Mechatronics Club Presents

MECHATASTIC

MECHATRONICS CLUB
AUTOMATING THE STANDARDS!

("Futuristic Robotic Arm", 2019)

2ND EDITION

A publication of the Department of Mechatronics and Control Engineering

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Chairman Mechatronics Department

DR. ALI RAZA

Last year, I highlighted the need to add human-centric approach in the conventional mix of mechatronics. But the real question was, are we doing it ourselves? Yes, we have practiced it in our academic activities and research labs. One such example, this year, was our research project in collaboration with Hamad Medical Corporation, Qatar, to develop a mechatronic simulator to test conventional CPR (i.e. Cardio-Pulmonary Resuscitation) techniques and then discovering a new and much-improved technique. We successfully concluded this phase and presented our human-centric mechatronics research in the flagship conference of European Resuscitation Council in Belgium. The readers may read about this and other activities inside the magazine. We created this opportunity by merging mechatronics with resuscitation sciences. It is in this context, I advocate my recent graduates to create opportunities for themselves by merging different ideas, and wish them all the success in their future endeavors.

Advisors Mechatronics Club

Mr. Rzi Abbas

Mr. Misbah-Ur-Rehman

Mechatronics club was formed with a vision to provide students with opportunities beyond curricular activities. Since its formation, Mechatronics Club has helped hundreds of students achieve something extra that will go a long way in their professional as well as personal lives.

We believe we should evolve for something better in every iteration. Therefore, every year, hardworking and enthusiastic students are given opportunity to add their share in the club's evolution process. Last year was no different than that and we have organized some of the best workshops, seminars, competitions, and trainings. Along with the Club, the involved students tested and polished their managerial as well technical expertise.

So, we invite every enthusiast to come forward for this life-long learning opportunity and make oneself visible to the world.

Chief Editor Magazine

Dr. Ayisha Nayyar

> **"Words, without power, is mere Philosophy"**
> -Allama Iqbal

In Mechatastic, we as a team tried to present the assets of our department through powerful words.

It is pretty vital to arm the minds of the youngsters with the advancements in the technical world and the facilities we, as a department, provide to inculcate our nation. The main focus of this magazine is on the amenities that the Mechatronics department offer, in the form of Course-related/Research-oriented labs and other services for Graduate and Post-graduate studies. Our teachers continuously monitor the students' performance and arrange the resources for the timely completion of their degree requirements. FYPs (Final year projects) of the students and the successful alumni are the bear witness of the mentioned entitlements.

I expect that the reader will appreciate the content and the details of our magazine and will get the full benefit of it.

President Mechatronics Club

Muhammad Ali Hadir

In the light of the scientific world marathon, the mechatronics club facilitates the narrative of development, technical growth, and problem-solving attitude adoption. We aim to generate engineering solution minds, endorsing the ideology of leadership, and teamwork.

"Together we can do so much" is the vision entitled to the club. Being a club member, a student gets involved in both managerial and technical roles. The most amazing part is when students of various ages, skill sets, and flexible viewpoints all hustle together in order to achieve a common goal. I believe the mechatronics club holds the vision of teamwork and the flame of engineering in its core values.

MEET THE TEAM

Iqra Amjad
Head
Research & Documentation

Zain Ul Hassan
Co-Head
Technical

Mujtaba Shabbir
Co-Head
Research & Documentation

Zainab Ishtiaq
Deputy Director
Design

Salman Farooq
General Member
Design

Faizan Tanwir
General Member
Research & Documentation

Alishba Khalid
General Member
Sponsorship

ACKNOWLEDGEMENT

We would like to express our sincere endorsement to our esteemed Chairman, Dr. Ali Raza, for his honorable suggestions and our highly qualified and cooperative Directors, Mr. Misbah Ur Rehman and Mr. Muhammad Rzi Abbas, to induce the second volume of Mechatastic. The official magazine of the Mechatronics and Control Engineering Department. We would like to recognize the prestigious supervision of our Chief editor Dr. Ayisha Nayyar; her mentorship and guidance have been a precious resource throughout this journey. We would also like to appreciate the senior leadership of the Mechatronics Club, our worthy President, and the Executive Body. We are grateful to them for their constant motivation, guidance, and assistance in gathering the resources vital to concluding the magazine.

We want to ensure a special thanks to respected members of the Mechatronics club and the students of the Mechatronics Department who worked as volunteers in the documentation and design of the magazine. The documentation of the magazine was done by Iqra Amjad, Mujtaba Shabbir, Faizan Tanwir, and Zain ul Hassan with dedication and hard work.

The eminent names of the magazine team include Zainab Ishtiaq, Salman Farooq & Rafay from the Design Team, Wasil Fayyaz, and Mujahid Iqbal from the Research and Documentation Team, Zain Syed from the Sponsorship Team, Mughees Ahmed from the Technical Team, and Nimra Areeb. We are obligated to you for your proficiency and commitment to the magazine's compilation and design.

Special appreciation to Alishba Khalid. Her creative and wholehearted volunteerism and design skills created all the difference.

We admire the efforts of the sponsorship team and cinematography team as well. The timely coordination with Noor Sultan from the Sponsorship Team helped us to prepare for the magazine's printing phase. All the teams cooperated very professionally throughout the process. We understand the rigorous deadlines given to everyone for the relevant tasks. And in those circumstances, the work delivered was commendable.

Faizan Tanwir
Research and Documentation Team

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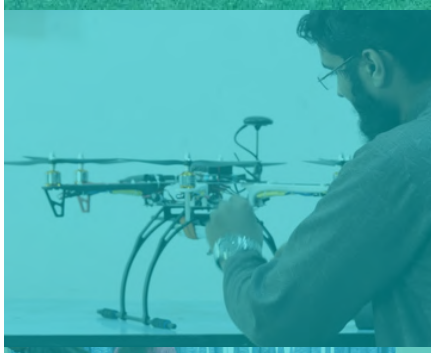
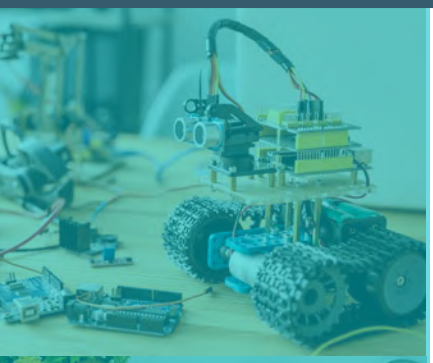
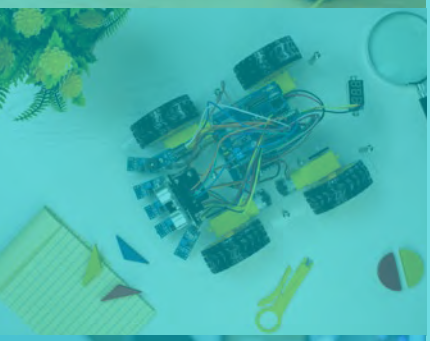
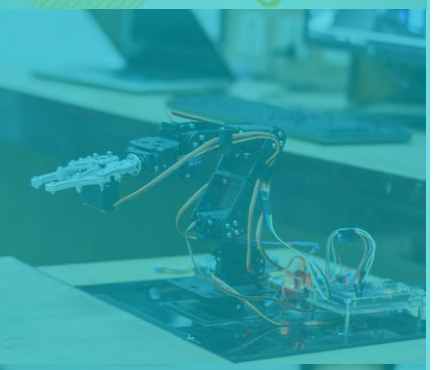
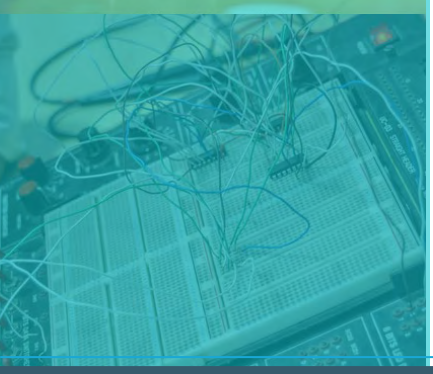


HISTORY

With an aspiration of developing individuals who influence the world, Mechatronics & Control Engineering was adopted as a discrete bachelor's degree program in 2001 to acclimatize to the needs of the rapidly advancing world. Back in 1999, mechatronics was offered as a postgraduate degree program at UET Lahore. The Department of Mechanical Engineering supervised the program. After its evolvement, the degree program was assigned a distinct study area in 2005: the Department of Mechatronics & Control Engineering (DMCE). Since 2005, the department has catered to the need for engineers and researchers in the Mechatronics domain. The department has successfully delivered several projects of Artificial intelligence. It has enhanced the concept and use of robotics and automation to substitute human labor and facilitate production.

MISSION

The department, through quality education and enabling environment, aims to foster professional engineers capable of designing complex Mechatronic systems, serving current industrial needs, and developing innovative technologies.

Program Educational Objectives (PEOs)

To nurture Mechatronics engineers who

- Can skillfully design and implement integrated solutions to general Mechatronics engineering problems.
- Is capable of developing professional skills, while adhering to high ethical values, to excel in the industry, research organizations, and succeed in entrepreneurial ventures.
- Can innovate and embark on new directions in advancing the Mechatronics technologies with direct national and international relevance.
- Will contribute to diversity, socioeconomic growth, and sustainable development.

Program Learning Outcomes (PLOs)

Engineering Knowledge

An ability to apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

Problem Analysis

An ability to identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

Design/Development of Solutions

An ability to design solutions for complex engineering problems and design systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

Investigation

An ability to investigate complex engineering problems in a methodical way including literature survey, design and conduct of experiments, analysis and interpretation of experimental data, and synthesis of the information to derive valid conclusions.

Communication

An ability to communicate effectively, orally as well as in writing, on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

Environment & Sustainability

An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

Individual & Team Work

An ability to work effective, as an individual or in a team, on multifaceted and /or multidisciplinary settings

Project Management

An ability to demonstrate management skills and apply engineering principles to one's work to manage projects in a multidisciplinary environment as a team member and/or leader.

The Engineer & Society

An ability to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.

Modern Tool Usage

An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering activities, understanding the limitations.

Ethics

Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

Lifelong Learning

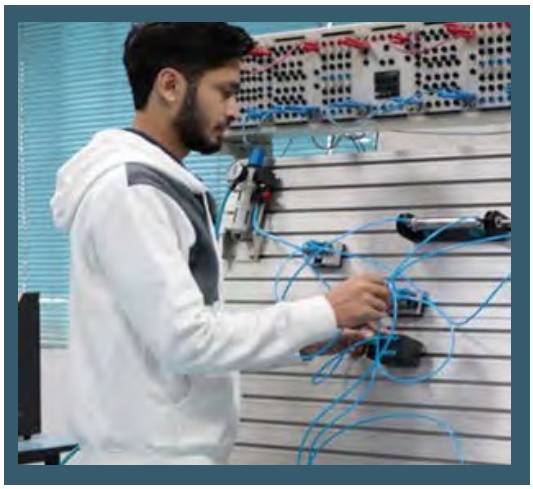
An ability to recognize the importance of, and pursue lifelong learning in the broader context of innovation and technological developments

LABS & FACILITIES

The Department of Mechatronics & Control Engineering houses different labs for undergraduate, graduate, and doctorate students. These labs radically develop robots, programmed efficiently through stimuli and percepts without extensive reconfiguration of their hardware and software components. Some of the notable labs, along with ongoing projects that are contributing to the technical development of masses, are mentioned ahead.

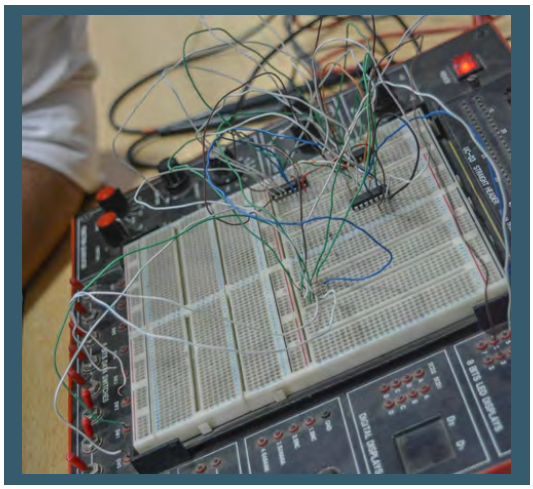
HYDRAULICS & PNEUMATICS LAB

The Hydraulics & Pneumatics lab contains various pneumatic circuits, hydraulic motors, and pneumatic valves with the advanced industrial trendy Allen Bradley PLCs hardware and software. All the equipment is well installed and efficiently programmed. This lab has advanced hydraulic systems to manufacture various products and by-products.



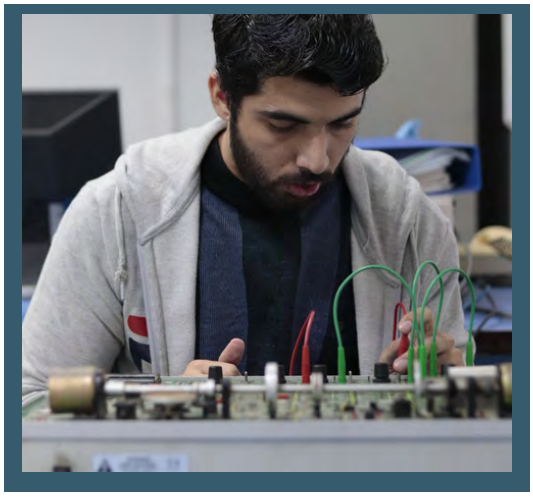
EMBEDDED SYSTEMS LAB

It mainly works on different multitask robots, intelligent systems, multiple degrees of freedom cobots, and working on prostheses, and Gravity compensators. For the Collaborative robots, this lab contains intelligent robotic manipulators, Robix toolkit, Lego Mindstorms, Pitsco Tetrix Kits, and NImyRIO that allow physical interaction and synergistically share the workspace with other robots and co-workers, and to facilitate future industrial applications,.



