SABANCI UNIVERSITY

Faculty of Engineering and Natural Sciences

ANNUAL REPORT
2017-2018
ACADEMIC YEAR

Sabancı Üniversitesi

FACULTY OF
ENGINEERING AND
NATURAL SCIENCES

Dean's Message

We will be seeing more of the impactful results emerging from our research in the coming years.

Our Faculty of Engineering and Natural Sciences (FENS) has had yet another successful year in all dimensions of undergraduate and graduate education, research and outreach activities. This report provides a glimpse of the many stories we celebrate in the FENS building throughout the year, and we invite you to visit the FENS website as well as those of the individual programs to get a full picture of our accomplishments.

FENS boasts to serve three quarters of the student body of Sabancı University. Our programs are well-established and are recognized such that our graduates are regularly offered graduate studentships at top institutions around the world. We are also very proud to contribute to reverse brain drain in Turkey; in the 2017–18 academic year we have had seven full-time faculty members join FENS; you can read their stories on pages 7–9.

With our many programs supporting undergraduate and graduate research in intriguing ways, we have expanded the contributions of students in our research generation: Our very successful Industry Focused Projects (Sanayi Odaklı Projeler, dubbed SoP) continues into its third year, our faculty members offer the largest number of projects to the Program for Undergraduate Research (PURE) which opened its doors to students from all around the world in Summer 2018, the Three Minute Thesis (3MT) Competition once again recognized graduate students who could best communicate their findings in a limited amount of time, and the Dr. Gürsel Sönmez Research Award continues to honor the best theses of our recent graduates.

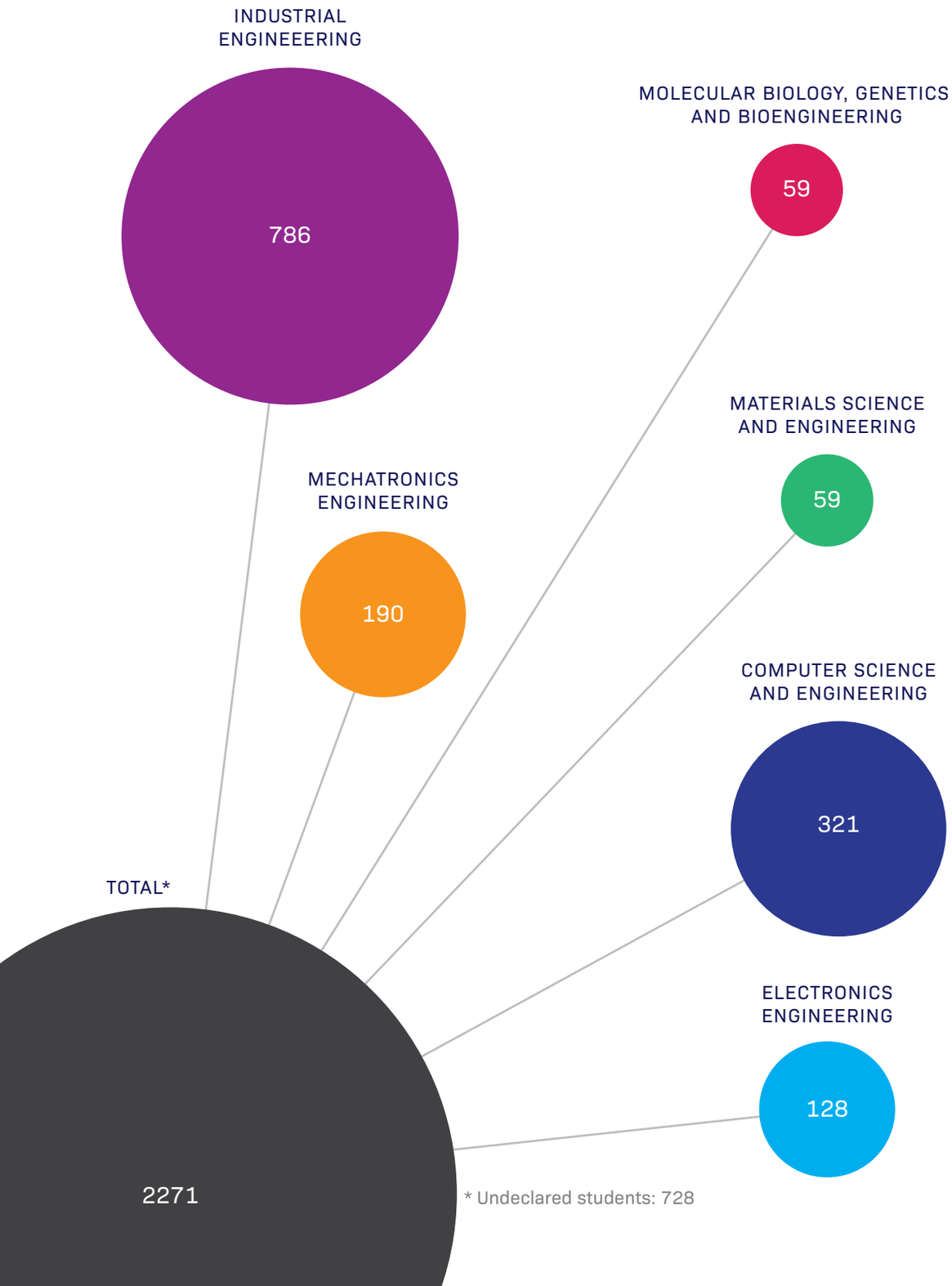
Our faculty members have increased the number of publications, not only in number, but also in terms of the quality of publishing media. Over the next few years, I am confident that we will be seeing more of the impactful results emerging from research carried out in our faculty. In parallel with this development, the sponsored research volume has displayed a great boost in this academic year. Meanwhile, our collaborations have expanded to leave footprints all over the world map (page 12).

I conclude by stating how happy I am to see that many of our alumni in academia are women (page 34) abolishing the prejudiced idea that science and engineering degrees offer careers predominantly to men. All our stakeholders who take pride in the accomplishments of FENS invite you to join us in spreading the word on how the diverse and creative activities conceived here contributes to placing Sabancı University amongst the top academic institutions in the world.

