CPED NEWSLETTER

DEPARTMENT OF COMPUTER ENGINEERING, UNIVERSITY OF ENGINEERING & TECHNOLOGY TAXILA

[Prof.Dr. Hafiz Adnan Habib]

Message From Chairman

Hands on experience over modern tools are the right way to learn and comprehend new concepts and technologies. The continuous experiment creates perfection. Identifying problems around us, brain storming upon possible solutions, experimenting rigorously leads to the refinement and development of practical solutions. Presenting and displaying the developed solutions in real world scenarios lead to innovative products and socio-economics development. The department aims to provide such a environment and facilities that enable and empower our students with capabilities and skills to propose, experiment and develop solution for real world challenges around us. The department also aims to develop life long learning skills in our students for continual.

Prof. Dr. Hafiz Adnan Habib
Chairman Computer Engineering Department
adnan.habib@uettaxila.edu.pk

CPED Engaging its Alumni

" We have decided to improve our department through our dynamic alumnus, wo represent us in a vibrant manner. "

PROF. DR. ADNAN HABIB

The department has started publishing its newsletter to provide the updates about the activities of the department. It includes the achievements of its alumni working in different fields of engineering across the globe. The Newsletter will be published on a bi-yearly basis. It will provide the necessary information and opportunities to its alumni to collaborate with each other and with the department. The department has its presence already on social media with over 400 active members on its Facebook page. Computer Engineering department's alumni, who always wanted to share their experiences with students have an opportunity now. CPED has created a dedicated team under the supervision of Dr. Sanay Muhammad. This team would interact with alumni and engage them for the mentorship of its students, providing them job opportunities, helping them in their final year projects and guiding them for higher studies abroad and within Pakistan. The alumni team currently consists of Syed Muhammad Abubakr and Muhammad Nasir . S.M Abubakr is a graduate of 2012-2016 session and a PhD scholar in Tsinghua University, China. M. Nasir is a graduate of 2013-2017 session and currently working as a Lecturer in a private sector university.

[Syed Muhammad Abubakr]

[Muhammad Nasir]

Newly Proposed PEOs by CPED

CPED has proposed its new program educational objectives in the industry academia board meeting to set its vision clear for the graduates. These are the new PEOs that are under discussion

1- The graduates will have the ability to develop and design computing systems for real-world challenges and problems.
2- The graduates will follow professional and ethical practices as an individual as well as team members.
3- The graduates will be motivated and empowered to become entrepreneurs, managers, and life-long learners.

[A view of Computer Engineering Department]

Six Faculty Members Completed their PhDs with International Publication

Aamir Arsalan

Sanay Muhammad

Naveed Baloch

Aasim Raheel

Afshan Asim

Romana Farhan

Last year has been remarkable in the context of research progress at CPED. Six faculty members have completed their PhD journey with shining colours. These faculty members include Sanay Muhammad Umar Saeed, Afshan Asim, Romana Farhan, Aasim Raheel, Naveed Khan Baloch, and Aamir Arsalan. This endeavor resulted in a dozen of international journal and conference publications. Sanay Muhammad Umar Saeed conducted research on human stress using brain computer interfaces that resulted in 3 journals and 2 conference publications. Afshan Asim conducted research work focused on developing methods of content-based image and video retrieval directly in compressed domain using visual saliency models. Dr. Romana Farhan has recently completed her PhD from the Computer engineering department. The topic of her thesis title is "Security and Integrity of Critical Data in Remote Health Monitoring". She has published 3 high impact factor journal papers as a result of her PhD work. Aasim Raheel's dissertation title is 'Emotion recognition using EEG in response to multiple sensorial media'. He published 4 impact factor journals and a conference paper during his PhD. One of his paper published in a well reputed journal 'Information Fusion' having an impact factor of 13.66. Naveed Khan Baloch worked on Error Control Mechanism for Reliable and Efficient Network on Chip Design and published his work in highly reputed international journals. Aamir Arsalan completed his PhD Computer Engineering in May 2021. His research topic was "Human Stress Assessment Using Physiological Signals". He published three impact factor journal and two conference papers from his thesis.

