FACULTY OF ENGINEERING AND ARCHITECTURE

BULLETIN

JULY 2023

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What you will read in this issue

TAG

NEWS FROM THE FACULTY

News From The Faculty

Civil Engineering

The "Area-Based Competency Analysis of Universities" report, prepared by the Scientific and Technological Research Council of Turkey (TUBITAK), in which the performance of universities in 21 main fields and 132 sub-research areas is evaluated based on research intensity and quality indicators, has been published.

Continuing many studies on contributing to the production of new technologies and developing projects that will benefit society, IGU took place in the top ten in Türkiye-General Quality Ranking with Broadband Technologies, Internet of Things, Robotics, Economics, Business Administration, Mass Communication, Energy Storage, Satellite and Launch Technology, and Civil Engineering sub-research areas.

Industrial Engineering

Industrial Engineering Department Board held a meeting on 20 July 2023. The meeting was chaired by head of Department Prof. Dr. Tarık Çakar. Evaluation of course success rates for the 2022-2023 Spring Semester, comparison of course success rates with the 2021-2022 term, evaluation of course / lecturer survey results, discussing the courses to be offered for the 2023-2024 fall semester undergraduate program have discussed at the meeting.

"Industrial Engineers Graduation Ceremony Held"

The 2022-2023 Academic Year Graduation Ceremony was to take place on July 19 at the Yahya Kemal Beyatlı Performance Center. We congratulate our Industrial Engineers and wish them success in their business life.

Industrial Engineering
Graduation Studies

2023 Industrial Engineering Graduate Ümit Can Kızılcan Applied Six Sigma Project Methodology in a Manufacturing Sector in his Graduation Project.

In the study, it was revealed that for organizations whose customer demands and requirements in the business world are constantly changing and quite high, organizations that want to gain competitive advantage because only producing and selling are not enough, must have a constantly evolving structure and exhibit a performance that exceeds customer demands. For this purpose, the project has been implemented using the Six Sigma (TÖAİK) method..

In the study, analyzes were performed with the MINITAB program. As a result of the study, in the business that was implemented:

- Deviations in cycle time were brought under control and time was saved.

- Improvements in the machine, capacity losses were prevented and the OEE value was increased.

Industrial Engineering
Graduation Studies

2023 Industrial Engineering Graduates Elif Nur Karagöz and Deniz Kartal studied the Analysis of Artificial Intelligence Detection and Cyber Security Attacks of IOT and IIOT Applications in Graduation Projects.

In the study, RPL protocol cyber attacks on IoT and IIoT devices were carried out in a simulation environment and data were obtained. The obtained data was transferred to expert cloud systems and cyber attack detection was carried out with artificial intelligence. The detected cyber attacks were classified by Fuzzy AHP, Fuzzy Electre and Fuzzy TOPSIS methods from Multi-Criteria Decision Making Methods.

In line with the results, it has been revealed that among the possible cyber attacks that can be carried out on the enterprise, it is the most correct option to prevent the Alternative 1 cyber attack.

With the prevention of Alternative 1, it is foreseen to ensure the continuity of the process flow and data security of the enterprise, with the continuity of the production and the continuity of the data flows without interruptions in the production process, by taking all the measures against the attack that can be carried out on the IoT sensor devices placed on the production lines in the smart factory.

Mechatronics Engineering

Prof. Dr. Bedri YÜKSEL, one of the faculty members of the department, together with the faculty members of Balıkesir and Bandırma Onyedi Eylül University, made a technical trip and made inspections at the ENERJİSA Bandırma Natural Gas Cycle Power Plants and the Solar Power Plant (GES) located in the same field. In the Bandırma district of Balıkesir, the natural gas combined cycle power plants commissioned by Enerjisa, one of the leading companies of our country, in 2010 and 2016, respectively (DGÇ1), have a capacity of 936 MW, and the second (DGÇ2) has a capacity of 607 MW. During the meetings, meetings were held with the power plant authorities on energy production and import, maximum utilization and production of renewable energy sources, energy saving and waste energy recovery. Collaborative working topics were explored.

