Annual Progress Report 2017-2018

Department of Electronics Engineering

University of Engineering & Technology, Taxila

Annual Progress Report (2017-18)

<table>
<tr><th>Areas</th><th>Progress/Improvement</th></tr>
<tr><td>1. PEC Accreditation</td><td>

PEC Re-accreditation visit was held on 24-25 May, 2018
PEC accredited 2K14 batch without OBE-based System
PEC accredited 2K15 & 2K16 batch with OBE-based System for Level-II

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<tr><td>2. Undergraduate Students Strength</td><td>
<table>
<tr><th>Sr. No</th><th>Intake Batch</th><th>Total Applicants</th><th>Total Admission Offered</th><th>Total Students Admitted</th><th>Present Strength</th><th>No. of Sections</th></tr>
<tr><td>1</td><td>2K15</td><td>4221</td><td>45</td><td>45</td><td>38</td><td>1</td></tr>
<tr><td>2</td><td>2K16</td><td>4371</td><td>49</td><td>46</td><td>41</td><td>1</td></tr>
<tr><td>3</td><td>2K17</td><td>1791</td><td>47</td><td>46</td><td>44</td><td>1</td></tr>
<tr><td>4</td><td>2K18</td><td>4291</td><td>38</td><td>38</td><td>38</td><td>1</td></tr>
<tr><td colspan="3">Total</td><td>175</td><td>175</td><td>161</td><td>4</td></tr>
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</td></tr>
<tr><td>3. Post graduate Students Strength</td><td>
<u>MSc. Program</u>
<table>
<tr><th>Session</th><th>Enrolled</th><th>FT</th><th>PT</th><th>Course Work</th><th>Thesis</th><th>Dropped</th><th>Completed</th></tr>
<tr><td>MS-15</td><td>15</td><td>0</td><td>15</td><td>0</td><td>2</td><td>13</td><td>0</td></tr>
<tr><td>MS-17</td><td>23</td><td>15</td><td>8</td><td>6</td><td>14</td><td>3</td><td>0</td></tr>
<tr><td>MS-18</td><td>12</td><td>4</td><td>8</td><td>12</td><td>0</td><td>0</td><td>0</td></tr>
</table>
<u>PhD Program</u>
<table>
<tr><th>Session</th><th>Enrolled</th><th>FT</th><th>PT</th><th>Course Work</th><th>Comprehensive</th><th>Thesis</th></tr>
<tr><td>PhD-14</td><td>3</td><td>0</td><td>3</td><td>0</td><td>1</td><td>2</td></tr>
<tr><td>PhD-15</td><td>3</td><td>0</td><td>3</td><td>0</td><td>1</td><td>2</td></tr>
<tr><td>PhD-17</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>PhD-18</td><td>2</td><td>0</td><td>2</td><td>2</td><td>0</td><td>0</td></tr>
</table>
<u>Admission Details</u>
<table>
<tr><th></th><th>Applications</th><th>Entry Test</th><th>Interview</th><th>Merit List</th><th>Registered</th></tr>
<tr><td>MS-2018</td><td>45</td><td>36</td><td>32</td><td>22</td><td>12</td></tr>
<tr><td>PhD-Fall-2018</td><td>6</td><td>3</td><td>3</td><td>3</td><td>2</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>4. Faculty/Staff</td><td>

Currently there are 5 PhD & 5 MSc. Faculty members:

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	• 1-Associate Professor, 4-Assistant Professors, 5-Lecturers (2 Lecturers went for PhD. Study Leave abroad), 4-Lab. Engineers and 3-Lab supervisors, 2 Junior Programmer • Advertisement and Selection Board for induction of more PhDs and Lab Engineers is in process in consultation with the Dean/Registrar.
5. Student-Teachers Ratio	• 161/8=20.125
6. Outcome-Based Education System (OBE)	• Dept. of Electronic Engineering is one of the pioneers in UET, Taxila to adopt the OBE-based system. PEC accredited 2K15 & 2K16 batches with OBE-based System for Level-II. • Two Mock Visits conducted from OBE external experts • OBE-based system is fully functional in the department. • Dedicated OBE Cell is functioning to maintain the record of each semester.
7. Undergraduate Labs	• Recently, following 9 state-of-art labs have been established and upgraded: o Computer Lab-1 o Computer Lab-2 o Basic Electronics Lab o Digital Electronics Lab o VLSI Design Lab o Microprocessor & Microcontroller Lab o Instrumentation & Control Lab o DSP & Communication Lab o Project Lab
8. Postgraduate Lab	o The PC-1 for the postgraduate lab is in process.
9. Need for fully functional Placement Bureau	• It does exist and a faculty member looks after the Bureau. Moreover, request for recruitment of full-time Staff has been forwarded to Registrar.
10. Workshop/ Seminar/Conference	• Engr. Atif Imtiaz participated in international conference in Indonesia. • Engr. Zohaib Hasan Naqvi participated in international conference in Jordan. • Dr. Usman Masud participated in international conference in USA. • Dr. Usman Masud participated for two international Conferences in Pakistan.
11. Publications	• 13 journal papers published in 2017-18. Details are given in (Annex-I).
12. Departmental Library	• Departmental Library has been established with 120 books.
13. Classrooms	• Currently there are 6 class rooms and 1 lecture theatre • All classrooms have been upgraded with two white boards, multimedia and other facilities.