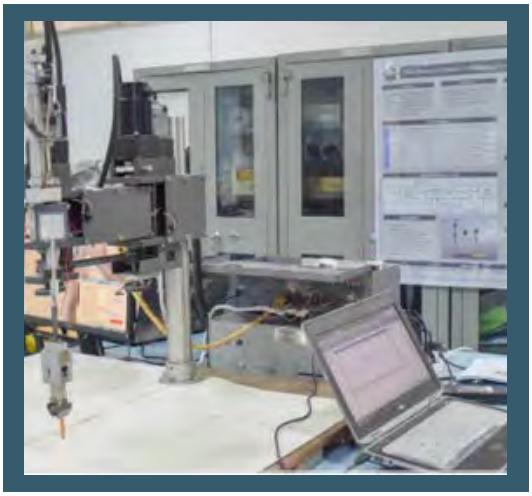
CONTROL & INSTRUMENTATION LAB

Advanced and comprehensive instrumentation trainer DIGIAC 1750 is being installed in the Instrumentation lab to work and model various signal conditioning circuits and display devices with the full range of input and output transducers.



AUTOMATION LAB

The Automation lab has multi-dimensional and conventional mechanism setups to enhance and check the functionality and durability of different collaborative and non-collaborative robots. Several automated robots are being designed and tested in this lab for industrial applications.

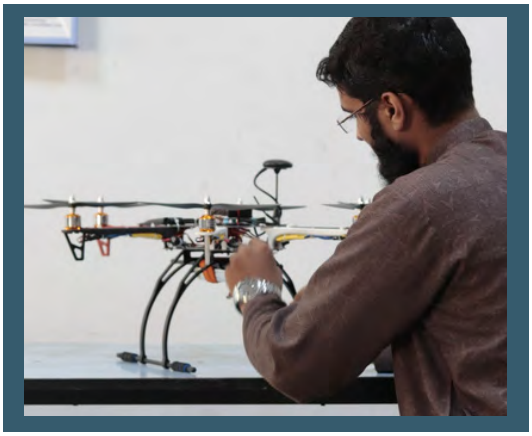


AI AND ROBOTICS LAB

Our signature lab also establishes the first state-of-the-art gait analysis with optoelectronic system and force platforms, leading to severe multiple predicament and complications solutions. Graphics Processing Units (GPU) are installed to accelerate graphic rendering by handling various data to make it worthwhile for machine learning purposes.

POWER ELECTRONICS LAB

Power electronics lab is one of the essential learning-oriented labs as it houses modern electrical and electronics components. This lab is well equipped with fast and dynamic semiconductor switching devices and other electronic components enabling students to explore the marvels of the electronic world.



HUMAN CENTERED ROBOTICS LAB OF NCRA

HCR – or Human-Centered Robotics Lab – is a part of the National Center of Robotics and Automation (NCRA). The lab aims to design and develop integrated robotic systems based on intelligent sensing and actuation to interact with humans seamlessly, actively learn from them, and eventually create an effective collaborative environment. Human-robot interaction is at the core of our research, which possesses many possibilities. Ensuing the path that will lead towards the solution of the proposed bigger problem, the following subsidiary application domains have been identified:

COLLABORATIVE ROBOT

EXOSKELETON

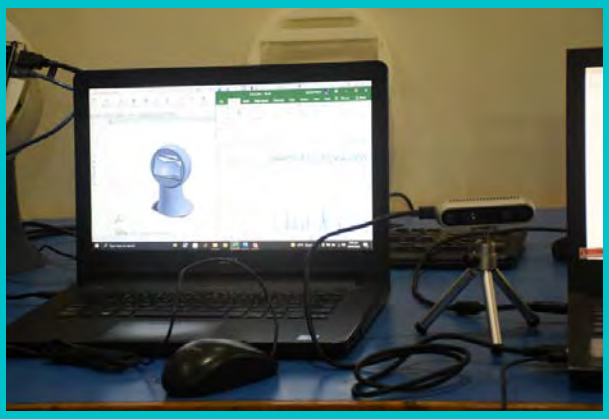
ACTIVE PROSTHETICS

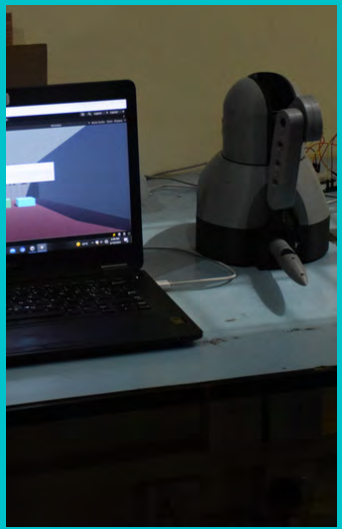
IHYA LAB OF MECAHTRONICS RESEARCH IN RESUSCITATION SCIENCES

This research lab has been recently established by the Department of Mechatronics and Control Engineering in collaboration with Hamad Medical Corporation Qatar. The lab aims to develop intelligent and marketable mechatronic devices which aid in resuscitation practices in and out of hospital settings, thus saving precious lives of the patients. It also aims to become an innovation hub in the domain of resuscitation sciences. Currently, the lab's primary focus is on the development of newer CPR machines and associated biomedical devices. A few final year projects under this lab are:

- Smart Electropneumatic mattress
- Haptic Device for Robotic Surgery
- Sports Bio-Mechanical Analysis using motion capture

Learn more at: https://mce.uet.edu.pk/research/





DEPARTMENT'S PHD FACULTY

DR. ABBAS ZILQURNAIN NAQVI

Ph.D. Purdue University, Indiana, U.S.A

Research Areas:

Machine Vision, Machine Learning

DR. M. AHSAN NAEEM

Ph.D. Duke University, Durham, North Carolina, U.S.A

Research Areas:

Quantum Computing, Machine Learning

DR. UMMUL BANEEN

Ph.D. University of New South Wales, Sydney, Australia

Research Areas:

Structural health monitoring, Mechanical Vibrations

DR. ALI RAZA

Ph.D. University of Texas at Austin, USA

Research Areas:

Human-Centered Robotics, Bio-Inspired Computational Intelligence

DR. MOHSIN RIZWAN

Ph.D. University of Texas at Arlington, USA

Research Areas:

Micro-Scale System Modeling, Advanced Control Systems

DR. AYISHA NAYYAR

Ph.D. University of Engineering and Technology, Lahore,

Research Areas:

Structural Health Monitoring

DR. MARIA AKRAM

Ph.D. University of Engineering and Technology, Lahore,

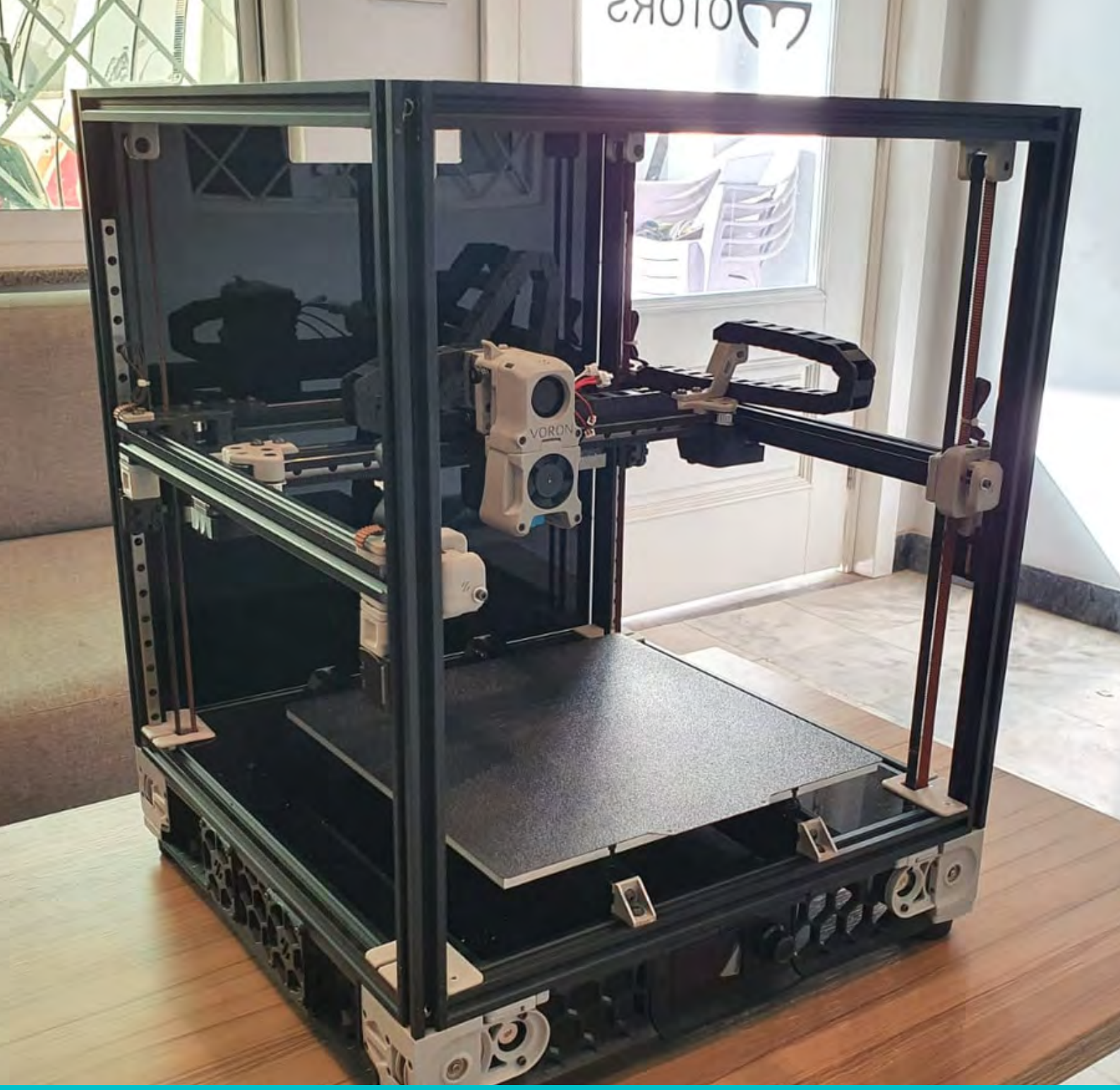
Research Areas:

Mobile Robotics

PUBLICATIONS OF THE YEAR 2021-2022

Sr. No	Authors	Title	Journal /Conference	Year
1	Rashid Mazhar, Tahir Hamid, Ali Raza, Wasif Ali	A mechatronic bio-mimicking simulator to study various combinations of mechanical compressions during CPR.	Resuscitation - 2022	2022
2	Awais Naeem, Mohsin Rizwan, Hafiz Farhan Maqbool, Muhammad Ahsan, Ali Raza, Alireza Abouhossein, Abbas Ali Dehghani-Sanij	Virtual constraint control of Knee-Ankle prosthesis using an improved estimate of the thigh phase-variable	Biomedical Signal Processing and Control - 73, 103366	2022
3	Muhammad Ahsan, Syed Abbas Zilqurnain Naqvi and Haider Anwar	Quantum circuit engineering for correcting coherent noise	Physical Review A	2022
4	M.Abdullah Sheeraz, M.Sohail Malik, Khalid Rahman, Hassan Elahi, M. Khurram, Marco Eugeni, Paolo Gaudenzi	Multimodal Piezoelectric Wind Energy Harvester for Aerospace Applications.	International Journal of Energy Research	2022
5	M.Abdullah Sheeraz, M.Sohail Malik, Khalid Rahman, Hassan Elahi, Zubair Butt, Iftikhar Ahmad,Marco Eugeni, Paolo Gaudenzi	Numerical Assessment and Parametric Optimization of a Piezoelectric Wind Energy Harvester for IoT-Based Applications.	Energies	2021
6	Ahsan Ali, M.Abdullah Sheeraz, Saira Bibi, M.Zubair Khan, M.Sohail Malik, Wjahat Ali	Artificial Neural Network based Optimization of a numerically analyzed m-shaped Piezoelectric energy harvester.	Functional materials letters	2021

7	Javaid Kumail, Ayesha Siddiqa, Syed Abbas Zilqurnain Naqvi, Allah Ditta, Muhammad Ahsan, M. A. Khan, and Tariq Mahmood	Explainable Artificial Intelligence Solution for Online Retail	Computers, Materials & Continua (CMC)	2022
8	Siddiqa, Ayesha, Syed Abbas Zilqurnain Naqvi, Muhammad Ahsan, Allah Ditta, Hani Alquhayz, M. A. Khan, and Muhammad Adnan Khan	Robust Length of Stay Prediction Model for Indoor Patients	Computers, Materials & Continua (CMC)	2022
9	Nayyar, A., Baneen, U., Ahsan, M., Zilqurnain Naqvi, S. A., & Israr, A.	Damage detection based on output-only measurements using Cepstrum analysis and a baseline-free frequency response function curvature method	Science Progress	2022
10	Nayyar, A., Baneen, U., Naqvi, S. A. Z., & Ahsan, M.	Detection and localization of multiple small damages in beam.	Advances in Mechanical Engineering	2021
11	M. Ahsan Naeem, Mohsin Rizwan, P. S. Shiakolas	Micropart Motion on a Surface Due to Controlled Surface Excitation	IEEE Access	2021
12	O. Saleem, K. M. Hassan, Mohsin Rizwan	An experimental comparison of different hierarchical self-tuning regulatory control procedures for under-actuated mechatronic system	PLOS ONE	2021
13	Naeem, Muhammad Ahsan, Armughan Sarwar, Abdullah Humayun, and Muhammad Waseem	The Development of Robot Control via Virtual Reality for Safe Human-Robot Interaction	PJEAS UET	2021

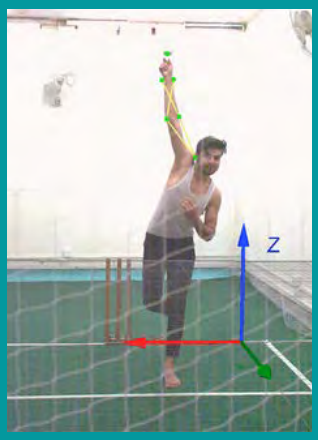


FEATURED PROJECTS

Lab projects, Final Year Projects, and Student projects:
An effort to highlight research being conducted in Department of Mechatronics and Control Engineering.

