Spring 2019 Vol.1 No.2

ORIC
NEWSLETTER

Capital University of Science & Technology Pakistan

Capital University
of Science and Technology Islamabad

MOU between CUST and Shanghai Jiao Tong University (SJTU), China
Three Days Autodesk Inventor Workshop
BIM CoE Workshop on Revit Structure Fundamentals
Seminar on Cyber Security: Next Defense Frontier
ORIC Business Plan Competition
One-Day Workshop on Latex

Expressway, Kahuta Road, Zone-V, Islamabad +92-51-4486705 http://www.cust.edu.pk

Table of Contents

Patron
Prof. Dr. Muhammad Mansoor Ahmed
Chief Editor
Prof. Dr. Aamer Iqbal Bhatti
Editors
Muhammad Farhan
Muhammad Raheel Anjum

Graphic Designer and Photographer
Taaruf Ullah Khaweri

Dean ORIC Message

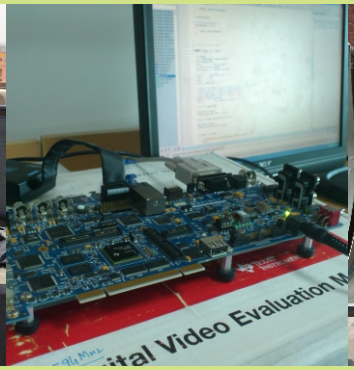
Capital University of Science & Technology (CUST) Islamabad is a progressive academic institution determined to produce competent professionals, who could be instrumental in the development of a prosperous society. The core objective of ORIC at CUST is to provide strategic and operational support to the university research activities, strengthen academia-industry linkages and promote entrepreneurship, technology-transfer and commercialization activities. ORIC has the responsibility of guaranteeing that all research programs and policies reflect the core values of academic freedom, professional integrity, ethical conduct and full compliance with all policies, legal requirements and operational standards of the university. We believe in continual capacity building of our students to satisfactorily equip them with modern tools and skills vital for the industry. A number of joint ventures are being done with industry through mutual collaborations. To showcase our recent progress report, the ORIC Newsletter Spring-2019 is in your hands. This Newsletter entails the contribution of ORIC towards its embattled domains i.e. Research Operations, Technology Incubation & Innovation and Industrial Liaison. It is comforting to see that ORIC is playing its leading role in facilitating university's research outcomes and Technology Incubation & Innovation activities. The Office of Research, Innovation and Commercialization has done great work in compiling this Newsletter of great value and is committed to unfold its prolific endeavor to the next level.

Prof. Dr. Aamer Iqbal Bhatti

Research Proposals

Capital University of Science and Technology (CUST) has always been proactive in the field of practical research. CUST encourages researchers to seek external funding for their research work. Office of Research, Innovation and Commercialization (ORIC) fully assists the faculty researchers in their proposal write up and associated procedures. ORIC has started working on seeking research grants and sponsorships from various funding agencies. ORIC in collaboration with relevant faculty members have worked on various research proposals. The following list briefs the current status of research proposals being worked on by ORIC and submitted in various funding agencies.

S#	Title	Principal Investigator(PI)	Status	Funding Agency
1	Investigation of Drug Resistant Strains of Mycobacterium Tuberculosis	Dr. Shaukat Iqbal Malik	Submitted	PSF
2	Molecular and Bioinformatics analysis of Drug Resistance Strains of Mycobacterium Tuberculosis	Dr. Shaukat Iqbal Malik	Submitted & under Review	Shanghai Science and Technology Committee
3	Design and Development of Energy Efficient Electric Vehicle with On-Board BMS and Motor Control	Dr. Khawar Naveed	Submitted & under Review	Ignite
4	Indigenous Development of Drone Detection Radar	Dr. M. Faisal Iqbal	Submitted & under Review	Ignite
5	Capacity Building of an Accomplished Engine Research Group for the Development High Power Diesel Engine	Prof. Aamer Iqbal Bhatti	Submitted & under Review	PSF through HIT Taxila
6	Integrated Modeling and Simulation of High-Power Diesel Engine for verification of Engine Design enhancement	Dr. Col. Kanwar Faraz Ahmed Khan	Submitted & under Review	PSF through HIT Taxila
7	Mualim-Entertainment Based Learning Tool (EBLT)	Mr. Shahzad Rafique	Submitted	Going Global 2020
8	Electric Rickshaw	Dr. Khawar Naveed	In Progress	PSF
9	Dynamic Behavior of Prototype Interlocking Plastic Block Structure Using Locally Developed Low Cost Shake Table	Dr. Majid Ali	In Progress	PSF


MOU between CUST and Shanghai Jiao Tong University (SJTU), China

A Memorandum of mutual interest was signed between Capital University of Science and Technology and Shanghai Jiao Tong University (SJTU), China in January 2019. The parties agreed to promote academic collaboration through joint research and development activities of mutual interest in accordance with their respective needs and objective and shall, by joint agreement determine the area and subject of such collaboration, on the basis of the understanding set out in the agreement.

It was formally agreed to exchange the scientific, academic and technical information and appropriate academic materials and other information of mutual interest for which each party holds intellectual property rights. Joint training of professional and technical personnel of SJTU and the CUST through specialized short courses, workshops or seminars was also contracted through this MOU.

Industrial Liaison Meeting of Dean ORIC with Dean FoE and HoDs

An Industrial Liaison meeting was held by the Office of Research Innovation and Commercialization on 21st Feb 2019 in the office of Dean Faculty of Engineering (FoE). Dean ORIC and HoDs of Electrical Engineering, Mechanical Engineering and Civil Engineering Departments were present in the meeting. After a deliberate discussion it was agreed upon the constitution of Departmental Industrial Outreach Committees (IOC) of CUST Engineering Departments. The core objective of these committees would be the identification of local industries and defining feedback mechanism from industries to improve the employability of CUST graduates. It was also agreed upon the constitution of Industrial Advisory Board which should be comprised of Dean FoE (Convener), HoD's, Industry Members (02 from each Department), Dean ORIC and IOC members.

Three Days Autodesk Inventor Workshop

Capital University of Science and Technology hosted a three days workshop entitled "Autodesk Inventor Short Course" on 6th – 08th February 2019. The workshop was a part of the university collaboration with H-Cube BMG Pvt. Ltd. Office of Research Innovation and Commercialization in collaboration with the Department of Mechanical Engineering organized the particular workshop aiming to equip students with the contemporary engineering tools and software.

Autodesk Inventor is a computer-aided design application for 3D mechanical design, simulation, visualization and documentation developed by Autodesk. A total of 22 Mechanical Engineering students attended the 3-day workshop from 10:00 AM to 4:00 PM. Instructor of the Workshop was Mr. Muhammad Umer, lecturer at Lahore Institute of Animation and Design (LAD), Islamabad campus. The participants of the workshop were also provided user level AUTODESK authorized certifications by LAD.

BIM CoE Workshop on Revit Structure Fundamentals

BIM Center of Excellence (BIM CoE) at Department of Civil Engineering, Capital University of Science & Technology in collaboration with H-cube conducted a two days training workshop on Revit Structure Fundamentals on 22nd February and 1st March, 2019.

Ten individuals from various organizations with diverse educational/industrial background participated in this training. During the two days workshop, the participants were briefed about the fundamentals of Structural Modeling and experienced hands-on training of Revit Structure. At the end the training, certificates were distributed among the participants.

Seminar on Genomics Approach in Drug Designing

Capital University of Science and Technology hosted a seminar entitled “Genomics Approach in Drug Designing” on 28th March 2019. Genomics is an interdisciplinary field of biology focusing on the structure, function, evolution, mapping and editing of genomes. Genomics, particularly through high-throughput sequencing and characterization of expressed human genes has created new opportunities for drug discovery.

