAlB_{14} / TiB_2$ composite materials to optimize potential compounds.



School of Nursing

The Global Aspects of Medicine in Turkey: Medical Tourism and Health Conditions of Irregular Immigrants

Project Supervisor
Assistant Professor Ayşecan Terzioğlu

Students
Berkant Çağlar, Alanur Üner,
Çağlar Uysal, Zhanara Anarbaeva

The project focuses on the policies on medical tourism in Turkey, as well as how those policies influence the experiences of various social actors -foreign patients, patient supervisors, nurses and doctors. The project highlights the social and cultural aspects of medical tourism and compares the related policies with the ones produced for the irregular (ie undocumented or informal) immigrants' health conditions and health care access.

College of Administrative Sciences and Economics (CASE)

The Neural Basis of Economic Behavior Programming for Experiments on Gender and Economic Decisions

Project Supervisor
Assistant Professor Seda Ertaç

Students
Eray Türkel, Ömer Faruk Sözbir,
Duygu Çelik, Lütfullah Bingöl, Levent Cıvı

Students are involved in two projects, one of which is 'The Neural Basis of Economic Behavior' and the other is 'Programming for Experiments on Gender and Economic Decisions'. **The Neural Basis of Economic Behavior** involves the analysis of data coming from a set of experiments that study time preference and competitive attitudes. The experiments have collected data on behavior in incentivized decision-making environments, along with neural measurements through EEG. Time preference is elicited via decisions that involve trade-offs between smaller-earlier and larger-later rewards. Competitive attitudes are measured by the response to competitive incentive schemes in a real effort task. The project has analyzed these data to uncover potential relationships between behavior and activation of different areas in the brain. **Software Programming for Experiments on Gender and Economic Decisions** involves programming a laboratory experiment on gender and economic decisions, in particular competitiveness. Students were expected to learn to use the software z-tree and work with the professor in designing and programming the experiment.

College of Social Sciences and Humanities (CSSH) / Psychology Department

The Role of Parenting and Child Temperament in Social Adjustment and Social Information Processing: A Cross-cultural Study

Project Supervisor
Assistant Professor Bilge Yağmurlu

Students
Betül Urgancı, Bade Dalahmetoğlu,
Ceyda Kuşak, Mina Özdemir

This project investigates social development and social information processing abilities of pre-school children using the theoretical framework of the Bioecological Systems theory. Social information processing refers to understanding of social situations and the forms of attributions people make about these situations. Social information processing is significantly linked with social development in childhood, including peer relations, internalizing and externalizing problems, and positive social behaviors. Studies have shown that children's social competence is affected by parenting, particularly maternal cognitions and behaviors; and this relation might be mediated by social information processing. Temperamental characteristics of children may also have a role in these relations. Child temperament influence maternal cognitions and behaviors both directly and also indirectly via influencing maternal well-being and stress. More distal variables such as mothers' self construal, cultural and religious values, and normativeness perceptions of parenting practices may also influence parental cognitions and behaviors, and children's developmental outcomes.

Koç University Center for Gender Studies (KOC-KAM)

Research on Women and Gender

Project Supervisor
Zeynep Gürlü Göker

Students
İlkan Can İpekçi, Yağmur Zafer, Elif Birced, Aslıhan Hatunoğlu

While interning at KOC-KAM, students participated in KOC-KAM's ongoing research projects and events/publication activities. The work included literature reviews on relevant assigned topics on gender, research/editing/formatting for the center's publications on women and gender, partaking in the preparation of a training program curriculum on gender equality in the workplace, and compilation of a reference base for gender related books, articles and reports.

Histological Analysis Techniques

Cardiovascular Tissue Engineering

Cardiovascular Biomechanics

Project Supervisor
Assistant Professor Kerem Pekkan

Students
Ali Akan, Zeynep Yey,
İpek Çağlayan, Mert Akan.

Students took part in three projects. One of them is ‘**Histological Analysis Techniques**’: Tissues are mainly composed of cells, and a matrix surrounding the cells, namely the extracellular matrix (ECM). In this study, the cells and ECM proteins were visualized using various histological staining methodologies and microscopy techniques. Embryonic chick heart and vessels were used as the model tissue. In ‘**Cardiovascular Tissue Engineering**’, cardiac cells were isolated from embryonic chick hearts at different developmental stages. The isolated cells were cultured for a specific period of time and monitored for their morphology and behavior on 2D and 3D surfaces. Also covered in the project is the fabrication of various biomaterials. In ‘**Cardiovascular Biomechanics**’, students reconstructed patient-specific anatomies from scanned MRI/CT data and apply Computational Fluid Dynamics (Finite Element Method) technique to predict the flow inside these computational models. Project involved close interdisciplinary collaboration with the top clinical centers and doctors in Istanbul and in the world.