Aeronautical Engineering

The 1st International Contemporary Research Conference ICRS 2023, has one of the academic staff of our department as the host, Dr. Samuel Moveh, and with the contributions of Prof. Dr. Oktay ÖZCAN, it was carried out successfully. Prof. ÖZCAN's research on "recent studies in advanced fluid dynamics" attracted great attention.
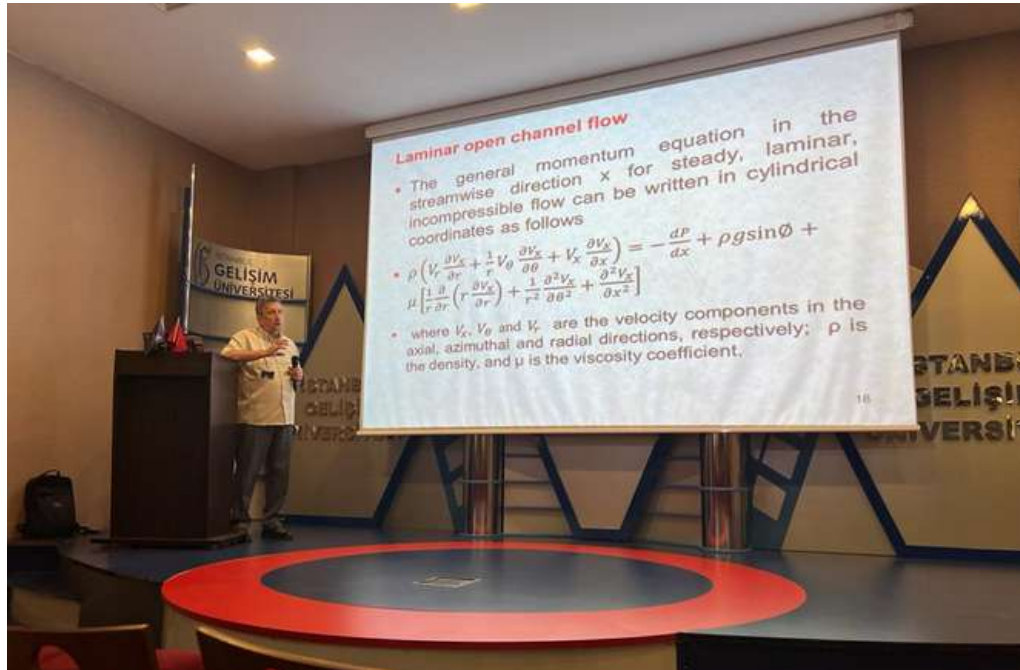
After the announcement of the university exam results, there is a great interest in our department as part of the Preference and Promotion Days held on the 17th Floor of J Block of our University. prof. Dr. Cemalettin Kubat, Prof. Dr. O. Ergüven Citizen and Research Assistants introduce our department to young candidates who will make a choice.

Architcture

Students of the Department of Architecture (English) and Department of Architecture, who successfully submitted the ARC420 Diploma Project instructed by Prof. Mehmet Harun Batırbaygil, Assist. Prof. Meryem Müzeyyen Fındıkgil, Assist. Prof. Semih Göksel Yıldırım and Assist. Prof. Oluwagbemiga Paul Agboola; the MIM420 Diploma Project instructed by Prof. Mehmet Şener Küçükdogu, Assoc. Prof. Türkan Uzun and Lecturer Elif Tan, were entitled to graduate.