Office of Research Innovation and Commercialization in collaboration with the Faculty of Health and Life Sciences organized the seminar aiming to equip faculty, researchers and students with the most recent knowledge about Genomics and Drug Designing. The guest speaker at the event was Dr. Johar Ali, Head of Genomics Center, Rehman Medical Institute (RMI), Peshawar. The participants of the seminar included faculty members, researchers and students of Biosciences and Pharmacy Departments.

BIM CoE Workshop on Revit Architecture Fundamentals

BIM Center of Excellence (BIM CoE) at Department of Civil Engineering, Capital University of Science & Technology (CUST), Islamabad in collaboration with H-cube conducted a two days training workshop on Revit Architecture Fundamentals on 29th and 30th March, 2019.

This training was specifically arranged for undergraduate students (batch 153) of Civil Engineering Department, CUST. Eighteen (18) students participated in this training. During the two days training, students were briefed about the fundamentals of BIM and received hands on training of Revit Architecture. Upon completion of the training, certificates were also presented to the participants.

Three-Days Workshop on Model Predictive Control (MPC)

Capital University of Science and Technology hosted a three days workshop entitled "Model Predictive Control: Algorithms, Tools & Applications" on 4th – 6th April, 2019. Office of Research Innovation and Commercialization organized the particular workshop to equip students, researchers and Industry professionals with the most recent knowledge of Model Predictive Control and its practical and industrials implications. MPC is a tool to optimize a system's performance by using a model to predict the system's future trajectory. In recent years MPC is rapidly expanding in several other domains, such as in the automotive and aerospace industries, smart energy grids, and financial engineering.

Joint Industrial Outreach Committees Meeting

The 1st Joint Industrial Outreach Committee Meeting of Faculty of Engineering was held on 18th April, 2019. Prof. Aamer Iqbal Bhatti, Dean Research & Innovation, chaired the meeting. The IOC members of Electrical Engineering, Mechanical Engineering and Civil Engineering Departments attended the meeting.

Dean ORIC presented the data of Rawalpindi and Islamabad Chambers of Commerce and Industry with locations of nearby Industrial units and asked IOC members to visit these industries and seek their problems that can be solved by CUST faculty and students. He further acclaimed the Engineering Faculty to invite Industry Professionals, arrange their visits to university labs and seek suggestions about how we can upgrade our labs to meet modern Industry requirements. These efforts can ultimately increase the graduate's employability of CUST. A brief discussion on CUST Testing and Consultancy policy was also deliberated.

Seminar on Cyber Security: Next Defense Frontier

Capital University of Science and Technology hosted a seminar entitled "Cyber Security: Next Defense Frontier" on 24th April, 2019. The purpose of organizing given seminar was to create awareness about Cyber Attacks and significance of Cyber Security in modern digital world. Cyber Security is the practice of protecting systems, networks and programs from digital attacks. These cyber attacks are usually aimed at accessing, changing, or destroying sensitive information, extorting money from users or interrupting normal business processes.

The participants of the seminar included graduate students, faculty and researchers from Capital University of Science & Technology. The guest speaker at the event was Mr. Rizwan Mustafa Mir, Chief Executive Officer, Universal Services Fund, Islamabad.

ORIC Research Committee Meetings

Seventh ORIC Research Committee Meeting

The Seventh ORIC Research Committee meeting was held on March 14, 2019. Dean Research & Innovation, Prof. Aamer Iqbal Bhatti chaired the meeting. He welcomed the committee members and presented them "Annual Research Book 2017", the first formal publication of ORIC. The Final Year Projects of Faculty of Engineering were briefly discussed in the meeting. Dean Research & Innovation briefed the committee members about the proposed list of activities for Spring- 2019 and asked for their recommendations. Dean ORIC apprised the members about the constitution of Industrial Outreach Committees of Faculty of Engineering and asked members to play their prospective role in these committees. The initiative of ORIC regarding Final Year Projects (FYPs) Funding along with its terms and conditions was also deliberated in detail.

Eighth ORIC Research Committee Meeting

The Eighth ORIC Research Committee meeting held on 2nd May, 2019 and was chaired by Dean Research & Innovation, Prof. Aamer Iqbal Bhatti. The meeting was held to evaluate top 5 Final year Projects out of the shortlisted ones for the funding of 30,000 PKR. The students presented their project ideas and business plans before ORIC Research committee. The committee evaluated the presentations according to specific criteria. The main focus was on practical feasibility, business plan and marketability of particular idea. A total of 5 projects were shortlisted for funding.

Ninth ORIC Research Committee Meeting

The Ninth ORIC Research Committee meeting was held on July 31, 2019 and was chaired by Dean Research & Innovation, Prof. Aamer Iqbal Bhatti. The commercialization and business prospects of top 5 FYPs funded by ORIC were discussed in detail. The committee thought over the commercialization aspects of FYPs and provided valuable feedback about their commercialization and accompanying challenges. Dean Research & Innovation informed the committee members about the "Competitive Research Programme" initiated by Pakistan Science Foundation (PSF) for research proposals of engineers, scientists and technopreneurs. He provided the details of the particular programme and asked the members to submit at least one proposal from their respective department in PSF Research Grant Programme.

ORIC Business Plan Competition

Office of Research, Innovation and Commercialization (ORIC) upon the profound desire of Vice Chancellor initiated Final Year Projects funding for Undergraduate students of Capital University of Science & Technology, Islamabad. The purpose of given activity was financial encouragement of students whose project ideas have particular business and marketing prospective. A total of five Undergraduate projects were funded encompassing 30,000 PKR each. The specific criteria for the said funding along with associated terms and conditions were advertised in first week of March 2019.

After an initial assessment the top 9 projects were shortlisted. The initial scrutiny of applications was done in a meeting held on 22nd April 2019 in ORIC Office. It was decided by the committee members that the top 9 projects would be re-evaluated through their project and business plans presentation. The final evaluation of shortlisted projects was done in 8th ORIC Research Committee Meeting held on 2nd May, 2019. The students presented their project ideas and business plans before ORIC Research committee. The committee evaluated the presentations in accordance with the practical feasibility, business plan and marketability of every project. After a systematic analysis by Committee following students were shortlisted for the funding.

S #	Student Names	Project Title	Supervisor
1	1. Zeeshan Yousaf 2. Atif Ijaz 3. Nauman Zakir	Off Grid Automatic Egg Incubator	Dr. Muhammad Ashraf
2	1. Saad Bin Zubair 2. Tajammul Baig 3. Arhaam Mubarak	Design and Fabrication of Automatic Solar Tracker with Pannel Cleaning and Cooling system	Dr. Saif-Ur- Rahman
3	1. Iqra Majeed 2. Andla Sohail	AL-FUNOON	Dr. Sajid Bashir
4	1. Alina Sarwar 2. Rubeeqa Tahir 3. Usman Mehmood	Blindroid	Mr. Ibrar Arshad
5	1. Aashan Javed 2. Usama Mehmood	Prosthetic Hand Using Brain Pulses	Dr. Muhammad Aleem

The award ceremony was held on 27th May 2019. Dr. Arshad Hassan, Dean FMSS was chief guest at the occasion. Following the ceremonial, Dean FMSS delivered a brief talk. He inspired the students about their endurance and highlighted the importance of business plans in present age of commercialization. He also emphasized interdepartmental collaborations and joint projects for better progression of students and faculty

Visit of CTO, Designx Solutions to CUST Electrical Engineering Labs

Office of Research, Innovation & Commercialization organized the Industrial visit of Mr. Shakaib, CTO, Designx Solutions on 13th May, 2019. Designx Solutions is an Electrical and Electronic based Manufacturing company located in Islamabad. Prof. Aamer Iqbal Bhatti, Dean Research & Innovation, Dr. Muhammad Ashraf, Professor EE Department and Mr. Osama Akbar Raja, Lecturer EE Department welcomed the honorable guest.