	• Request for the up gradation of Lecture Theatre is submitted for the approval.
14. Furniture	• New furniture for different labs has been purchased with the amount of Rs.0.6 million.
15. Course Files	• The course files of each semester are properly checked and managed by the OBA cell of ENCD. • The format of the course file is upgraded with the inclusion of Theory and Lab Instructor feedback forms.
16. Revision of Curriculum	• Pre-requisite System-based Undergraduate curriculum is implemented for 2K18 session according to guidelines given by the PEC. • Proposal for MSc and PhD revised Curriculum is submitted for review in the Board of Faculty and Academic Council.
17. Computers	• There are total 137 computers in the department. Among them 121 computers for students use and 16 for faculty and staff members. • Existing computers are upgraded, while core i7 computers have been purchased for the up gradation of different labs. • Wifi Facility is available in entire department.
18. BSc. Students Common Room	• For boys and girls, two separate common rooms are provided for their extra-curricular activities. • Request for indoor Table-Tennis and other indoor activities are submitted for approval.
19. Full-Time MSc. Students	• 24-hours access in two rooms for Male and Female MSc. Students are dedicated for their research. • Computers are provided to all full-time MSc. Students for their research.
20. Final Year Project	• List of Final Year Projects (FYPs) of 2K14 and 2K15 is given in (Annex-II). • Max. two students are involved in FYP. • Two groups win the ICT Scholarships.
21. Plantation.	• Department is decorated with more than 40 plants.
22. Events Organized by IEEE Consumer Electronic Society (CES)	• Following Events/Workshops/Talks are organized by the IEEE-CES of ENCD. ○ Development of soft skills ○ Engineering Knowledge for Children ○ Commercialization of Projects ○ Research Methodology ○ CES Fiesta
23. Student Societies	• The proposal for the construction of following two societies are requested to DSA ○ Electronic Dept. Literary Society ○ Electronic Dept. Sports Society

24. Student Industrial Trips	• Microtech. Ltd., Lahore (2K14, 2K15 Sessions) • Packages, Lahore (2K14 Session) • National Institute of Electronics, Islamabad (2K16, 2K17 Sessions)
25. Departmental Website	• Departmental website is upgraded and related data/forms are uploaded.

Dr. Yaseer Arafat Durrani
Chairman ENCD

(Annex-I)

List of Publications 2017-18

Journals:

1. Yaseer A. Durrani "Power Analysis Approach for NoC-based Homogeneous Stacked 3D ICs" World Scientific Journal of Circuits, Systems and Computers, Vol. 27, no. 2, pp. 1-16, 2018, Print ISSN: 0218-1266, Online ISSN: 1793-6454, https://doi.org/10.1142/S0218126618500342 (IF: 0.47)
2. K. Mahmood, A. Rafique, Yaseer A. Durrani "Effect of Isothermal Treatment on Ni3Al Coatings Deposited by Air Plasma Spraying System, Journal Archives of Metallurgy and Materials, Vol. 63, no. 1, ISSN: 1733-3490, 2018 (IF: 0.571)
3. Yaseer A. Durrani "Power Macro-Modeling Technique for NoC-based Homogeneous Layered 3D ICs" Wiley International Journal of Numerical Modeling, Electronic Networks, Devices & Fields, Vol. 30, no. 6, DOI:10.1002/jnm.2309, 2017, ISSN: 1099-1204, (IF: 0.515)
4. Yaseer A. Durrani, T. Riesgo "Power modeling for High Performance network-on-chip architectures" Elsevier Journal of Microprocessors & Microsystems, Vol. 50, pp. 80-89, 2017, ISSN:0141-9331, DOI:10.1016/j.micpro.2017.03.003, (IF: 0.571)
5. Yaseer A. Durrani "Power Optimization using Low-Transition Rate based LFSR Pattern Generator", Technical Journal, UET, Taxila, Vol. 22, No. 2, pp. 60-65, ISSN: 1813-1786, June, 2017.
6. Yaseer A. Durrani "Fundamentals of Low-Noise in Analog Circuits", Technical Journal, UET, Taxila, Vol. 22, No. 1, pp. 46-51, ISSN: 1813-1786, Jan, 2017.
7. M. Awais, A. Ahmed, S. A. Ali, M. Naeem, W. Ejaz and A. Anpalagan, "Resource Management in Multicloud IoT Radio Access Network," in *IEEE Internet of Things Journal*, October 2018.
8. Qaisar Bashir, Muhammad Naeem Shehzad, Aamir Rashid et al, "An online temperature-aware scheduling technique to avoid thermal emergencies in multiprocessor systems", Elsevier journal of Computers & Electrical Engineering, Volume 70, August 2018, Pages 83-98. (IF=1.747)
9. Haider, K.S., Ghafoor, A., Imran, M. and Malik, F.M., "Model reduction of large scale descriptor systems using time limited gramians", Asian Journal of Control, 19(3), pp.1217-1227, 2017.
10. Haider, S., Ghafoor, A., Imran, M. and Malik, F.M., "Frequency Interval Gramians Based Structure Preserving Model Order Reduction for Second Order Systems", Asian Journal of Control, 20(2), pp.790-801, 2018.
11. Haider, K.S., Ghafoor, A., Imran, M. and Malik, F.M., "Frequency limited Gramians-based structure preserving model order reduction for discrete time second-order systems", International Journal of Control, pp.1-12, 2018.
12. Haider, K.S., Ghafoor, A., Imran, M. and Malik, F.M., "Time-limited Gramians-based model order reduction for second-order form systems", Transactions of the Institute of Measurement and Control, p.0142331218798893, 2018.
13. M. Saqlain, M. Riaz, and K. S. Haider, "Controller design for performance analysis and optimization of twin rotor system", International Science Journal, vol. 29, no 2, pp. 349-355, 2017.