Five FYPs Secured IGNITE Funding

IGNITE has approved the Funding to Final Year Projects (FYPs) 2021 for the students at Universities / DAIs across Pakistan, out of which, UET Taxila acquired the funding for 18 FYPs. It is pertinent to mention that CPED acquired funding for 5 FYPs and Ranked 2nd among the Departments in UET Taxila.

Project Title: Bowling action detection using smart sensors

One of the hot topics in the modern era of cricket is to detect and recognize whether the bowling action of a bowler is legal or not. Likewise, the detection of bowling actions and deliveries, such as off-spin, leg-spin, doosra, leg-cutter, off-cutter etc., is also significant in improving the game. Because of the complex bio-mechanical movement of the bowling arm, it is not possible to decide with the naked-eye whether a bowling action is legal or illegal. Inertial sensors are currently being used for activity recognition in cricket for the coaching of bowlers and detecting the legality of their deliveries and moves, since a well-trained and legal bowling action with different bowling verities is highly significant for the career of a cricket player. Hence, we propose a framework to examine the movement of the bowling arm of a cricketer to evaluate and understand the bowling action and styles using a smart sensor.

Project Title: Room Disinfecting Robot

As we know the whole world is suffering from a virus named Covid-19. This virus killed more than 1.08 Million People in the world and more than 37 Million cases reported. People can be

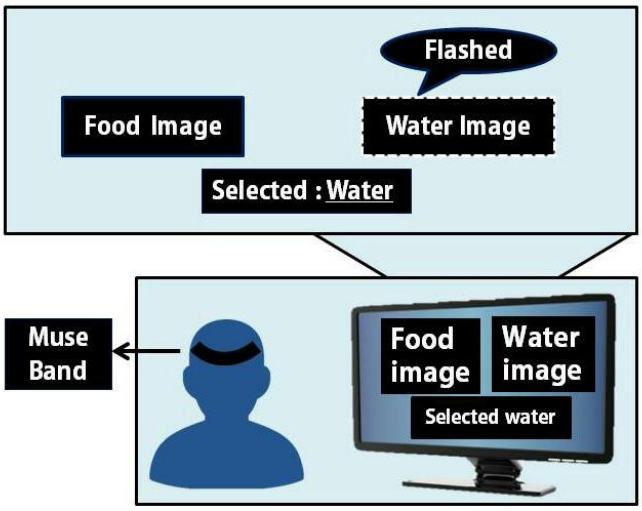
infected through the contaminated surface of any kind things. And, also in the hospitals, Restaurant's and Industries, some areas are contaminated with germs or diseases. To overcome this problem, we will develop a Robot that will move around in the Room to disinfect the contaminated areas.

Project Title: Blind's Eye

Visually impaired people are not able to walk and detect obstacles. Navigation is almost impossible that makes independent mobility impossible. This project helps to enhance the mobility of visually impaired people. The navigational facility will provide assistance to destination. Different sensors will be used to detect obstacles, the height of the obstacle, stair detection and navigation to make the blind individual independent.

Project Title: Pictorial Speller

Locked-in syndrome is a neurological condition in which the user is incapable to speak or move. In Locked in syndrome, the person is unable to communicate in an ordinary mode. However, the individual is aware of the surroundings and moves his eyes. In order to allow a user to communicate in a Locked in syndrome without any help, Brain computing is a viable option. This kind of communication used for people affected by specific motor disabilities. Presented research work focuses on the communication method (On-screen speller) for Lock in syndrome patients by retrieving their brain signals. One method of acquiring brain signals are using EEG devices. EEG signal measures the flow of charge. Neuron generates an electrochemical pulse during information exchange. The methods are used for targeted and non-targeted EEG signals of classification. The presented work proposes an approach to exclude the non-targeted EEG signals to decrease the computational overhead and increasing the speed of the training cycle. For this purpose, develop a brain computer interface (BCI) based application that helps the paralyzed or disabled patients to communicate with the outer world. It is a non-invasive system "Pictorial Speller" based on subjects' focus on a particular object using Electroencephalograms (EEG) signal.