The objective of present visit was to show CUST EE Department labs and seek suggestions about how we can upgrade our labs to meet modern day Industry requirements. This would help us in training our students according to technical skills in compliance with market requirements that would ultimately enhance employability chances of our students.

Subsequently the honorable guest comprehensively visited labs and gave valuable suggestions and recommendations regarding up gradation of EE labs.

Establishment of CS Incubation Lab at CUST

Office of Research, Innovation and Commercialization in collaboration with department of Computer Science has formally inaugurated the Incubation lab at Capital University of Science & Technology on 16th May, 2019. Dr. Muhammad Azhar Iqbal, Assistant Professor, CS Department have laid his special devotion to make this workroom possible. The purpose of this incubation center is to provide a platform to CS students where they can practice their technical, innovative and freelancing skills for comprehensible earning.

The respective ceremony was inaugurated by Dr. Nayyar Masood, HoD CS Dept. Prof. Aamer Iqbal Bhatti, Dean Research & Innovation, Dr. Muhammad Azhar Iqbal and Assistant Directors ORIC were also present at the occasion. Dean ORIC and HoD, CS Dept. greeted the students and acknowledged the efforts of Dr. Muhammad Azhar Iqbal and ORIC team. The students also gave a brief demonstration about their job details and future prospects.

MOU between CUST and SJTU, China for Establishment of "Shanghai-Islamabad-Belgrade Joint Innovation Center on Antibacterial Resistance"

The Shanghai Jiao Tong University, China (SJTU) and the Capital University of Science and Technology share a common interest in research on bacterial antibiotic resistance (ABR), an urgent global problem. SJTU and CUST agreed on establishment of "Shanghai-Islamabad-Belgrade joint innovation Center on Antibacterial Resistance" through application for the funding by the Shanghai Science and Technology Committee in 2019. The proposed center is expected to pursue the cooperation through Academic visits, Joint Research Activities and Publications, Exchange of Academic Materials, and potential commercialization of arising Intellectual Property (IP). With the focus on bacterial pathogens with ABR, both parties aim to perform the molecular and bioinformatics analysis of drug resistance strains of Mycobacterium tuberculosis. The Center is scheduled to commence on the date of 1st January 2020 and shall terminate on 31st December 2022.

One-Day Workshop on Latex

Capital University of Science and Technology hosted "One-Day Workshop on Latex" dated 17th July, 2019 from 10:00 AM to 3:30 PM. Office of Research Innovation and Commercialization organized the particular workshop aiming to update students and faculty members with the practical and hands-on knowledge about creation of technical and scientific documents using Latex with illustrations.

LaTeX is a typesetting system suitable for producing scientific and mathematical documents which enables authors to typeset and print their work at the highest typographical quality. The first session covered the basic topics about Latex Overview & Installation, Document Write up (Sections and paragraphs), Packages Installation, Figures & Tables Insertion, Mathematical Operations, Table of Contents and Bibliography. The second session encompassed the practical illustrations of Latex about creating structured documents like research thesis, research paper, project presentation etc. The resource person for the particular workshop was Dr. Ali Arshad, Assistant Professor, COMSATS University Islamabad. A total of 80 participants attended the workshop including MS & PhD students and faculty members from CUST, FAST NUCES, IST, FJWU etc.

MOU between CUST and IdeaGist Pakistan PVT Ltd

IdeaGist Pakistan is the sole distributor of IdeaGist Global Platform, connecting innovators, entrepreneurs, investors, and students from 195 UN recognized countries and territories. Under the umbrella of the Prime Minister's Startup Pakistan, IdeaGist plans to invest PKR 8 billion, over the next five years, in the entrepreneurial and innovation ecosystem in Pakistan.

To formalize collaboration between CUST and IdeaGist and to make it durable and sustainable Mr. Hassan Syed, CEO IdeaGist visited ORIC Office CUST and signed an MOU on 16th July, 2019. Dean Research & Innovation, Prof. Aamer Iqbal Bhatti welcomed the honorable guest. The Assistant Directors ORIC were also present on this auspicious occasion. Mr. Hassan showed his gratitude to Dean ORIC for the valuable agreement and desired to continue the collaboration in the areas of mutual interest.

Both parties agreed to provide online entrepreneurship training to final year students, offering entrepreneurship as a career choice to the university students, support business incubation centers, one-on-one mentoring and connecting the incubator to a global pool of investors.

One-Day Workshop on Research Methodology

Office of Research Innovation and Commercialization in collaboration with Dr. Amir Qayyum, Dean Quality Enhancement Cell (QEC) hosted a two days workshop entitled "Research Methodology" on 19th – 20th August 2019. The objective of given activity was to enlighten the faculty members and active researchers with the present knowledge about Research Methodology and its associated tools. The workshop was intended to present the most recent knowledge about Research Tools, Technical & Proposal Writing, Research Planning and Literature Review. The event was attended by graduate students, researchers and faculty members of CUST. The workshop resource person, Dr Inam Ul Ahad works as Research Development Manager in I Form Advanced Manufacturing Research Centre and as Senior Materials Research Scientist in the Advanced Processing Technology Research Centre, Dublin City University, Ireland.

Design of Posters for CUST Research Groups

Office of Research, Innovation and commercialization has started designing Research Group posters of CUST faculty members to depict their academic profile, key research areas and major expertise in a presentable way. These posters also provide information about group members and Postgraduate (MS/PhD) alumni of the particular group. Following are the Research Group Posters designed by ORIC in Spring-2019:

- Poster for Vision and Pattern Recognition Systems Research Group (VisPRS)
- Poster for Industrial and Environmental Microbiology Research Group
- Poster for ThermoFluids Research Group
- Poster for Water and Environment Research Group (WE R)
- Poster for Genetic and Molecular Epidemiology Research Group
- Poster for Entrepreneurship Research Group

Research Group of Vision and Pattern Recognition Systems (VisPRS)

GROUP INTRODUCTION

Vision and Pattern Recognition Group of Capital University of Science & Technology is actively involved in basic and applied research in the fields of Image Processing, Machine/Computer Vision and Pattern Recognition/Classification. The scope of research not only includes the algorithm development and analysis but also system development and the optimizations involved. Presently this group has more than 20 members including 6 MS students, 12 PhD scholars and 3 post doctoral researchers belonging to different organizations.

GROUP HEAD

Dr. Imtiaz Ahmad Taj

Dr. Imtiaz Ahmad Taj received his PhD degree in Electronics and Information Engineering from Hokkaido University, Sapporo, Japan where he was endowed with Outstanding Young Researcher Award by IEICE Japan. He is actively involved in Teaching, Research and Academic Management. Currently he holds the Office of Dean Faculty of Engineering at Capital University of Science and Technology, Islamabad. He also remained on key positions in various R&D companies notably CET and CARE. Dr. Imtiaz Ahmad has been teaching and doing research in Machine vision, Pattern Recognition & Biometrics, Optical Networking, Nonlinear Optics, Photorefractive Wave Mixing, Free-space Optical Switching etc. He introduced several graduate level academic courses for the first time in Pakistan including Computer Vision, Pattern Recognition and Machine learning.Under his supervision, more than 20 students have successfully completed their research thesis at MS and PhD level and still a number of students are pursuing their research with him.He has accomplished more than 60 Publications in national and international Journals & Conferences of highest repute. He has served in organizing and technical committees of many international Journals & Conferences. He has successfully completed three national level research projects in the capacity of Project director leading a team of more than 15 researchers in each project. He also remained member and chained various Professional and Non Professional bodies and organizations.