Student: 190407411 Ali Hussein Alali
Subject: Fair and Exhibition Center

Student: 190407541 Ruya Aldoori
Subject: Fair and Exhibition Center

Student: 190404009 Furkan Arıkan
Subject: Wellness and Fitness Center

FROM OUR ALUMNI

2023 Industrial Engineering Graduate Aleyna Beren Gürel shared her thoughts with us after graduation.
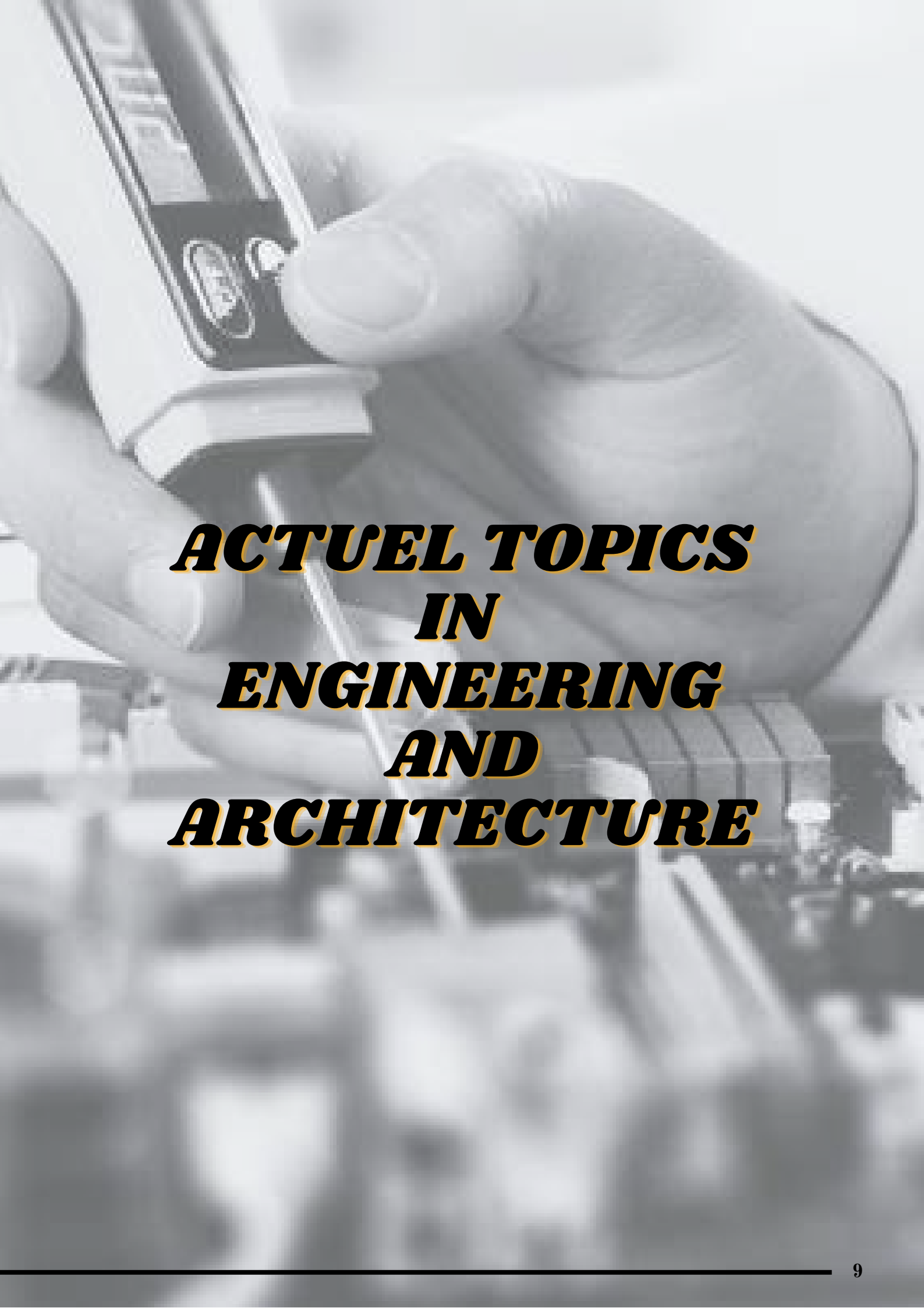
My name is Aleyna Beren Gurel. I won the Department of Industrial Engineering in 2019 and I am graduating this year.

I saw the ABET certificate while choosing the Industrial Engineering Department of Istanbul Gelişim University. Very few universities have this certificate, I thought this department is trying to make great contributions to learning.

One of the factors that I paid the most attention to when choosing this department and school was its academic staff. They have eliminated all the options with his training staff, which we can call excellent. While they were studying, they were not content with our lessons, and they also conveyed their knowledge of business life and life to us.

I advise my friends who are currently studying in the department and who want to choose this department, to keep in mind everything they did during their internship, to take a notebook and write down everything they learned about their internship, to improve their MS Office applications and foreign languages.