Artificial Circulatory Environment and Blood Mechanical Trauma

Role of Shear Stress in the Regulation of Erythrocyte Deformability and Effective Factors

Project Supervisor
Özlem Yalçın

Students
Özge Atçı, Bahar Atay, Zeynep Küçüksümer,
Haluk Berk İpek, Alper Turgut

Students took part in two projects:

Artificial Circulatory Environment and Blood Mechanical Trauma: Red blood cells (RBC) are exposed to shear stress (SS) at varying levels (1-10 Pascal) at different location of circulatory system. SS in this physiological range do not cause any detectable damage in RBC, however, RBC are exposed to extreme SS in artificial circulatory environments, such as cardiopulmonary bypass, circulatory support devices and hemodialysis equipments. Mechanical hemolysis is the widely-used indicator of exposure to high shear forces and non-physiological environments. SS levels below a critical magnitude may not cause hemolysis but induce subtle damages to RBC, which is known as sub-hemolytic blood trauma. Sub-hemolytic trauma causes alterations of cellular metabolism and rheological properties of RBC, including significant impairment of deformability. In this study, an ektactometer was used to apply SS at magnitudes of 50-500 Pascal for 120-600 seconds, as a model of sub-hemolytic trauma to RBC. Sub-hemolytic damage can be demonstrated as impaired RBC deformability based on the EI-SS curves (elongation index/shear stress), obtained before and after the mechanical stress application. Ektactometry was also used to detect the magnitude of shear stress when the mechanical hemolysis starts, by monitoring the RBC concentrations (as reflected by diffraction pattern area) under continuously increasing shear stress, in a wider range including the expected hemolytic threshold level.

Role of Shear Stress in the Regulation of Erythrocyte Deformability and Effective Factors: Erythrocytes, constituting 40-50 percent of blood volume, are among the major determinants of the fluidity of blood and flow resistance in the vasculature, accordingly. Their unique shape changing capability is responsible for the non-Newtonian flow behavior of blood, together with erythrocyte aggregation. The shape changing ability of erythrocytes under external forces is known as deformability. Deformability has been assumed as a passive behavior being determined by the special geometry and material properties of erythrocytes. Although the erythrocyte membrane skeleton has been accepted as an important structure influencing deformability, mechanisms related to the active regulation of this property have only been considered in the last several years. It has been observed in the preliminary



studies that improvements in erythrocyte deformability are induced by shear forces at levels relevant to human circulatory system, these improvements being at levels sufficient to result in significant hemodynamic alterations. This improvement in deformability has a time course characterized with time constants in the order of several seconds. The response is reversible in periods in the order of 10 seconds. This mechanical response has been assumed as a physiologically important phenomenon, affecting microvascular blood flow. Determination of the abovementioned erythrocyte mechanical response in detail and the related molecular mechanisms is crucial in developing and further testing this hypothesis. The erythrocyte mechanical response described above has been first observed and defined recently at Koç University Hemorheology Laboratory. This preliminary study showed the details of this response like time course, dependence on the magnitude and duration of shear forces and reversibility. The initial phase of the project aimed to investigate the dependence of preliminary results on the physiological status of erythrocytes - such as dependence on hemoglobin oxygen saturation. Shear forces with well defined magnitude and geometry were applied either using an ektactometer with a co-axial cylindrical viscometer or an in vitro flow system pumping blood samples through a capillary tube with selected geometry to obtain a given pressure gradient. The second phase of the project included experimental work to identify the molecular mechanisms mediating the mechanical response, based on the modulation of the defined response by inhibitors/blockers of selected intracellular signalling mechanisms. The proteomic alterations under the influence of mechanical forces in erythrocytes were investigated in the third stage of the project.