— Canan Atılgan

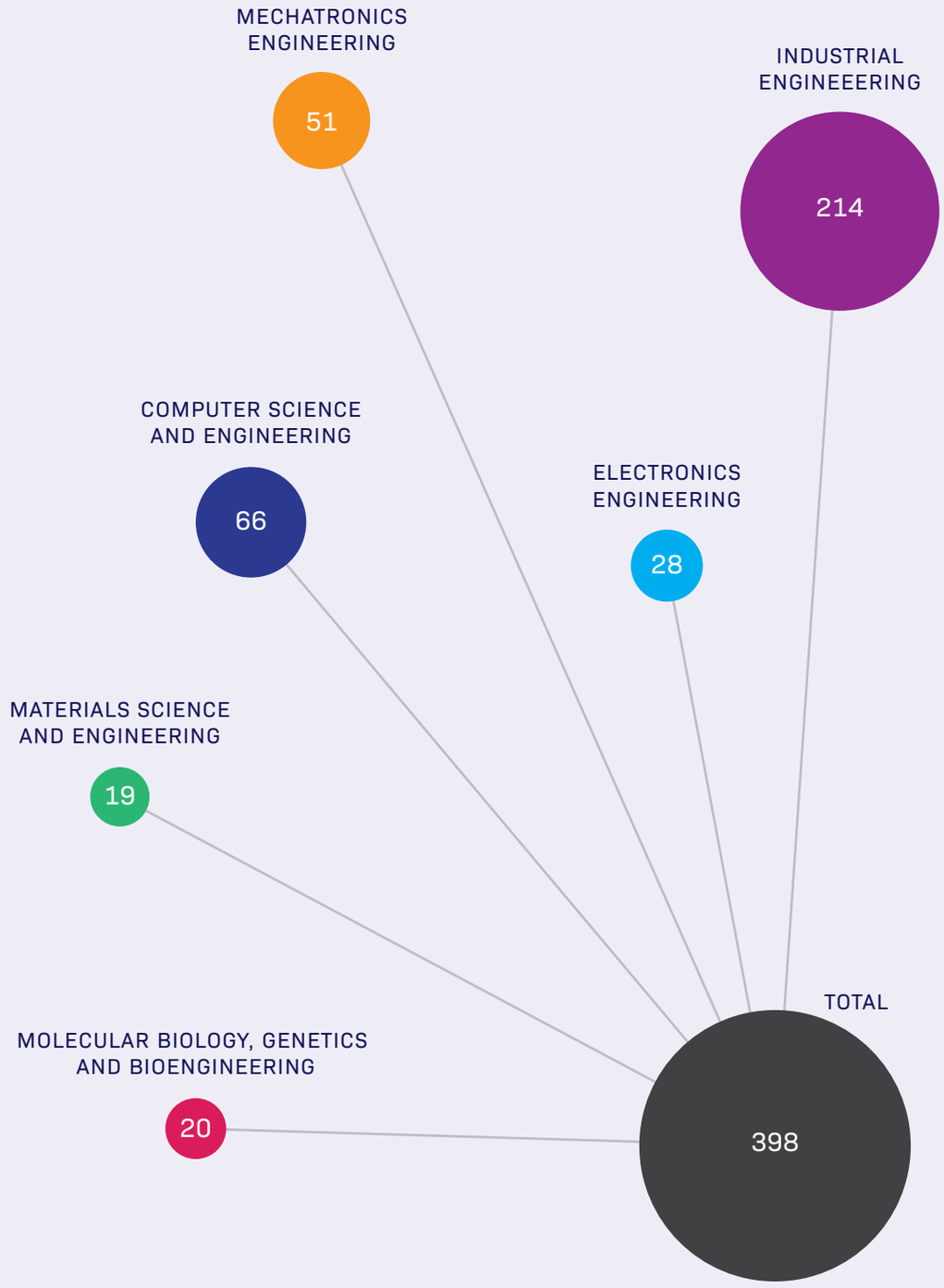
Student Numbers

Undergraduate Student Enrollment 2017–2018



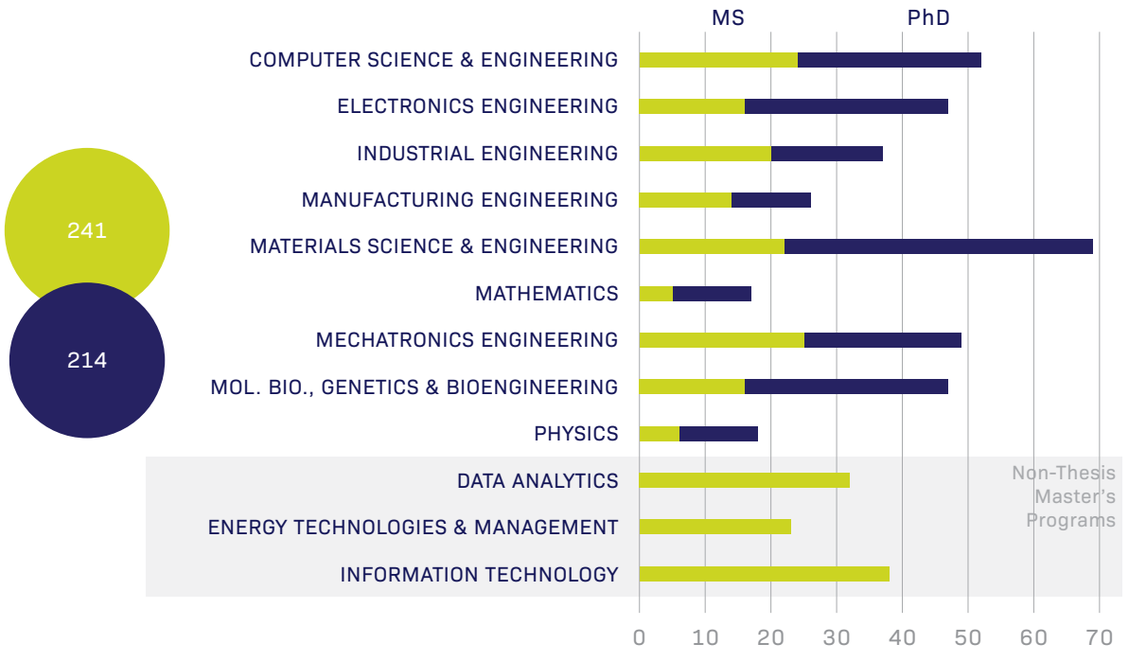
* Undeclared students: 728

Undergraduate Student Alumni 2017–2018

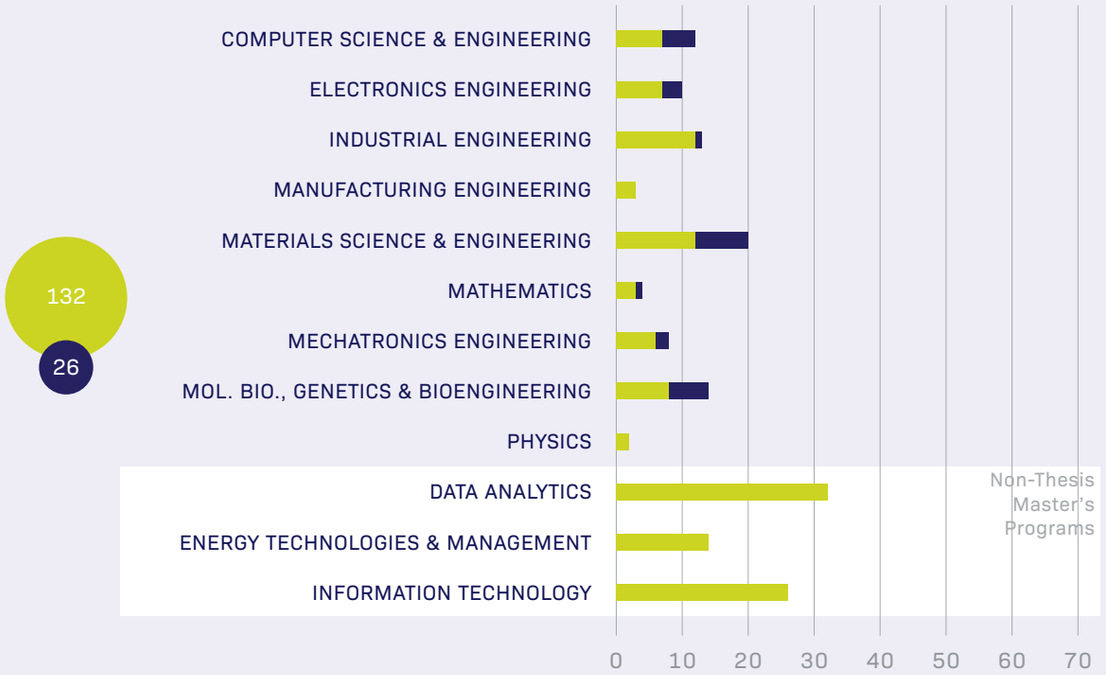


Student Numbers

Graduate Student Enrollment 2017–2018



Graduate Student Alumni 2017–2018



Newcomers

7 new faculty joined FENS to bring the full time total to 103.

Mohammad Sadek

MATHEMATICS

Mohammad Sadek is a faculty member in the Mathematics Program. After obtaining his B.Sc. from Cairo University in 2005, he joined the University of Cambridge, U.K., for his graduate studies. He obtained the Certificate of Advanced Studies in Mathematics in 2006, and earned his Ph.D. in 2010. During his Ph.D., he answered questions about polynomials of the third degree in three variables, namely, Elliptic Curves. In August 2010, he joined the American University in Cairo as an Assistant Professor. In 2016, he was tenured and promoted to an Associate Professor. His research interests lie within Arithmetic Geometry. This is the field where Number Theory meets Algebraic Geometry. He gets himself busy answering number theoretic questions using geometric tools and algebraic techniques. His field of research is where geometry enlightens us about the texture of numbers and their interrelations. Currently, he is exploring how arithmetic geometry can be used to study the dynamics of the iterations of polynomials of low degree.

NURDAGÜL ANBAR MEIDL

MATHEMATICS

Nurdagül Anbar is a faculty member in the Mathematics Program. She earned her B.S degree in Mathematics at Middle East Technical University, Ankara, Turkey in 2007. Then she earned her Master degree on the subject "Ramification in extensions of rational function fields" and Ph.D. degree on the subject "Algebraic curves in prime characteristic" with Prof. Henning Stichtenoth at Sabancı University. During her Ph.D. (March 2011-February 2012), she visited the University of Perugia in Italy to work with Prof. Massimo Gulietti. After obtaining her Ph.D., she worked as a post-doctoral researcher at Sabancı University (July 2012-February 2014), Max Planck Institute for Mathematics (March 2014-May 2014) in Bonn, Germany, the Technical University of Denmark (November 2014-September 2016) in Lyngby, Denmark, Otto-von-Guericke-Universitat (October 2016-March 2017) in Magdeburg, Germany, RICAM (May 2017-January 2018) and Johannes Kepler University (February 2018-August 2018) in Linz, Austria. Her research interests include Function Fields and Algebraic Curves over Finite Fields, Coding Theory, Finite Galois Geometry and Cryptographically significant functions, Boolean functions and Permutation Polynomials.

Emre Erdem

MATERIALS SCIENCE AND NANOENGINEERING

Emre Erdem is a faculty member at Materials Science and Nanoengineering since October 2018. After graduating from Ankara University Physics department in 1998 he obtained Ph.D. and M.Sc. degrees in Physics in 2006 and 2001 from University of Leipzig (Germany), respectively. His Ph.D. thesis was mainly about the investigation of size effects on ferroelectric PbTiO3 nanoparticles via EPR spectroscopy. In 2006, he joined the Physical Chemistry Institute at Technische Universität Darmstadt for postdoctoral studies. Then, in 2010, he became a research group leader in the University of Freiburg on spectroscopic studies of functional nanomaterials. Finally, in 2017, he obtained his Habilitation degree on Physical Chemistry at the University of Freiburg.

He has a strong background in diverse fields, such as materials physics, physical chemistry, atomic physics, solid-state physics, defect chemistry, studies of electronic properties of energy materials and the synthesis and characterization of nanocrystals (functional nanomaterials, piezoelectrics, supercapacitors and, in particular, semiconducting quantum dots). In addition, he has expertise not only in advanced spectroscopic methods, such as electron paramagnetic resonance (EPR), Raman spectroscopy, impedance

Newcomers

spectroscopy, ultraviolet-visible (UV-VIS) and photoluminescence (PL) spectroscopies, but also on imaging techniques such as transmission/scanning (TEM/SEM) electron microscopy, both theoretically and experimentally.

He won several prestigious international awards and fellowships such as LE STUDIUM / Marie Skłodowska-Curie Research Fellow at GREMAN Laboratory, University of Tours (France) in 2017; Feodor Lynen Research Fellowship of Alexander von Humboldt Foundation in 2017; Eugen Grätz Prize in 2011 and won DAAD scholarship in 1999.