RESEARCH AREAS

- Biometrics: Fingerprint, Iris, Face, Palm print and Signature
- Video Encoding and Processing
- Machine Learning and Deep Neural Networks
- Super Resolution Imaging
- Vision Based Navigation & Registration, Vision Based Tracking
- Time Frequency Analysis of Dynamic Signals
- Automatic Activity Detection and Vision Based Security Systems
- Medical Diagnosis using Pattern Classification Algorithms
- Algorithm Development & Hardware Design

R&D Projects

1. Design and Development of on-board Image Registration and Position Estimation System for Autonomous Vehicle Navigation
2. Automatic Personal Identification Biometrics System (APIBS) for Large Scale Applications
3. Real Time Implementation of H.264 Decoder for Heterogeneous Multicore Architectures

PhD ALUMNI

Dr. Muhammad Naeem Ratyal

Thesis Title: 3d Face Recognition Based On Pose And Expression Invariant Alignment
Year: 2016

Dr. Muhammad Sajid

Thesis Title: Towards Facial Asymmetry Based Face Recognition
Year: 2016

Dr. Muhammad Asif

Thesis Title: Efficient Framework For Macroblock Prediction And Parallel Task Assignment In Video Coding
Year: 2016

Dr. Mubeen Ghafoor

Thesis Title: Fingerprint Enhancement and Nonlinear Distortion Removal by effective use of Contextual filtering
Year: 2014

Dr. Muhammad Ajab

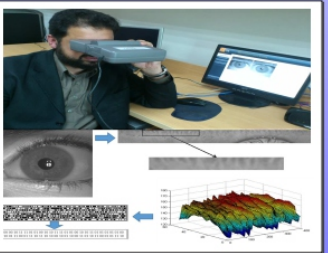
Thesis Title: A Combination of Linear and Quadratic Time- Frequency Techniques for Time-Varying Signals
Year: 2013

Dr. Usama Ijaz Bajwa

Thesis Title: Performance Enhancement of Subspace Learning Face Recognition by Effective Use of Classifiers
Year: 2013

Dr. Nabeel Ali Khan

Thesis Title: Cross-term Suppression in Wigner Distribution
Year: 2010



Current PhD Students

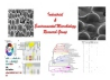
1. Mr. Ahmad Bilal Mehmood
2. Ms. Samana Batool
3. Mr. Aamir Javed
4. Ms. Keenjhar Ayoob Chandio
5. Mr. Muhammad Tahir Awan

Selected Publications

Journal Publications

- T. Zia, M. Ghafoor, S. A. Tariq, and I. A. Taj, "Robust Fingerprint Classification with Bayesian Convolutional Networks", **IET Image Processing**, vol. 13, no. 3, pp. 1–10, 2019, (I.F: 1.401).
- M. Tahir, I. A. Taj, F. A. Assuncao, and M. Asif, "Fast Video Encoding based on Random Forests", **Journal of Real-Time Image Processing**, vol. 16,no. 10, pp. 1–21, 2019, (I.F: 1.574).
- M. Sajid, I. A. Taj, U. I. Bajwa, and N. I. Ratyal, "Facial asymmetry based Age Group Estimation: Role in Recognizing Age-Separated Face Images", **Journal of Forensic Sciences**, vol. 63, no. 6, pp. 1727–1749, 2018, (I.F: 1.184).
- N. I. Ratyal, I. A. Taj, U. I. Bajwa, and M. Sajid, "Pose and expression invariant alignment based multi-view 3D face recognition", **KSII Transactions on Internet and Information Systems**, vol. 12, no. 10, pp. 4903–4929, 2018, (I.F: 0.681).
- M. Asif, I. A Taj, S. M. Ziauddin, M. B. Ahmad, and M. Tahir, "An efficient framework for prediction parameters selection in advanced video coding", **IEEE Access**, vol. 6, pp. 25277-25291, 2018, (I.F: 3.557).
- M. Ghafoor, S. Iqbal, S. A. Tariq, I. A. Taj, and N. M. Jafri, "Efficient Fingerprint Matching Using Graphical Processing Unit", **IET Image Processing**, vol. 12, no. 2, pp. 274–284, 2018, (I.F: 1.401).
- S. A. Tariq, S. Iqbal, M. Ghafoor, I. A. Taj, N. M. Jafri, S. Razzaz, and T. Zia, "Massively parallel palmprint identification system using GPU", **Cluster Computing Springer**, vol. 20, no. 3, pp. 1–16, 2017, (I.F: 1.682).
- M. Ghafoor, I. A. Taj, and N. M. Jafri, "Fingerprint Frequency Normalization and Enhancement using 2-D STFT Analysis", **IET Computer Vision**, vol. 10, no. 8, pp. 806–816, 2016, (I.F: 1.087).
- M. Sajid, I. A. Taj, U. I. Bajwa, and N. I. Ratyal, "The Role of Facial Asymmetry towards Recognizing Age-Separated Face Images", **Computers & Electrical Engineering (Elsevier)**, vol. 54, pp. 255–270, 2016, (I.F: 1.747).
- M Asif, Imtiaz A. Taj, S.M. Ziauddin, M.B. Ahmad, M. Tahir, "A Hybrid Scheme Based on Pipelining and Multitasking in Mobile Application Processors for Advanced Video Coding", **Scientific Programming, Hindawi Publishing Corporation**, vol. 2015, no. 2, pp. 1–16, 2015, (I.F: 1.344).
- N. I. Ratyal, I. A. Taj, U. I. Bajwa , and M. Sajid, "3D face recognition based on pose and expression invariant alignment", **Computers & Electrical Engineering (Elsevier)**, vol. 46, pp. 241–255, 2015, (I.F: 1.747).
- M. Ghafoor, I. A. Taj, W. Ahmad,and N. M. Jafri, "Efficient 2-fold contextual filtering approach for fingerprint enhancement", **IET Image Processing**, vol. 8, no. 7, pp. 417–425, 2014, (I.F: 1.401).
- U. I. Bajwa, I. A. Taj, M. W. Anwar, and X. Wang, "A Multifaceted Independent Performance Analysis of Facial Subspace Recognition Algorithms", **PLoS ONE**, vol. 8, no. 2, pp.e56510, 2013, (I.F: 2.766).

Industrial and Environmental Microbiology



GROUP INTRODUCTION

The Industrial and Environmental Microbiology Research Group is passionate to work on diverse research areas within the domain of Microbiology, Molecular Biology, Industrial Biotechnology, Dairy Microbiology, Systematics & Taxonomy, Tissue Culture and Bacterial Metabolites Encapsulation.

GROUP HEAD

Dr. Arshia Amin Butt

Dr. Arshia completed her PhD degree in Microbiology with specialization in Microbial Biotechnology, Bacterial Systematics and Taxonomy from Department of Microbiology, Quaid-i-Azam University Islamabad. Her research work included the isolation and identification of bacteria based on 16S rRNA gene sequence. She experimented on house keeping gene(s) as well as whole genome sequence of selected bacterial strains. She had sequenced many bacterial strains using 16S rRNA gene and submitted these sequence data to DNA database. She had also worked on 2nd generation pyrosequencing technique and analyzed huge data by using various bioinformatic tools. She remained Senior Research Fellow at Yunnan Institute of Microbiology (YIM), Yunnan Kunming China. She had worked with National Agriculture Research Centre Islamabad on Micropropagation of commercially important Date palm varieties. She had also worked with Pakistan Biological Safety Association and Fogarty International Centre, NIH, USA on Biosafety and Biosecurity related projects. Dr Arshia is a lifetime member of Next Generation Global Health Security Network and Pakistan Biosafety Association. She is also active member of American Society of Microbiology. She is receipent of numerous national and international trainings and certifications. Presently she is actively involved in Academia and Research at Department of Bioinformatics and Biosciences, Capital University of Science and Technology,Islamabad.