SPORTS BIO-MECHANICAL ANALYSIS USING MOTION CAPTURE

Cricket has become a very intense sport in Pakistan. Because coaching is not easily accessible and also not affordable for most youngsters. There are many gaps between technology and players, and many problems are yet to be solved.
In this project, we are providing an easy and affordable way of coaching by making a batting optimization app and a bowling action validation system. This will help the batters to improve their batting and the bowlers to try different types of variations in bowling, keeping their bowling action valid.
We are using motion capture technology and Qualisys equipment, and machine learning algorithms to localize and derive 3d skeletons out of players' body nodes for analysis that helps calculate motion parameters like distance, velocity, and angles of the body.
We analyze how the batsman has played a specific shot, type of shot, and how good the shot played. We are making a standalone mobile application that can process, store and display players' statistics.

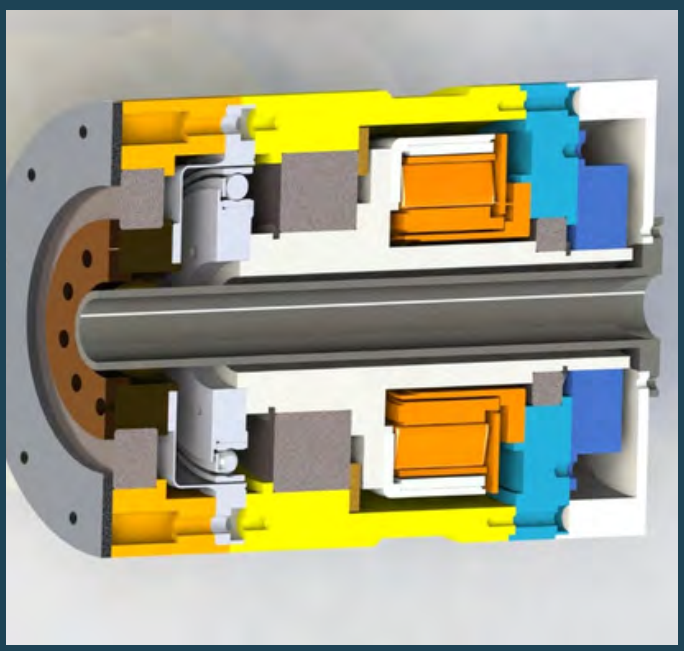


The expected result at the end of this project is to develop an app with the following features:

1. Batsman will be able to compare his shots with the international players.
2. Batsman can select which shot they want to optimize.
3. Batsman can choose their favorite player, and the app will generate stats comparing with only that player.
4. Bowler can bowl any action, and the app will detect whether it is valid or not according to ICC rules of bowling action.

DESIGN AND DEVELOPMENT OF MULTI-DOF ROBOTIC MANIPULATOR

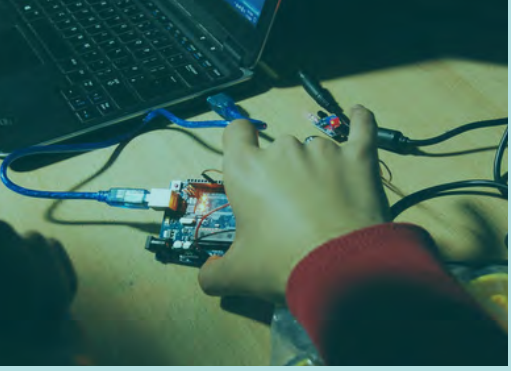
The use of robotic manipulators is essential to modern industry for tasks involving human health and safety risks. Industries in Pakistan pay high costs not just for importing robotic manipulators but also for their aftersales services and maintenance. The aim of the project proposed in this report is to indigenously design industrial manipulators to facilitate local industries in lightweight robotic applications such as painting, welding, and pick and place. The project employs mechanical design techniques for CAD modeling, manufacturing, and assembly of robots. For software integration, motors are run in the joint assembly using the EPOS microcontrollers and driver. Twin-CAT networking in CANBUS configuration is proposed by the report to implement the control of the robot.

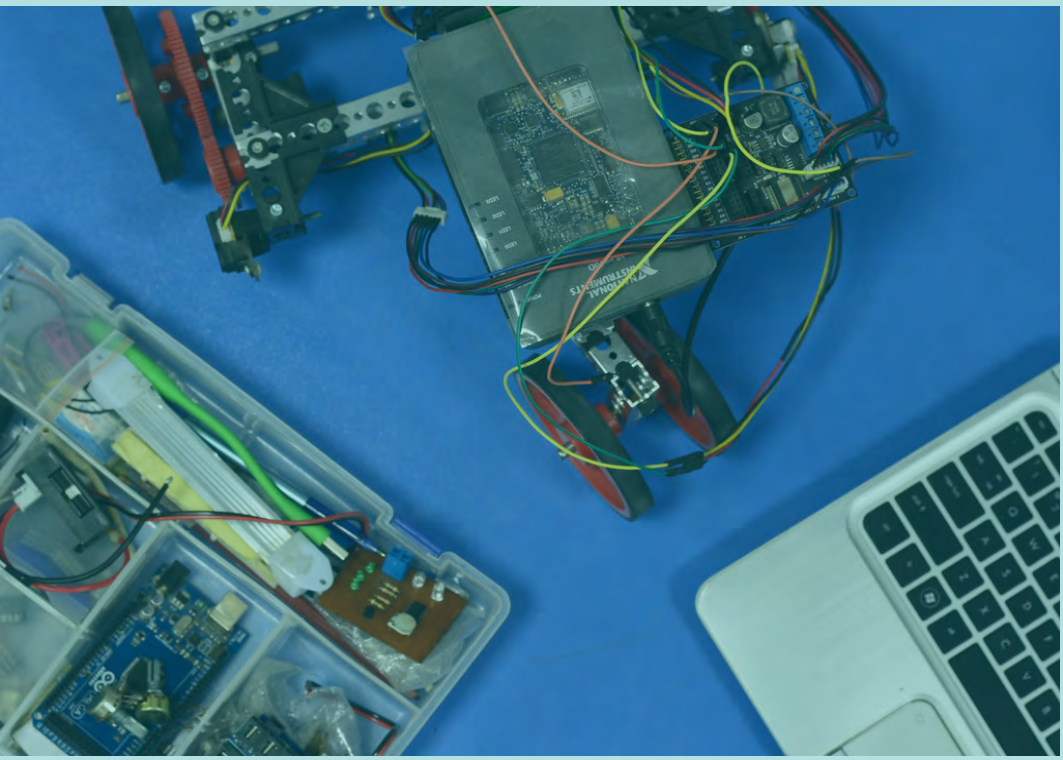


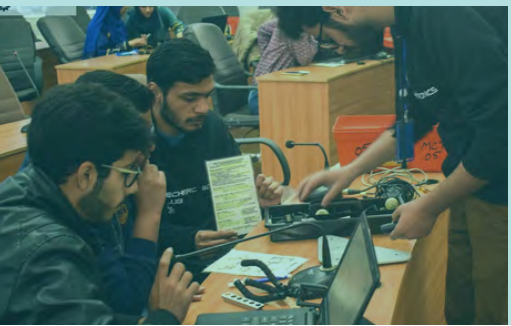
Vision Based Sign language converter-II

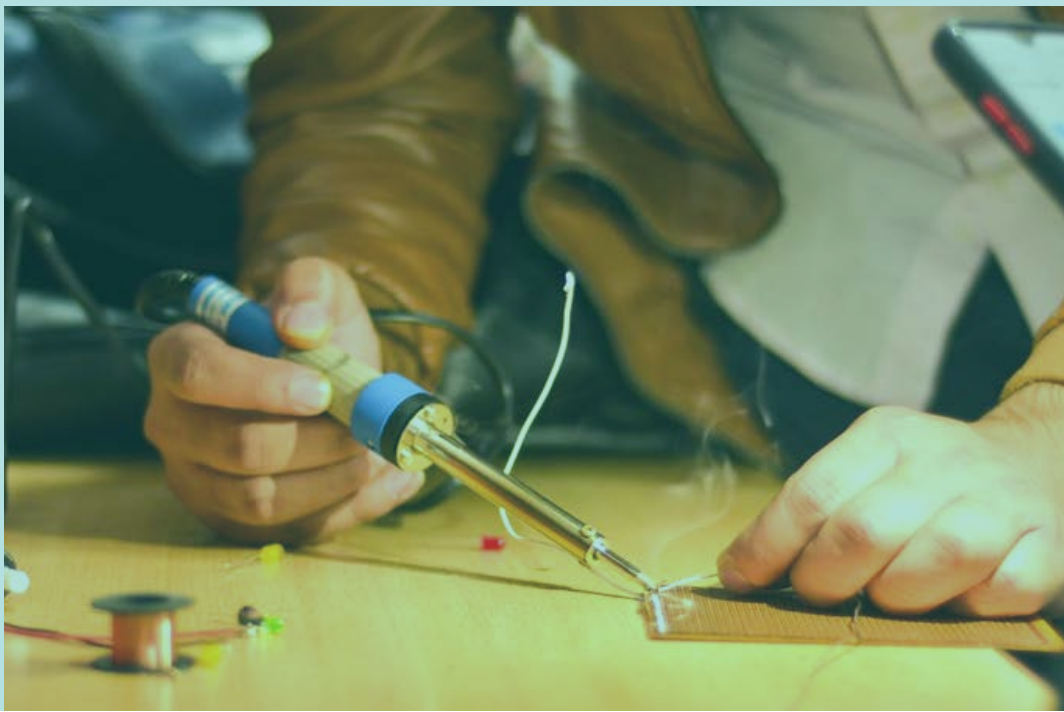
Statistics by the World Health Organization state that approximately 70 million people worldwide are deaf. Unfortunately, the majority of these are children. Various solutions have been proposed to help rectify this natural issue, including gloves and other hardware devices, but most are inefficient and difficult to use. Moreover, these hardware devices require some different power source for their working and pose difficulty in having a separate carriage facility to carry them all the time, but they are also very costly. To tackle this problem, this FYP will develop a user-friendly mobile application using a MediaPipe hand tracking solution and fully connected neural networks that allow the real-time translation of signs into text. Our solution is zero-cost and highly effective. It removes the need to carry a separate device, i.e., a sensory glove, for hand gesture recognition and allows a user to access this app all the time through a smartphone. Hence, this solution is convenient as well as efficient.

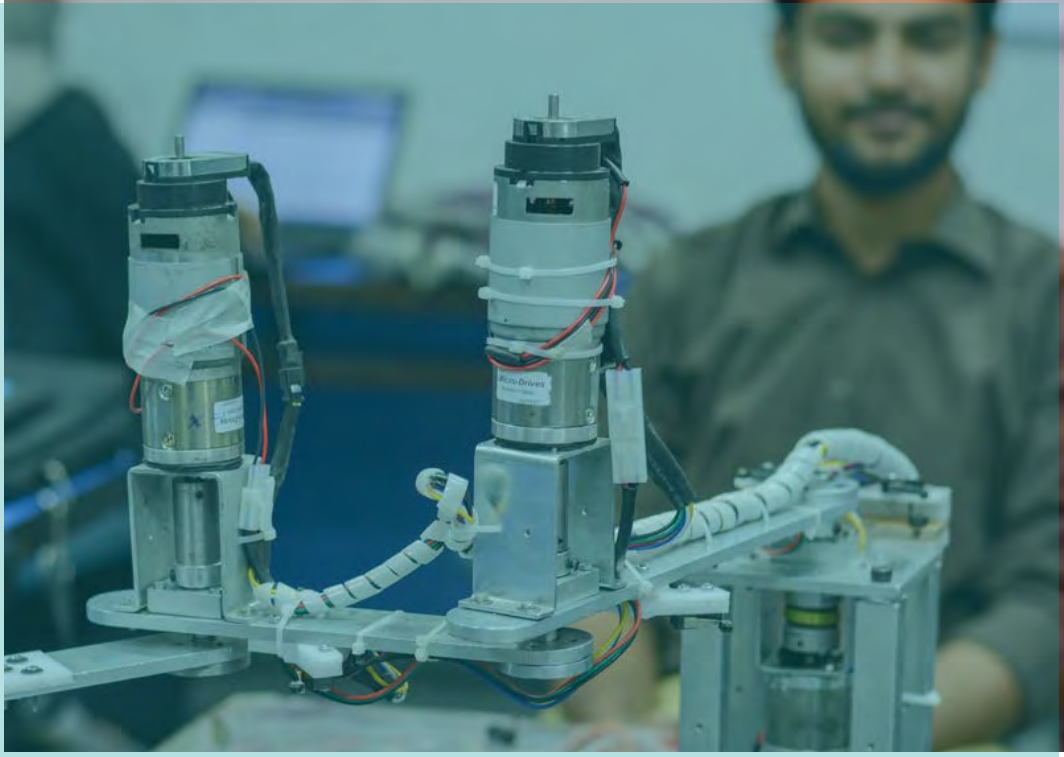
Most importantly, it is applicable at massive levels compared to the earlier available solutions, which were costly and ineffective. Numerous researches are being done in the sign language domain to facilitate this worldwide community. Various technological solutions have also been developed, but no solution has been effective enough to benefit the community as a whole comfortably. We intend to establish a Dynamic Two-way Vision Sign Language Recognition (SLR) solution using the state-of-the-art hand tracking technique developed by MediaPipe, a framework developed by Google.