Ogün Adebali

MOLECULAR BIOLOGY, GENETICS AND BIOENGINEERING

Ogün Adebali is a faculty member in the Molecular Biology, Genetics and Bioengineering Program. He earned his B.S degree in Molecular Biology and Genetics at Middle East Technical University, Ankara, Turkey in 2011. Then, he transitioned into computational biology and pursued doctoral studies in the graduate school of Genome Science and Technology at the University of Tennessee. His doctoral work was on understanding protein function and interaction through comparative genomics studies. After receiving his Ph.D. degree in 2015, Dr. Adebali worked on molecular evolution as a post-doctoral researcher at Oak Ridge National Laboratory. Then, he moved to the Universty of North Carolina at Chapel Hill for his second post-doctoral position. He worked on Next Generation Sequencing data analyses in the field of DNA Damage and Repair. His research interests include developing novel bioinformatics tools and computational biology approaches to gain insights into the molecular mechanisms of protein function in the context of evolution and rare disease. He currently focuses on protein sequence analyses of G protein-coupled receptors. On the other hand, he continues investigating how genomes are damaged and repaired by utilizing computational methods.

Öznur Taştan

COMPUTER SCIENCE AND ENGINEERING

Öznur Taştan is a faculty member affiliated with Computer Science and Engineering, and Molecular Biology, Genetics, and Bioengineering programs.

Dr. Taştan holds a BSc in Biological Sciences and Bioengineering from Sabancı University and received her Ph.D. in 2011, from Carnegie Mellon University, School of Computer Science, Language Technologies Institute. She worked as a post-doctoral researcher at Microsoft Research New England Lab (Cambridge, MA, USA) until 2012. She was a faculty member at the Department of Computer Engineering of Bilkent University as a faculty member in 2012–2017. In 2017 December, she came back “home” to join Sabancı University. Dr. Taştan research lies at the boundary of machine learning and computational biology. Advances in molecular profiling technologies have resulted in large quantities of data, turning biology into a data-rich field. A key challenge is to use this data effectively to advance our understanding of the molecular basis of the workings of the cell, diseases, and to translate this knowledge into clinics. Dr. Taştan research focuses on developing and applying machine learning approaches towards this aim. Dr. Taştan is a recipient of the Young Scientist (BAGEP) Research Award of the Science Academy, Turkey, UNESCO-L’OREAL National Fellowship for Young Women in Life Sciences and TUBITAK Career Award.

Christopher Mayack

MOLECULAR BIOLOGY, GENETICS AND BIOENGINEERING

Christopher (Chris) Mayack is a faculty member in the Molecular Biology, Genetics, and Bioengineering program. He first learned about honey bees when conducting a summer undergraduate research internship that focused on understanding the cognition and navigation abilities of foraging honey bees at the University of Kansas in 2005. He worked with Dr. Rudolf Jander, a former graduate student of Karl von Frisch (Nobel Laureate). He graduated with honors in biology and a minor in chemistry from State University of New York at Geneseo in 2007 and then earned a Ph.D. in Zoology at Colorado State University in 2012. During his Ph.D. he studied the physiological and behavioral effects of the now world-wide distributed honey bee microsporidian gut pathogen that is implicated to play a role in the most recent bee declines, called Nosema ceranae. He was then awarded a two-year Alexander von Humboldt Post-Doctoral Fellowship, which was conducted in Germany, at Martin Luther University Halle-Wittenberg, to pursue studies investigating the role highly conserved metabolic pathways in the evolution of social behavior in bees. Then as a two-year Visiting Assistant Professor at Swarthmore College, he has mentored a number of undergraduate research students interested in the dynamics of collective decision making, improving bee health, and the regulation of appetite in highly social bees. Currently, he would now like to take a multi-omic systems biology approach to understand how stressed bee colonies collapse. In particular, he is interested the metabolic pathways that are affected from multiple stressors that lead to synergistic declines in bee health.

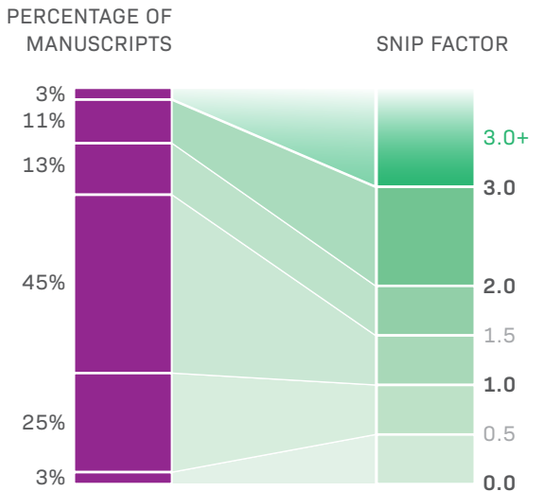
Amine Gizem Özbaygın

INDUSTRIAL ENGINEERING

Gizem Özbaygın is a faculty member in the Industrial Engineering Program. Prior to joining Sabancı University, she earned her B.S. and Ph.D. degrees in Industrial Engineering from Bilkent University in 2011 and 2017, respectively. In her Ph.D. dissertation, she studied several variants of the vehicle routing problem and developed optimization algorithms to solve them. During her Ph.D. studies, she was awarded the international research fellowship grant from the Scientific and Technological Research Council of Turkey in February 2016, and worked as a research fellow at the H. Milton Stewart School of Industrial and Systems Engineering at Georgia Institute of Technology between April 2016 and January 2017. Her primary research interests are in modeling and solving large-scale optimization problems with a focus on transportation and logistics, and with innovative applications in vehicle routing and scheduling, last-mile and same-day delivery planning, city logistics, crowdsourcing, dynamic ride-sharing, and urban mobility planning. She is also affiliated with the Smart Mobility and Logistics Lab (SML) at Sabancı University.

Publications

SNIP Factor Distribution



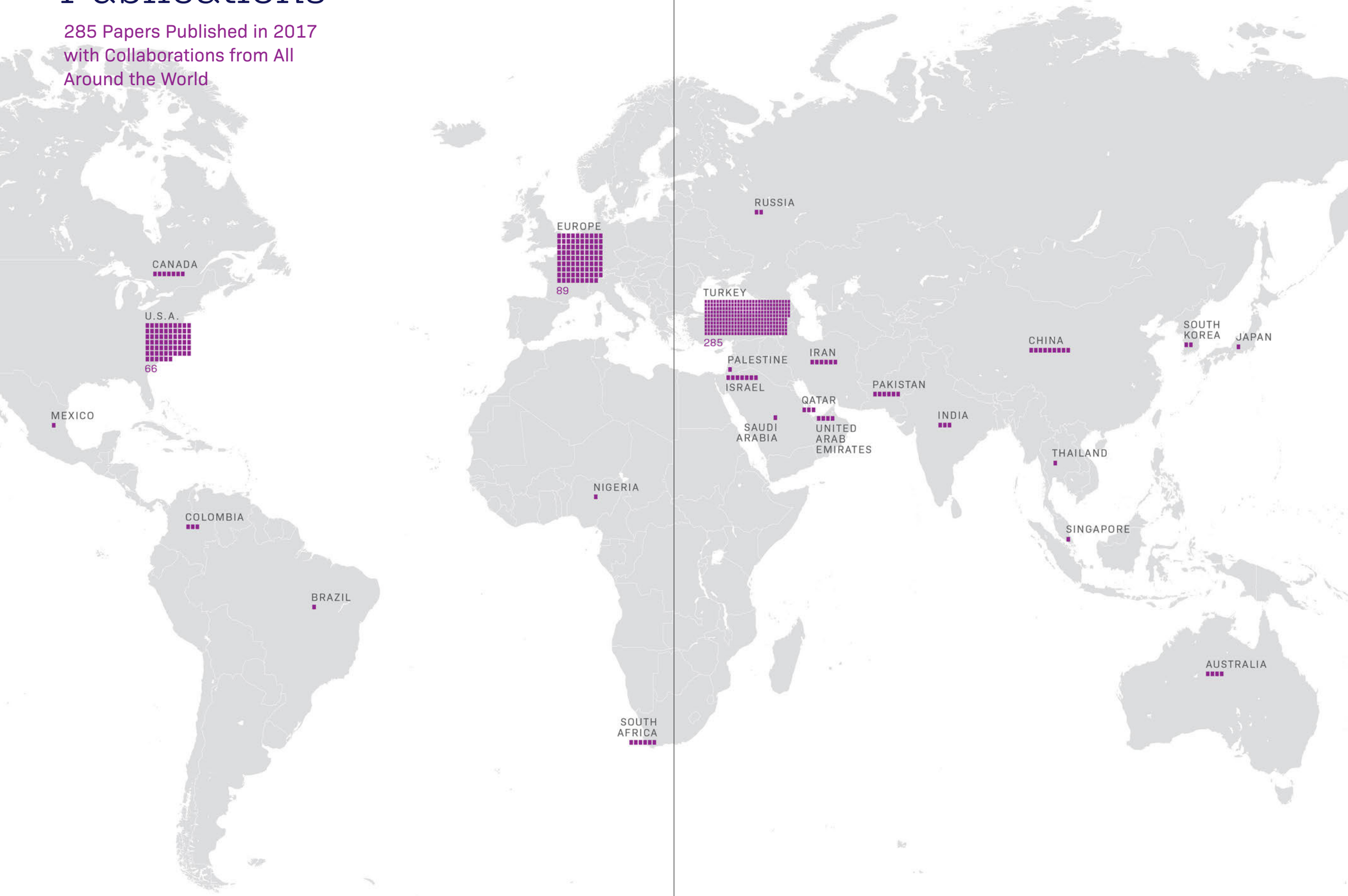
Web of Science Categories

33	ENGINEERING ELECTRICAL ELECTRONIC
23	MATERIALS SCIENCE MULTIDISCIPLINARY
22	OPERATIONS RESEARCH MANAGEMENT SCIENCE
19	MATHEMATICS APPLIED
18	MULTIDISCIPLINARY SCIENCES
17	COMPUTER SCIENCE INFORMATION SYSTEMS
16	ASTRONOMY ASTROPHYSICS
16	CHEMISTRY PHYSICAL
15	MATHEMATICS
14	ENGINEERING MECHANICAL
14	TELECOMMUNICATIONS
12	CHEMISTRY MULTIDISCIPLINARY
12	INSTRUMENTS INSTRUMENTATION
12	PHYSICS APPLIED
12	PLANT SCIENCES
11	COMPUTER SCIENCE THEORY METHODS
11	ELECTROCHEMISTRY
11	ENGINEERING MANUFACTURING
10	COMPUTER SCIENCE ARTIFICIAL INTELLIGENCE
10	ENERGY FUELS
10	NANOSCIENCE NANOTECHNOLOGY
9	COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS
9	COMPUTER SCIENCE SOFTWARE ENGINEERING
9	THERMODYNAMICS
8	AGRONOMY