When I think of Istanbul Gelişim University, I think of "a university devoted to self-development". I congratulate everyone who will choose Istanbul Gelişim University in advance and wish them success.

ACTUEL TOPICS IN ENGINEERING AND ARCHITECTURE

Multicore Processors and Their Applications
Prepared by: Res. Assist. Mehmet Ali BARIŞKAN
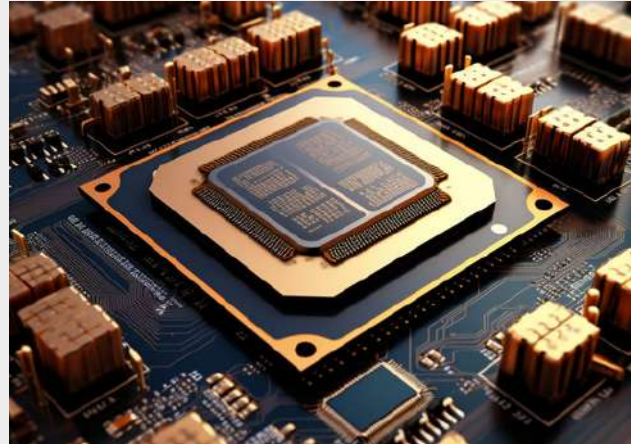
Computer technology is advancing every day and nothing could better illustrate this revolution than the 96 and 128-core processors. In the past, the level of performance that we could only find in supercomputers and data centers is now available in desktop and mobile devices. But what do these processor giants do, who uses them, and why is so much power required? Here's what you've been wondering...

Computers are more complex than we think, and processors are the heart of these complex systems. As the number of cores increases, the processor's ability to perform multiple tasks simultaneously also increases. 96 and 128-core processors are ideal for tasks that require intensive computation. For example, scientific research, data analysis, rendering movies, complex 3D modeling, and artificial intelligence applications.

These processors also have high L3 cache memory. The cache acts as a buffer between the processor and RAM and allows the processor to process data faster. High L3 cache enables the processor to process more data faster, which increases overall computer performance. So these colossal processors are not only multicore, but also very fast.

So, who needs this power? Frankly, a general user will probably not use the full potential of these kinds of processors. However, for professionals and those who work on complex computer tasks as a hobby, these processors can be an invaluable investment. Professionals, especially data scientists, software developers, 3D animators, and scientists, can greatly benefit from this power.

In particular, in the fields of artificial intelligence and machine learning, 96 and 128-core processors are creating a revolution. In these fields, there is a need to process and model very large data sets, which requires serious processing power. These processors allow these tasks to be performed more quickly and effectively.

In conclusion, 96 and 128-core processors are opening the doors to a new era in computer technology. These massive processors enable both professional and hobbyist users to perform complex tasks more quickly and effectively. These powerful components are revealing new possibilities in every area of life, from science to art, entertainment to education. Indeed, technology is advancing faster than we think. And the end of this advancement is not in sight.

Large Language Model: The Technology of the Future
Prepared by: Res. Assist. Mehmet Ali BARIŞKAN

Artificial intelligence and language learning have become one of the hottest technology trends of the past decade, and large language models are leading the charge. These super-advanced language learning tools are pushing the boundaries in understanding and mimicking human language. But what are large language models and what makes them so exciting? Read on...

Large language models are artificial intelligence systems that typically learn from a wide database of text and then can be used in language-based tasks. These models are typically used in language-based tasks such as text generation, comprehension, translation, and more. Models like GPT (Generative Pretrained Transformer), developed by OpenAI, are one of the pioneers in this field.

These models learn from text databases and are then typically used in tasks like text generation or understanding text. For instance, a large language model can understand a user's question and generate responses. This is used in many applications, such as technical support, customer service, and more.

But that's just the beginning. Large language models allow for more sophisticated applications that can be used in health, education, research, and more. For example, a model could be used to understand medical texts and assist doctors in diagnosing diseases. In education, the model could answer a student's questions and assist in understanding complex topics.