Medical School

KOÇ UNIVERSITY HOSPITAL: THE FIRST PHASE OF THE PROJECT COMPLETED

Koç University Hospital is located in the Topkapı-Davutpaşa district of Istanbul, on the lot where once the old Arçelik home appliances factory was founded. This area has been first used for military purposes in the Ottoman era and was left abandoned until 1950s. From that time till the turn of the millennium the area hosted many small and medium scale industrial facilities as seen in similar areas on the perimeters of the city. The urban transformation of the area will replace these small and medium workshops and factories with new residential, health care and educational buildings in the very near future. The area is located next to the one of the oldest and important high-speed roads of Istanbul (D-100), which is well connected to the other districts of the city. Given the presence of the Yıldız Technical University campus nearby, this area has the potential to be transformed into a high quality settlement with a focus on education and health care facilities.

Koç University Hospital has been designed both as a hospital with its 250 beds and also as a high-end research and educational institution. The campus includes a research hospital with high-tech simulation laboratories and a nursing school. A medical faculty and a university hospital have been constructed in the first phase of the project.

Kreatif Mimarlık and Cannon Design collaborated in the design of the campus to create a responsive scenario flexible enough to meet the changing requirements of the ever-developing health care industry. The design of the masses creates a unique sense of place and also reflects the brand value of Koç Group that helps to build up a health care institution identity with utmost global standards, bringing novelty to the health care industry. The distribution of the functional areas are planned to stimulate the collaboration and integration of different disciplines that are essential for a successful medical education. Traditional külliye



(complex of buildings) patterns of Turkish and Anatolian culture have been synthesized in the design concept of the campus, with the contemporary needs; however, strong traditional elements of Turkish architecture such as eaves, alcoves, arcades, courtyards or ornaments are avoided to be imitated per se, thus a functional and timeless design has been achieved.

The courtyards planned in the campus are important architectural elements that integrate the exterior and interior spaces. These courtyards serve as joint spaces that improve and enhance the connection of different areas of the program as well as serving as public spaces that help to open the campus to the city with their inviting atmospheres. One of the other side benefits of these open spaces is to bring daylight to the floors underneath.

The spine, which is formed by the courtyards, connects the buildings on the first level, acting like a green street. The blocks on the northeast side of the lot are planned to be higher whereas the southwest blocks are kept lower in order to enhance the daylight accessing the courtyards.

The main entrance to the complex is located on Yıldız Street; southeast direction of the area and a ring road surrounding the campus is formed to

increase the accessibility to the buildings. The exits of the carpark and the service entrances are located on Yol Street, on the northwest side of the complex. In order to decrease the density of people using the major entrance, different polyclinic entrances are planned on the southwest and staff entrances are on the northeast side of the complex. Medical school and university hospital form the front blocks of this courtyard system, whereas the nursing school, simulation labs, social facilities, sports center and future expansion units will be located behind.

All of the infrastructural systems of the complex have been designed to respond to the changing requirements of the medical technology and developing research and educational requirements. All educational and medical areas are planned according to the Turkish and international health standards. The structural and electro-mechanical systems are designed with the ultimate quality that will enable the buildings to serve during and after major natural disasters. The energy efficiency of the campus was another major concern in the design process; thus a tri-generation system has been set up that will enable the buildings to generate most of their energy consumption. In addition, all electro-mechanical systems are chosen among alternatives that have low-maintenance costs and higher efficiency.

College of Social Sciences and Humanities

INTERNATIONAL WORKSHOP ON INVOLVING CITIZENS IN EMERGENCY PREPAREDNESS AND RESPONSE

"Involving Citizens in Emergency Preparedness and Response" workshop, organized by Fp7 funded COSMIC project, was held at Koç University Research Center for Anatolian Civilizations (RCAC) on September 4. The international workshop examined the role of citizens as volunteers, social activists, and citizen journalists at times of emergencies and crises focusing on practical, theoretical, and ethical issues related to citizen participation in emergency/crisis response/management. Keynote Speakers for the workshop were Patrick Meier and Farida Vis.

KÜMPEM CONFERENCE CEMENTING COLLABORATION BETWEEN RETAILERS AND ACADEMIA

The fourth annual retail conference organized by Koç University Migros Retail Research Center (KÜMPEM) took place on May 15 and 16. "New Technologies and Digital Applications in Retail," was the theme for this year's conference. The invite-only event drew crowds of sector insiders and researchers to the conference room of The Marmara Hotel. This year's keynote speech was given by NCR Corporation Executive Vice President Gil Roth, who shared his insights on how innovation and technology are rapidly transforming traditional retailers.