[Block Diagram of Pictorial Speller]

Project Title: Designing of Crypto Processors

Crypto processors are specialized processors that execute cryptographic algorithms within the hardware. The idea of a cryptographic processor is not new. However, with the development of new and improved technologies attackers have found ways to make our systems vulnerable to different cyberattacks most importantly using power attacks. The most dangerous and effective of them are Differential Power Analysis (DPA) attacks. These attacks analyze the immediate values produced during cryptographic algorithm execution in a processor and then using statistical analysis they use the information to speculate the key. In this project students explore techniques to help us resist the attacks by masking the intermediate values and then develop an efficient solution to allow us to protect our devices from these attacks.

Research Group Activities

Engr. Waqar Amin is doctoral student under the supervision of Dr. Fawad Hussain, he is conducting his research in the domain of Network on Chip (NoC), he is working on the application mapping for NoC. Recently he submitted his research work to MICPRO and is under review. Ms Misbah Farooq conducted her MS thesis research work under the supervision of Dr. Fawad Hussain. She worked in the domain of speech-based emotion recognition, she worked on to evaluate the impact of feature selection for speech-based emotion recognition. She also published her research work in Q1 ranked journal (Sensors) with an impact factor of 3.275. Ms. Shamila Akhtar conducted her MS thesis research work under the supervision of Dr. Fawad Hussain. She worked in the domain of speech processing, she worked on to the problem of Arabic mispronunciation detection for non-native learners. Her research work got published in Q2 ranked journal (Electronic) with an impact factor of 2.412.

SIMPLE (Signal Image Multimedia Processing and LEarning) group is headed by Dr Muhammad Majid, a foreign qualified member of CPED. Last year 3 PhDs and an MS student of SIMPLE group got their degrees. SIMPLE group published 17 internationals journals and 3 conference papers in the last year. A research project of Simple group titled "Brain Activity analysis in response to HDR videos using EEG won the funding of 0.47 million PKR.

[Dr. Muhammad Majid]

DEAR-MULSEMEDIA was developed by the researchers at SIMPLE group and published the first dataset of its kind in an impact factor of 13.66 journal. Another milestone achieved by the group is to publish its paper in highly acclaimed QoMEX 2021 conference internationally.

PGS New Members

Dr. Usman Qayyum has joined the PGS board for this tenure. He is an experienced researcher, a skilled Artificial Intelligence and Machine Vision professional, with a proven track record in the research industry with 15+ years of experience. He holds Ph.D. with a focus in Robotics and Artificial Intelligence, from the Australian National University. He did Postdoc on Self Driving Cars. He has a solid experience in AI, Deep Learning, Robotics, Computer Vision, and Predictive Analytics.

ERP System- A Step Towards Automation

[Prof. Dr. Adeel Akram]

CPED has taken a step towards automating students related activities as per university policy by adopting ERP. ERP@CLOUD is a web based, comprehensive, powerful, flexible, user friendly, secure and integrated automation system for universities academic and administrative processes. It may run on a cloud infrastructure. All activities are carried out in a paperless, quick, easy and effective manner and at the same time it brings greater transparency and accountability. ERP@CLOUD may be integrated with Online Payment Gateway and Auto SMS/Email. ERP@CLOUD provides secure, accurate and timely information to all users at all levels for better information and decision making. It improves transparency and accountability in various processes followed in the Institute and assists to comply with HEC SOPs and guidelines.

\CEO Syntaxmatic Technologies and Dr. Adeel Akram had active interaction with the department. The company has involved 16 internees from the 2k18-CP session. Following is the list of modules assigned to each internee.