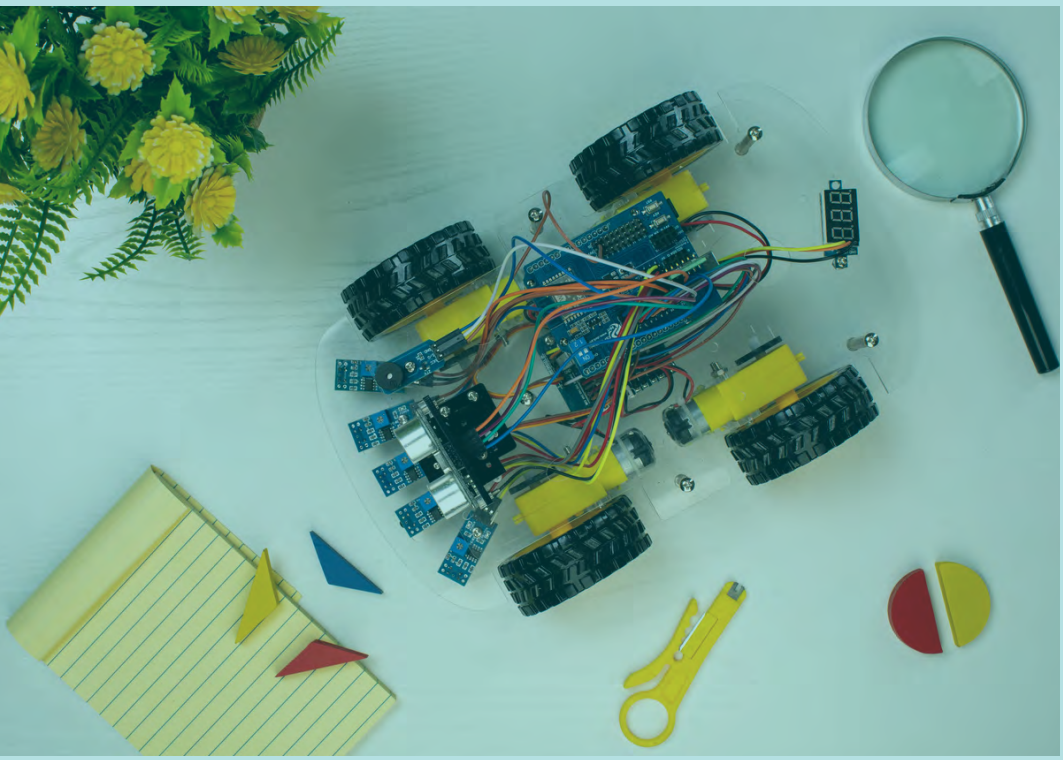


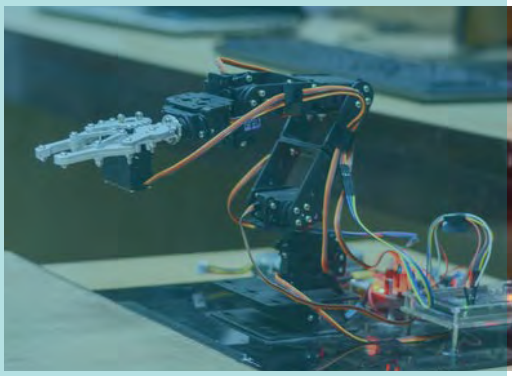












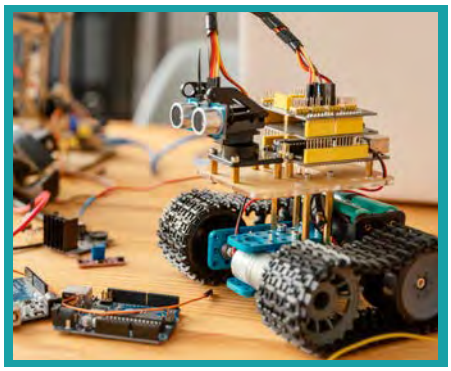
MECHATRONICS CLUB

MECHATRONICS CLUB

Automating the Standards!

MECHATRONICS CLUB FOUNDING

As the Mechatronics & Control Engineering department grew more substantial, the faculty and the students felt a need for a platform to groom and train the students with the latest technological developments in mechatronics. The manifesto of this platform was to teach the students through workshops, seminars, and competitions and prepare them for leadership roles in their professional life apart from academics. Hence, a student body named “Mechatronics Club” was formed at the Mechatronics & Control Engineering department in 2007. Since its foundation, the Mechatronics club has effectively served to impart technological innovation and management abilities and groom students about the developments in the Mechatronics domain. Alumni of the Mechatronics club and Mechatronics & Control Engineering department are successfully producing value in different occupations. Mechatronics Club is on its way to creating more gems for society under competent and experienced leadership.



CLUB'S MISSION & VISION

To create an enhancement of Soft skills while keeping everyone technically sound. We are empowering every individual to be resourceful, respectful, and responsible lifelong learners.

To work with students from diverse Engineering backgrounds and provide a safe and healthy learning environment for all students.

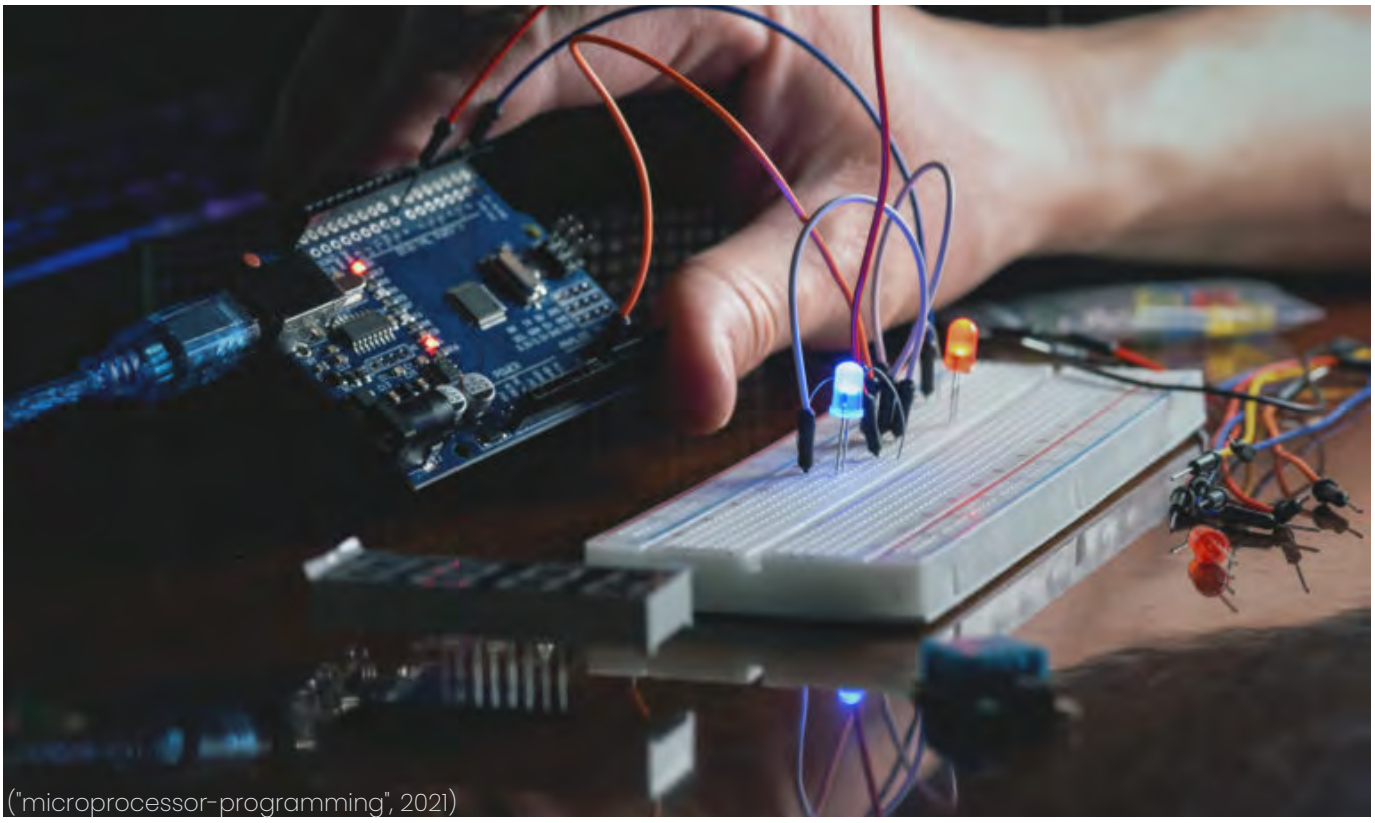
To promote and develop life-long ties for students while creating a positive and enjoyable learning environment within the Society.

To prepare responsible, motivated members with Problem-solving aptitude.

To encourage student involvement and accomplishment.

INSIGHT ON MECHATRONICS

Mechatronics is a multidisciplinary field of engineering that encompasses various technological fields like mechanical, electrical, computer science, telecommunication, etc. It is an integrated and versatile engineering field that aspires to create advanced machines and devices that significantly impact the world's technological advancements. Mechanics and electronics are two essential features of the modern world that commands industrial functioning and operations. Linking them together gives us a revolutionizing concept that has become the need of the hour i.e., Mechatronics. Various technological fields leading us to the fourth industrial revolution are inter-connected with Mechatronics Engineering. Such areas include Automation, Robotics, Control, Artificial Intelligence, and the Internet of Things. It is a comprehensive solution to manage various processes involved across multiple verticals heavily reliant on manufacturing, designing, processing, and analytics.



("microprocessor-programming", 2021)

The main idea behind this field is to design electro-mechanical systems that employ the controlled interconversion of one form of energy to another. It enables Mechatronics Engineers to develop Electromechanical or Technical, semi-autonomous, or autonomous systems for real-time control. The field is applying the sciences of digital control systems, control electronics, and machine design through CAD, electro-mechanics, and automation for the design, development, implementation, and integration into the everyday industry.

To fully understand the concept of this engineering domain, one should look at the technological advancements done in this field. The following are some of the examples explaining the impact of this versatile engineering field on everyday professional life.

SENSOR TECHNOLOGY

AUTONOMOUS CARS

INDUSTRIAL ROBOTS

CROP HARVESTER

BIO-MECHATRONICS

ELECTRIFICATION

In this field, there is no limit to ideas. Mechatronics has many possibilities for products that can improve our life. The only thing is to imagine what to design for people's benefit and the rest of the possibilities are endless.

("image of man with robotic hand", 2022)

ACADEMIC STRENGTHS & RESEARCH DOMAINS

The research focus of an institution indicates its academic strength. This intellectual strength goes a long way to determine the quality of educational products expected from such an institution. To this effect, here is the analysis of the research domain strengths of the Department of Mechatronics & Control Engineering. The department is a multidisciplinary and thus, a Multiaxial Research hub is found here, including the domains of:

MULTI-BODY DYNAMICAL SYSTEMS

ROBOTICS

ARTIFICIAL INTELLIGENCE

BIOMEDICAL APPLICATIONS

STRENGTHS OF THE MECHATRONICS PROGRAM

The primary strengths of the program are summarized as under:

- The undergraduate program is one of the oldest in Pakistan (started in 2001).
- The program has a multi-disciplinary composition keeping pace with the modern developments in the field.
- The students have successfully participated in a number of national level competitions.
- It is consistently among the top choices during yearly student intake.
- The average class is observed to have a healthy urban-rural balance in addition to having a good gender balance. Thus, the program reflects the true spirit of Pakistan.
- The department provides significant seed money to all the groups working towards their final year projects.
- The alumni reflect the success of the program both in industry and academia.

MECHATRONICS CLUB

EVENTS

With the trademark of being the leading Robotics society of UET Lahore, Mechatronics Club advances the organization of technical as well as non-technical events to develop the attitude and courage in students to take up challenges in specialized domains, which ultimately shape them and construct them with the essential grooming required besides their curriculum to outperform others in the post-graduation life. Here are some of the events organized by the Club.

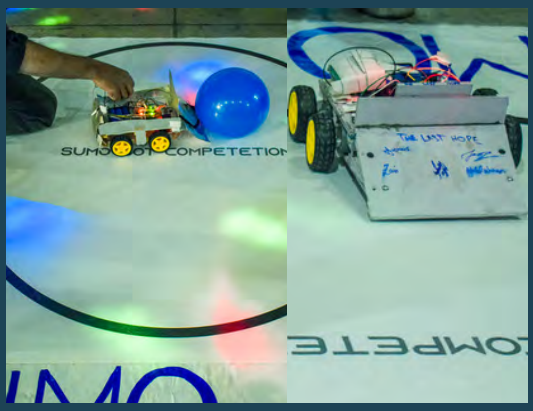

Events
ue un club

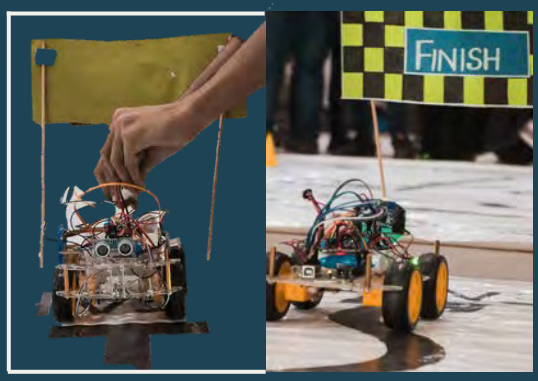
TECHNICAL ACTIVITIES

Mechatronics club encourages students to participate in Tech events to boost their confidence and to get expertise in their field of interest by having hands-on experience.

ROBOCOM

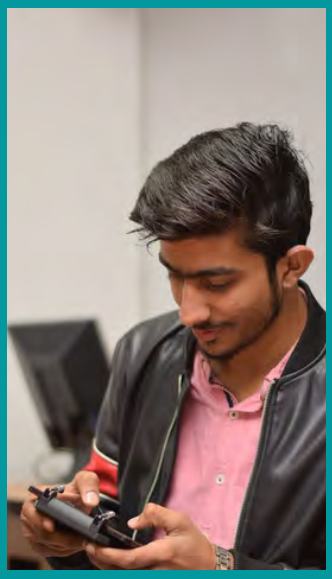
ROBOCOM is our flagship event. It is an interuniversity competition, having participants from all over the country. ROBOCOM includes Line Navigation, Maze Solving, SumoBot, Robo War & RC Car modules. A Robotics Workshop is organized where hands-on experience is provided to the attendees on the industrial-grade robotic arms alongside these modules. The major module of SumoBot, is held with the collaboration of other esteemed technical societies like IEEE, IET, and ASME. This year, the Team "Gears" from GC University won the title of SumoBot.