What's most exciting about large language models, however, is their limitless potential. Their text generation capabilities can be used in storytelling, journalism, script writing, and more. Their understanding capabilities can be used in social media analysis, market research, political analysis, and more.

Of course, there are also some concerns with large language models. These include issues such as bias, generating misleading information, and privacy breaches. However, with proper use and regulation of these technologies, these issues can be minimized and the potential benefits can greatly outweigh.

In conclusion, large language models are showcasing the potential of artificial intelligence in understanding and creating language. These sophisticated tools, which can be used in health, education, communication, and more, are shaping the technology of the future. However, to fully realize the potential of large language models, we must be cautious about how these tools are used ethically and securely. This will be a crucial part of the journey of large language models in the future.

Some News in the World of Science
Prepared by: Dr. Mustafa NURİ

Electricity Generation by Diurnal Temperature variation
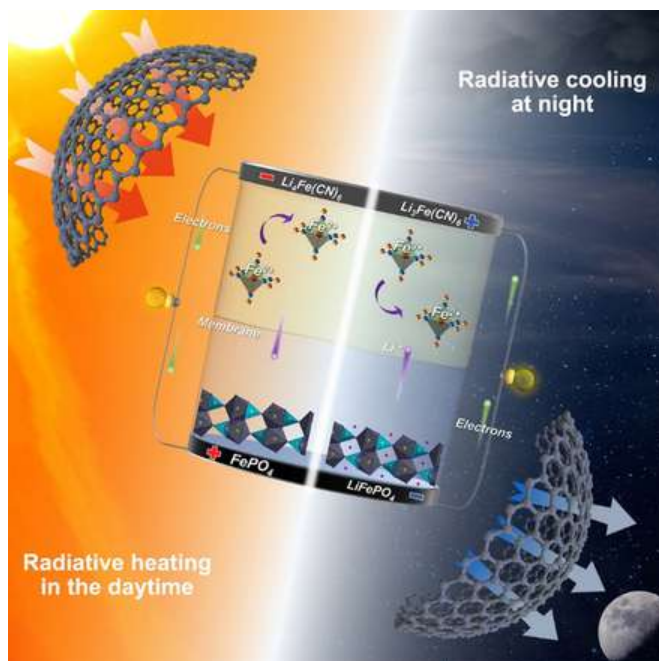
As the negative consequences of the climate crisis (such as droughts, record high temperatures, and the increase in the number of floods) are increasing daily, it has become more important to develop clean energy sources to reduce greenhouse gases in the atmosphere. in accord with that, Hang Zhang from the National University of Singapore and his colleagues have introduced a new way of obtaining energy continuously during the day and night. The developed system converts the temperature variation between day and night into electrical energy. The driving force of the system will be provided by solar energy. Details of the study were published in the July 2023 issue of the journal Joule.

Capturing the Atmospheric Carbon Dioxide

In another study published in the July issue of the journal of Joule, Sayan Kar from Cambridge University and his colleagues announced that they have developed a solar-powered system that converts atmospheric carbon dioxide into a reusable fuel ($CO + H_2$). In this process, PET plastic waste is also converted into glycolic acid for further use.
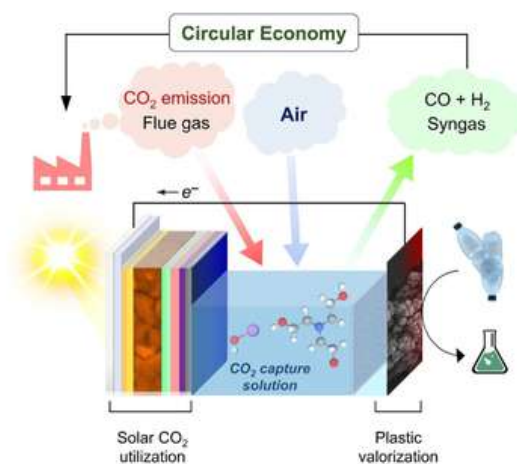
Is It Possible to Predict Major Earthquakes?

According to Quentin Bletery and Jean-Mathieu Nocquet of the Université Côte d'Azur, yes. In the article published in the July issue of the journal of Science, it was stated that the time series of GPS data was examined 48 hours before the 90 earthquakes of 7 and higher magnitudes. As a result, significant changes were detected in GPS signals approximately 2 hours before major earthquakes. According to the authors, it is possible to improve this period with more careful measurements.