Awards and Distinctions of Head

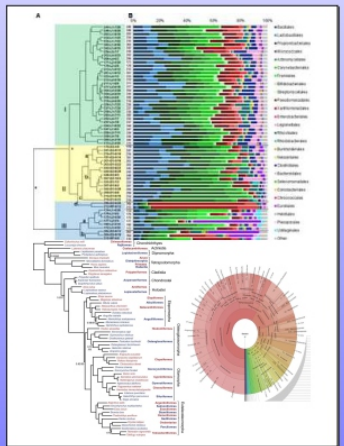
- Certified by IFBA for Biorisk Management
- Certified for Transportation of Infectious Substance by WHO
- Awarded for "Best Presenter Award" in International Conference on Date Palm entitled "Date palm Tissue Culture, Outstanding Problems and Solutions."

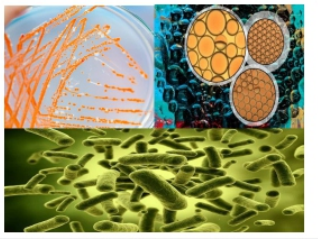
RESEARCH AREAS

- Glacial Soil Bacterial Diversity Shift and Impact of Physicochemical Characteristics over Diversity Distribution
- Psychrophilic Bacterial Diversity and Isolates Antibiotic Resistance Pattern
- Microbially Enhanced Oil Recovery (MEOR) with reference to Biotransformation Capability and Enhanced Surfactant Activity
- Encapsulation of Probiotic Bacteria and Metabolites for Biodegradable Polymers
- Antimicrobial Activities of Medicinally Important Plants
- Characterization and Identification of novel Bacterial Species from Extreme Environments
- Bacterial Systematic and Taxonomy
- Psychrophilic Bacterial Diversity and Antibiotic Resistance Pattern of Isolates
- High Temperature Tolerance in Various Microorganisms at Molecular level
- Identification of Novel High Temperature Tolerant Bacteria and their Mechanisms of Tolerance
- Proteomics in Bacteria for Targeting of high Temperature Tolerance

GROUP MEMBERS

- Hafsa Raja
- Zainab Rasheed Bhutto
- Tehseen Zahra
- Sajida Tayyaba
- Rabia Shahid
- Quratul Ain Rehman
- Barira Anees
- Sundus Batool
- Tooba Khalid
- Haseem Batool
- Shagufta Batool





Selected Publications

- A. Amin, I. Ahmed, N. Salam, B.Y. Kim, D. Singh, X.Y. Zhi, M. Xiao, and W.J. Li, "Diversity and distribution of thermophilic bacteria in Hot Springs of Pakistan". **Microbial Ecology**, vol. 74, no. 1, pp. 116, 2017.
- A. Amin, I. Ahmed, N. Khalid, G. Osman, I. U. Khan, M. Xiao, and W. J. Li, "Streptomyces caldifontis sp. nov., isolated from a hot water spring of Tatta Pani, Kotli, Pakistan". **Antonie van Leeuwenhoek Journal Microbiology**, vol. 110, no. 1, pp. 77, 2017.
- A. Amin, I. Ahmed, N. Habib, S. Abbas, F. Hasan, M. Xiao, W. N.Hozzein, and W. J. Li, "Microvirga Pakistanensis sp. nov., a novel bacterium isolated from desert soil of Cholistan, Pakistan. Archives of Microbiology ". **International Journal of Systematic and Evolutionary Microbiology**, vol. 198, no. 10, pp. 933, 2017.
- I. U. Khan, F. Hussain, N. Habib, M. Xiao, I. Ahmed, A. Amin, X. Y. Zhia, and W. J. Li, "Nocardioides thalensis sp. nov., isolated from a desert". **International Journal of Systematic and Evolutionary Microbiology**, vol. 67, no. 8, pp. 2848, 2017.
- I. U. Khan, N. Habib, F. Hussain, W. D. Xian, A. Amin, E. M. Zhou, I. Ahmed, X. Y. Zhi, and W. J. Li, "Thermus caldifontis sp. nov., a thermophilic bacterium isolated from a hot spring". **International Journal of Systematic and Evolutionary Microbiology**, vol. 67, no. 8, pp. 2868, 2017.
- A. Amin, I. Ahmed, N. Habib, S. Abbas, M. Xiao, W. N.Hozzein, and W. J. Li, "Nocardioides Pakistanensis sp. nov., isolated from hot water spring of Tatta Pani in Pakistan". **Antonie van Leeuwenhoek Journal Microbiology**, vol. 109, no. 8, pp. 1101, 2016.
- A. Amin, I. Ahmed, G. Osman, N. Habib, F. Hussain, M. Xiao, M. N. Rao, and W. J. Li, "Proposal of Zafarii solitudinis sp. nov., a halotolerant bacterium isolated from hot water spring of Tatta Pani, Pakistan". **International Journal Systematic and Evolutionary Microbiology**, vol. 109, no. 8, pp. 1101, 2016.
- M. I. Afridi, N. Ali, K. I. Shinwari, M. A. Hassan, A. Amin, A. Shah, and A. Muhammad,"Optimization of Aseptic Conditions for Micropropagation of Olive (Oleaeuropaeal.) Cultivar Uslu". **Journal of Bio-Molecular Sciences (JBMS)**, vol. 3, no. 1, pp. 35, 2015.

ThermoFluids Research Group

FlowTherm ThermoFluids Research Group

GROUP INTRODUCTION

The Thermo-Fluids Research Group at Capital University of Science and Technology involves multidisciplinary researchers with a clear focus on both fundamental and applied research in thermo-fluids including Multiphase Flows, HVAC, Sprays and Combustion, Computational Fluid Dynamics, Aerodynamics, Turbulence, Renewable Energy and Thermal & Hydraulic Augmentation.

GROUP HEAD

Dr. Muhammad Mahabat Khan

Dr. Muhammad Mahabat Khan has done his Ph.D. in Computational Fluid Dynamics from Ecole Centrale de Lyon, France. He has worked as Advanced Development Engineer in Continental Automotive, France for more than five years. He was rewarded with research grant worth £20,000 at University of Leeds for developing Fuel Processing Methodology for Turbulent Flows in engines. He is also recipient of research award worth €2.3 million from Continental Automotive, France. His research interests include; Large Eddy Simulation of Turbulent Flows, Modeling and Simulation of Fuel Injection Systems, Multiphase Flows, Heat Transfer Enhancement etc. He is also reviewer of famous International Journals like:

1. International Journal of Heat and Mass Transfer, Elsevier
2. Energy Conversion and Management, Elsevier
3. Atomisation and Sprays, Begellhouse.

Currently he is serving as Assistant Professor in department of Mechanical Engineering at Capital University of Science & Technology, Islamabad.

RESEARCH AREAS

- Atomization and sprays
- Large Eddy Simulation of Turbulent Flows
- Coherent Structures in Turbulent Flows
- Multiphase Flows, Free Surface Flows and Particulate Flows
- Combustion and Heat transfer Enhancement
- Ejector Refrigeration
- Phase Behavior and Phase Change
- Heat Exchangers
- Refrigeration and Air Conditioning

Group Members

1. Dr. M. Mahabat Khan
2. Dr. Saif ur Rahman
3. Dr. Khawar Naveed
4. Dr. Muhammad Irfan
5. Mr. Saif Ullah
6. Mr. Atif Bin Asghar
7. Engr. Muhammad Ahmed
8. Engr. Madeeha Khan

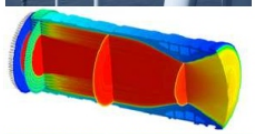
MS/PhD Students

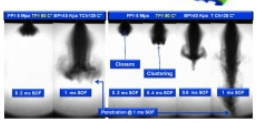
MS Students

1. Mr. Liaqat Hussain
2. Mr. Fakharul Hasnain
3. Ms. Madeeha Khan
4. Mr. Muhammad Ahmed
5. Mr. Rehan Qaiser
6. Mr. Amani Room

PhD Students

1. Mr. Rizwan Sabir
2. Mr. Noman Bashir
3. Mr. Shahid Shafiq





ALUMNI

Mr. Abubakar Ayub

Thesis Title: Exergetic optimization and comparison of combined gas turbine supercritical CO2 power cycles
Year: 2018