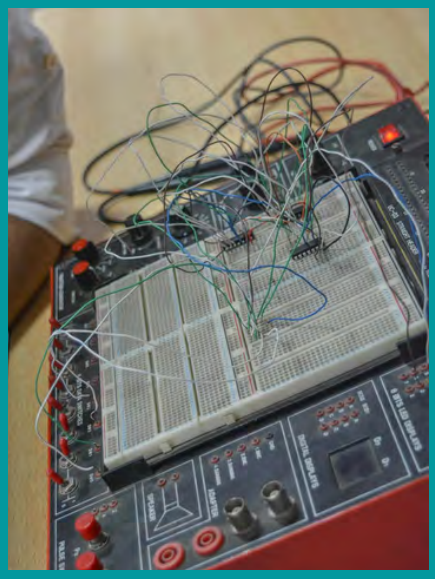


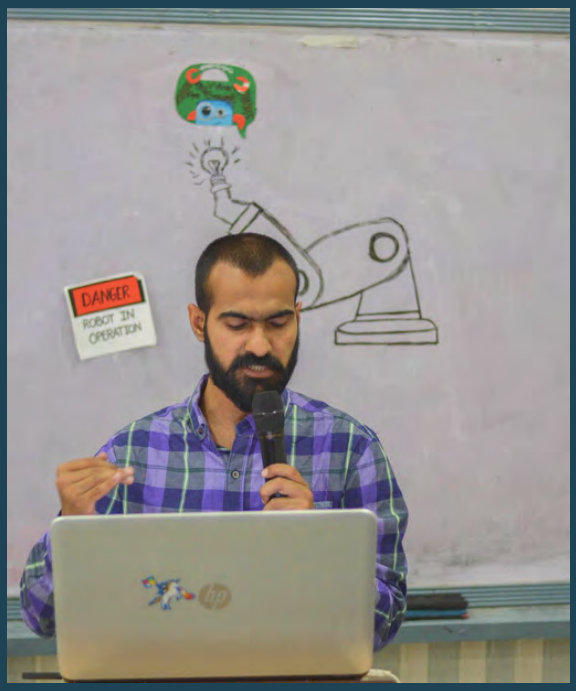


MECHTECH

Under the umbrella of MECHTECH, several competitions demanding sharp technical and soft skills are organized. These include Speed Coding, E-Gaming, Intra LFR/LNR, CADMAD, Speed Wiring, Speed Soldering, Technical Presentations, and Logo Quiz. Over the years, such events have provided the students with entertainment beside the technical grind of engineering knowledge.







WORKSHOPS

Workshop Week brings an opportunity to youth to practice their practical skills in diverse domains, i.e., Solid Works, PCB Fabrication, Arduino Programming, Machine Learning, Freelancing, etc. The prominent workshops held this year are: Unity 3-D, LFR, CV writing, Advance Python: Mediapipe, SumoBot, LNR, and RC car.

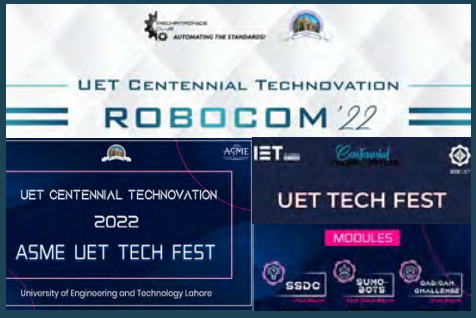
INDUSTRIAL TOURS

Industrial Tour is being organized to provide the departmental students with an insight into the Industries working in **Pakistan.** The 2018 session went on a one-day trip to **Heavy Industry TAXILA this year**. This is a Pakistani state-owned defense manufacturing and military-industrial complex. A detailed demonstration of the manufacturing unit was given on this tour. Moreover, in the **final year tour** of 5 days, the students went to Taxila Museum and Murree Breweries.

The students from the 2019 session went to the **ORIENT industry** and **Mangla DAM**, where they are illustrated by the working and generation of the plant.

In the industrial tour of the 2020 session, the students visited the production unit of **6B Food industries** - where they observed the process of beverage production from scratch.

TECHNOVATION WEEK



Centennial Celebrations

The signature event of UET, Technovation week, was held in the second last week of March 2022. Various inter and intra-university competitions, technical modules, and project displays were held. From the mechatronics department, the following projects were displayed:

- Libaas- An Augmented Reality Try-on Environment
- Collaborative 5-DOF Manipulator (Cobot)
- Active Prostheses
- Exoskeletons
- Smart Bat
- Interactive Website
- Design, Fabrication and Control of AMBU bag
- Laser Engraving Machine

We are pleased to mention that the project 'Libaas' secured the first position. It is an Augmented Reality Try-on Environment presented by our esteemed professor Mr. Misbah ur Rehman. Meanwhile, the second position was secured by: the 'Design and control of the 5-DOF Robotic Manipulator' project. It is a project under the Human-Centered Robotics Laboratory of the Mechatronics Department, and its design and development have been completed in tenure of two and a half years.

NON-TECHNICAL ACTIVITIES

Mechatronics Club has its hybrid modules in which non-technical events are also organized.

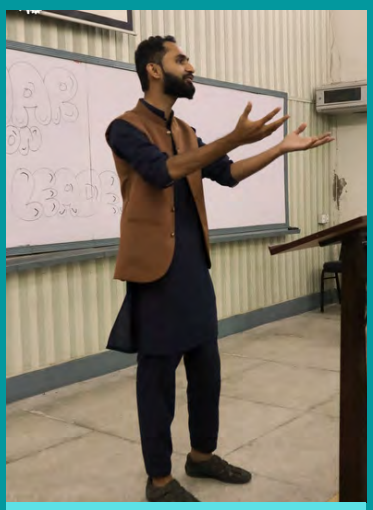
ORIENTATION WEEK

Orientation Week is organized to warmly welcome the junior students of the department. This year's orientation week included multiple activities like Departmental Visit, Photo-Booth, Orientation Ceremony, Squid Game, Team mingle, Prize distribution, and Photo Montage. Orientation week became a part of their lifelong memories and ensured their participation. Such activities boost their confidence and form an interactive bond with their seniors.

SEMINARS

The club continues its legacy by organizing some eventful seminars. The Organizational behavior and the one by the Youth Club are among the worth mentioning seminars being held this year.

Enabling Entrepreneurship

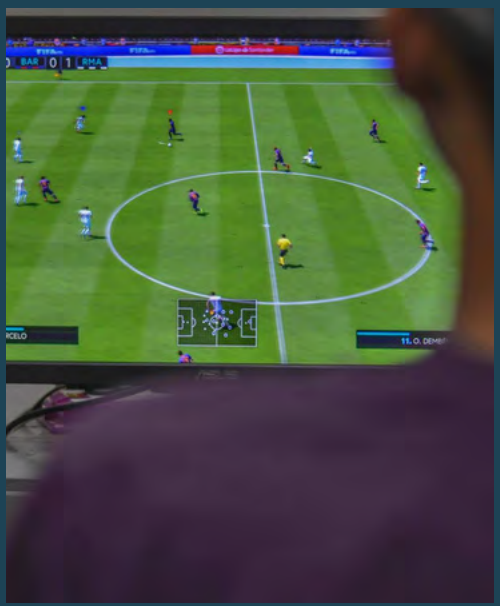


Organizational Behaviour and Leadership

A conversation about conversations

GAMING WEEK

Mechatronics club presents one of its most exciting events “GAMOPHILE”. The event had some electrifying modules like chess, marvel quiz, wire loop, PUBG, Tekken tag 2, and Fifa.



SPORTS WEEK

Mechatronics club tries hard to promote healthy competition between the club members. The event presented: "Sports week'2022" included different modules of outdoor sports such as Cricket, Football, Badminton, and Tug of war.

COLOR SYMPOSIUM

Mechatronics Club brings another exciting activity 'Color symposium'. In this photo session, all sessions participated wearing the allotted dress codes and gathered at the lalazar park for group photos.

COLLABORATIONS

Numerous other collaborative events and workshops were also organized for the students' grooming, learning, and personality development.

The club celebrates Iqbal Day in collaboration with the Iqbal Academy, besides its collaborations with AIESEC, IEEE, IET, ASME, etc., to organize different extracurricular activities throughout the year.

Iqbal Quiz 2020

The sponsors which were gathered this year for our signature event ROBOCOM include OZI Group, Byte and JOLTA Electric.

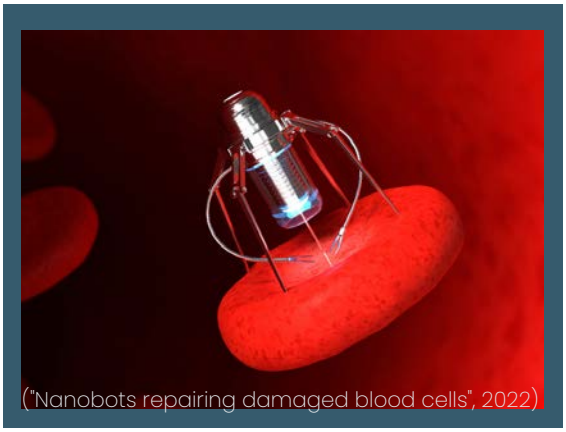
The collaboration this year with AKS-UET Photography Society and SAE (Society of Automotive Engineers) was noteworthy.

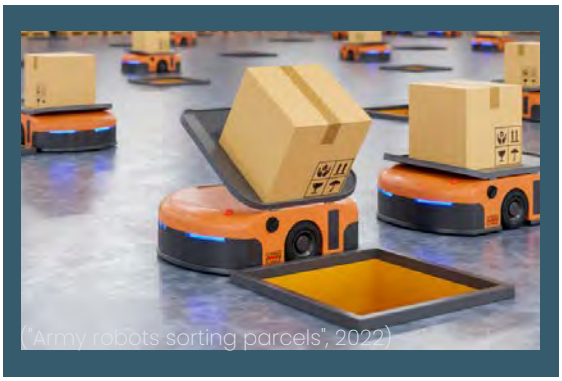
OPPORTUNITIES

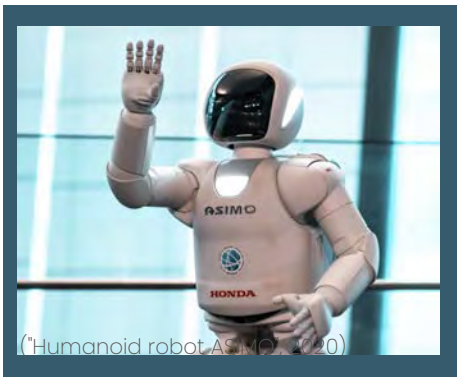
Ways to advance career as a Mechatronics Engineer

Industries hiring Mechatronics Engineers

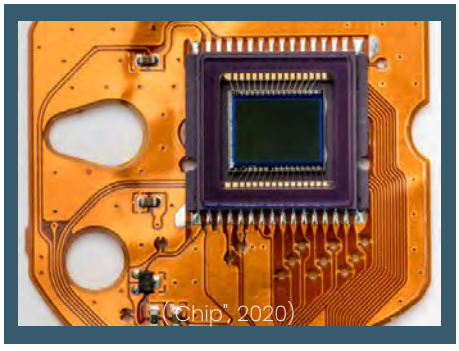
With the broad category of skills, Mechatronics & Control Engineers are equipped to work in almost any place. Many enterprises are moving towards humanoid robots and other forms of automation. Robots are now being used for drilling, welding, and even inspection in the aircraft manufacturing industry. In the medical domain, automated, sensor-equipped systems can help monitor vital signs, while medical robots can support the patients undergoing rehabilitation and even assist with surgical tasks. Meanwhile, innovative assembly lines improve efficiency in manufacturing while holding down costs. The new era of automation and industry 4.0 shows that the jobs and skills of mechatronics will be massively demanded in the upcoming years.