Conferences:

1. S. Haider, A. Ghafoor, M. Imran, F. M. Malik, “Techniques for computation of frequency limited H-Infinity norm”, 4th International Conference on Mechanical, Electronics and Computer Engineering, China, pp. 1-5, 2017.
2. Usman Masud et al.,”Design of Logistic Air Vehicle (LAV) to avoid Real-time Obstacles in Logistics and Biomedics”, 3rd International Conference on Emerging Trends in Engineering, Management and Sciences, Peshawar, October 2018.
3. Usman Masud et al.,” A P300 brain computer interface based intelligent home control system using a random forest classifier”, IEEE Symposium Series on Computational Intelligence, Honolulu, Hawaii, pp. 1-5, 2017.
4. Naqvi, S. Z. H., “Design and simulation of enhanced 64-bit Vedic multiplier”, In Applied Electrical Engineering and Computing Technologies (AEECT), IEEE Jordan Conference on (pp. 1-4), October 2017.
5. M. A. Imtiaz, Mahum Naveed, Nimra Bibi, Sumair Aziz and Zohaib Hassan“Control System Design, Analysis & Implementation of Two Wheeled Self Balancing Robot (TWSBR)”, 9th IEEE Annual Information Technology, Electronics & Mobile Communication Conference, IEEE IEMCON 2018, Vancouver, Canada, 1-3 Nov, 2018. (Accepted)
6. Sumair Aziz, Zeeshan Kareem, Muhammad Umar Khan and M. A. Imtiaz, “Embedded System Design for Visual Scene Classification”, 9th IEEE Annual Information Technology, Electronics & Mobile Communication Conference, IEEE IEMCON 2018, Vancouver, Canada, 1-3 Nov, 2018. (Accepted)

(Annex-I)

List of Final Year Project (2K14)

Sr. No:	Supervisor	Title	Abstract
1	Prof. Dr. Gulistan Raja	Human Tracking System on Zynq-700 SoC Platform	Over the past few years, human tracking has become an active area of research due to its wide range of potential applications in on-line pedestrian detection and video surveillance. Among a few challenges faced are varying viewpoints, illumination and postures. Even though certain kinds of movements are very characteristic of humans and integrating motion information allows significant improvement in accuracy. This research aim to develop a human tracking system on Zynq SoC that is more robust to such effects and expect to make significant gains in accuracy through diversification of the feature set. Zynq SoC platform is quite suitable for performance demanding embedded system designs, for example, for image processing, multimedia, machine vision, and robotic applications.
2	Prof. Dr. Gulistan Raja	Image De-blurring for Rotating Imaging Platform	Given a degraded image that is a convolution of an image with a linear time-invariant Point Spread Function (PSF) and then corrupted by additive noise, deconvolution aims to obtain an optimal estimate of the input image. Examples of image degradation include blurring introduced by relative motion between imaging sensor and scene, defocusing as well as the noise introduced from the electronics of the system. The process of deconvolution is known to be an ill-posed problem. Therefore, regularization is often used for de-convolution. In this study, image deconvolution model will be developed by studying following transformations - Estimation of Point Spread Function (PSF) caused by sensor movement - Estimation of PSF corresponding to movement of objects relative to sensor - Study of optical blur caused by optics (can be modeled as Gaussian function) - Degradation due to low resolution detector array. The objective is to estimate a composite deconvolution kernel for a rotating imaging system. The data set acquired by a camera mounted on a rotary head will be used for

			estimation and subsequently validation of algorithm.
3	Prof. Dr. Gulistan Raja	Real-time Image Enhancement Algorithms on Zynq-7000 platform	Due to the progression of the programmable logic devices has motivated the availability of an increasing set of low-cost development boards such as Zed Board, based on Avnet Zynq-7000 family of devices, which are a combination of the hardware and the software. The overall input/output capability is on a single silicon Integrated circuit. For Development of different application domains in the embedded system this platform is used as the basic element which gives the advantages like versatility, increased computational speed and opportunity to connect to sensors, actuators or input/output peripherals. There are different stages of video processing such as capturing the image from the outer sensor writing it to the memory, data processing of the memory information, visualization of the results to establish processing options for user interaction with control application. The goal is to implement image enhancement algorithms like image denoising, image sharpening etc. on real-time fast frame rate camera on Zynq Soc.
4	Prof. Dr. Gulistan Raja	Stereo Range Finder	Depth estimation using stereo vision is one of the most popular and active research problem in field of computer vision. It is a tool to incur relative information from two images of the same scene to produce a disparity map, though accurate disparity map remains a huge challenge for researchers. Stereo vision has many applications, as it aims to achieve the depth perception using cameras instead of active sensors technologies (e.g. LASER Triangulation, Time of Flight based range finding) which suffer from systematic errors (noise, ambiguity) and nonsystematic errors (motion blur, scattering, etc.). These active sensor technologies are costly and take considerable time to acquire data of an object. In order to optimize the cost and make the system work in various conditions, the depth estimation system using two separately located cameras is proposed. Unlike conventional stereo vision systems, the proposed system captures multiple views of the scene, each view taken by different camera mounted on separate platforms at separate locations to estimate depth/range of the far