Custom 3D Printer Design and Construction
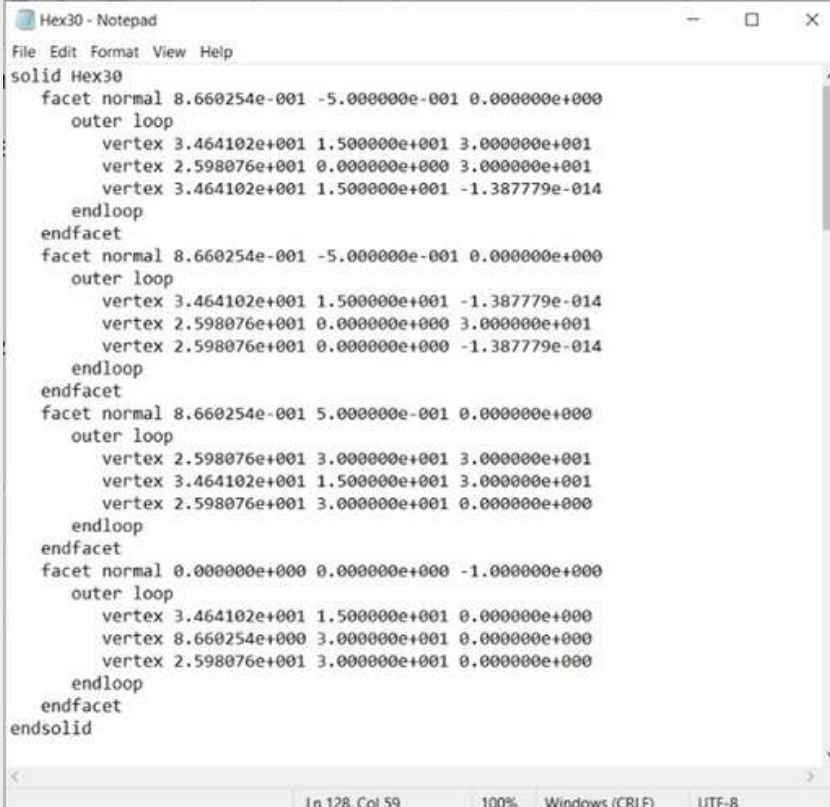# Prepared by: Asst. Prof. Dr. Safar POURABBAS

Today, great potential and success has been revealed in 3D Printers. However, despite these developments, 3D printer technology is open to research and development. For this reason, we are constantly witnessing 3D printers working with new and special principles. This article will focus on the design and construction of a special and new 3D printer.

In general, three main steps must be followed for the design and development of a 3D printer. These are 1) developing the 3D printer robot and extruder, 2) 3D model slicing and interface software, and 3) the firmware controlling the 3D printer robot. 3D printer robot and extruder design and development can be done by experienced mechanical engineers as an engineering subject, with sufficient time and effort. The firmware controlling a 3D printer, on the other hand, is a very daunting subject and can be seen as a very difficult subject for many mechatronics engineers and even software engineers. But currently, several firmwares are easily accessible over the internet thanks to open source mobility. These firmwares have advanced features and can even move five axes simultaneously. We can give examples of these firmwares from GRBL and Marlin. With these firmwares, today many 3D printers and even CNC machines are offered to the market as commercial products. Therefore, one of these firmwares can easily be used to develop a custom new 3D printer. But 3D model slicing and development of interface software must be done by the designer. Otherwise, a special and new 3D printer design and development can never happen. This article will explain how to take this step.

The sliced 3D model is first converted to *.obj or *.stl file in Solidworks etc. software. Here slicing is explained only for *.stl file. *.stl file can be saved in binary and ascii format. Binary format is smaller, while ascii format is easier to understand because it is in text form. Here the subject is continued on ascii, but the steps to be described are fully applicable to the binary format as well.