89 Papers Published in 2017
with Collaborations from Europe

Publications

285 Papers Published in 2017 with Collaborations from All Around the World



Patents

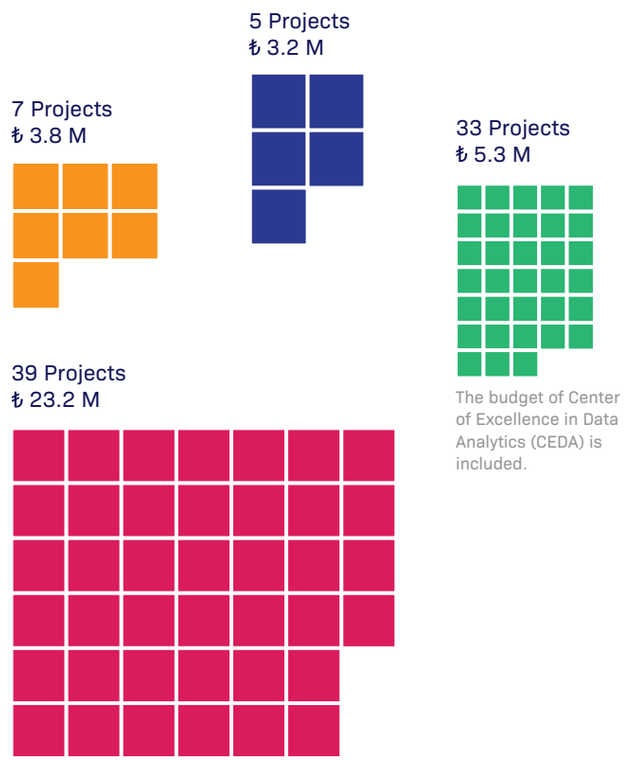
	INVENTORS
Multifunctional Tools For Endoscopic Surgery	Meltem Elitaş
Additive For Suspensions	Özge Akbulut, Yusuf Menceloğlu
A Micromixer Based Hydrodynamic Cavitation	Ali Koşar
Nanoplasmic Device With Nanoscale Cooling	Ali Koşar,Kürşat Şendur
Pharmaceutical Drug Delivery System	Ali Koşar
Artificial Hollow Biological Tissue Network And Method For Preparation Thereof	Bahattin Koç
Stable Electrospinning Composition For Stable Nano/ Submicrostructure Production And Preparation Method Thereof	Melih Papila, Yusuf Menceloğlu
Method For Production Of Three-Dimensional Closed Graphene-Based Nano/Micro Structures	Yusuf Menceloğlu, Mehmet Yıldız, Burcu Saner Okan
Self-Healing System Comprising Logitudinal Nano/Microstructures And Method Of Production Thereof	Yusuf Menceloğlu, Mehmet Yıldız, Melih Papila, Volkan Özgüz, Burcu Saner Okan
Food Packaging Material with Antibacterial, Ethylene Scavenging and Barrier Properties	Yusuf Menceloğlu, Fevzi Çakmak Cebeci, Hayriye Ünal, Serkan Ünal
Variable Negative Stiffness Actuation	Volkan Patoğlu
A Series Elastic Holonomic Mobile Platform For Upper Extremity Rehabilitation	Volkan Patoğlu
Exoskeleton	Volkan Patoğlu
Large Format Short Wave Infrared (SWIR) Focal Plane Array (FPA) With Low Noise And High Dynamic Range	Yaşar Gürbüz

Projects

Budget Source as of June 2018

- EU
- Non-Governmental Organizations/University/Other
- TUBITAK
- Business Enterprises

FACULTY OF ENGINEERING AND NATURAL SCIENCES



The budget of Center of Excellence in Data Analytics (CEDA) is included.

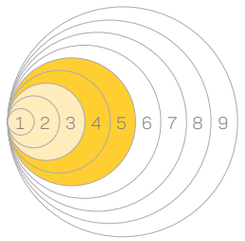
FACULTY OF ENGINEERING AND NATURAL SCIENCES
&
SABANCI UNIVERSITY NANOTECHNOLOGY RESEARCH AND APPLICATION CENTER (SUNUM)

Our Stories

FD radio development and test set-up

Single Antenna Full Duplex Radio

Prof. Özgür Gürbüz
Prof. İbrahim Tekin

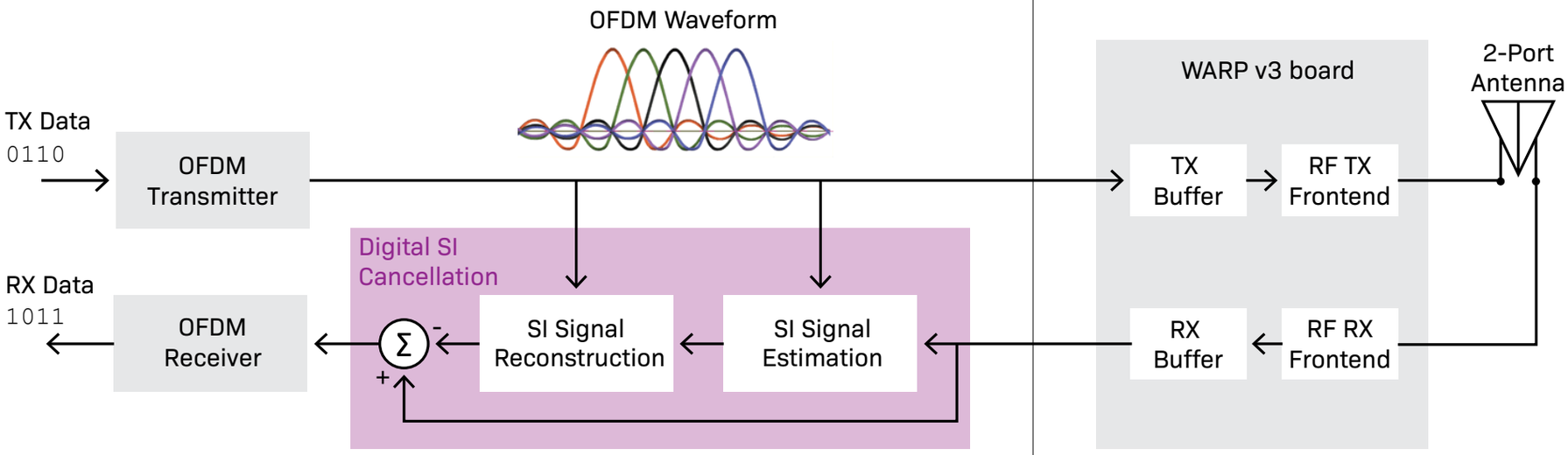


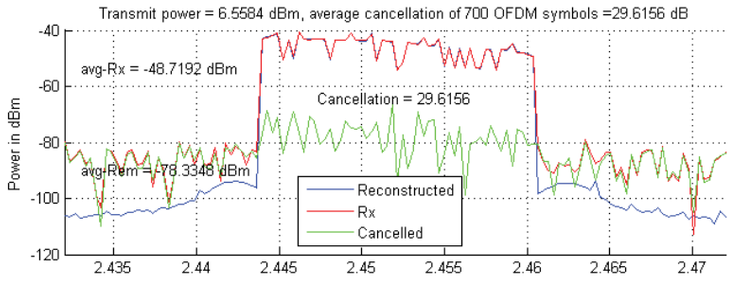
A taboo in wireless communications is that a radio cannot transmit and receive on the same frequency at the same time, due to high self-interference (SI) observed in the receiver.

Recent research has broken this taboo, proving the feasibility of full duplex (FD) communication, i.e., simultaneous transmit and receive in the same band, by employing SI cancellation techniques at different levels. Promising doubled wireless channel capacity and higher gains at the system/network level, FD communication has become one of the candidate technologies for 5G wireless systems.

Prof. Özgür Gürbüz and Prof. İbrahim Tekin from the EE program have designed and successfully implemented a novel low complexity FD radio in the 2.4 GHz band, employing only a monostatic antenna with digital self-interference cancellation techniques.

Prof. Tekin's antenna design approach provides very high isolation between antenna ports and eliminates use of the RF circulator/duplexer/diplexer structures in the full duplex radio, which is a significant advantage over existing designs. With this approach, novel antennas have been designed for differential and double differential feed using dual polarizations, and 70–80 dB isolation





Digital self-interference cancellation for FD radio

levels are obtained for the first time in the literature. Prof. Gürbüz led the work on digital SI cancellation algorithms, which estimate the SI signal and perform reconstruction at the baseband level on a software defined radio (SDR) set up. With the proposed algorithms, up to 35 dB digital SI cancellation is obtained, in addition to 5–7 dB improved performance under multi path channel, while requiring one third of the computational complexity, as compared to existing, state-of-the-art methods.