			located objects. The synced frames of the two cameras located at a known distance will be used as input of this stereo range finding (SRF) algorithm. The range measuring accuracy using SRF as a function of distance between two cameras will also be investigated.
5	Prof. Dr. Gulistan Raja	Vision Based Navigation system	Easily maneuverable and more and more affordable, UAVs have become a real center of interest. In the last few years, their utilization has significantly increased. Today, they are used for multiple tasks such as navigation, transportation or vigilance. Nevertheless, the success of these tasks could not be possible without a highly accurate localization which can, unfortunately be often laborious. However, a major drawback with vision-based algorithms is the lack of robustness. The goal is to mount a vision system on the UAV which can provide a robust alternative to IMU/GPS navigation unit, which can be useful in GPS-denied environments.
6	Dr. Yaseer A. Durrani	Design of Autonomous Control of Model Helicopter	The objectives of this project is to implement an autonomous helicopter, which will go through the flight dynamics of lift, hovering and landing, by using gravitational and physical sensors to perceive any disturbance affecting the over-all inclination and correcting the error caused by disturbance to achieve stable flight. Such correction computations will be quantified by an on-board microcontroller, which will control the helicopter servos accordingly.
7	Dr. Yaseer A. Durrani	Design of Low-Power 16-Bit Microprocessor Using VHDL	In this project, the students will design a low-power 16-bit microprocessor. The microprocessor will be synthesized in VHDL using Xilinx ISE. Then it will be simulated using ModelSim and the programs are burn into FPGA board. The FPGA should act as actual microprocessor. The 16-bit microprocessor is widely use in microcontroller devices with specific task because it has a specific instruction where it only done a given instruction.
8	Dr. Yaseer A. Durrani	Design of fourth order active filter with Sallen and Key topology	In this project, the students will design the active filter with the second and the fourth order Butterworth responses in the category of Sallen and Key filter architecture. This type of filter has voltage controlled voltage source topology that uses a unity-gain amplifier. The complex transfer function of the filter will be obtained and the capacitor/ resistor values will be calculated. The filter will be simulated with the Multisim program and compared with the

			Matlab tool. The results of the frequency responses will be compared.
9	Dr. Azhar Zaidi	Embedded System Design for the Detection & Classification of Cardiovascular Disorders (CVD)	Cardiovascular disorders (CVDs) or Heart diseases are broad terms that can affect both vasculature and the heart muscle itself. CVDs remains the first cause of mortality globally, responsible for 17.5 million people dying annually. More than 75% of CVDs deaths occur in middle and low income countries. The heart sounds are still the primary tool for screening and diagnosing many pathological conditions of the human heart. Using auscultation technique which was invented and defined by Laennec for heart sound analysis is still insufficient. Phonocardiography (PCG) is one of non-invasive techniques to diagnose condition of human heart. A Phonocardiogram (PCG) can provide most valuable diagnostic information for evaluating many cardiac abnormalities, including the valvular heart disease, the rate and rhythm, congestive heart failure, and anatomical defects of the heart. Our Objective is to design a standalone, low-cost & portable system that detects & classifies the heart pathological murmur.
10	Dr. Azhar Zaidi	REAL-TIME VISION BASED IMPLEMENTATION OF PLANT DISEASE IDENTIFICATION SYSTEM ON FPGA	Plant diseases have turned into a dilemma as it can cause significant reduction in both quality and quantity of agricultural products. To overcome that loss, we implement a computer vision based real time system that can identify the type of crops diseases. Computer vision based applications are computationally intensive and time consuming, so FPGA based implementation will be used to have the real time identification of plant disease.
11	Dr. Azhar Zaidi	DESIGN AND DEVELOPMENT OF INTELLIGENT ROBOTIC PLATFORM FOR CROPS HEALTH MONITORING APPLICATIONS	Automated Field Phenotyping is to perform high-throughput plant phenotyping in the field. That is, to make data collection effective, easy, and less labor intensive for scientists doing crop phenotyping research. Objective of this project is to develop a robotic platform that is capable of autonomously navigating through field and gathering imagery data for crop health monitoring purposes.
12	Dr. Aamir Rashid	DESIGN OF A LOW-COST REAL-TIME BIO-MEDICAL DATA ACQUISITION SYSTEM	Bio-electric signals are low-voltage, low-frequency signals that are highly susceptible to noise. Therefore, the bioelectric signal acquisition system should provide very high input impedance, very high Common Mode Rejection ratio (CMRR), high voltage gain and high selectivity. To achieve these specifications, bio-electric acquisition systems are commonly designed using precision