Mr. Rizwan Bhatti

Thesis Title: Numerical study of hydrogen peroxide thermal decomposition in a shock tube
Year: 2017

Selected Publications

Journal Publications

- M. M. Khan, J. Hélie, and M. Gorokhovski, "Computational methodology for non-evaporating spray in quiescent chamber using Large Eddy Simulation", International Journal of Multiphase Flow, vol. 102, pp. 102–118, 2018.
- M. M. Khan , N. A. Sheikh, A. Khalid, and W. A. Lughmani, "Experimental characterization of sprays under highly evaporating conditions", Heat and Mass Transfer, vol. 54, no. 5, pp. 1531–1543, 2018.
- M. Irfan and M. Muradoglu, "A Front Tracking Method for Particle-Resolved Simulation of Evaporation and Combustion of a Fuel Droplet", Computers and Fluids, vol. 174, pp. 283–299, 2018.
- A. Ayub, N. A. Sheikh, R. Tariq, M. M. Khan, and C. M. Invernizzi, "Exergetic Optimization and Comparison of Combined Gas Turbine Supercritical CO2 Power Cycles", Journal of Renewable and Sustainable Energy, vol. 10, no. 4, p. 044703, 2018.
- E. Khalid, S. Manzoor, N. A. Sheikh, M. Ali, H. M. Ali, and M. M. Khan, "Numerical Investigation of Transient Response of a Coupled Two Degrees of Freedom Symmetric Airfoil before Flutter", International journal of Aeroacoustics, vol. 17, no. 3, pp. 275–294, 2018.
- M. Irfan and M. Muradoglu, "A front-tracking method for direct numerical simulation of evaporation process in a multiphase system", Journal of Computational Physics, vol. 337, pp. 132–153, 2017.
- M. M. Khan, J. Hélie, M. Gorokhovski, and N. A. Sheikh, "Experimental and Numerical study of Flash Boiling in Gasoline Direct Injection Sprays", Applied Thermal Engineering, vol. 123, pp. 377–389, 2017.
- M. M. Khan and N. A. Sheikh, "Experimental characterization of sprays under highly evaporating conditions", Journal of Mechanical Science and Technology, vol. 31, no. 4, pp. 1–13, 2017.
- M. M. Khan, J. Hélie, M. Gorokhovski, and N. A. Sheikh, "Air Entrainment in Multi hole Gasoline Direct Injection Sprays", Journal of Applied Fluid Mechanics, vol. 10, no. 4, pp. 1223–1234, 2017.
- M. Ali, M. H. Iqbal, N. A. Sheikh, H. M. Ali, S. Manzoor, and M. M. Khan "Performance investigation of air velocity effects on PV modules under controlled conditions", International Journal of Photoenergy, vol. 2017, pp. 1–10, 2017.
- M. R. Bhatti, N. A. Sheikh, S. Manzoor, and M. M. Khan, "Numerical studies of Hydrogen Peroxide Thermal Decomposition in a Shock Tube using OpenFOAM", Journal of Thermal Science, vol. 26, no. 3, pp. 235–244, 2017.
- A. Mustafa, A. Erten, R. M. A. Ayaz, O. Kayilliioglu, A. Eser, M. Eryurek, M. Irfan, M. Muradoglu, M. Tamyeri, and A. Kiraz, "Enhanced dissolution of liquid microdroplets in the extensional creeping flow of a hydrodynamic trap", Langmuir, vol. 32, no. 37, pp. 9460–9467, 2016.

Water and Environment Research Group (WE R)

GROUP INTRODUCTION

The Water and Environment Research (WE R) Group focuses on performing research work in broad domains including Environmental Studies, Climate Change Assessment, Water Crises,Irrigation Channel Efficiency Improvements etc. The group is actively involved in finding means to augment needs of potable water by adopting rainwater harvesting & greywater reuse techniques at residential levels and exploration of groundwater recharge potential in populated areas. The Research work not only concentrates on exploration of Water Resources Flow Forecasting but also on scientific evaluation of Barrage Related Issues.The Research Group also addresses Water Storage and Distribution issues at national and international levels.

GROUP HEAD

Dr. Ishtiaq Hassan

Dr. Ishtiaq Hassan has vast academic and Industrial experience. He did his PhD in Civil Engineering with specialization in Water Resources and Irrigation Engineering from UET Taxila. He served in NESPAK from 1999 to 2014. He has many design and project management projects to his credit. His key research areas include Water Resources Planning & Designing, Global Warming & Climate Change, Rainwater Harvesting, Flow Estimations, Hydrology and Public Health Engineering. He is currently supervising 05 PhD and 04 MS students in addition to 03 MS students who have got their MS degree. He has authored numerous research papers published in HEC recognized / ISI recognized journals. He has also presented his research work in various conferences. Currently he is chairing Civil Engineering Department at Capital University of Science & Technology, Islamabad.

RESEARCH AREAS

- Scientific Evaluation of Barrage related issues with Remedial Measures
- Water Distribution and Water Storage Issues
- Irrigation Channel Efficiency Improvements
- Climate Change and Global Warming
- Water Resources Conservation
- Water Distribution Studies
- Environmental Impact Assessment Studies
- Environmental studies

MS ALUMNI

Mr. Muhammad Ali

Thesis Title: Comparative Evaluation of Hydro power Potential of Jhelum and Indus Basins Using GIS
Year: 2018

Mr. Arsam Awan

Thesis Title: Optimum Lengths of Lining to Reduce Losses in Watercourses by Using Advanced Non-linear Modeling
Year: 2017

Mr. M. Umar Nadeem Qureshi

Thesis Title: Comparative Study of Hydroponic and Geoponic systems
Year: 2017

GROUP MEMBERS

1. Engr. Syed Shuja-ul-Hassan
2. Engr. Aruba Waqar

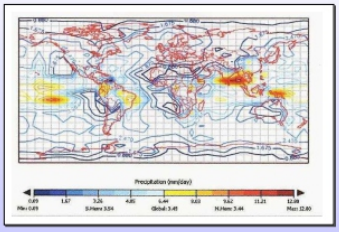
MS/PhD Students

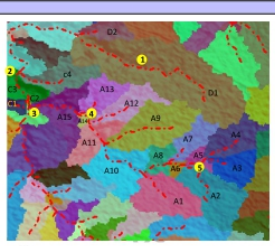
MS Students

1. Mr. Kawish Mehboob
2. Mr. Hamid Ali Shah
3. Mr. Shafqat Ali Aslam
4. Mr. Adnan Ahmed Khan

PhD Students

1. Mr. Muhammad Hassan
2. Mr. Shahmir Janjua
3. Ms. Erum Aamir
4. Mr. Arsam Awan
5. Mr. M. Waqas Zafar
6. Ms. Laila Khalid





Selected Publications

Journal Publications

- H. Ishtiaq, R. Osama, M. A. Furqan, U. Zakir, A. Hamza, A. Shehryar, M. Arsalan, and W. Aruba, "Reducing water demands by adopting harvesting and recycling techniques in Pakistan", J. Bio. Env. Sci. vol. 14, no. 4, pp. 79–88, 2019.
- I. Hassan, A. R. Ghumman, Y. Ghazaw, R. H. Abdel-Maguid, B. Samreen. "Climate Change Impact on Precipitation in Arid Areas of Pakistan",International Journal of Water Resources and Arid Environments, vol. 6, no. 1, pp. 80–88, 2017.
- A. A. Awan, I. Hassan, and M. Hassan, "Optimizing lining length of watercourses for increased water saving in Punjab, Pakistan", Journal of Biodiversity and Environmental Sciences (JBES), vol. 10, no. 2, pp. 173–180, 2017.
- I. Hassan,"Rainwater Harvesting - an alternative water supply in the Future for Pakistan", Journal of Biodiversity and Environmental Sciences, vol. 8, no. 6, pp. 213–222, 2016.
- I. Hassan, A. R. Ghumman, and H. N. Hashmi, "Global warming and temperature changes for Saudi Arabia", Journal of Biodiversity and Environmental Sciences (JBES), vol. 8, no. 1, pp. 179–191, 2016.
- I. Hassan and A. R. Ghumman, "Application of Civil Engineering Softwares for Downscaling GCM Results", International Invention Journal of Engineering Science and Technology, vol. 2, no. 1, pp. 1–9, 2015.
- A. R. Ghumman, I. Hassan, Q. U. Z. Khan, and M. A. Kamal,"Investigation of impact of environmental changes on precipitation pattern of Pakistan", Environmental Monitoring and Assessment vol. 185, no. 6, pp. 4897–4905, 2013.