When exporting a 3D model in *.stl format, all surfaces of the model are covered with triangles and the data of these triangles are saved as *.stl file. The following figure shows an example of an ascii *.stl file. For each triangle in this file, the vector perpendicular to its surface and the position of its three vertices are expressed on separate lines. Before slicing, these first triangles are read one at a time and stored in a Python list.

The following figure shows how to read triangular data from a *.stl file. Triangles are added to the list of triangles one by one and stored. Because a triangle consists of three lines and three vertices, the line and point classes are defined and used to define lines and points. Line and point classes are also added below. After the triangles are read, the slicing process begins.

```python
def fileToTriangles(filename):
    with open(filename, 'r') as f:
        next(f)        # ignore first line
        counter = 0
        triangles = list()
        points = list()
        for line in f:
            l_ = line.split(" ")
            l = [value for value in l_ if value != '']
            if counter == 6:
                counter = 0
                continue
            elif counter == 0:
                if l[0] == 'endsolid':
                    break
                points.insert(0, Point(float(l[2]), float(l[3]), float(l[4][:-1])))
            elif counter == 2:
                points.insert(0, Point(float(l[1]), float(l[2]), float(l[3])))
            elif counter == 3:
                points.insert(0, Point(float(l[1]), float(l[2]), float(l[3])))
            elif counter == 4:
                points.insert(0, Point(float(l[1]), float(l[2]), float(l[3])))
            counter += 1


        while points:
            triangles.insert(0, Triangle(points[2], points[1], points[0], points[3]))
            points = points[4:]

        return triangles
```

```python
class Triangle:
    def __init__(self, p0_, p1_, p2_, norm_):
        self.p0 = p0_
        self.p1 = p1_
        self.p2 = p2_
        self.norm = norm_
    def toString(self):
        return "Triangle("+self.p0.toString()+","+self.p1.toString()+","+self.p2.toString()+")"
```

```python
class Point:
    def __init__(self, x_, y_, z_):
        self.x = x_
        self.y = y_
        self.z = z_

    def dotProduct(self, p):
        return self.x*p.x + self.y*p.y + self.z*p.z

    def normalize(self):
        return math.sqrt(self.x**2 + self.y**2 + self.z**2)

    def toString(self):
        return "Point("+str(self.x)+","+str(self.y)+","+str(self.z)+")"
    def equals(self, p2):
        if close(self.x,p2.x) and close(self.y,p2.y) and close(self.z,p2.z):
            return True
        else:
            return False
```

(... continues)

ACADEMIC AND SCIENTIFIC ACTIVITIES

ELECTRICAL AND ELECTRONICS ENGINEERING

·Asst. Prof.Dr .Ayşe Karaoğlu, from Italy INFN-LABORATORI NAZIONALI DEL SUD (LNS) CATANIA, Prof. Dr. In collaboration with G. A. Pablo Cirrone, he submitted his project proposal 'Understanding the cell damage mechanisms at the DNA-scale from induced secondary reactions using the Geant4 toolkit: the case of the proton-11B reaction' to the TÜBİTAK 2219 program.

One of our Electrical and Electronics Engineering Department Asst. Prof.Dr Fatma Gülşen Erdinç participated in İEEE 5TH Global Power ,Energy, and Communication Conference 20232023 held in Paris by presenting an article titled "Uncertainly Dealing Energy Management of a PV and Battery Supplied Grid Connected Charging Service Station for a Fleet of Mobile Charging Oriented EVs"

Department of Electrical and Electronics Engineering Asst. Prof.Dr Fatma Gülşen Erdinç's article titled " Development of a New Operation Strategy Enabling Transactions of Flexibility Among Households for a Residential Neighborhood " was published in the journal " Karaelmas Fen ve Mühendislik".

CIVIL ENGINEERING

The research paper titled "Engineering Properties of Different Fiber-Reinforced Metakaolin-Red Mud Based Geopolymer Mortars" prepared by one of our department member, Assoc. Prof. Dr. Anıl NIS was published in the Construction and Building Materials with Q1 impact factor.

Zainab Razzaq Abdulabbas ALMAHMODI, a graduate student of our department member Assis. Prof. Dr. Metin MEHMETOGLU, successfully defended her master's thesis titled "Prediction of Free Compressive Strength of Cement Stabilized Clay Using Artificial Neural Networks (ANN) Model" and graduated.