Following the keynote speech, Prof. Michael Wedel of Maryland University took to the stage to talk about usage of eye-tracking in measuring the effectiveness of retailers' visual strategies. Next was Prof. Vishal Gaur of Cornell University, who introduced a new performance metric for retailers called "Adjusted Inventory Turnover" (AIT), a useful and reliable metric in measuring inventory turnover. Prof. Victor Martinez-de-Albeniz of IESE Business School presented the findings of his large-scope research on how quick-response supply-chain model effects the sales of fast fashion retailers. Prof. Jie Zhang of Maryland University presented her research on customized digital promotions. Associate Prof. Berk Ataman of Koç University talked about the life span and effectiveness of mobile applications used by retailers to reach out to their customers.

During the applied research session of the conference, Prof. Gürhan Kök of Koç University and Yunus Emre Koç of Turkish retailer DeFacto presented the results of their prepack optimization project which resulted in a 9% increase in the gross



margin. Prof. Kök, who serves on the Board of Directors for KÜMPEM, pointed out that collaborations between retailers and academics benefit both parties immensely and KÜMPEM aims to support more collaborative projects in the future. Prof. Kök emphasized how important it is for researchers to get familiar with real world problems and accessing such information helps academics discover new and exciting research problems. The conference also featured a panel discussion entitled "New tech trends in retail" joined by Turkey SAP COO Uğur Candan, Infotron CEO Burak Pekcan, Davranış Enstitüsü co-founder Akan Abdula and futurist Halil Aksu. KÜMPEM Director Asst. Prof. Meltem Kayhan also gave a speech in the conference, welcoming the attendees. You may find more information on KÜMPEM and its annual retail conference on <http://KUMPEM.ku.edu.tr/>

Law School

LLM IN PUBLIC LAW STUDENTS WIN RAOUL WALLENBERG RESEARCH GRANT

Three LLM in Public Law students, Deniz Yılmaz, Betül Durmuş and Melike Yılmaz, won a competitive grant sponsored by the Raoul Wallenberg Institute of Human Rights and Humanitarian Law. This is the first grant won by Law School post-graduate students. With the grant, the team will document and analyse Turkey's implementation of decisions given by the European Court of Human Rights on women's cases. The project, in particular, seeks to understand to what extent implementation of judgments is gendered.



KOÇ UNIVERSITY ACADEMIC COUNCIL GIVES THE THUMBS UP FOR THE ESTABLISHMENT OF THE CENTER FOR GLOBAL PUBLIC LAW

In its May 2014 meeting the KU Academic Council approved the establishment of the Center for Global Public Law (CGPL). The CGPL will be a centre of excellence carrying out research in both the theoretical, empirical and practical dimensions of the globalisation of public law. The CGPL is expected to be up and running in the beginning of 2015.

ASSOCIATE PROFESSOR BAŞAK ÇALI INVITED TO ADVISE THE COUNCIL OF EUROPE

The Council of Europe Committee of Ministers has invited Dr. Başak Çalı to Strasbourg as an expert to discuss her research into the social legitimacy of the European Court of Human Rights in September 2014. This provides a Koç University scholar a unique opportunity to influence the design of the future of the European Court of Human Rights.

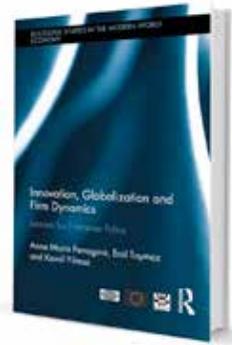
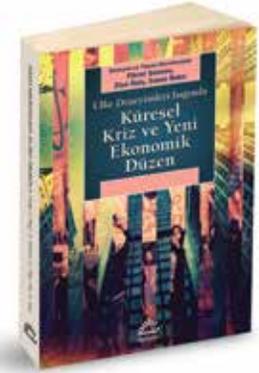
College of Administrative Sciences & Economics

2nd ISTANBUL GRADUATE SUMMER SCHOOL OF ECONOMICS WAS HOSTED BY KOÇ UNIVERSITY

2nd Istanbul Graduate Summer School of Economics organized by Koç University, Bilgi University, Boğaziçi University, and Sabancı University was hosted by Koç University in Rumelifeneri Campus between the dates July 14 and 25. During the summer school, Prof. Luca Gambetti from Universitat Autònoma de Barcelona, Prof. Ramon Marimon from European University Institute and Prof. Tayfun Sönmez from Boston College gave lectures entitled “Empirical Time Series Methods for Macroeconomic Analysis”, “Recursive Contracts: Theory and Practice”, and “Pairing Markets: Theory and Practice”.