Projects List

1) Technical Documentation of ERP@CLOUD (Use Cases, Test Cases, Workflow Diagrams, Activity Diagrams).
2) User Manuals of ERP@CLOUD (HTML, PDF, Videos).
3) Day Care Center Management System.
4) Project Management System.
5) Hospital Management System.
6) Complaint Management System.
7) Advertisement Management System.
8) Maintenance Management System.
9) Transport Management System.
10) Housing & Accommodation Management System.
11) Parking Management System.
12) Meetings Management System.
13) Career Portal.
14) Sports Management System.
15) Estate & Security Wing Management System.
16) Visitors Management System.

Newly Appointed Associate Professor

[Dr. Farhan Qamar]

Dr. Farhan Qamar has joined the computer engineering department as an associate professor on 16-Feb-2021 and brought some rich experience of communication technologies to this department. He completed his BS Computer engineering, MS Telecommunication Engineering and PhD Telecommunication Engineering from UET Taxila. Throughout his academic career he got A1 and A grades. After his graduation he worked with some top multinational organizations like Jazz/Mobilink and Huawei for more than 7 years. During his stay in multinational companies, he got worthy experience on world's top telecommunication vendors like Motorola, Alcatel, Huawei, ZTE, Cisco, NEC, and Dragon wave. Other than this rich industrial experience he performed more than 20 field trainings and got hand-on expertise on their equipment. He won 5 awards during his tenure.

He has joined telecommunication department of UET Taxila in Dec. 2012. During his stay in telecommunication engineering department, he taught major core courses at BS, MS and PhD level including wireless and mobile communication, optical communication, advanced optical communication, optical networks, transmission and switching, computer communication and networks and next generation networks etc. For the first time he developed the complete LAB curriculum of 'optical communication' course in this department and introduces the software Optisystem. He got research funding from different sources and published more than 40 journal papers, conference papers and book chapters in some reputed journals. His current impact factor is more than 50 and he served as reviewer of many journals. He has supervised more than 35 projects at BS level and 13 theses at PGS level. He was also acting as principal investigator of AOCG (Advanced optical communication group). He participated in 9 CPD trainings. He is professional engineer and HEC approved supervisor of the university.

Other than his academic career he performed many administrative tasks in the telecom department. He worked as director UGS, director QEC (TED), director departmental purchasing committee, director computing lab, director TIC (Telecommunication innovation center) lab, Member PC-1 budget utilization committee, member FYP evaluation committee, member gown committee, member scrutiny committee, class advisor, mentor for final year students (test/ interview preparation).

In the computer engineering department he has been given the responsibility of QEC coordinator.

Underwater Robots in CPED

[A View of Underwater Robot]

CPED based Swarm robotics lab purchased Underwater robots for the planned projects. Swarm Robotics Lab is one of the HEC funded labs under the National Centre for Robotics and Automation (NCRA). NCRA is a consortia of 11 labs over 13 universities of Pakistan with its headquarters at NUST College of E&ME. NCRA has been inaugurated in NUST College of E&ME by Prof. Ahsan Iqbal (Minister Planning, Development and Reforms) on May23, 2018. Swarm Robotics lab @ UET Taxila is having funding of approximately 79 Million PKR.

Alumni Success Story

Engr. Shakir Hussain, an alumnus of 2k4-CP, has been declared as 3rd most earning professional for the month of April 2021 at the platform of DigiSkills. Engr. Shakir Hussain Graduated in 2008 and joined a software house as an internee. He was offered job contract for 1 year and left the job after completing his contract in 2010. He joined another company and wasn't comfortable with the environment, so he left that company in 6 months. He had no job and then started MS in 2012, Fulltime. He completed MS in 2014 but got no Job.