("Nanobots repairing damaged blood cells", 2022)


("Army robots sorting parcels", 2022)



("Humanoid robot ASIMO", 2020)


("Chip", 2020)

Research and Academics

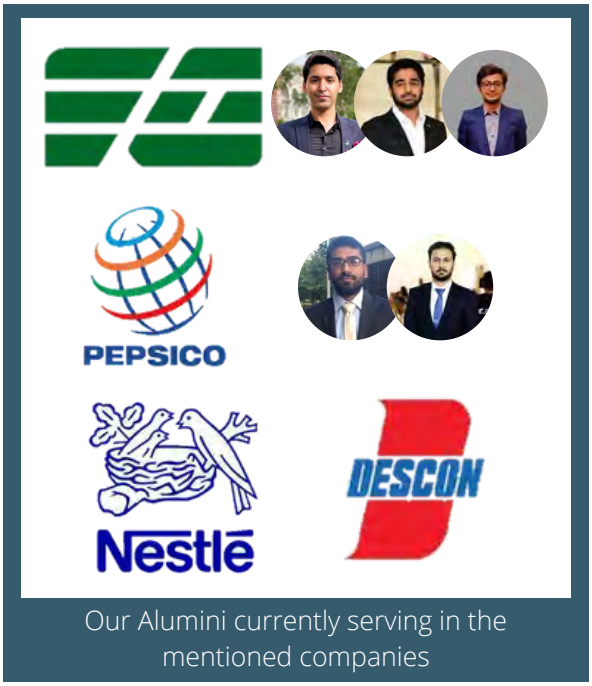
Mechatronics & Control Engineers can also seek their careers as full-time Research and Development (R&D) engineers in different companies. This is a specialized job and requires at least a Master's degree but preferably a Ph.D. degree. Mechatronics & Control Engineers can go on with different research domains depending on their research orientations and field of interest. Broadly categorizing, Mechatronics & Control Engineers may pursue the potential research fields:

- Robotics
- Automation
- Control Systems
- Artificial Intelligence
- Data Science
- Renewable Energy
- Digital Electronics
- Embedded Systems

Scope in Pakistan

The scope of Mechatronics & Control Engineers is mainly in robotics engineering, telecommunication engineering, HMI systems, automation system, and industrial control systems. Many hi-tech engineering industries in Pakistan hire Mechatronics & Control Engineers; the major ones are enlisted below:

- HONDA Atlas Cars
- Nestle
- PepsiCo
- Coca Cola
- Fatima Group
- Engro Corp.
- Packages Ltd
- Tetra Pak
- DESCON
- Avanceon

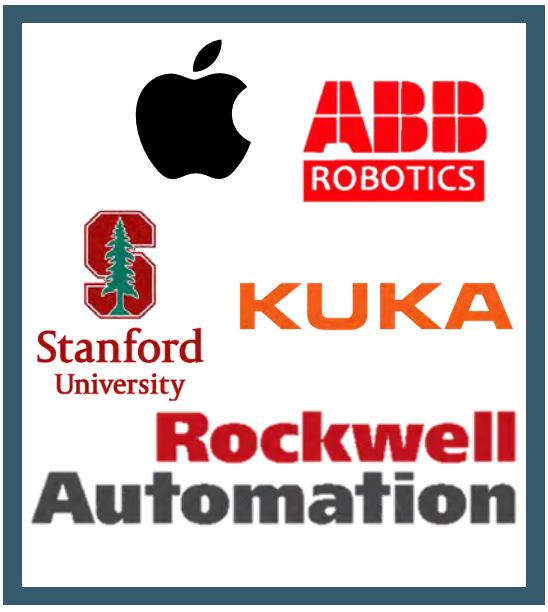


Our Alumini currently serving in the mentioned companies

Mechatronics & Control Engineers can apply for various positions depending on their experience and skills. Some of these are entitled as:

- Management Trainee Officer (MTO)
- Production and Quality Assurance Engineer
- Instrumentation and Control Engineer
- Graduate Trainee Engineer (GTE)
- Automation Engineer

Scope Abroad



Normally, due to the lack of R&D sector industries in Pakistan, most engineers serve abroad in different organizations and institutes. After completing their Ph.D., they tend to fill in the industries and large organizations. Some of the top organizations and institutes where Mechatronics & Control Engineers serve are enlisted below:

- CALTECH
- Stanford University
- Apple
- KUKA
- ABB
- Rockwell Automation

Depending on the aptitude and skills of Mechatronics & Control Engineers, they are currently serving and leading all major industrial and academic sectors. With the current pace of technological development, the need for Mechatronics & Control Engineers and other integrated technology engineers will proliferate.

ALUMNI SUCCESS STORIES

Serving across Pakistan and abroad in several domains, Our Alumni are making a positive impact through their passions and skills.

Saqib Hussain

Batch: 2007 - 2011
Technical Specialist Automation – Tetra Pak, Sweden

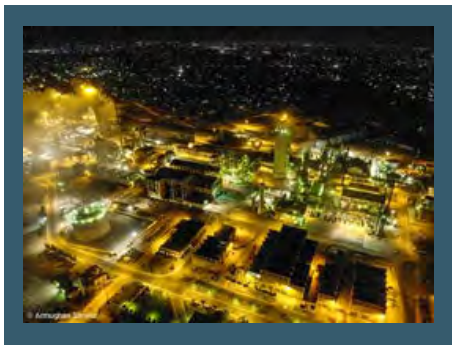
I wish my story inspires students on campus. My journey started ten years ago with a great company that is a leader in processing liquid food solutions. I still enjoy going to work every Monday morning and feel lucky enough to have those past moments that I still remember. Back in 2010, our MCT department chairman invited his class fellow (who was working with our company). They were looking for future engineers who could work on their customer facilities on high-speed filling lines, servo systems, conveyors, and processing machines. This motivated many of us to wish for this type of work. During the interview process, there were five rounds of screenings together with students from universities like NUST, GIKI, NED, etc. We realized that students from UET lack critical skills (specifically preparation, confidence, and communication) to secure a job compared to many from other institutions.

I want to talk about the three mentioned skills briefly. It would be best if you never took any interview un-prepared. Read the employer website, try to fit yourself into what JD (job description) is looking for, and highlight those strengths during the whole interview process; spend hours researching different scenarios that can come during the interview and how you solved them. Grow your confidence. Confidence does not come in one day; instead, it results from many accomplishments, experiences, abilities, and beliefs that you are the best fit for the role. If you are fully prepared and confident, you will surely deliver a lasting impression to the interviewer through your communication skills. After a recurring follow-up with Human Resources a few weeks later and showing interest, I was invited for a technical assessment for another FSE position (Field Service Engineer - Processing), which landed me a job offer on the same day. Since then, life has given me different and exciting experiences every day. I am currently based in Sweden - working with a team of automation engineers from different nationalities & with many years of experience. My everyday work involves dealing with global customers, designing and developing programming solutions with industrial controllers to meet the demand for liquid food solutions, including dairy, beverages, & prepared food machines, and traveling around the world. A few courses worth mentioning that are still relevant for me include hydraulics & pneumatics, industrial automation, system design & thermodynamics. One piece of advice for students at the campus, build your confidence throughout your four years at UET by delivering different experiences, i.e., engaging in volunteer work, taking short work assignments apart from studies during semester breaks, collaborating with students from various universities, etc. Despite all the challenges, build your own experiences empire, so you deserve your karma. Good luck!

Armughan Sarwar

Batch 2015-2019
Instrumentation and Controls Engineer
– Fatima Fertilizers, Pakistan

Since my days at the Dept. of Mechatronics and Control Engineering, UET Lahore. I was intrigued by the electronic sensors. They never seemed to me like mere electronic components, but I always perceived them as the eyes, ears, and hands of an autonomous system. Furthermore, the sensors themselves cannot do much without a brain, where all inputs are analyzed, and suitable outputs are generated. This brain (control unit) always made me think about how the automated machines are so similar to the human control philosophy. After working on sensors and programmable control units, I fell in love with the paradigm of Instrumentation and Control systems, which led to my decision to pursue my career as an I&C Engineer at Fatima Group.

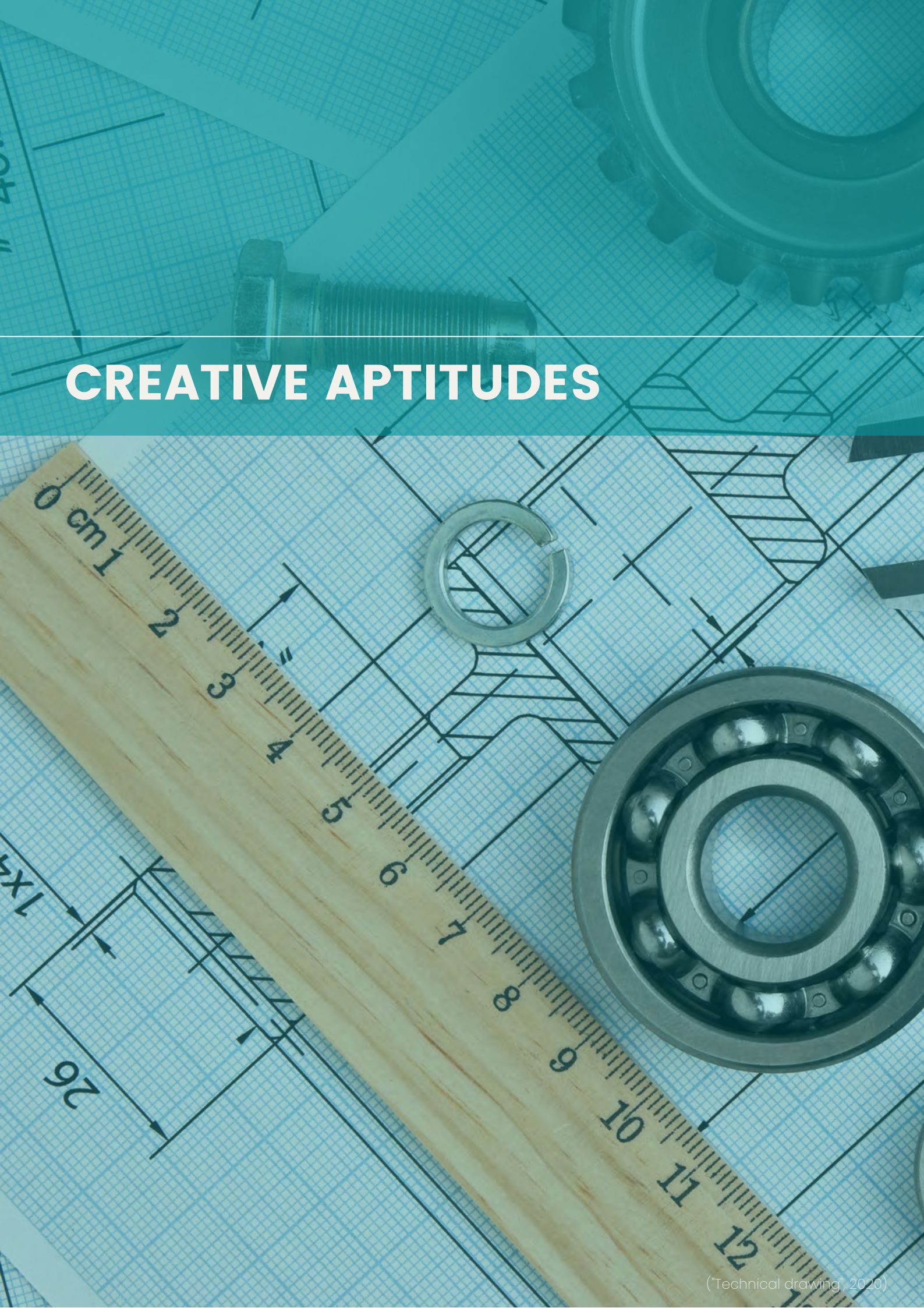


Huma Akbar

Batch 2016-2020
Incharge and Founder
-KidsLogiX world and Robosmart Creative Club, Lahore

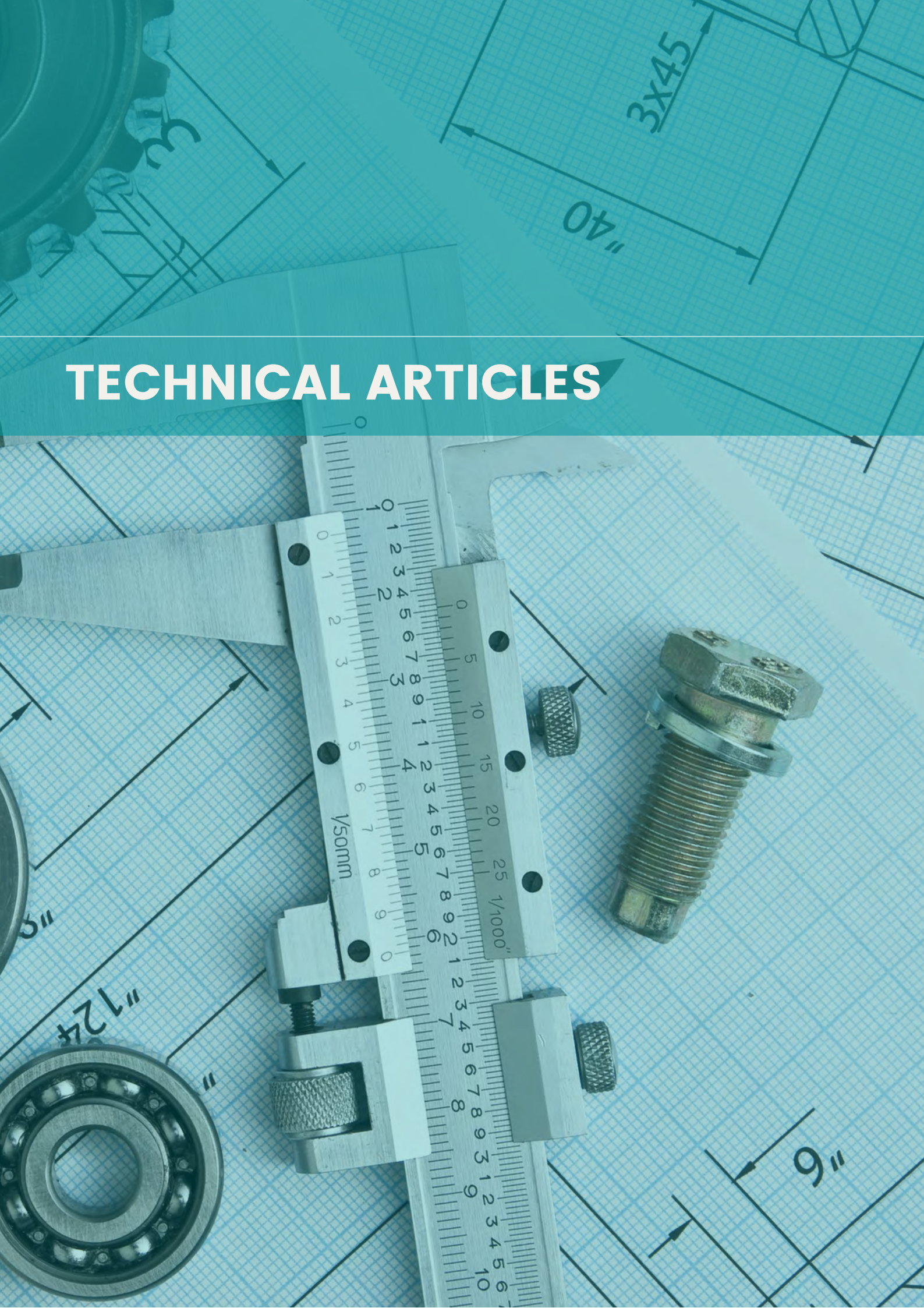
I am delighted to see that our little ones are very interested in studying technical subjects in their schools at the beginner level. I also get in touch with many other schools where everyone now wants to implement STEM education in schools. My students take part in Robotics Competitions in many institutions, and by the grace of Allah, they are also successful. Let me concise the entire story by sharing a few lines. “A dream does not become a reality through magic; it takes sweat, determination, and hard work.” Determine your goals and work on them by heart, and you will see that Allah will make your path easy and give you success.