Conference Proceedings

- I. Hassan, A. R. Ghumman, and W. Aruba. "Simulating Precipitation of Bahawalpur and its Adjoining Cholistan Desert of Pakistandue to Climate Change", 8 International Conference on Water Resources and Arid Environments (ICWRAE 8), 2019.
- A. Waqar and I. Hassan, "Comparative Analysis of Solid Waste Management Practices in Higher Education Institutions of Developing Countries", 3rd Asian Conference on Science, Technology & Medicine, ACSTM , 2019.
- I. Hassan, A.R. Ghumman , Y. Ghazaw , R. H. Abdel-Maguid, and B. Samreen, "Climate Change Impact on Precipitation in Arid Areas of Pakistan", 7th International Conference On Water Resources And Arid Environments, pp. 195–205, 2016.

Water and Environment Research Group (WE R)

GROUP INTRODUCTION

The Water and Environment Research (WE R) Group focuses on performing research work in broad domains including Environmental Studies, Climate Change Assessment, Water Crises,Irrigation Channel Efficiency Improvements etc. The group is actively involved in finding means to augment needs of potable water by adopting rainwater harvesting & greywater reuse techniques at residential levels and exploration of groundwater recharge potential in populated areas. The Research work not only concentrates on exploration of Water Resources Flow Forecasting but also on scientific evaluation of Barrage Related Issues.The Research Group also addresses Water Storage and Distribution issues at national and international levels.

GROUP HEAD

Dr. Ishtiaq Hassan

Dr. Ishtiaq Hassan has vast academic and Industrial experience. He did his PhD in Civil Engineering with specialization in Water Resources and Irrigation Engineering from UET Taxila. He served in NESPAK from 1999 to 2014. He has many design and project management projects to his credit. His key research areas include Water Resources Planning & Designing, Global Warming & Climate Change, Rainwater Harvesting, Flow Estimations, Hydrology and Public Health Engineering. He is currently supervising 05 PhD and 04 MS students in addition to 03 MS students who have got their MS degree. He has authored numerous research papers published in HEC recognized / ISI recognized journals. He has also presented his research work in various conferences. Currently he is chairing Civil Engineering Department at Capital University of Science & Technology, Islamabad.

RESEARCH AREAS

- Scientific Evaluation of Barrage related issues with Remedial Measures
- Water Distribution and Water Storage Issues
- Irrigation Channel Efficiency Improvements
- Climate Change and Global Warming
- Water Resources Conservation
- Water Distribution Studies
- Environmental Impact Assessment Studies
- Environmental studies

MS ALUMNI

Mr. Muhammad Ali

Thesis Title: Comparative Evaluation of Hydro power Potential of Jhelum and Indus Basins Using GIS
Year: 2018

Mr. Arsam Awan

Thesis Title: Optimum Lengths of Lining to Reduce Losses in Watercourses by Using Advanced Non-linear Modeling
Year: 2017

Mr. M. Umar Nadeem Qureshi

Thesis Title: Comparative Study of Hydroponic and Geoponic systems
Year: 2017

GROUP MEMBERS

1. Engr. Syed Shuja-ul-Hassan
2. Engr. Aruba Waqar

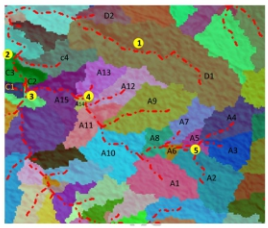
MS/PhD Students

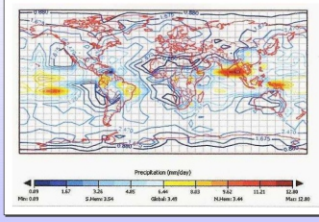
MS Students

1. Mr. Kawish Mehboob
2. Mr. Hamid Ali Shah
3. Mr. Shafqat Ali Aslam
4. Mr. Adnan Ahmed Khan

PhD Students

1. Mr. Muhammad Hassan
2. Mr. Shahmir Janjua
3. Ms. Erum Aamir
4. Mr. Arsam Awan
5. Mr. M. Waqas Zafar
6. Ms. Laila Khalid





Selected Publications

Journal Publications

- H. Ishtiaq, R. Osama, M. A. Furqan, U. Zakir, A. Hamza, A. Shehryar, M. Arsalan, and W. Aruba, "Reducing water demands by adopting harvesting and recycling techniques in Pakistan", **J. Bio. Env. Sci.** vol. 14, no. 4, pp. 79–88, 2019.
- I. Hassan, A. R. Ghumman, Y. Ghazaw, R. H. Abdel-Maguid, B. Samreen. "Climate Change Impact on Precipitation in Arid Areas of Pakistan",**International Journal of Water Resources and Arid Environments**, vol. 6, no. 1, pp. 80–88, 2017.
- A. A. Awan, I. Hassan, and M. Hassan, "Optimizing lining length of watercourses for increased water saving in Punjab, Pakistan", **Journal of Biodiversity and Environmental Sciences (JBES)**, vol. 10, no. 2, pp. 173–180, 2017.
- I. Hassan,"Rainwater Harvesting - an alternative water supply in the Future for Pakistan", **Journal of Biodiversity and Environmental Sciences**, vol. 8, no. 6, pp. 213–222, 2016.
- I. Hassan, A. R. Ghumman, and H. N. Hashmi, "Global warming and temperature changes for Saudi Arabia", **Journal of Biodiversity and Environmental Sciences (JBES)**, vol. 8, no. 1, pp. 179–191, 2016.
- I. Hassan and A. R. Ghumman, "Application of Civil Engineering Softwares for Downscaling GCM Results", **International Invention Journal of Engineering Science and Technology**, vol. 2, no. 1, pp. 1–9, 2015.
- A. R. Ghumman, I. Hassan, Q. U. Z. Khan, and M. A. Kamal,"Investigation of impact of environmental changes on precipitation pattern of Pakistan", **Environmental Monitoring and Assessment** vol. 185, no. 6, pp. 4897–4905, 2013.

Conference Proceedings

- I. Hassan, A. R. Ghumman, and W. Aruba. "Simulating Precipitation of Bahawalpur and its Adjoining Cholistan Desert of Pakistandue to Climate Change", **8 International Conference on Water Resources and Arid Environments (ICWRAE 8)**, 2019.
- A. Waqar and I. Hassan, "Comparative Analysis of Solid Waste Management Practices in Higher Education Institutions of Developing Countries", **3rd Asian Conference on Science, Technology & Medicine, ACSTM** , 2019.
- I. Hassan, A.R. Ghumman , Y. Ghazaw , R. H. Abdel-Maguid, and B. Samreen, "Climate Change Impact on Precipitation in Arid Areas of Pakistan", **7th International Conference On Water Resources And Arid Environments**, pp. 195–205, 2016.

Research Group of Vision and Pattern Recognition Systems (VisPRS)

GROUP INTRODUCTION

Vision and Pattern Recognition Group of Capital University of Science & Technology is actively involved in basic and applied research in the fields of Image Processing, Machine/Computer Vision and Pattern Recognition/Classification. The scope of research not only includes the algorithm development and analysis but also system development and the optimizations involved. Presently this group has more than 20 members including 6 MS students, 12 PhD scholars and 3 post doctoral researchers belonging to different organizations.