[Engr. Shakir Receiving Award at Connected Pakistan]

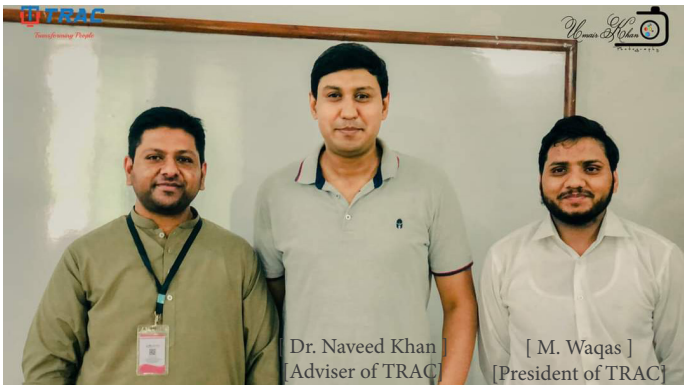
He formally started freelancing in May 2014. He signed up on fiverr and started to grow. He gained direct clients from Fiverr clients and then referral clients. Different companies started to approach him, and he became TRS (TOP RATED SELLER) on fiverr in 2017. He developed a remote team and was awarded one of the Emerging Faces of Pakistan in a conference Help by Connected Pakistan in 2018. He started an office in 2019 and registered as a company QUIPSOL in Pakistan then in UK with the help of a friend. He was listed on Digiskills.pk's LEADER BOARD and Nominated for ignite awards: Ignite is planning an event by end of this year where top 10 earners of DigiSkills.pk will be recognized (https://digiskills.pk/). We wish him more success as an alumnus of CPED.

TRAC UET Taxila (Activities)

TRAC is departmental society in UET Taxila, and it organizes many events and works through all the year. This year TRAC hosted following events.

- Internet of Things webinar on 19th November 2020 by two guests Dr. Hassan Nazeer Chaudhry and Bilal Riaz.
- WordPress training on 18th December 2020 by Muhammad Saqib (TRAC, Software Head).
- Internet of Things & Industry 4.0 training on 28th December 2020 by Muhammad Waqas (TRAC, President).
- Start your Career as a Freelancer webinar on 4th March 2021 by two guests Sidra H Siddiqui and Syed Faseeh ul Hassan.
- How a Working Woman Can Balance Job and Household? Webinar on 8th March 2021 by two guests Engr. Nosheen Sohail and Sadia Malik.
- How To Handle Depression? Webinar on 8th March 2021 by our guests Ms. Barza Iftikhar Mir.
- Youth of Pakistan and Leadership webinar on 3rd April 2021 by our guest Mr. Usman Fahad.
- Maximizing Ramadan webinar on 10th April 2021 by guest Zaid Saeed Khan.