CREATIVE APTITUDES



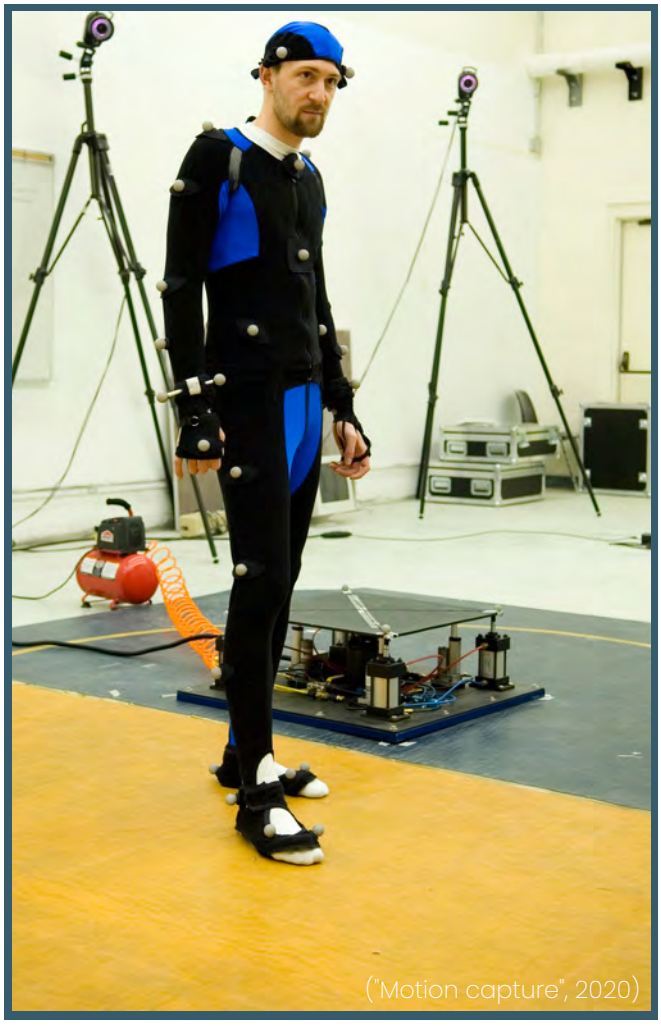
("Technical drawing", 2020)

TECHNICAL ARTICLES



Qualisys

Qualisys is a leading provider of precision motion capture and 3D positioning tracking system with a 30+ years-long history of supplying a variety of industries with high-end camera systems and expertise. Qualisys is originally located in Sweden, with offices in Europe, North America, and Asia. With such a huge global distribution and partner network, Qualisys is providing services in over 15 different countries allowing them to cater to the diverse needs of customers.
Qualisys offers a variety of marker-based and marker-less motion capture systems for a range of applications including indoors, outdoors, and underwater as well.



("Motion capture", 2020)

Their cameras are capable of recording high-speed, high-resolution calibrated videos that are capable of capturing active and passive marker data. Their software support includes a user-friendly interface that provides easy access to skeletal data, marker labeling, trajectory editing, and rigid body data.

Recently, the Department of Mechatronics and Control Engineering at UET Lahore acquired a state-of-the-art marker-based motion capture system from Qualisys. This system includes; three Miqus M3 and two Miqus Video cameras along with the required hardware and a lifetime license for their proprietary software Qualisys Track Manager (QTM). A workshop was organized by Qualisys in UET Lahore to equip students and faculty alike with the fundamentals of motion capture and how to incorporate Qualisys hardware into it. Brief sessions were conducted to demonstrate the real-time synchronization of Miqus M3 and Miqus Video cameras using their native software QTM.

Motion capture, commonly referred to as MOCAP, is typically used to record the motion of objects, humans, animals, or robots in order to produce a 3D model. For marker-based motion capture, opto-reflective markers are placed on dynamic objects, and their movement is recorded. It is then converted into 3D models to analyze and process the captured data.

Prior to data collection, the work environment is calibrated in order to set a reference coordinate system. This effectively allows the user to track the dynamic position with high accuracy. The Qualisys system in the Department of Mechatronics and Control Engineering, UET Lahore is currently being utilized in a project funded by Higher Education Commission (HEC) under National Research Program for Universities (NRPU). This project aims to develop a probabilistic marker-less motion capture system for bio-centered applications by using Qualisys's marker-based system as a reference point. Recently, a number of data collection trials were performed using the equipment with semi-professional bowlers to determine the illegality of their bowling action as standardized by ICC rules and regulations. Apart from its use in the NRPU project, the Qualisys system will also be implemented in an active prosthesis project to extract lower body kinematic data. Various other applications are also being explored including clinical gait assessments, robotics, motion monitoring, sports, and biomechanics research.

- Mian Husnain Akram
Revised by Mr. Ammar

Learn more at: https://www.qualisys.com/

Artificial Intelligence and the Future of Humanity

"What technological marvels Artificial Intelligence (AI) may sprout in the foreseeable future?", a question that continues to leave both experts and laymen curious and inquisitive. Human being, the best of God's creations, is unique in its learning instincts; our brain, the powerhouse of information storage and processing, enables faster and efficient learning even without any external supervision. Conventional machines, on the other hand, cannot learn by themselves; they need to be explicitly programmed to execute specific set of tasks. AI is a novel tool to forge human-like characteristics and attributes in the machines so that they can take intelligent decisions independently and exhibit reduced dependence on human supervision or involvement. More importantly, it allows machines to simulate human learning traits, in particular, learning from examples or past experiences and to progressively improve their performance on the future tasks. From self-driving cars offering routine long-distance rides to NASA Mars rover operating thousands of miles away with remarkable accuracy and precision, intelligent machines are only beginning to transform age old fantasies into today's reality. AI has a lot more to offer than simply producing smart machines; in years to come, it is likely to shape our lifestyle in an unprecedent manner with dramatic consequences.

Yet, predicting the impact of novel technology can help us foresee the landscape of transformation. Around sixty years ago, Gordon E. Moor, Intel first CEO, accurately envisioned the world full of miniaturize-able telecommunication and computational devices including cellular


("tech", 2021)

phones and mobile computers. Shrinking integrated circuits (IC), containing enormous data processing prowess, architect reliable long-distance computer networking. Much like the way internet completely substituted a wide array of routine tasks of the recent past with a deep-rooted culture of online activities prevailing now-a-days, we may soon witness a society that could barely function without AI. Currently every sector of modern age economy is keen to invest in AI based solutions for automating their processes and improving customers experience. Experts predict that AI will be able to modernize around 90% of our lifestyle by the end of the decade. Tech giants including Google, Facebook, Amazon and Microsoft are housing the strongest of AI research teams for advancing techniques in view of future needs and challenges and to eventually expand a new horizon of ways we interact with physical world. However, the applicative domains of AI


("Data", 2022)

are not restricted to information technology only; commerce, medical equipment, process and manufacturing industry, law firms and education sectors offer new avenues of advancing its scope and state-of-art. There is a growing global market of several real-life AI products developed by Siri, Tesla, Cogito, Netflix, Pandora, Boxever, Nest, flying drones and several others. By running AI algorithms on built-in processors, our future machines will function independently and efficiently, saving fuel/energy consumption while simultaneously minimizing the downtime and optimizing the efficiency. The entire socio-economic landscape looks ever so bright, yet, every milestone in this journey requires us to embrace and address several unforeseen challenges along the way.

One of the main problems with AI is that it realizes only software components of the system. That software typically evolves much faster than the hardware, the concomitant improvements and upgradations in the latter eventually pose system-level performance bottleneck, potentially depriving us of the full capabilities of cutting-edge AI techniques. On the other hand, complex tasks offloaded to fully AI automized hardware may dissuade human workers to perform to best of their psychomotor and cognitive abilities. Fiercely competitive future job market threatens to replace less skilled human workforce with advance intelligent robots. The survival will belong to the fittest—the one who would successfully substitute machines for human labor for lower production cost, improved productivity and higher efficiency. With every passing day, we build more robots ready to perform tasks that were once considered manually cumbersome and painstaking. A large-scale grim impact may be that the entire society gradually becomes so accustomed to AI that we may lose solemn realization that recklessly pursuing ubiquitous mechanization of life is both unwise and unnatural. Therefore, our approach to embracing this novel technology should be of great caution and care, as we continue to push the frontiers of AI tools for realizing smart systems of the future.

- Zain-ul-Hassan
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COMPARATIVE LITERATURE & PAINTINGS

("quill pen and ink", 2019)

Islam and science: Parallel or perpendicular

First Perspective

("Old Islamic scientist", 2020)

The contrast and comparison between Islam and science have been a subject of never-concluding debate in a variety of spheres in the Muslim as well as the western world. One may acquire the notion that Islam and its adherents repudiate every impression of science, but that might not be factual subjectively.

Science tries to extract knowledge and utilize it productively, and Islam also upholds this cause. The Mohamedans, considering the man as the crown of the creation, behold applied sciences as an inducer of selflessness towards the creation. They regard the natural sciences as prompt towards the creator.

However, sometimes a falsifiable scientific theory supporting the Godless theory of life ends up in a clash between religion and science. Such theories question the need for ethics and conscience while these two things are the first concern in religion.

Islam and science are not at cross purposes as per elucidations in historical records of both the East and the West. Knowledge, as mentioned in the sacred texts of Islam, is the lost heritage of Muslims, and they should acquire it wherever they see it. Indeed, contrary to the reigning perceptions and received wisdom, Muslim scholars travelled hundreds of miles to quench their thirst for knowledge. This made them receptive to new ideas, and they gathered much knowledge from the Indo-Greek and Chinese cultures.

The medieval Islamic empires inherited the scientific conceptions of late antiquity. They sustained it, illustrated it, and finally handed it to Europe. The Renaissance in the West owes a considerable extent of knowledge to the Islamic cultures and their technological and medical innovations, and discoveries, a whole world of innovation that opened before them in the form of ancient Greek philosophy and Vedic Sources is nothing but beneficence in the form of the translations and renderings done by Muslim Scholars dwelling across Arabia, Persia, Spain, and India.

Suppose one goes through the grandeur and prestige of the Muslim World of the Middle ages to that of pre-colonial eras, the reign spanning from the Iberian and engulfing the Indian Peninsula, encompassing the Nile region. In that case, it will be determined that the masters of the Mediterranean and the lords of the once Byzantium and Persian lands made ground-breaking achievements in all the domains of natural and social sciences. From estimating the radius of Earth,

developing the techniques of automata, remodelling the optics and vocals, devising the paraphernalia for surgery and medicine to amplify the science of metallurgy, uncovering the miracles of chemistry, formulating the interminable derivations in the chapters of algebra and geometry, and scrutinizing the cosmos, Muslim Scientists were insuperable. Muslims Jurists and theologians penned a diverse class of writings, not to be confused with narrow-minded Mullas and mystics, not to be jumbled with whirling dervishes, carved extensive volumes on the paradox of infinity, essentialism, apparentism, and speculative philosophy, unveiling the hidden.

Muslims themselves neither abandoned their heritage mentioned above nor demolished it. The invaders like the Crusaders, the Mongols, and the Colonial Powers caused so. Islam was showcased to the enslaved Muslim nations as hostile to new ideas and incentives by the modernists. The coming generations started considering that Islam and Science are at odds.

The ethical and justified use of resources is a significant concern of modern philosophers in the current regime of materialism. Islam, being monotheistic philosophy, asks its adherents to explore materials, not worship them. The love for mere material means is avoided as those may become lords. Ultimately the idols and crosses, and even worse than the demon as in polytheistic and dark cultures, every cause of prosperity and ease, as well as that of agony and grief, are objectified as the "Supreme Being". Both secular nationalism and atheistic socialism, at least in their current state of human adjustments, must approach the psychological forces encompassing abhorrence, distrust, pique, and disgust, which may conclude to impoverishing the soul of man and hampers the discovery of his concealed sources of spiritual energy. He came across the notion that he cannot control his ruthless egoism and infinite gold-hunger progressively demolishes all higher-order struggles and strivings in him and is left with nothing but life-weariness.

Moreover, Islam, which in its apex manifestations is neither a set of precepts, sacerdotalism, nor mere rites and rituals, can all alone line up contemporary humanity with the burden of the great onus which the progression of science must entangle. It is only feasible by rising to a fresh vision of his origin and future, his whence and whither. Consequently, that man will sooner or later be victorious over a society inspired by an inhuman rivalry and a civilization that has lost its spiritual unity by its inner conflict of religiopolitical tenets.

Hence, it will not be falsified if one says that Islam and Science are parallel, not perpendicular, complementing each other. The present era demands that scientists underline their role in medicine, food production, and transport. Likewise, religious scholars should understand that their duty is realizing society about the meaning of life and lay stress on values that can explain the efficient use of resources. This can bridge the gap between the two.

However, if religious scholars deny the applicative significance of science and if scientists cross their boundaries to support the Godless theory of life, both sections will be responsible for holding society backward and hampering new inventions and initiatives.