			components which make them very expensive. The objective of this FYP is to design a precise, low-cost system for real-time data acquisition using general purpose Electronic components.
13	Dr. Aamir Rashid	DESIGN OF A HUMAN FACE DETECTION AND RECOGNITION SYSTEM	A face recognition system is one of the biometric information processing system with working range larger than others biometric identification technologies i.e.; fingerprint, iris scanning, digital signature, etc. These systems can be used for crime prevention, video surveillance, person verification, and similar security activities. The objective of this FYP is to design and implement a real-time face recognition system which would require implementation in hardware as well as software.
14	Dr. Aamir Rashid	DESIGN OF A REFLECTARRAY ANTENNA FOR 5G APPLICATIONS	5th Generation (5G) communications are currently represented as a future technology which is supposed to meet the high data rate goals, roughly 1000 times faster than the current systems. The peak data rate in the order of Gbps will require fast switching mechanism which is possible at short wavelengths of mm-waves. The objective of this FYP is to design and analyze microstrip reflectarray antenna capable of precise beam-steering in 5G band.
15	Dr. Imran Khan	Modeling quantum ballistic transport and quantum confinement of carriers in advanced 3D FinFETs	This project is related to the modeling of ballistic transport and quantum confinement of carriers in 3D FinFET device. Modeling and simulations of 3D silicon FinFETs will be performed with Bohm Quantum Potential (BQP) model using TCAD software. The effect of quantum confinement on carrier density in FinFET is required to be explained. In ballistic transport, carrier moves without collision and scattering across the channel. We will use silicon FinFET of thickness 6x7nm and 30nm gate length to find quantum confinement of carriers and compare classical drift diffusion and Non Equilibrium Green's function models.
16	Dr. Imran Khan	Quantum Transport Modeling in Multigate Transistors	This Project develops a methodology for the modeling and analysis of ballistic transport in advanced transistors. A Matlab model of ballistic transport modeling for multi-gate transistor will be developed. Due to scaling, device sizes are becoming smaller and ballistic transport modeling is getting importance in nano-transistors. In case of ballistic transport, carrier moves without collision and scattering

			across the channel. We'll use Non-equilibrium green function (NEGF) and drift diffusion model for the computation of ballistic IV curves in ballistic nanotransistors.
17	Dr. Imran Khan	Quantum Transport Modeling in Carbon Nanowire FET	This Project develops a methodology for the modeling and analysis of ballistic transport in CNW FET. A Matlab model of ballistic transport modeling for multi-gate transistor will be developed. Due to scaling, device sizes are becoming smaller and ballistic transport modeling is getting importance in nano-transistors. In case of ballistic transport, carrier moves without collision and scattering across the channel. We'll use Non-equilibrium green function (NEGF) and drift diffusion model for the computation of ballistic IV curves in ballistic nanotransistors.
18	Dr. Usman Masud	Optical feedback analysis in semiconductor lasers in multimode setup	In a laser system, multiple reflections emerge as a result of collision of light at numerous positions. This gives rise to the optical feedback within the system and produces different effects. For instance, the phase of the laser will be drastically hit by this phenomenon. In the setup developed for biomedical purposes, an analysis of optical feedback effects would help reveal multiple instabilities within the system, especially occurring within short time durations. For this, the student needs to get familiar with the existing setup. A supplemental part of this work would be to relate the conclusions with cavity ring down spectroscopy (CRDS).
19	Dr. Usman Masud	Relative Intensity Noise in semiconductor lasers in multimode setup	In a laser system, multiple reflections emerge as a result of collision of light at numerous positions. This gives rise to

			the optical feedback within the system and produces different effects. For instance, the phase of the laser will be drastically hit by this phenomenon. In the setup developed for biomedical purposes, an analysis of Relative Intensity Noise (RIN) would help reveal multiple instabilities within the system, especially occurring within short time durations. For this, the student needs to get familiar with the existing setup.
20	Dr. Usman Masud	Using DDE-BIF tool in semiconductor lasers in multimode setup	In a laser system, multiple reflections emerge as a result of collision of light at numerous positions. This gives rise to the optical feedback within the system and produces different effects. For instance, the phase of the laser will be drastically hit by this phenomenon. In the setup developed for biomedical purposes, an application of DDE-BIF tool would help reveal multiple instabilities within the system, especially occurring within short time durations. For this, the student needs to get familiar with the existing setup. Afterwards the tool has to be implemented along with various parameters.
21	Engr. Adil Usman	SCADA system based control and fault detection of Switchgear System using Labview	In this project SCADA system based control and fault detection of Switchgear System is proposed. The switchgear systems are frequently and necessarily used in heavy industrial processes like cement industry. Their control is a backbone for the drives of different machines. The fault in any part of switchgear system can cause huge financial loss. So, it is necessary to detect it before any major damage. There are generally three modes of operation of a switchgear system, i.e. direct online mode, forward/reverse mode and star-delta mode. In this project all the mode will be implemented using programmable controller (PLC) and NI Lab-View SCADA.
22	Engr. Adil Usman	Smart Solar Air Conditioner	The objective of this project is to design a cost effective solar based air conditioning system which will reduce the initial cost as well as operational and maintenance cost. Generally, a solar AC has a set of solar panels depending