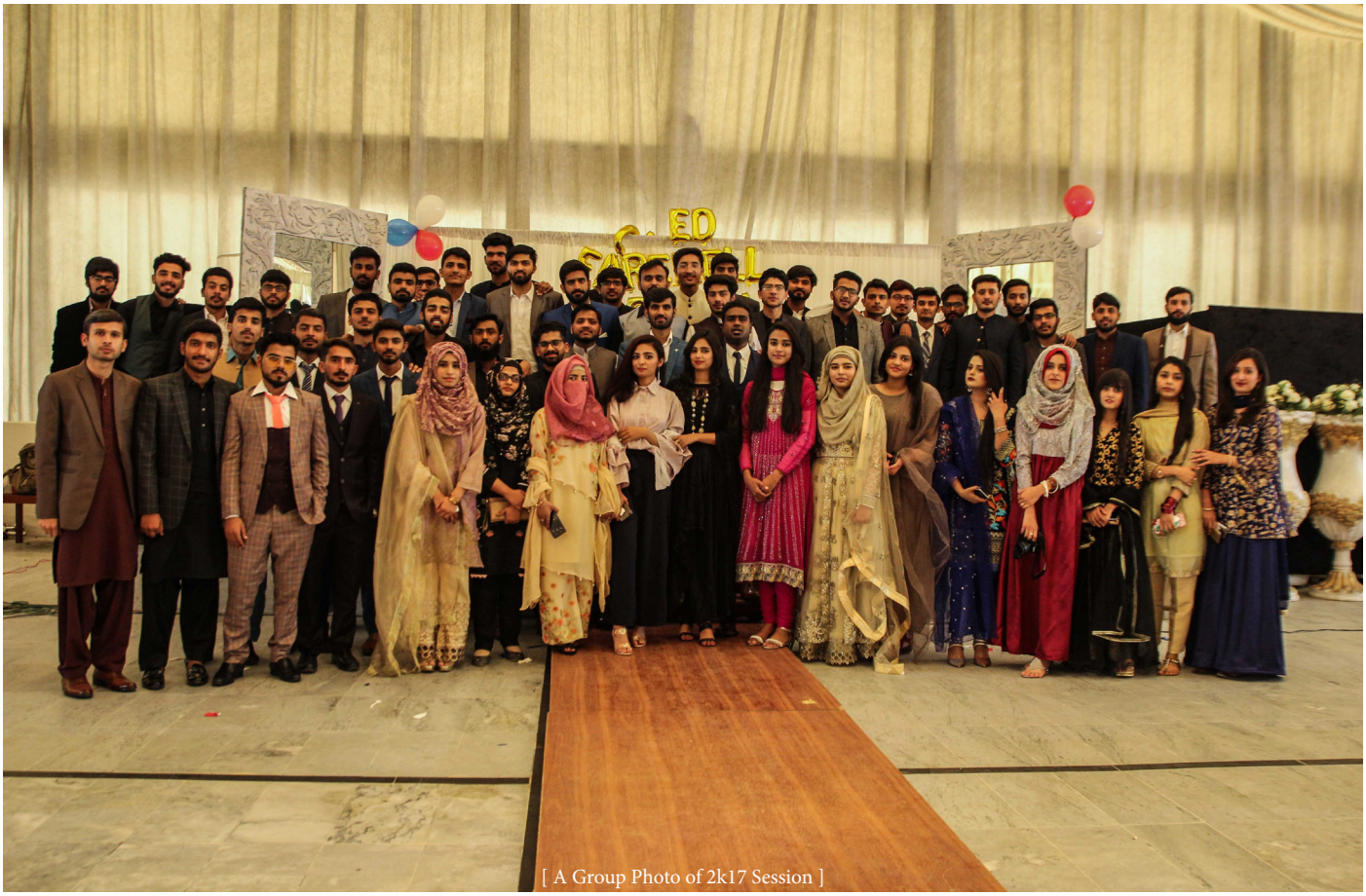
As technology is continuously evolving in every aspect. So, Taxilian Robotics and Automation Club (TRAC) make collaboration with Digital Division Pakistan, a software house in Lahore, on development of smart home project. As homes are getting better day by day. Homes are also getting modernized so there is need to work on its home automation system too. People secure their houses by installing cameras and other stuff so they can avoid any bad incident from happening like robbers breaking into people houses and getting away with luxurious stuff. So TRAC made smart bell in Collaboration with Digital Division Pakistan which is an application of home automation system. Smart bells or Smart Doorbells are devices which are not like traditional doorbells. They are connected with your mobile through the internet and a camera is installed too. A smart doorbell notifies the owner of the house when someone press the doorbell through a sensor and the owner can see who is at the door through the built-in camera and the owner can talk with the visitor or guest through the microphone. There is also smart lock with it. When the owner wants the guest or visitor to come in, they simply use the smart lock. Smart doorbells are operated by battery or wires.



[Dr. Naveed Khan] [Adviser of TRAC] [M. Waqas] [President of TRAC]

The 2nd collaboration of Taxilian Robotics and Automation club (TRAC) was with King's International College Mirpur on providing training, workshops, seminars in the future on different state-of-the-art technologies to enable students to work with current market demand. TRAC also hosted IOT bootcamp for students of king's international college Mirpur in Computer Engineering Department UET Taxila, Where TRAC arranged IOT workshop and gave them lab visit. This bootcamp also include an industry tour in Islamabad and MOU signing ceremony between TRAC and King's International college Mirpur at CPED UET Taxila.