- M. Noor Sultan

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Second Perspective

("golden age", 2019)

The connective "and" in the title could mislead someone into believing that Islam and Science are two separate entities that require some external mechanism to establish a relation between them. Nothing could be further from the truth if the word science is taken in its traditional sense. Islamic sciences naturally sprang from the roots of the integral Islamic tradition of learning. In the traditional Islamic civilization, prior to Western colonization of the majority of Muslim lands, Islam and science discourse fundamentally differed from its post-colonial version. From a traditional point of view, Islamic sciences are nothing but macrocosmic and microcosmic applications of the metaphysical principles revealed in the Holy Quran. Hence, there is no question of any tussle or tension between science and Islamic orthodoxy. Muslims developed technology and science according to their traditional worldview based on the non-confrontationist approach toward nature and its significance in the spiritual life of a human being. Nature was never treated as a thing or an "it" to be quantitatively studied, conquered, controlled, and manipulated. The symbolist spirit permeated traditional Islamic sciences: all the phenomena of nature were treated as signs and symbols pointing towards a higher reality, but not facts and things. These signs and symbols were channels through which one could gain traditional wisdom and connect with the ultimate source: GOD. The development of technology was not driven by exploitation and manipulation of nature for power acquisition and dominance. The utility of technology was primarily linked with the spiritual wellbeing of a human being and secondarily with worldly matters. The goal was to create an ambience where Muslims could coexist with nature and attain spiritual realization. The scientific achievements of Al-Beruni, Ibne Seena, and other early Muslim scientists testify that scientific endeavours of a high standard are possible under the traditional Islamic ambience. The post-Mongol Islamic era saw the emergence of three major empires: the Timuri empire in India, the Safavid empire in Iran and the Turkish Ottoman empire. The scientific achievements, especially in architecture, under the rule of these three empires further prove the capacity of the Islamic tradition to manifest scientific marvels. Even on the philosophical front, this era saw the emergence of two great philosophies: illuminationist philosophy by Shahabuddin Suhrawardi and transcendent theosophy by mullah Sadra.

While Islamic sciences flourished under the traditional umbrella, the west underwent a major intellectual transformation. Nominalism was gaining prominence in the intellectual circles in Europe by the start of the fourteenth century, while Christian philosophy was gradually fading away. Until the advent of the Renaissance in the seventeenth century, Western sciences were still traditional. However, philosophies based on rationalism and empiricism were gaining strength day by day. These humanistic philosophical enterprises prepared the ground for that scientific revolution primarily pioneered by Descarte, Galileo, Kepler, and finally Newton. A significant change took place in the west in understanding the very goal, meaning, and methodology of science. Galileo and Newton's modern astronomy and physics were based on a secularized view of the cosmos. The objective reality of nature was reduced to quantity, and quality was subjectivized, thus destroying the symbolist spirit. This led to the complete separation of the knowing subject and the known object, known as Cartesian dualism. Symbols became reduced to signs and facts; both the book of nature and the book of revelation became opaque and reduced to their external level of meaning. A new science was born which had the potential to discover a lot on the quantitative side of nature but at the expense of losing the traditional worldview and neglecting the spiritual dimension and the qualitative aspect of nature. This science could do nothing but confront the traditional worldview. It provided a world view in which Mother Nature was supposed to be conquered, exploited, and manipulated for worldly gains. The technological development under the new scientific framework was based on power, not contemplative wisdom. It allowed Europe to gain so much power that it could colonize most of the Muslim lands. To a large extent, this unfortunate historical event destroyed the traditional Islamic civilization that had developed in parallel to that of the west for so many centuries.

Napoleon's arrival in Egypt was a sign of a major transformation of the Islam and science discourse that had been taking shape in the eighteenth century and would provide the paradigm for the discourse until now. The Muslims were caught by a "catching up syndrome", which is a statement that identifies the cause of the decline of the Muslim power to falling behind Europe in science and technology. It also implies that as soon as Muslims catch up with Europe in scientific development, all their problems will be solved. This syndrome highly influenced the subsequent Islam and science discourse. The changing nature of this discourse manifested itself in two trends: justifying the acquisition of modern science through the two major sources of Islam: Quran and Sunnah; the emergence of an abundance of apologetic literature trying to find roots of modern scientific discoveries in Quran and Sunnah. Later, governments would establish institutions just for this purpose, and academic conferences would be held to bridge the gap between Islam and "modern Science".

Establishing a constructive relation between Islam and modern Science

First of all, the "and" in the phrase "Islam and Science" should be treated as a unitive, not a connective. This is extremely important because any discourse which stands on the assumption of multiple independent realities could be anything but Islamic as it contradicts the central idea of Islam: the unity of God. This does not imply that there cannot be diverse expressions and routes to one reality, but that these different expressions must be connected through a central theme which provides the unifying thread. Thus, for a constructive exploration of the relation between Islam and modern science, one needs to examine modern science from the lens of the traditional Islamic framework. There have been few efforts along these lines examining the relationship between Islam and modern science in the light of traditional Islamic concepts. This body of literature

covers a whole spectrum ranging from a critique of modern science to proposing alternative solutions. The critique of modern science is characterized by an emphasis on the limitations of the philosophical bases of modern science and a complete restructuring of modern science to reestablish its severed ties with the ultimate reality. The group proposing alternative solutions primarily attempts to restore traditional Islamic sciences in which nature was not divorced from its sacred aspect. However, this approach is sometimes mistakenly conceived as an attempt to restore the pre-modern status of science. Anyhow, the current Islam and science discourse is dominated by two opposing behaviours: one calling for an unconditional acceptance of modern science, and the other a total restructuring of the modern scientific framework to get it in line with the traditional framework.

Way forward

Intellectual front

What needs to be done is to examine the findings of modern science in the light of the metaphysical principles laid out in the Holy Quran, as these principles are ahistorical, timeless and always true. The facts generated through experimentation demand interpretations that require certain prior assumptions. The revealed metaphysical principles supply these prior assumptions in the Islamic context. From a practical point of view, governments in Islamic countries need to establish institutions where bright-minded people are trained to become well versed in traditional Islamic sciences and have the intellectual capacity to understand specific domains of modern science. Secondly, a new generation of Ulama with a sufficient understanding of modern science needs to emerge. Fortunately, there have been positive developments on both these fronts: a large number of Western Muslim scientists are working in some of the most advanced scientific laboratories in the world. These innovative minds can do wonders if given formal training in traditional Islamic sciences. Also, we see a new breed of Ulama having the required intellectual penetration in modern sciences. Islam and science discourse's future will depend highly on these two groups.

Technological front

The adoption of modern technology presents a dilemma: on the one hand, technological innovation is necessary for the survival of the Islamic civilization, especially when it is threatened on multiple fronts by an adversary having sophisticated and destructive technology. On the other hand, adopting modern technology implies exploitation and manipulation of nature which is against the basic principles of the traditional Islamic framework. I believe the solution lies in striking the right balance between these two alternatives. Islamic countries should encourage technology innovation to the extent that a minimum level of deterrence is established, which ensures the Islamic civilization's survival, integrity, and identity, but not indulge too much in the race of technological development.

Concluding remark

Modern quantitative sciences have inherent limitations in terms of providing wisdom to humanity. However, suppose the scientific findings are interpreted in light of the revealed principles. In that case, the complex symbolism hidden in the quantitative aspect of nature will reveal itself and again draw humanity's attention to the symbolized reality. I think the relationship between Islam and modern science should be defined in light of this fact.

- Dr. Syed Abbas Zilqurnain Naqvi

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"لہجہ بیان"

شاید میرے کسی کے لیے جذبات اور خلوص کو الفاظ کی ضرورت نہ ہو لیکن الفاظ کو ہمیشہ کسی کے دل میں اتارنے کے لیے جذبات اور خلوص کی ضرورت ہوتی ہے۔ کیونکہ اس کے بنا الفاظ سراسر کھوکھلے اور بات کی تاثیر ممکن نہیں ۔ہم اکثر بات کرتے وقت جن الفاظ کا چناؤ کرتے ہیں، وہ تلخ اور بے رخی کا مظاہرہ کرتے ہیں۔ لیکن ہمارے لئے یہ normal ہوتا ہے کیونکہ ہم یہ سوچنا ہی نہیں چاہتے کہ اگلا شخص ہماری اس بے رخی کو کس طرح سہتا ہے۔ خیر! بے رخی جہاں دل کی حساسیت کو تکلیف دیتی ہے۔ وہاں خلوص نرم لہجہ دل کے سکون کا باعث ہے۔ اپنوں کی غلطیاں بھی اپنی ہی ہوتی ہیں ۔ مل جل کر سدھار لینی چاہئیں۔ نہ کہ اس وقت کا انتظار کریں کہ کب تلخ کلامی ہو اور میں اس کو اس کی غلطی یاد کراؤں اور تکبر کی دستار باندھ کر دوسروں کے جھکنے کا انتظار نہیں کرنا چاہیے۔ یہی رشتوں اور دوستیوں کی بقا کا راز ہے۔

Haseeb Ahmed
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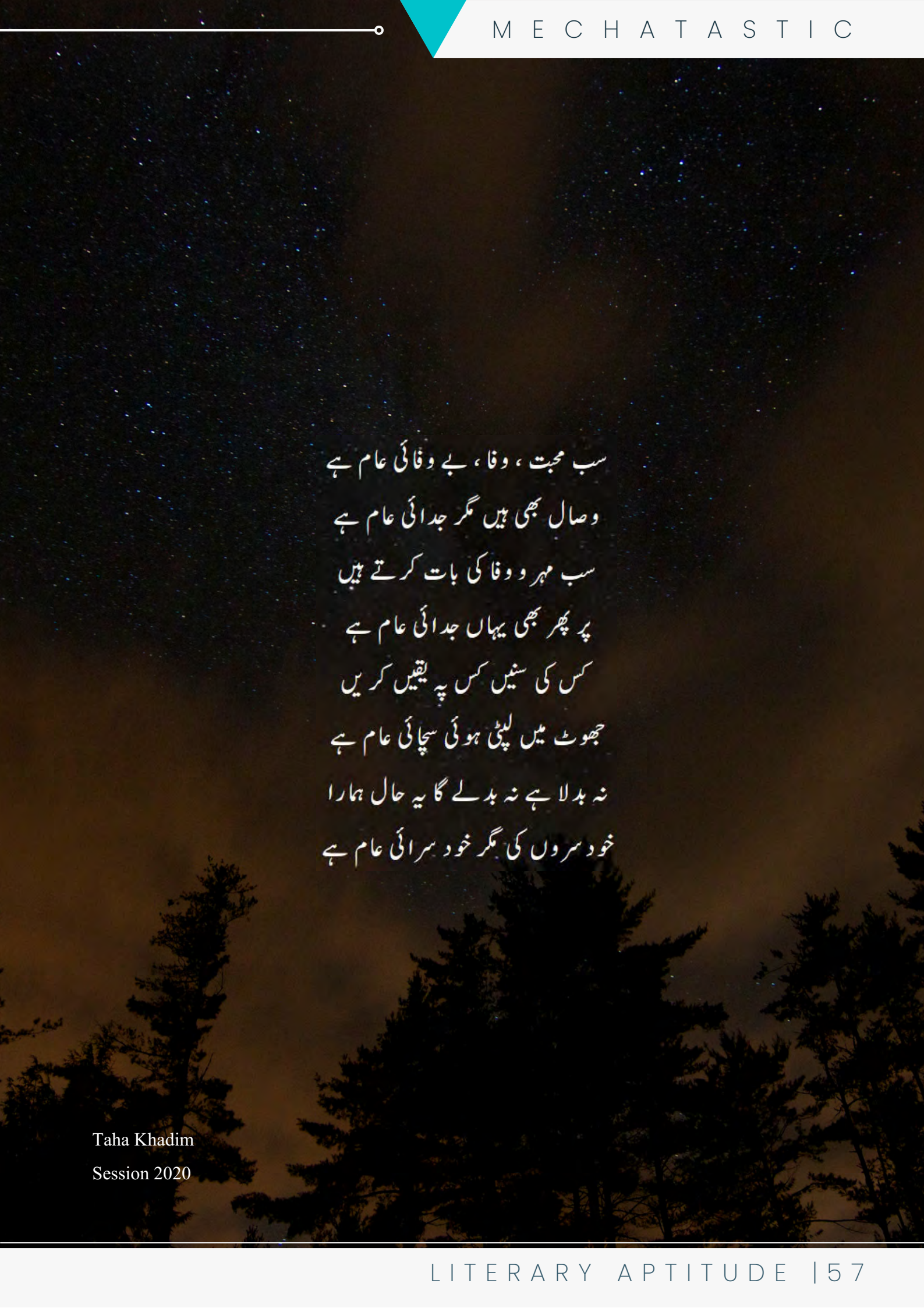

سب محبت ، وفا ، بے وفائی عام ہے
وصال بھی ہیں مگر جدائی عام ہے
سب مہر و وفا کی بات کرتے ہیں
پر پھر بھی یہاں جدائی عام ہے
کس کی سنیں کس پہ یقیں کریں
جھوٹ میں لپٹی ہوئی سچائی عام ہے
نہ بدلا ہے نہ بدلے گا یہ حال ہمارا
خود سروں کی مگر خود سرائی عام ہے

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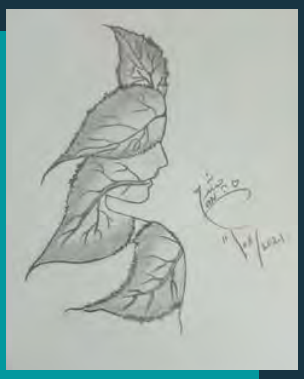

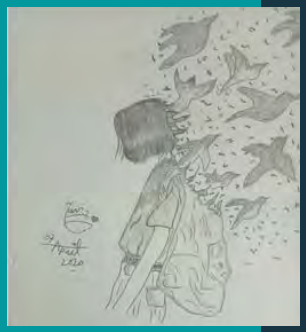

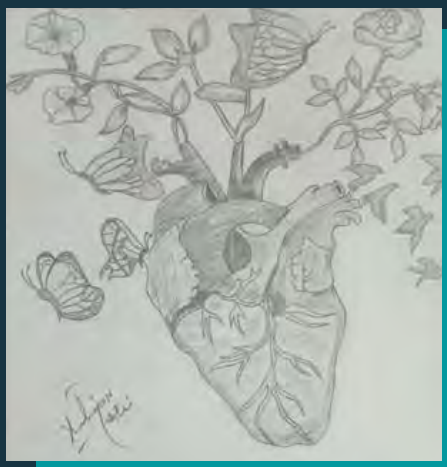

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