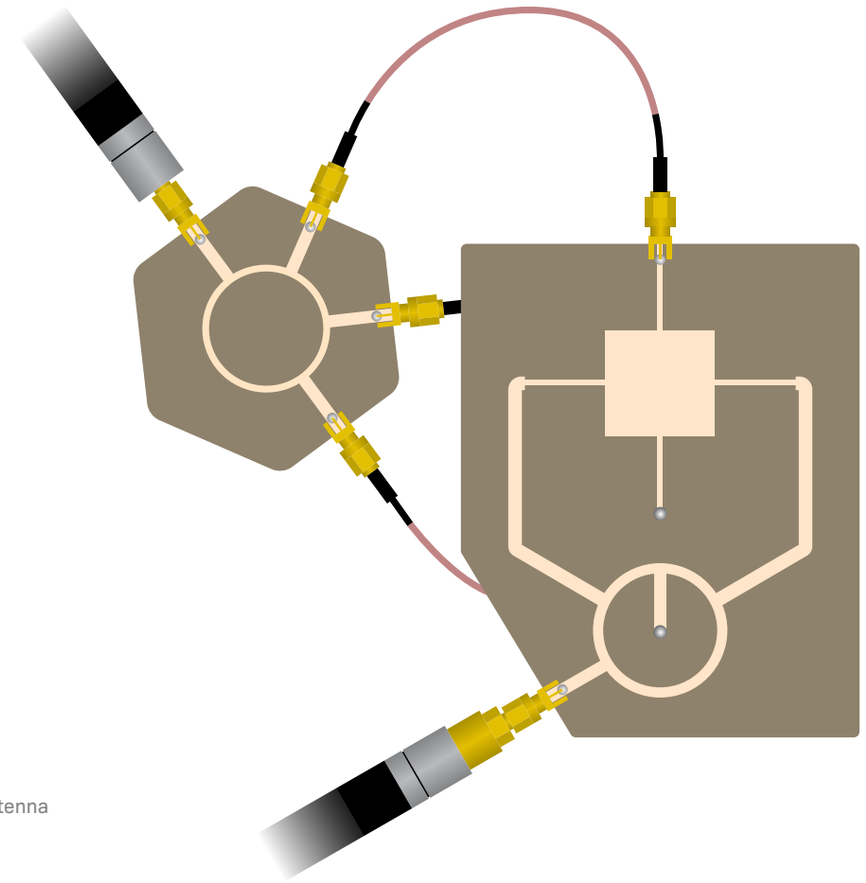
For our FD radio, the designed antennas and SDR with digital algorithms have been integrated and total SI cancellation of up to 100 dB has been measured, ensuring successful FD communication in short and medium range distances. Our team is currently working on a prototype to demonstrate real-time FD communication, as digital cancellation algorithms have been implemented on the FGPA on the SDR board.

Prof. Gürbüz has also worked on network algorithms/protocols to enable and utilize FD communication in wireless networks, including medium access control (MAC), power control and routing schemes, some of which can be implemented on our FD radio prototype. Our proposed FD MAC protocol has been recently reported as one of the candidate protocols by the IEEE 802.11 (Wi-Fi) FD task group.

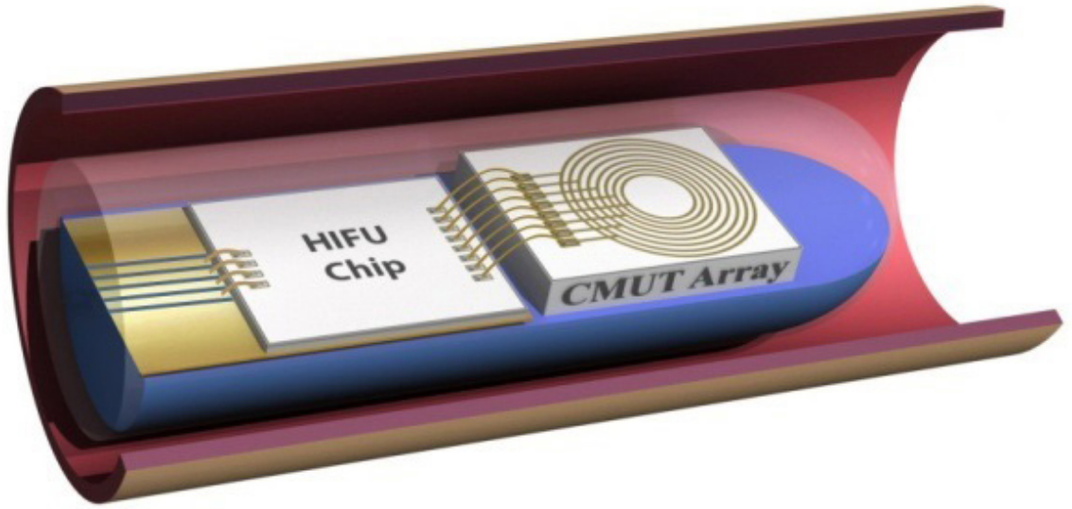
Three PhD and three MS students' theses are based on our works on FD radio and FD communications. In addition to numerous journal articles and conference proceedings, our works resulted in two patent applications, one of which has been approved by the European Patent Office. ■

With our single antenna FD radio, we achieved total SI cancellation of up to 100 dB, which ensures successful FD communication in short and medium range distances.

— Prof. Gürbüz, Prof. Tekin

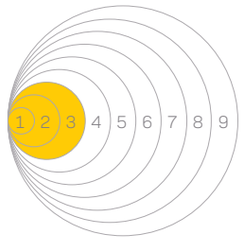


Double differential antenna designed for FD radio



An Intravascular HIFU Device

Dr. Ayhan Bozkurt (SÜ)
Dr. Arif Sanlı Ergün (TOBB-ETU)



The Acoustics Group of the EE Program has developed a Capacitive Micromachined Ultrasonic Transducer (CMUT) based High Intensity Focused Ultrasound (HIFU) device to be used for catheter based ablation.

CMUTs manufactured at Sabancı University Nanotechnology Research and Application Center (SUNUM) operate at 8 MHz, and comprise 8 concentric rings facilitating axial focusing. Each array element hosts about 150–160 cells of 44 μm diameter. Transducers are made of 2 μm thick Silicon Nitride membranes on a 200 nm vacuum gap, which incorporate buried Au drive electrodes. The device has a useful depth range of 6 mm with a focal spot size of less than a millimeter.

The intended use of the device, which can fit onto a Fr6 catheter, is to perform heating at locations that can be reached through blood vessels, which include the treatment of abnormal conduction fibers in the heart through ablation, or reduction of the blood brain barrier for targeted chemotherapy.

The functionality of the integrated system, which includes the transducer and a driver IC has been proven by IR thermography. Tests revealed that the temperature at the focal point rises by 13°C

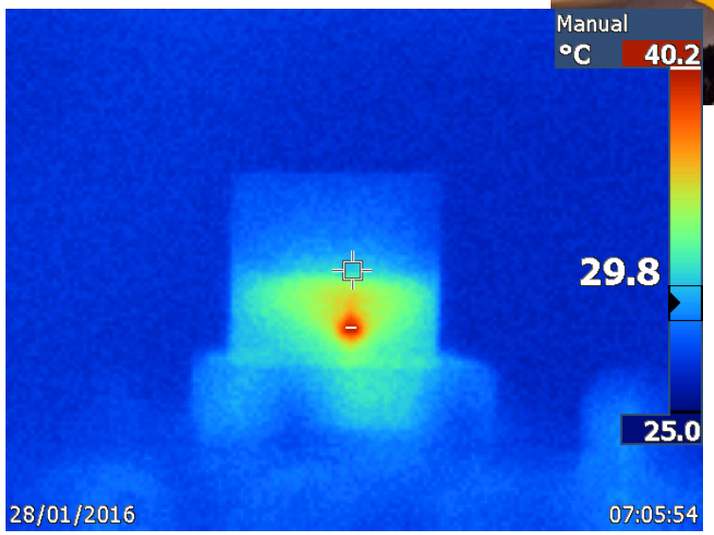
in about 10 seconds, which is capable of delivering the required CEM43°C thermal dose for therapeutic ablation.

During CMUT fabrication, a “buried electrode” technique was developed which led to a substantial improvement in the output sensitivity of the device.

The project was led by Dr. Ayhan Bozkurt (SÜ), Dr. Arif Sanlı Ergün (TOBB-ETU), and formed the PhD thesis topics of Dr. Omid Farhanieh and Dr. Rupak Barhan Roy. ■