			upon the size of AC, Charge controller, Battery bank for backup supply, and an inverter of required rating. But it is observed that with a battery bank and inverter, the initial cost of the system (especially with alternating current based compressor) is increased. And if we use the lead acid batteries then they have maximum life time of 1.5 years and their replacement again contribute to raise the operational cost. If we use dry batteries then they increase the initial cost and their life time is maximum 4 years. Moreover, with alternating current based AC unit (compressor, blower and outdoor unit fan) it will raise the power requirement from solar panels because around 30 to 35% of the generated power is lost in inversion operation depending upon the p.f. of the inverter. It is also not feasible even if we use DC inverter air conditioner with battery bank and inverter combination. In this project, a day time solar air conditioning system with pure DC operation is proposed to increase the efficiency in terms of power. As we know the shortfall of electrical energy in Pakistan is vulnerable. This product can be used for the office environment, where the air conditioning requirement is from 9am to 5pm and can reduce the load of the national grid during this time period. This product will reduce the monthly electricity bill of domestic users who use the air conditioners. There will be an additive feature of the product is that the solar energy can be utilized within the power generated range for other appliances. For that purpose, a power generated will be monitored and maximum attachable load will be displayed of a LCD. Then the recommended load can be connected using a remote control device.
23	Engr. Zohaib Naqvi	VEHICLE TRACKING SYSTEM	Tracking System for University transport for surveillance and facilitate the students. AGSM and GPS Module will be installed in each vehicle. GPS module will provide the longitude and Latitude information. GSM module will transmit the information to main server to update information. Gathered data will help to provide necessary information about any vehicle status. i.e. location, departure time, destination and surveillance in real time.
24	Engr. Zohaib Naqvi	BRAIN COMPUTER INTERFACE BASED COMMUNICATION FOR	A Brain Computer Interface (BCI) is a device that makes humans to control the devices with their thoughts. It functions by translating a neural signal, such as electroencephalogram (EEG), into a signal that can be used to control

		PEOPLE WITH LOCKED-IN SYNDROME	a computer or any other device. The aim of this project is to develop a very low-cost, simple and a robust BCI that could prevail in the market. By using this BCI, a user would be able to communicate with others by text. The work includes acquisition of EEG into the computer by self-made electrodes and EEG amplifier. To make BCI simple and affordable, the number of channels is limited to one. After filtering and processing of signals, control commands are generated to operate a GUI with which the user can compose text messages by selecting the alphabets that might be used for effective communication.
25	Engr. Zohaib Naqvi	SMART CAR PARKING SYSTEM	With the development of technology, smart devices are becoming more common in everyday life. The development of devices that can connect to the Internet and transmit data has been a source of inspiration for smart city designs. The common problem in our cities is the difficulty of finding free parking slots. The parking problem causes traffic to congest and people who go to work are looking for a place. A navigation and reservation based parking proposal system development is need of time for smart cities.
26	Engr.Atif Imtiaz	Real Time Adaptive Throttle Response Using Artificially Intelligent Electronic Control Units (ECU)	Due to the comprehensive development in the automobile industry, it is necessary for optimizations to be made in the design. Fuel consumption is one of the major design problems the companies face, to assist this matter, the project aims on improvement in fuel consumption of Electronically Fuel Injected Cars. The aim is to introduce Artificially Intelligent Electronic Control Units in Automobile Industry. An electronic prototype will be designed to demonstrate the effect of the Artificially Intelligent ECU consisting of both Mechanical and Electronic Units. This project will bring a major impact on the optimization of performance and fuel consumption.
27	Engr. Atif Imtiaz	Logistic Air Vehicle (LAV)	The aim of the project is to transport Products using GPS coordinates to required Destination. The user just provides Coordinates to LAV and the LAV will go to that destination by using the flight controller which will be design for it by using GPS System. During the flight of LAV, it will make LAV capable not only to go to required destination but with the capability to avoid Obstacles during its flight. Also it will make LAV capable to maintain its distance

			from ground at constant level, which helps it to avoid any kind of obstacle at constant distance.
28	Engr. Atif Imtiaz	SELF BALANCING ROBOT	In the recent years robotics has been advancing with the development of technology, bearing and handling complicated designs and tasks. Self balancing is also one such step in which a robot should have the capability of locomotion with balancing abilities like humans. This helps using such robots to do plethora of task in an efficient way like humans do. The project will consist of microcontroller based control system and sensors that are mounted on robot to balance it in the upright posture. If a robot is given a jerk from any direction it will try to balance itself and retain its position and direction. Robot abilities are achieved by using input from sensors like accelerometer and gyro along with output from robot motor control section. Thus self balancing robot has its seamless balancing and directional capabilities as a step towards the advancement in modern era of robotics.

Final Year Project Proposal Abstracts (Academic Year 2018-2019) Session 2K15 Electronics Engineering Department UET Taxila.

Design of the Maze Solver Robot (Adviser: Dr. Yaseer A. Durrani)

The field of autonomous robotics has various applications ranging from game simulations to health and safety automations whereby such a system would be developed to locate the shortest route for a fire rescue operation in a building or the location of the shortest escape route during a mine explosion. As the name of this project suggests, a maze solving robot is a robot that can travel through a maze by changing its direction whenever any obstacle occurs in a specific direction. Thus, such concept may be used to explore any hidden region without any human intervention.

Design of the Power Generation System Through 1000 CC Toyota Engine. Adviser: Dr. Yaseer A. Durrani

An engine-generator or portable generator is the combination of an electrical generator and an engine (prime mover) mounted together to form a single piece engine-generator. In addition, it includes a fuel supply, a constant engine speed regulator (governor) and a generator voltage regulator, cooling and exhaust systems, and lubrication system. Units larger than about 1kW rating often have a battery and electric starter motor; very large units may start with compressed air either to an air driven starter motor or introduced directly to the engine cylinders to initiate engine rotation. Standby power generating units often include an automatic starting system and a transfer switch to disconnect the load from the utility power source when there is a power failure and connect it to the generator.