GLOBAL ECONOMIC CRISIS AND THE EMERGING INTERNATIONAL ORDER

“Global Economic Crisis and the Emerging International Order” (Co-edited by Prof. Ziya Öniş and Asst. Prof. Caner Bakır of the Department of International Relations at Koç University and Prof. Fikret Şenses of the Department of Economics, Middle East Technical University) is an attempt to introduce the Turkish audience to broader debates on the changing architecture of the global political economy in the aftermath of the major financial crisis of 2007-2008. Approaching the global political economy from a varieties of capitalism perspective, the book documents the growing challenges faced by the established models of “Anglo-Saxon capitalism” and the European model of “welfare state capitalism” in the post-crisis era. A major focus of the book is on the rise of emerging powers, both BRICS and near-BRICS economies. Particularly, important in this context is the rise of China and its model of “strategic capitalism”. The recent Turkish experience is analyzed as part of these broader global shifts. The majority of the contributors are young scholars working on different aspects of international and comparative political economy from a broadly institutionalist perspective.



INNOVATION, GLOBALIZATION, AND FIRM DYNAMICS: LESSONS FOR ENTERPRISE POLICY

Innovation, Globalization, and Firm Dynamics: Lessons for Enterprise Policy, a book edited by CASE faculty member Prof. Kamil Yılmaz, along with Anna Ferragina (University of Salerno) and Prof. Erol Taymaz (METU), was published in February 2014 by Routledge. The book is about the relationship between firm dynamics, innovation and globalization, the processes that are essential for long term economic growth and welfare creation. The book presents new studies written by distinguished researchers in the field, who use state-of-the-art methodologies and extensive sources of firm- and plant-level longitudinal data to analyze and understand these major economic issues facing modern economies. The book responds to a growing concern among scholars, professionals, and policy makers over the recent decades about firm ability to survive and compete in a context of increasing globalization and international competition.

College of Science NEWS HIGHLIGHTS

> 2015 is announced as “The International Year of Light and Light-based Technologies (IYL 2015)” by the United Nations and UNESCO. This is particularly significant for the Koç University which has already become a center of excellence for the science and engineering of light thanks to its extensive research laboratories and research groups. <http://www.light2015.org/>

> Koç University is one of the few universities (as a matter of fact, the only one from Turkey) appearing in the Green Photonics Guide of the Optical Society of America under the Universities and Continuing Education category. http://greenphotonicsguide.com/Listing/Index/Business_Services/Universities_Continuing_Education/2185/407

> Prof. Alphan Sennaroğlu (Dean, College of Sciences, 2014) is announced among the 2014 class of Fellows of the Optical Society of America. This distinguished position is awarded for his contributions to the understanding of emerging infrared laser materials and the development of femtosecond laser sources.

> Prof. Can Erkey and his research group recently contributed to a book titled “Supercritical Fluid Technology for Energy and Environmental Applications” with a chapter about “Applications of Aerogels and Their Composites in Energy Related Applications”. The book is published in 2014 by Elsevier.

As of September, in the year of 2014, 38 externally supported research projects have become active. The value of these projects is approximately 25 million TL.

Research Projects at Koç University

The total number of externally funded projects, starting from January 2004 to September 2014, is 501, with a present value of 137 million TL. The graph below shows the number of research projects granted by funding institutions since 2004.

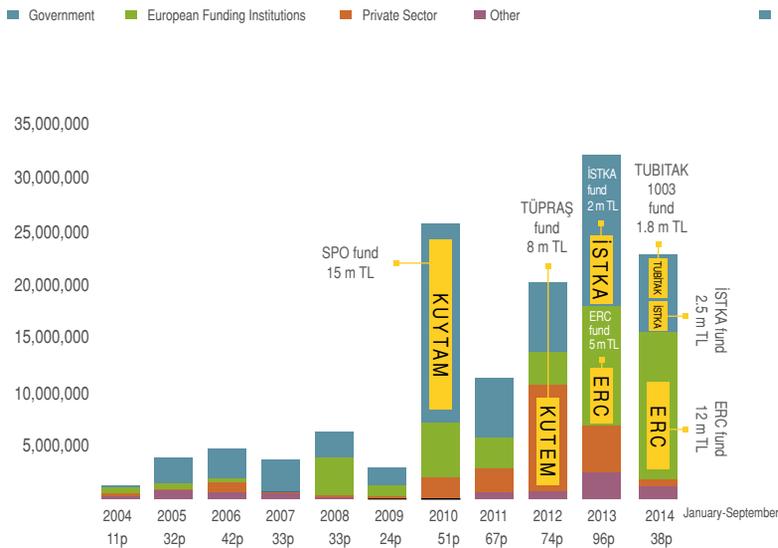
Among the projects that became active in 2013, the most significant one is the first ERC Starting Grant of Koç University, received by Assistant Professor Kerem Pekkan from the Department of Mechanical Engineering, with a budget of 5 million TL. In 2014, our success continued and Professor Özgür Barış Akan's ERC Consolidator Grant