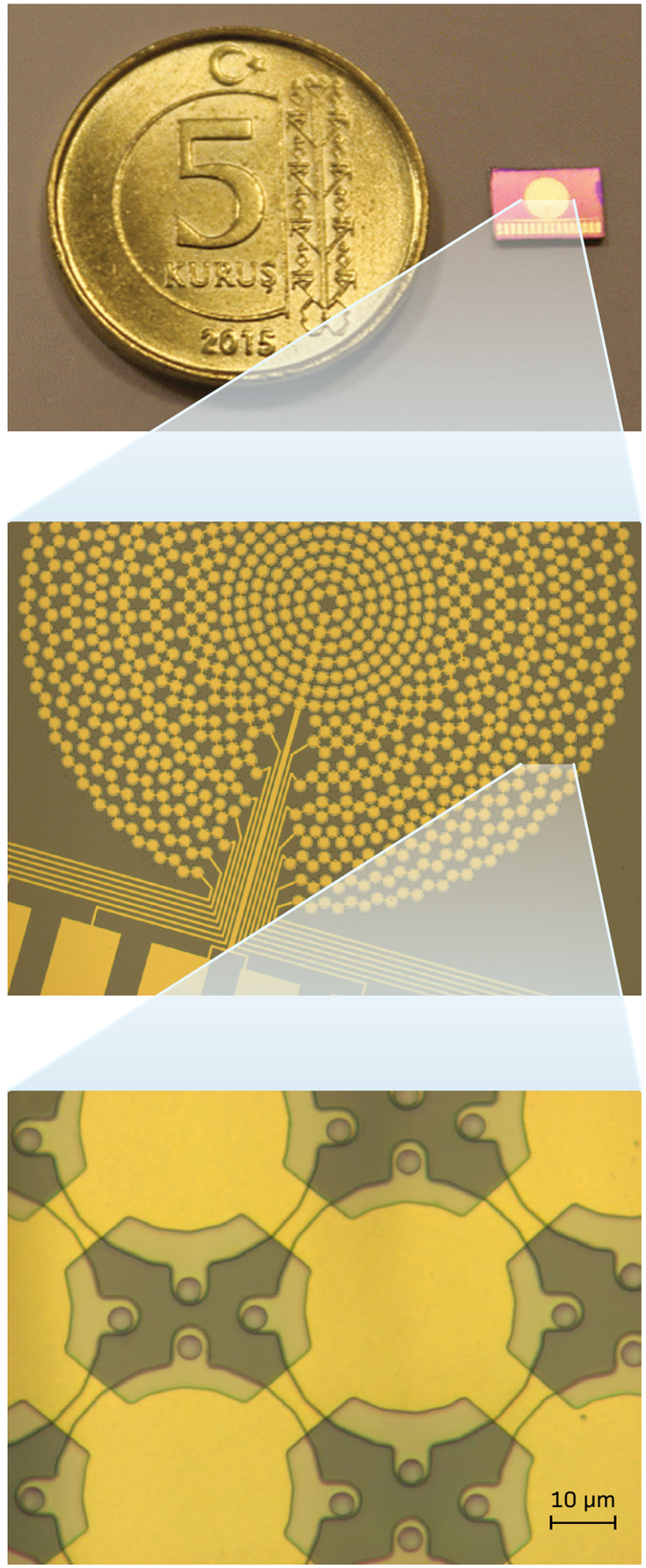
Our device can perform high accuracy ablation at externally unreachable body parts.

— Prof. Bozkurt



Devices are tested by IR thermography

Therapeutic thermal dose is achieved within the safe operating period of the device.



Awards & News

MURAT GENÇ'S NEW POSITION

Murat Genç (BS CS, 2004) is appointed as Director, Global Digital Marketing, Ecommerce, CRM and Media Information Technology.

DUYGU KARAOĞLAN ALTOP WON THE "CYBER SECURITY DOCTORATE AND GRADUATE DISSERTATION PRIZE"

Sabancı University Faculty of Engineering and Natural Sciences visiting faculty member Duygu Karaoğlan Altop (CS PhD, 2017) won the inaugural "Cyber Security Doctorate and Graduate Dissertation Prize" held by association with the Public Cyber Security Society.

Duygu won the prize with her dissertation under advisor Professor Albert Levi on Security for Body Area Networks.

SABANCI UNIVERSITY WON PRIZES IN THE "WOMAN TECHNOLOGY LEADERS COMPETITION"

Sabancı University won a number of prizes in the "Woman Technology Leaders Competition" held by Microsoft to recognize women working on technology in Turkey.

Sabancı University Faculty of Engineering and Natural Sciences member Dr. Esra Erdem received the "Woman Leader Making a Difference with New Technologies" category award, Professor Şirin Tekinay received the "Woman Instructor of the Year" category award.

Computer Science and Engineering Senior student İpek Ganiyusufoğlu was a finalist in the "Emerging Technology Stars" category.

APPLICATION THAT COMBINES POETRY WITH ENGINEERING

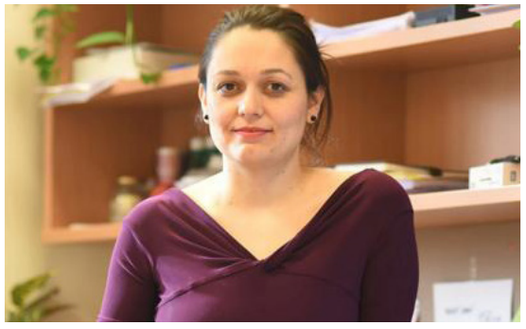
Computer Science and Engineering Senior student Emre Şahiner designed an application that matches colors to emotional states for poetry lovers.

ZEHRA SAYERS RECEIVED THE 2017 RAMMAL MEDAL AT A CEREMONY IN FRANCE

The Rammal Medal recognizes a scientist, group of scientist or an institution for outstanding contributions to science in the Mediterranean region, and its 2017 recipient Professor Zehra Sayers, President of Sabancı University, was also the Chair of the Scientific Advisory Committee of SESAME between 2002 and 2018. The 2017 and 2018 Rammal Medals were presented at ESOF2018, the EuroScience Open Forum, that took place in Toulouse, France between July 9 and 14, 2018 with more than 4000 participants. Rammal Medal Jury Chair Prof. Lauritz Holm-Nielsen emphasized Prof. Sayers' pioneering work in EMBL (European Molecular Biology Lab) Hamburg, her contributions to the foundation of Sabancı University, and her groundbreaking work in establishing the field of structural biology in Turkey.

SELMİYE ALKAN GÜRSEL RECEIVED THE ACADEMIC PRIZE IN THE WOMEN ENERGIZING TURKEY AWARDS

The Women Energizing Turkey Awards were endowed under the auspices of Minister of Energy and Natural Resources to raise awareness in the society about woman academics, professionals and entrepreneurs that serve the energy industry across Turkey. In introductory remarks by Jury President Güler Sabancı delivered that more than 200 submissions were received for this year's awards.



HOME TEST FOR GMO

A research group led by Dr. Meltem Elitaş developed a biosensor detecting the presence of Genetically Modified Organisms (GMO). The sensor will be able to detect GMO in baby food, animal feed and other allergenic food products in 30–40 minutes. Researchers aim to turn the sensor into a final product in 2 years.

Awards & News

ENTREPRENEURSHIP “HACKQUARTERS”

Kaan Akın (BS ME, 2010) gratefully acknowledges the flexibility and the visionary perspective offered by the multidisciplinary structure of Sabancı University (SU) via which, he proudly says, he was able to come up with the core idea of “Hackquarters” (https://hackquarters.co/). They help startups find their potential while contributing to corporates to perceive and bring forward their innovative ideas into real world applications. Through their pioneers’ program, Hackquarters lends students a helping hand to be a founder or to join a startup. Hackquarters’ area of expertise is diversified ranging from blockchain and artificial intelligence to biotechnology and cybersecurity. “80% of the job areas in the coming decade will be pertinent to the concepts that we have not yet been familiar with,” says Akın. “To cope with such uncertainty, continuous and collective improvement of individuals are utmost important; and this is where SU’s invaluable support to entrepreneurship programs play a vital role in addition to its core science and engineering education,” he adds.

WORLD’S HIGHEST-RESOLUTION “GRAPHENE-BASED OLED SCREEN” DEVELOPED

A research team headed by İsmet İnönü Kaya (http://people.sabanciuniv.edu/~iikaya/), member of the Faculty of Engineering and Natural Sciences of Sabancı University, has developed a graphene-based screen prototype that has the highest pixel resolution in any graphene-based screen so far. The prototype has been developed under the project named “Elmas” which was funded by the Undersecretariat for Defense Industries in partnership with ASELSAN. The team includes project engineers Süleyman Çelik, Hasan Özkaya, and Dr. Sibel Kasap; graduate students Hadi Khaksaran, Vahid Ardakan, and Abdülkadir Canatar; and a recent graduate, Dr. Cenk Yanık. The project uses graphene instead of indium tin oxide (ITO), which is the default material for anodes in OLED screens. Graphene is expected to play a key part in flexible screens and wearable technologies in the coming years due its translucency, high electrical conductivity, resilience, and flexibility.

ENTREPRENEURSHIP “VIDCO”

Multidisciplinary educational system of Sabancı University (SU) has paved the way for Fatih Demirkan (CS ’10). He came up with the name Vidco (Very Important Dreams COmmunity) Software while he was an undergraduate student at the Faculty of Engineering and Natural Sciences. Upon graduation, he teamed up with another SU graduate and founded Vidco (https://www.vidco.com.tr/) to develop database infrastructures on the web, mobile and social platforms. To date, the company has served over 160 customers and completed more than 200 projects specializing in content management for business-to-business applications. “Vidco’s products are the result of a policy that dictates continuous investment on research and development” says Demirkan, “rather than overnight and ad-hoc work that produces unsustainable service environment.” As a young entrepreneur, he puts his time and effort to cultivating other young entrepreneurs through Vidco’s support program.

THE “METU PROFESSOR MUSTAFA PARLAR FOUNDATION 2017 AWARDS”

As part of the METU Professor Mustafa Parlar Foundation (http://parlar.org.tr/) 2017 Awards, the Research Encouragement Prize was given to Sabancı University Faculty of Engineering and Natural Sciences member Dr. Nilay Noyan, the Technology Encouragement Prize was given to SUNUM Researcher Dr. Tolga Sütlü, and another Technology Encouragement Prize was given to the SUTAB (Sabancı University Tissue Ablating Bubbles) Team consisting of Faculty of Engineering and Natural Sciences members Dr. Ali Koşar, Dr. Asif Sabanovic, Dr. Devrim Gözüaçık and Dr. Mustafa Ünel, SUNUM Researcher Dr. Özlem Kutlu, Hisar Hospital Physician Dr. Sinan Ekici, Yıldız Technical University faculty Dr. Hüseyin Üvet, and Yeni Yüzyıl University faculty Dr. Cenk Kığ. The METU Professor Mustafa N. Parlar Education and Research Foundation awards recognize the endeavors and certify the competencies of researchers and scientists in all branches of science to encourage their work and to motivate younger generations to get involved in science.

Awards & News

GÜVENÇ ŞAHİN WAS AWARDED THE HUMBOLDT FELLOWSHIP

Humboldt Fellowship for Experienced Researchers Awards are given by the Alexander von Humboldt Foundation to support researchers outside Germany in their work with research institutions in Germany. The awards aim to enable researchers to carry out their proposed work in an institution that provides the needed research facilities. Faculty Member Güvenç Şahin will conduct his research on urban transport planning problems and multi-term optimization problems in collaboration with Zuse Institute Berlin's Mathematics of Transportation and Logistics group at intervals over the next three years.