Goodbye 2k17 Session



[A Group Photo of 2k17 Session]

We stand before you to pay the last appreciation and to say the final goodbye, to our dear students. It can be very hard to say "Goodbye" but there are so many meanings to it. It can mean a "forever goodbye" or "see you next time." Maybe this goodbye is forever for some of you and maybe some will be seen next time. Although it is very hard to say forever goodbye and that may hurt your feelings too but things have to end after completion. So is the case with your Computer Engineering studies that now comes to an end.

Throughout this journey, we have considered you as extensions of ourselves and prepared you best for the future. Throughout this journey, many of our students have got great achievements in their lives. Some got funding for their final year projects, some got remote jobs, and some students are having a great freelancing career. We appreciate the efforts and hard work that you have put in yourselves. We are glad to see the splendid achievements that you have made. On behalf of the University of Engineering and Technology Taxila, we would like to appreciate our dearest students for their hard work, achievements, and meritorious results. You have established yourselves as the shining stars of the institute.

Life is like hot water and cold ice cream, continue to eat ice cream that tastes good. Make yourself successful because it feels good. Learn into a flower because it smells good. Stare up at giant trees because they look good.

Classes came,
Classes went;
It's worth a lot,
The time you spent.
Congratulations
Are now due
To the graduate,
Special you!

(Joanna Fuchs)

We wish that you put up all your best efforts on the upcoming ventures as well and come out with flying colors.

Now, it is time to say goodbye after a successful academic journey of hard work. It may seem you like yesterday was the day when it was your first day in this university. Although the time passed fastly you made a special and different relationship with this place. Now, while it is ending, there must be fear and hesitation in your minds as you have spent much of your time at this place after your family.

We want to say a big thanks to all of you for working hard and making the institute proud. Although you are going from here but someone's life does not stop for anything, just live with the memories and good moments that you have received a lot from this place, and you are going to take them with you from here and goodbye to you today.

We will never forget these days spent with you all. Always remember that a dream does not become reality through magic; it takes sweat, determination, and hard work. Doing the best at this moment puts you in the best place for the next moment. Hard work beats talent if talent doesn't work hard.

Everyone had to be separated one day or the other, we pray that you may always be happy and make a lot of progress in your lives, and one day you will definitely achieve your goals.

We wish you all a very happy future!.

CPED is Transforming...

New initiatives have been taken to transform the CPED to meet the requirements of the modern era. Following is the brief highlight of the activities that are planned or in planning phase.

Internship Planning:

CPED has a rich faculty of 20 members. Each faculty member has provided 2 internship opportunities to the department for students by their active interaction with the domain related companies. A total of forty different private companies have been listed for internship program. Now students of 2k18-CP will get the desired opportunities of internship. Academic cell of the department facilitates the students in the process of internship. Students after getting information from the notice board of the department apply for the bonafide certificate to the department academic cell. Director undergraduate studies issues the certificate to the student for the organization in which he/she intends to apply for internship. Students apply with this certificate to the respective organizations and are places as internees.

Industry Developed Curriculum:

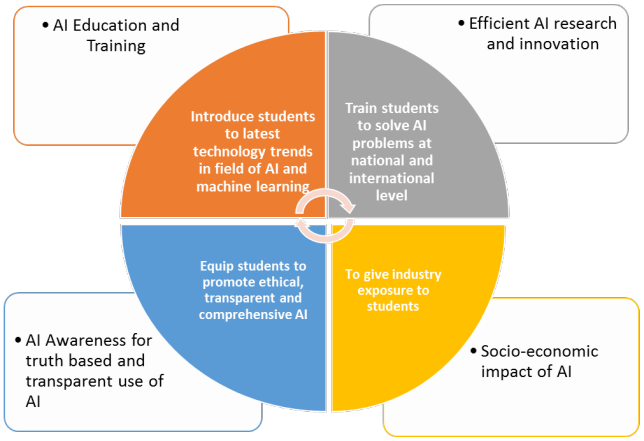
There are numerous courses available online for students to develop industry related skills. Faculty members have been asked to provide relevant industry developed curriculum for their courses. Now a student would know, which skills are trending in the market.