GROUP HEAD

Dr. Imtiaz Ahmad Taj

Dr. Imtiaz Ahmad Taj received his PhD degree in Electronics and Information Engineering from Hokkaido University, Sapporo, Japan where he was endowed with Outstanding Young Researcher Award by IEICE Japan. He is actively involved in Teaching, Research and Academic Management. Currently he holds the Office of Dean Faculty of Engineering at Capital University of Science and Technology, Islamabad. He also remained on key positions in various R&D companies notably CET and CARE. Dr. Imtiaz Ahmad has been teaching and doing research in Machine vision, Pattern Recognition & Biometrics, Optical Networking, Nonlinear Optics, Photorefractive Wave Mixing, Free-space Optical Switching etc. He introduced several graduate level academic courses for the first time in Pakistan including Computer Vision, Pattern Recognition and Machine learning.Under his supervision, more than 20 students have successfully completed their research thesis at MS and PhD level and still a number of students are pursuing their research with him.He has accomplished more than 60 Publications in national and international Journals & Conferences of highest repute. He has served in organizing and technical committees of many international Journals & Conferences. He has successfully completed three national level research projects in the capacity of Project director leading a team of more than 15 researchers in each project. He also remained member and chaired various Professional and Non Professional bodies and organizations.

RESEARCH AREAS

- Biometrics: Fingerprint, Iris, Face, Palm print and Signature
- Video Encoding and Processing
- Machine Learning and Deep Neural Networks
- Super Resolution Imaging
- Vision Based Navigation & Registration, Vision Based Tracking
- Time Frequency Analysis of Dynamic Signals
- Automatic Activity Detection and Vision Based Security Systems
- Medical Diagnosis using Pattern Classification Algorithms
- Algorithm Development & Hardware Design

R&D Projects

1. Design and Development of on-board Image Registration and Position Estimation System for Autonomous Vehicle Navigation
2. Automatic Personal Identification Biometrics System (APIBS) for Large Scale Applications
3. Real Time Implementation of H.264 Decoder for Heterogeneous Multicore Architectures

PhD ALUMNI

Dr. Muhammad Naeem Ratyal

Thesis Title: 3d Face Recognition Based On Pose And Expression Invariant Alignment
Year: 2016

Dr. Muhammad Sajid

Thesis Title: Towards Facial Asymmetry Based Face Recognition
Year: 2016

Dr. Muhammad Asif

Thesis Title: Efficient Framework For Macroblock Prediction And Parallel Task Assignment In Video Coding
Year: 2016

Dr. Mubeen Ghafoor

Thesis Title: Fingerprint Enhancement and Nonlinear Distortion Removal by effective use of Contextual filtering
Year: 2014

Dr. Muhammad Ajab

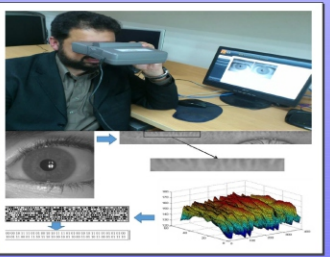
Thesis Title: A Combination of Linear and Quadratic Time- Frequency Techniques for Time-Varying Signals
Year: 2013

Dr. Usama Ijaz Bajwa

Thesis Title: Performance Enhancement of Subspace Learning Face Recognition by Effective Use of Classifiers
Year: 2013

Dr. Nabeel Ali Khan

Thesis Title: Cross-term Suppression in Wigner Distribution
Year: 2010



Current PhD Students

1. Mr. Ahmad Bilal Mehmood
2. Ms. Samana Batool
3. Mr. Aamir Javed
4. Ms. Keenjhar Ayoob Chandio
5. Mr. Muhammad Tahir Awan

Selected Publications

Journal Publications

- T. Zia, M. Ghafoor, S. A. Tariq, and I. A. Taj, "Robust Fingerprint Classification with Bayesian Convolutional Networks", **IET Image Processing**, vol. 13, no. 3, pp. 1–10, 2019, (I.F: 1.401).
- M. Tahir, I. A. Taj, P. A. Assuncao, and M. Asif, "Fast Video Encoding based on Random Forests", **Journal of Real-Time Image Processing**, vol. 16,no. 10, pp. 1–21, 2019, (I.F: 1.574).
- M. Sajid, I. A. Taj, U. I. Bajwa, and N. I. Ratyal, "Facial asymmetry based Age Group Estimation: Role in Recognizing Age-Separated Face Images", **Journal of Forensic Sciences**, vol. 63, no. 6, pp. 1727–1749, 2018, (I.F: 1.184).
- N. I. Ratyal, I. A. Taj, U. I. Bajwa, and M. Sajid, "Pose and expression invariant alignment based multi-view 3D face recognition", **KSII Transactions on Internet and Information Systems**, vol. 12, no. 10, pp. 4903–4929, 2018, (I.F: 0.601).
- M. Asif, I. A Taj, S. M. Ziauddin, M. B. Ahmad, and M. Tahir, "An efficient framework for prediction parameters selection in advanced video coding", **IEEE Access**, vol. 6, pp. 25277-25291, 2018, (I.F: 3.557).
- M. Ghafoor, S. Iqbal, S. A. Tariq, I. A. Taj, and N. M. Jafri, "Efficient Fingerprint Matching Using Graphical Processing Unit", **IET Image Processing**, vol. 12, no. 2, pp. 274–284, 2018, (I.F: 1.401).
- S. A. Tariq, S. Iqbal, M. Ghafoor, I. A. Taj, N. M. Jafri, S. Razzar, and T. Zia, "Massively parallel palmprint identification system using GPU", **Cluster Computing Springer**, vol. 20, no. 3, pp. 1–16, 2017, (I.F: 1.602).
- M. Ghafoor, I. A. Taj, and N. M. Jafri, "Fingerprint Frequency Normalization and Enhancement using 2-D STFT Analysis", **IET Computer Vision**, vol. 10, no. 8, pp. 806–816, 2016, (I.F: 1.087).
- M. Sajid, I. A. Taj, U. I. Bajwa, and N. I. Ratyal, "The Role of Facial Asymmetry towards Recognizing Age-Separated Face Images", **Computers & Electrical Engineering (Elsevier)**, vol. 54, pp. 255–270, 2016, (I.F: 1.747).
- M Asif, Imtiaz A. Taj, S.M. Ziauddin, M.B. Ahmad, M. Tahir, "A Hybrid Scheme Based on Pipelining and Multitasking in Mobile Application Processors for Advanced Video Coding", **Scientific Programming, Hindawi Publishing Corporation**, vol. 2015, no. 2, pp. 1–16, 2015, (I.F: 1.344).
- N. I. Ratyal, I. A. Taj, U. I. Bajwa , and M. Sajid, "3D face recognition based on pose and expression invariant alignment", **Computers & Electrical Engineering (Elsevier)**, vol. 46, pp. 241–255, 2015, (I.F: 1.747).
- M. Ghafoor, I. A. Taj, W. Ahmad,and N. M. Jafri, "Efficient 2-fold contextual filtering approach for fingerprint enhancement", **IET Image Processing**, vol. 8, no. 7, pp. 417–425, 2014, (I.F: 1.401).
- U. I. Bajwa, I. A. Taj, M. W. Anwar, and X. Wang, "A Multifaceted Independent Performance Analysis of Facial Subspace Recognition Algorithms", **PLoS ONE**, vol. 8, no. 2, pp.e56510, 2013, (I.F: 2.766).

Capital University of Science and Technology
Off Kaak Pul, Sihala Road, Zone-V, Islamabad
UAN: (051) 111-555-666
http://www.cust.edu.pk