NEW NOVEL TRANSMITTER PROTECTS WIRELESS FROM HACKERS

Sabancı University Faculty of Engineering and Natural Sciences alumnus Rabia Tuğçe Yazıcıgil developed a novel type of transmitter at Massachusetts Institute of Technology (MIT) during her post-doctoral studies. With the current advancements towards 'internet of things', millions of devices (vehicles, home appliances, medical devices, etc.) are connected to each other forming a network; thus, vulnerable to cyber-attacks. To protect the wireless data from hackers, the developed device uses ultrafast "frequency hopping" and data encryption. The initial applications of this technology could involve securing smart meters that read home utilities, control heating, or monitor the grid.

VORTEX ENERGY AIMS TO GLOBALIZE IN CLEAN ENERGY

Vortex Energy is a startup that has been established by Sabancı University (SU) Faculty of Engineering and Natural Sciences (FENS) alumni Ahmet Şahinöz, Ömer Güven, and Nuh Conağası. The company develops an environmentally friendly vertical axis wind turbine to harvest on-site wind energy in residential areas. The idea has started after Ahmet Şahinöz started to work in a course project proposed by FENS faculty member Serhat Yeşilyurt; but it continued to flourish rapidly after Industrial Engineering students Ömer Güven and Nuh Conağası joined the team. They constructed the startup, Vortex Energy, with TUBITAK 1512 funding. The company is planning to introduce their product into the European market around 2020.

'BONİ'NİN KUTUSU' SUPPORTS CHILDREN'S PSYCHOLOGICAL AND PHYSICAL DEVELOPMENT

'Boni'nin Kutusu' is a monthly delivered activity box for children between 6–9 years old. The founder of the company, İdil Öksüz, is an alumnus of Sabancı University, Industrial Engineering Program. After graduation, she continued her graduate studies in the United States and then started working in a startup on monthly delivered activities for children. She saw the opportunity to introduce this idea in Turkish market and founded the company 'Boni'nin Kutusu'. The monthly packages are aimed to engage children more in the real world rather than screen. These activities are designed either for children to complete on their own to improve their confidence, or with their parents to spend quality time together.

Awards & News

A TURKISH HANDWRITING RECOGNITION SYSTEM

A team led by Berrin Yanıkoğlu, Member of the Faculty of Engineering and Natural Sciences, developed a Turkish handwriting recognition system to be used as part of the "Development and Application of Handwriting Recognition Technologies for Use in Intelligent Classrooms" project.

The project aims to contribute to the Improvement of Opportunities and Technologies in Education, which is an initiative taken by Turkish Republic Ministry of Education. The developed handwriting recognition system will help users in providing e-content based on teaching technologies.

The developed system can recognize the writings made using a stylus on a touch screen. The project enhances human-machine interaction as in speech recognition by contributing the development of technologies such as Optical Character Recognition (OCR) and Intelligent Character Recognition (ICR), which are in the focus since 1960s.

Compared to recognition of English, which has been incorporated into tablets and phone since 2000s, recognition of Turkish language is more complicated due to agglutinative morphology, where the words can be extended by having more suffixes such as "gitti, gittim, gittiler", which extends the number of available versions of the words in the so-called vocabulary.

The system is known as the most advanced for Turkish, which is intended to be used by primary school students. However, it is yet to be in product phase.

THE "INNOVATION PRIZE"

Ergi Şener got BSc in Microelectronics Engineering and MSc in Industrial Leadership in Electronics Engineering and Computer Science both from Sabancı University in 2005 and 2007, respectively. He is the founder and CEO of Bonbon Tech, a technology company in retail analytics.

Ergi was invited as an honorary guest to the 4th Big Data Analysis and Data Mining Conference, where he was awarded with the Innovation Prize. A product of the Bonbon Tech, the BonAir App was featured as a case study at the same conference at an international journal.

ENTREPRENEURSHIP "SORU.AI"

SORU.AI company which was founded in Silicon Valley by Emre Ertan, 2010 graduate of Manufacturing Systems and Engineering from Sabancı University, and his partner Ertan Dogrultan got investment of 500.000 USD with an evaluation of 6 million USD.

SORU.AI, which can be considered as artificial intelligence based work analyst, was established in July 2017 with aim of advising companies towards development by performing data analysis in an automated fashion.

The employees of SORU.AI customers can use the interface as if they are talking to a human thanks to the natural language processing interface. SORU.AI can perform several analyses in an automated manner by collecting the data related to the company through the application programming interfaces, which included preparation of the sales, marketing and financial reports, identification of customer groups through behavioral analysis.

THE IEEE TURKEY PHD DISSERTATION AWARD

Süheyla Çetin Karayumak, 2016 PhD Graduate of Computer Science from Sabancı University won the IEEE Turkey PhD Dissertation Award.

The IEEE Turkey PhD Dissertation Award is given to outstanding young scientists who have completed their PhDs in a university in Turkey within the last two years in one of the areas of activity of IEEE.

Süheyla Çetin Karayumak completed her PhD in 2016 at Sabancı University under the supervision of Gözde Ünal. In her PhD studies, she developed new mathematical solutions to complex medical imaging problems by developing machine learning algorithms.

By using fast and practical segmentation methods, Suheyla contributed to mapping vessel structure from variety of medical imaging methods. Towards the end of PhD studies as she focused on neuroimaging and more specifically diffusion magnetic resonance imaging (dMRI) and white matter analysis, her effort led to an method to model the asymmetry of white matter fibers. This may be a good step forward in diagnosing neurological disorders.

Suheyla is currently working as a postdoctoral researcher, since 2016, at Harvard University Medical School Physchiatric Neuro-Imaging Lab.

Awards & News

MOBILE APPLICATION TO HELP DYSLEXIA

Ph.D. student Günet Eroğlu developed a mobile application “Auto Train Brain” oriented towards dyslexic children with difficulties in learning. The application, supported by the Dyslexia Association, has got the Clinical Research Ethical Approval. It was tested with over 1000 healthy and 17 dyslexic people and improvement in cognition performances was observed after 20 uses. Auto Train Brain mobile application is available at Google Play Store and App Store.

NASA AND ESA SATELLITE TELESCOPES OBSERVING A BLACK HOLE

A research team led by Dr. Emrah Kalemci observed a black hole system named MAXI J1820+070 simultaneously with the European Space Agency (ESA) gamma-ray satellite INTEGRAL, NASA X-ray satellite SWIFT, and Tübitak National Observatory telescopes. The aim of the observations was to determine the environment around these exotic objects when they are about to send large amounts of matter with speeds close to the speed of light back into the interstellar space. Well-coordinated observations in infrared, visible, X-ray and gamma-ray (different types of emitted energy as light) led the team to determine the temperature and energy distribution of particles in this extreme environment, and the findings have been sent to Monthly Notices of Royal Astronomical Society for publication.

UNUSUAL INFRARED LIGHT EMISSION FROM A NEUTRON STAR

A research team including Sabancı University Faculty Member Dr. Ünal Ertan and Foundations Development Program Faculty Member Dr. Şirin Çalışkan observed an extended area of infrared emissions around a neutron star named RX J0806.4-4123 using NASA’s Hubble Space Telescope. The observation by Sabancı University faculty together with researchers at Pennsylvania State University, and the University of Arizona was published in the Astrophysical Journal. The researchers suggest two possibilities that could explain the extended infrared signal. The first is that there is a disk of material surrounding the neutron star after the supernova. In this model, the source of the emissions is the core of the disk that is closest to the star. Although the area is much smaller than the observed source, the infrared radiation generated there may scatter and reflect on the outer disks, which leads to an image that is the observed emission.

New Program
Cyber Security

Cyber security has emerged as an important discipline with its central position in the intersection of computer science, electronic engineering, and mathematics.

Cyber attacks and threats have been escalating their negative impact on IT infrastructures, and this trend is expected to result in much more serious consequences in every aspect of society from the financial industry to critical infrastructures in the future.

On the other hand, the paucity of cyber security professionals, experts, and academics still remain the major obstacle to sustain meaningful strategies and deploy effective countermeasures to overcome cybersecurity threats.

Cyber Security Graduate Program

- Master’s Degree for Professionals
- Master Program with Thesis
- PhD Program

→ **Program website:** https://sec.sabanciuniv.edu/

Alumni in Academy

Dr. Zeynep Temel (ME PhD, 2013) is an Assistant Professor in the Robotics Institute at the Carnegie Mellon University.

Canan Dagdeviren (MAT MSc., 2009) started at a Faculty position in the EECS Department at MIT and in the MIT Media Lab in January 2018.

Serap Aksu (MAT BSc, 2008) is an Assistant Professor at Koç University.

Dr. Elif Özden Yenigun (MAT PhD, 2013) is Senior Tutor in textiles at the Royal College of Art.

Ahu Gümrah Dumanlı (MAT PhD, 2008) is a Faculty Member in Imperial College London.

Kübra Kalkan Çakmakçı (CS MSc, 2011) is an Assistant Professor at Ozyegin University.

Aycan Adrian Corum (EE MSc, 2012) is a Faculty Member at Cornell University.

Rabia Tugce Yazicigil (EE BS, 2009) is an Assistant Professor (ECE) at Boston Universtiy of Engineering.

Ece Gelal (Telecommunications BS, 2004) is an Assistant Professor at Bahçeşehir University, Faculty of Engineering and Natural Sciences, Computer Engineering Department.

Aydın Aysu (EE MSc, 2010) is an Assistant Professors at Electrical and Computer Engineering department of North Carolina State University.