Multi-signal Medical monitoring system Adviser: Dr. Aamir Rashid

Medical science and technology has progressed enormously during the last century. This has resulted in improved health-care and life-expectancy but at ever-increasing medical cost. The health-care expenditure even in developed countries is increasing at un-sustainable rate and it is the need of the hour to find solutions to this problem. The most effective option is preventive health-care i.e. detecting and caring for diseases and ailing conditions at their earliest stages or preventing them al-together. One of the ways to achieve this is by adequate and continuous monitoring of human body's biomedical signals. The idea of this project to develop a system capable of monitoring and analyzing multiple bio-medical signals of a person for early detection of several conditions.

Self-Driving Robotic Car using Artificial Neural Networks Adviser: Dr. Aamir Rashid

Artificial Neural Networks (ANN) are the ideal technology for autonomous vehicles. The idea of this project is to build a robotic vehicle that uses ANNs for navigation, obstacle detection and collision avoidance. The images from the camera mounted on the vehicle will be used to train the ANN for different driving scenarios. Once the learning process is complete the vehicle should be able to adjust its speed while navigating the turns and stop when an obstacle is detected in its path.

Smart Water Quality Monitoring System Adviser: Dr. Aamir Rashid

Inferior quality drinking water is the leading cause of many health conditions in any developing country like Pakistan. Water quality of drinking water is rapidly deteriorating due to contamination of ground water from factory chemicals, sewerage waste and fertilizers. Therefore, continuous monitoring of drinking water quality is needed. The aim of this project is to develop a smart system based on sensors monitoring various parameters to assess the quality of water on a continual basis. Detection of biological contaminants are more challenging and image processing techniques can be used to this end. The option of incorporating such a system in the monitoring system will be explored.

Design of Fruit Sorting Machine using Artificial Intelligence Adviser: Dr. Aamir Rashid/Dr. Usman Masud

Our Citrus and Mango Fruit Industry must work with hundreds of thousands of fruits every season by manually sorting the fruit according to varied sizes and quality. This entire process is currently manual and a very laborious task. In this project we will build a robotic setup (including a conveyor belt and a robotic arm) that will intelligently sort different fruit according to its size and quality. The sorting algorithm will be designed using Neural Networks which will take the image of the fruit and its weight as its input and classify it to one of the predefined categories accurately and in real-time.

Traffic Flow Estimation from Aerial Videos Adviser: Dr. Aamir Rashid/Dr. Usman Masud

Efficient traffic management has become very important with increasing growth of vehicles on roads of all major cities of Pakistan. Currently traffic management is performed by traffic police without any aid from video surveillance. The knowledge of traffic flow rate on various major roads of the city can provide tremendous help in regulating the city traffic more efficiently. The purpose of this project is to estimate the traffic flow from aerial videos using computer vision techniques in real time.

Relative Intensity Noise in semiconductor lasers in multimode setup Adviser: Dr. Usman Masud

In a laser system, multiple reflections emerge because of collision of light at numerous positions. This gives rise to the optical feedback within the system and produces different effects. For instance, the phase of the laser will be drastically hit by this phenomenon. In the setup developed for biomedical purposes, an analysis of Relative Intensity Noise (RIN) would help reveal multiple instabilities within the system, especially occurring within short-time durations. For this, the student needs to get familiar with the existing setup.

Using DDE-BIF tool in semiconductor lasers in multimode setup Adviser: Dr. Usman Masud

In a laser system, multiple reflections emerge because of collision of light at numerous positions. This gives rise to the optical feedback within the system and produces different effects. For instance, the phase of the laser will be drastically hit by this phenomenon. In the setup developed for biomedical purposes, an application of DDE-BIF tool would help reveal multiple instabilities within the system, especially occurring within short-time durations. For this, the student needs to get familiar with the existing setup. Afterwards the tool has to be implemented along with various parameters.

Real-time Vision based implementation of plant disease identification system on FPGA Adviser: Dr. Azhar Ali Zaidi

Plant diseases have turned into a dilemma as it can cause significant reduction in both quality and quantity of agricultural products. To overcome that loss, we implement a computer vision based real time system that can identify the type of crops diseases. Computer vision-based applications are computationally intensive and time consuming, so FPGA based implementation will be used to have the real time identification of plant diseases.

Implementation of a Drone Surveillance System Adviser: Dr. Azhar Ali Zaidi

Drones (Unmanned Aerial Vehicles) has attracted lot of attention and undergone tremendous development in recent years. Due to its low cost and ease of use, it is used in many applications, such as aerial photography, traffic monitoring, disaster monitoring etc. However, the increasing use of drones can be a threat for the public security and privacy. The drones entering the security-sensitive areas should be detected and localized for possible defense against these drones. The surveillance of these drones is a challenging task due to their small size and low speed flight at low altitude. The purpose of this project is to explore different technologies used for drone surveillance and to implement a cost effective surveillance system for drones detection and localization.

An IoT based Smart Health Care Monitoring System Adviser: Dr. Sajjad Hussain

This project aims to develop an Internet of Things based smart health care monitoring system. Smart sensors for human body temperature, heart rate monitor, ECG monitor will collect the medical health data of a patient. The collected data will be uploaded in a cloud-based system. Medical practitioners will be able to retrieve the data to suggest prescriptions or medical advice. The patient will also be able to check his health records via web or mobile application.