İnşaat Mühendisliği öğretim üyelerimizden Dr. Öğr. Üyesi Metin MEHMETOĞLU'nun "Mechanical and Physical Performance of Portland Cement Composites with Partial Replacements of Metakaolin and Ulexite" başlıklı makalesi International Journal of Engineering Technology (IJET) adlı dergide yayınlanmıştır.

CIVIL ENGINEERING (CONTINUED)

The project titled "The Effect of Single and Hybrid Nano Material Use on the Mechanical and Durability Performance of Geopolymer Composites and Fractal Crack Characterization with the Help of Three Dimensional Tomography", which is carried out by Assis. Prof. Dr. Hamit ÖZTÜRK, and Assoc. Prof. Dr. Anıl NİŞ, as a researcher, has been awarded project support within the scope of TUBITAK1002-Fast Support Program. A total of 5 academicians from two different institutions are involved in the project, including researchers from Istanbul Gelisim University as well as Istanbul University-Cerrahpaşa.

MECHATRONICS ENGINEERING

The article titled "Exploration of the improving effect of Cd-doping on structural, photocatalytic, and biological properties of ZnO nanoparticles" prepared by Asst. Prof. Dr. Kenan ŞENTÜRK and his working group was published by the Journal of Nanoparticle Research on 08.07.2023.

ARCHITECTURE

The research work entitled "Built Environment Transformation in Nigeria: The Effects of a Regenerative Framework" was published by Assist. Prof. Oluwagbemiga Paul AGBOOLA, a faculty member at the Department of Architecture (English), in the Journal of Asian Architecture and Building Engineering.
Access Link:
https://www.tandfonline.com/doi/full/10.1080/13467 581.2023.2238045

Assist. Prof. Oluwagbemiga Paul AGBOOLA, who served as a panelist to evaluate the students' final research papers on Advanced Human Resources Management, held on July 22, 2022, was awarded a certificate of appreciation by the Faculty of Business, Management and Accounting at De La Salle Araneta University in the Philippines.

ARCHITECTURE (CONTINUED)

A book chapter entitled "Comparative Evaluation of the Influence of Architectural Founders On Contemporary Urban Planning and Design" was published by Assist. Prof. Oluwagbemiga Paul AGBOOLA in International Studies in Architecture, Planning and Design.
Access Link:
https://www.seruvenyayinevi.com/icerik/haber-blog/haziran-2023-uluslararasi-kitap-bolumleri-yayinlandi

The article titled "Proposed Framework for Daylight-Focused Homes during Design Development" prepared by Assist. Prof. Semih Göksel Yıldırım, a faculty member of the Department of Architecture (English), together with Stuart W. Baur, Thomas G. Yarbrough and Matthew Nieters, was published in the International Journal of Engineering Technologies.
Access Link:
https://dergipark.org.tr/en/pub/ijet/issue/78073

INDUSTRIAL ENGINEERING

Working in Department of Industrial Engineering Assist Prof. Dr. Binnur Gürül's new book has published.

Istanbul Gelisim University (IGU) Engineering and Architecture Faculty Industrial Engineering Faculty Member Assit. Prof. Dr. Binnur Gürül's 374-page book titled "Sustainable Production Indicators and Corporate Sustainability Performance" was published in July 2023.
Assit. Prof. Dr. Binnur Gürül introduces the book as follows:
"The reason for the emergence of the subject of "sustainability", which has been talked about a lot in recent years, is actually the fact that natural resources are limited, but consumer expectations and needs are unlimited. In this context, the production sector; While providing economic development and growth by producing more and meeting the needs of consumers, on the other hand, it has to find solutions that will reduce the use of resources to be used in production, and it has to do this with a sustainable understanding. On the other hand, according to the Global Risk Report (published by the World Economic Forum), the biggest global risk for the next decade is the inability to fight against climate change and global warming. In this direction, although sustainable production has been a strategic necessity for all producers for a long time, the changing economic conditions, geopolitical developments, climatic changes and social changes on a global scale require the restructuring of sustainable production. In this context, this book offers the manufacturing industry a framework for both sustainable production and corporate sustainability."