and Professor Hakan Ürey's ERC Advanced Grant (both researchers from the Department of Electrical and Electronic Engineering) received a total of 12 million TL. During the same year, 3 TÜBİTAK 1003 projects were granted 1.8 million TL, while 3 other ISTKA projects received a total of 2.5 million TL.

Only in 2014, 38 new projects were supported externally. These projects have a present value of approximately 25 million TL. As of September 2014, the total number of ongoing projects is 165, with a present value of 71 million TL. The breakdown of these projects according to sources of funding is provided below.

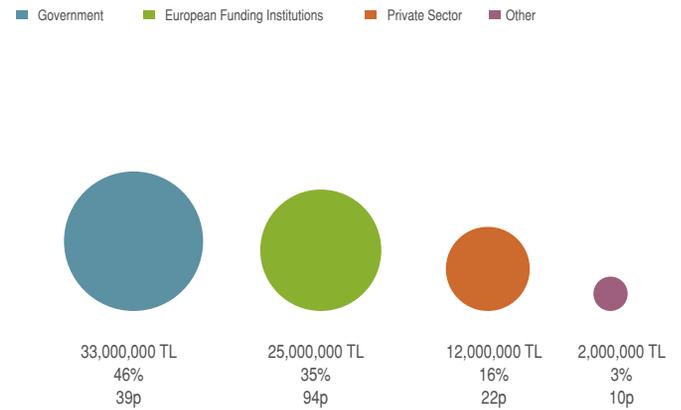
Granted projects by years and funding institutions

January 2004-September 2014
p= number of projects



Share of granted research budget by funding institution

Analysis of active projects by September 2014 (165p)
p= number of projects



Current Research Sponsors

- Arçelik
- AXA Research Fund
- Dutch Embassy
- EMBO Installation Grant
- EMRP
- European Commission – Seventh Framework Programme
- European Metrology Research Programme
- Ford-OTOSAN

- Fotoniks Ltd. Şti.
- International Development Research Centre (Canada)
- Istanbul Development Agency
- İstanbul Ulaşım A.Ş.
- Katron Defense
- Lockheed Martin
- Ministry of Science, Industry and Technology
- Open Society Institute

- Qatar National Research Fund
- TİM Plastik
- TÜBİTAK
- TÜPRAŞ
- Türk Telekom
- University of Sydney

AWARDS

TÜBA and TÜBİTAK Awards 2014

Özgür Barış Akan	TÜBİTAK Encouragement Award
Bahar Rumelili	TÜBİTAK Encouragement Award
Fuat Balcı	TÜBİTAK Encouragement Award
Zeynep Aycan	TÜBİTAK Science Award

National Awards 2013

Mine Çağlar	Hayri Körezlioğlu Research Award
Menderes Işkın	Mustafa Parlar Science Encouragement Award
Özgür Barış Akan	Bilim Kahramanları Derneği Young Scientist Award
Seda Keskin Avcı	Bilim Kahramanları Derneği Young Scientist Award

2014

Özgür Barış Akan	BAGEP Science Academy Young Scientist Award
Sinem Çöleri Ergen	BAGEP Science Academy Young Scientist Award
Seda Keskin Avcı	BAGEP Science Academy Young Scientist Award
Emre Mengi	BAGEP Science Academy Young Scientist Award
Özlem Altan Olcay	BAGEP Science Academy Young Scientist Award

Aslı Niyazioğlu	BAGEP Science Academy Young Scientist Award
Tuğba Bağcı Önder	BAGEP Science Academy Young Scientist Award
Menderes Işkın	FABED Eser Tümen Distinguished Young Scientist Award
Özgür Barış Akan	Kadir Has University Promising Scientist Award

International Awards 2013

Elvan Ceyhan	Election to Global Young Academy (Mathematics)
Şener Aktürk	Joseph Rothschild Prize (Nationalism and Ethnic Studies)



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