Coursera Partnership for Covid-19

Coursera provided its free 5000 coupons for CPED as a partnered program for Covid-19 affected education. Due to COVID-19, to help minimize the impact of the coronavirus (COVID-19) outbreak on students, the Coursera community (https://www.coursera.org) is launched a global effort to assist universities and colleges to deliver courseware online. Coursera for Campus (https://www.coursera.org/campus/) is available globally at no cost to any university impacted by COVID-19. Dr Waqar from CPED applied for this opportunity for UET Taxila and got free access to this platform, which benefited hundred of students during Covid period.

New Curriculum Adopted:

Pakistan Engineering Council under its Act of Parliament and especially after attaining Washington Accord full signatory status and IPEA licensing authority, took up the challenge to review and develop the curricula for engineering programs based on Outcome-Based Education (OBE) System. PEC has therefore constituted an Engineering Curriculum Review and Development (ECRDC) and also subject ECRDCs comprising of eminent engineers and professionals from academia and industry to take up the task of curricula review and updating. Nevertheless, the basic templates developed by HEC NCRCs have been followed as guidelines. Under OBE based curriculum review and development framework, PEC held national and regional levels stakeholders and industrial consultation workshops engaging HEIs, industry, technical and consulting organizations. The experts' feedback and suggestions were translated into the curriculum review process taking into consideration of the dynamics of technological advancement, industrial needs and management-cum-soft skills for engineering graduates. This curriculum document would therefore serve as a guideline. According to the guidelines provided by the PEC, CPED has adopted the new curriculum for its students, in which old courses are replaced by fresh ones to meet the skills requirement by the current market.



[Strategic Goals and Missions of AIRD Society]

Societies for Advanced Technologies:

1) Society of Web Skills

For the last few years, the focus is shifting towards hands-on skills rather than merely a degree holder. The tech giants like Apple, Google, Facebook, Tesla, etc., are more concerned with hiring people with hands-on skills to execute the projects than to look for people who graduate from leading engineering schools. Web skills are very high in demand worldwide, and millions of freelancers work from the comfort of their homes by executing their hands-on skills to solve people's problems worldwide. Pakistan's freelancing share is continuously increasing in a worldwide freelance community. Currently, Pakistan is at the 4th position in the top 10 countries that successfully provide their services over a wide range of freelance marketplaces like Freelancer, Fiverr, Upwork, guru, Amazon, etc. Keeping in view the high demand for various web skills (e.g., e-commerce, graphics designing, web development, digital marketing, etc.), the Department of Computer Engineering is taking the initiative to propose the start of society, "Society of Web"

Artificial Intelligence Research and Development (AIRD) Society :

Artificial Intelligence (AI) today is a huge benefit to humanity because it boosts our efficiency and throughput, while creating new prospects for income generation, cost savings and job creation. Innovations in AI have opened new prospects for progress in critical areas such as health, finance, national security, education, energy, and the environment. In recent years, machines outperformed humans in performing certain specialized tasks, such as some aspects of image recognition. It is predicted by experts that rapid progress in the field of artificial intelligence will continue. Though it is very implausible that machines will exhibit broadly-applicable intelligence comparable to or beyond that of humans in the next 20 years, yet it is to be expected that machines will reach and surpass human performance on more and more tasks.

AIRD society will enable students to rethink how we integrate information, analyze data, and use the resulting insights to improve decision making, survey the current state of AI and its existing and potential applications. Detailed description of strategic goals and mission of AIRD society is shown in Figure 1.

For More Details Visit:
https://web.uettaxila.edu.pk/CPED/

- **Cheif Editor:** Prof. Dr. Hafiz Adnan Habib
- **Managing Editor:** Dr. Sanay Muhammad
- **Designer:** Muhammad Taimoor