Outreach Activities

Communicating Science

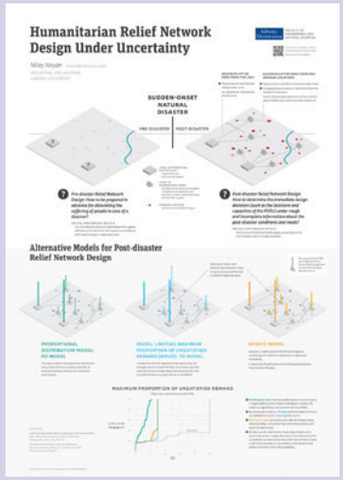
Communicating Science aims to lower the language barriers to create a two-way communication between scientists and the public. We have realized that the most efficient platform of communication emerges when the experts cope with the challenge of answering a diverse set of questions by nonexperts.

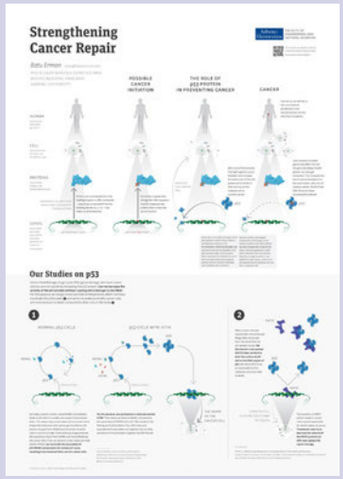
We desire to multiply our communication channels to include all layers of the public and to have the society's engagement in the science-engineering-technology ecosystem.

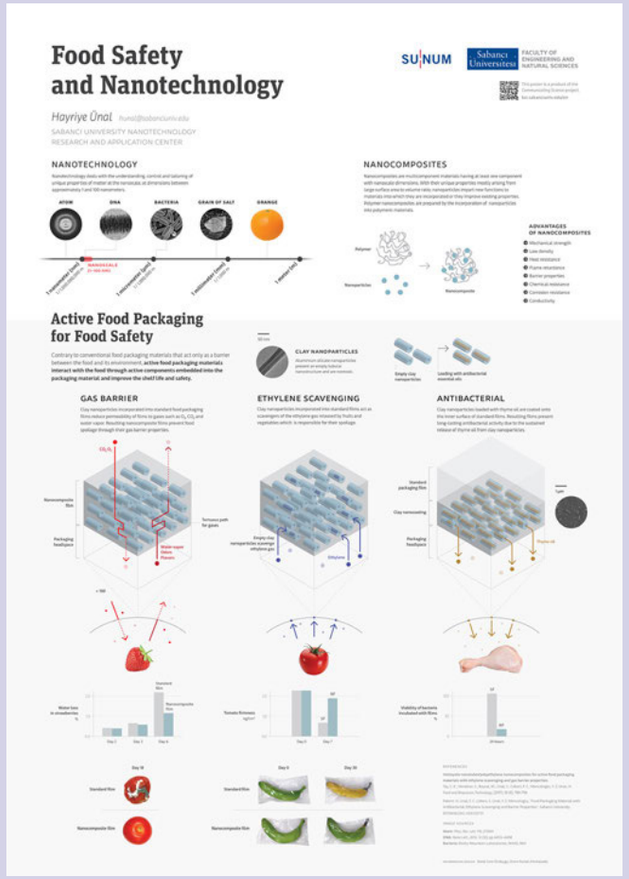
Deniz Cem Önduygu and Emre Parlak, who have graduated from Sabancı University and work on information design, are part of our team.

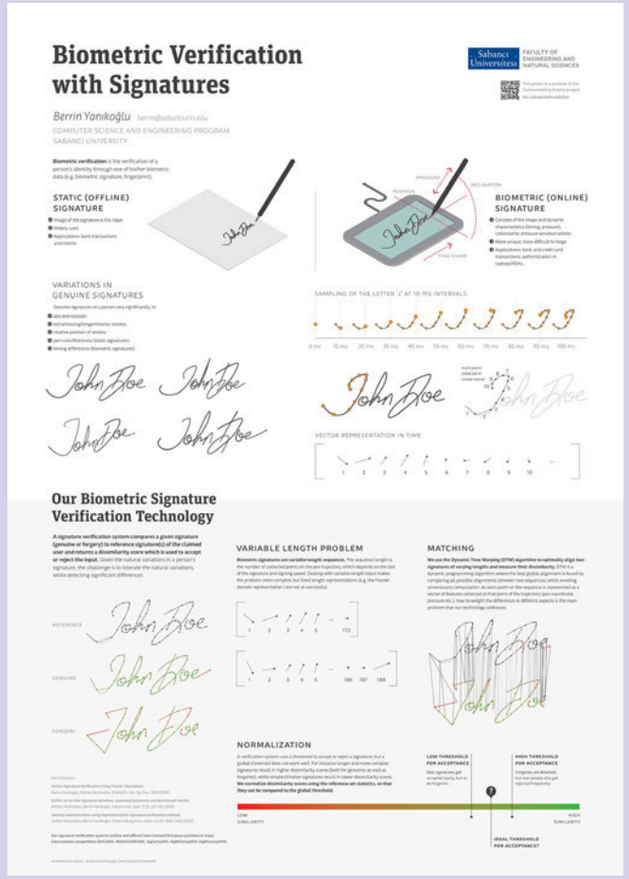
→ **You can see everything we create on the project's website: http://bsi.sabanciuniv.edu/en**

We made our first video (in Turkish) for Hayriye Ünal's "Food Safety and Nanotechnology". You can watch it on Youtube by clicking on the image.









We added two new posters to our series this year: "Food Safety and Nanotechnology" (Hayriye Ünal) and "Biometric Verification with Signatures" (Berrin Yanıkoğlu).

Our Awards

3MT THREE MINUTE THESIS AWARDS

The second Three Minute Thesis (3MT®) competition was hosted by Sabancı University on May 9, 2018. Founded by the University of Queensland Australia, the competition was carried out by the Sabancı University Faculty of Engineering and Natural Sciences Research Awards Committee.

The jury members of the competition were VSY Biotechnology ve İlaç Sanayi A.Ş. CEO Ercan Varlıbaş, Sabancı University Faculty of Engineering and Natural Sciences Member Hasan Sait Ölmez, Digital Transformation Advisor and Lecturer at Bilgi and Bahçeşehir Universities Kozan Demircan, Sabancı University Faculty of Arts and Social Sciences Member Murat Germen and Sabancı University Vice President of Research and Development Şirin Tekinay.

WINNER PRIZE

Ebru Demir, 3 MT 2018 winner, Mechatronics Engineering PhD, "Low Reynolds Number Swimming of Helical Structures and Rigid Spheres"

RUNNER-UP PRIZE

Atia Shafique, 3 MT 2018 Runner-Up, Electronic Engineering PhD, "Modelling and characterization of High TCR Low Noise Si/Si1xGex Multi-Quantum well Module for Uncooled Microbolometers"

PEOPLE'S CHOICE PRIZE

Ali Asgharpour, 3MT 2018 People's Choice, Physics PhD "Spin transistor based on Exotic materials "

→ **Please visit the 3MT Awards** website for more information about the competition.

SAKIP SABANCI AWARD FOR THE HIGHEST RANKING UNDERGRADUATE STUDENT

Winner is Mehmet Oğuz Gök who graduated from the Molecular Biology, Genetics and Bioengineering Program.

GÜRSEL SÖNMEZ AWARDS

The "Gürsel Sönmez Awards" established in 2006 in memory of the Faculty of Engineering and Natural Sciences member and valued scientist Gürsel Sönmez were given for the 12th time this year.

To commemorate his achievements and to inspire and encourage young scientists, an award is presented each year to selected graduate students of FENS who write distinguished MS or PhD theses. The selection process is pursued at the end of each academic year, by the Gürsel Sönmez Award Committee formed by faculty members representing each program.

The following students are the recipients of the Gürsel Sönmez Research Award in 2017–2018.

Ahmad Reza Motezakker, Mechatronic Engineering Graduate Program 2017–2018 Spring Semester candidate.

Behzad Sardari Ghojehbeiglou, Electronic Engineering PhD Program 2016–2017 Spring Semester graduate.

Çağatay Yılmaz, Materials Science and Engineering PhD Program 2017–2018 Spring Semester candidate.

Ebru Demir, Materials Science and Engineering PhD Program 2017–2018 Spring Semester candidate.

→ **Please visit the "Gürsel Sönmez"** website for more information about the competition.

Our Awards

FENS EXCELLENCE IN TEACHING AWARDS 2018

We are delighted to announce our outstanding graduate students FENS Teaching Award recipients. The recipients, their programs and the courses they supported are as follows:

Siamak Naderi Varandi
Industrial Engineering, PhD Student
IE 405 - Decision Analysis

Alihan Çelik
Industrial Engineering, MSc Student
ENS 480 - Analysis of Social Networks
IE 305 - Simulation

Gizem Acar
Electronics Engineering, MSc Student
EE 307 - Semiconductor Physics and Devices
MATH 201 - Linear Algebra

FACULTY of ENGINEERING and NATURAL SCIENCES CONNECTIONS

→ Learn about FENS: fens.sabanciuniv.edu

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Industrial Engineering ie.sabanciuniv.edu
Manufacturing Engineering mfg.sabanciuniv.edu
Materials Science and Nano Engineering mat.sabanciuniv.edu
Mechatronics me.sabanciuniv.edu
Molecular Biology, Genetics and Bioengineering bio.sabanciuniv.edu

Chemistry chem.sabanciuniv.edu
Energy energy-minor.sabanciuniv.edu
Mathematics math.sabanciuniv.edu
Physics phys.sabanciuniv.edu

Data Analytics da.sabanciuniv.edu
Energy Technologies and Management energy.sabanciuniv.edu
Information Technology msit.sabanciuniv.edu

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