An IoT based Smart Water Consumption Monitoring System Adviser: Dr. Sajjad Hussain

This project aims to develop an Internet of Things based smart water consumption monitoring system. Flow monitoring sensors will be used to monitor the water flow through all the taps in a household. The daily consumption of water will be uploaded in a cloud-based system. User will be able to monitor the daily water consumption for each tap in the house through a smart phone application. This system will report any water leakages as well. Based on average daily consumption, the water pump will fill the water tank to save electricity and natural water resources. The system will shut off the valves if a tap is left open for longer than usual.

A Smart Wearable Activity Tracker Adviser: Dr. Sajjad Hussain

This project aims to develop a smart bracelet for activity tracking. The device will use accelerometer and heart rate monitor sensor. Efficient algorithms will be developed to differentiate between different sports activities including walking, running and jogging etc. The device will also monitor the sleep duration of the user. The user will be able to monitor the fitness activities, calories burned and live heart rate on a smart phone application.

2-DOF position control of an Inverted Pendulum (Simulation and Hardware based) Adviser: Dr. Shafiq Haider

The above topic involves position control of cart as well as inverted pendulum. First, simulations for obtaining required results (e.g. time and frequency domain specifications) for position control in Matlab with and without the application of controller will be analyzed. Secondly, same objectives will be applied in hardware for submission.

PLC based Automation of a process (Simulation and Hardware based) Adviser: Dr. Shafiq Haider

An industrial plant of your choice e.g. cement, chemical etc. will be automated and interfaced for monitoring and control to SCADA system. First simulations in ladder logic simulator will be performed and then same results will be obtained in hardware form.

Model order reduction of large scale systems (Research based) Adviser: Dr. Shafiq Haider

When order of system models in so high e.g. in thousands or millions, it becomes very difficult (or even impossible) to perform analysis and design for it due to computational, storage or cost constraints. Therefore, order reduction techniques are devised to closely approximate large systems behavior with manageable low order system.

Vehicle Tracking system Adviser: Engr. Syed Zohaib Hassan Naqvi

A GSM modem transmits data (Longitude & Latitudes) taken from GPS module to server where it will be stored, and information can be retrieved upon request by the end user through android mobile Application. Each module comprises of GPS and GSM modules Interfaced with microcontroller. System is useful for students to track their university Point/bus on their respective routes where as system can also be installed by individual for security (tracking) purpose.

2kW Intelligent Solar System Adviser: Syed Zohaib Hassan Naqvi

In this project, a LabView based intelligent solar system is proposed. The generation, power storage and connected load will be continuously monitored. There will be two modes of operation i.e. automatic and manual. In automatic mode, the programmed load will be

automatically connected to the system according to the generation during day time. In manual mode the suggested load will be displayed according to the generation and the user can connect the suggested load/appliances using a remotecontrol device.

1.1Kv/220VAC/200VDC Solid State Transformer Adviser: Engr. Adil Usman

Solid-state transformer (SST) is a collection of high-powered semiconductor components, conventional high-frequency transformers and control circuitry which is used to provide a high level of flexible control to power distribution networks. Add some communication capability and the entire package is often referred to as a smart transformer. SST technology can step up or step-down AC voltage levels just like that of the traditional transformer, but it also offers several significant advantages. These include: allow two-way power flow input or output AC or DC power actively change power characteristics such as voltage and frequency levels improve power quality (reactive power compensation and harmonic filtering) provide efficient routing of electricity based on communication between utility provider, end user site and other transformers in the network greatly reduce the physical size and weight of individual transformer packages with equivalent power ratings

2kW Uninterruptable Power Supply with High Speed Transfer Switch and Approximated Sine Wave Output Adviser: Engr. Adil Usman

The CBEMA curve defines the time bound for the backup supply within which the load must be connected. In this project 2kW UPS is proposed which will obey these time bounds and having a Power Electronic devices-based switch with transfer time less than 8ms irrespective of load nature. Moreover, this inverter is expected to have Sine Wave as output using cascaded inverters/cycloconverters.

3kW SiC MOSFET Based Inverter Adviser: Engr. Adil Usman

The Power Converter design uses silicon carbide (SiC) devices with a wide bandgap. Wide-bandgap power switches offer higher temperature, higher frequency and higher voltage operation capability with lower losses compared to the currently used silicon-based power switches. Therefore, inverter using SiC Power MOSFET is expected to be an efficient inverter with lower heating issues and smaller on-state losses.

Autopilot Design for a Quad propeller Hovercraft Adviser: Engr. Muhammad Atif Imtiaz

This project includes an autonomous quad copter that can navigate autonomously. It has various practical applications such as last-leg of delivery, crop monitoring, land surveying, search & rescue assistance and military utilization. The Aim of the project is to design and build a UAV quad-copter setup capable of being remotely controlled to fly specific pre-decided missions. The quad-copter configuration has the advantage that it can hover over an area of interest unlike a conventional aircraft that has to constantly move forward. Such missions may incorporate examination of a hard to reach area, quick organization video from the area of an invented ground incident, or surveillance video from a pre-determined route around campus.

Wireless control of a telemetric robotic hand Adviser: Engr. Muhammad Atif Imtiaz

In real life, the robotic is design in such a way that it can helps to assists and entertain in human daily life, for example robotic vacuum is designed for daily household cleaning, robotic pets designed to entertain human within a safety manner, robotic hand or leg designed for

helping disable to back to normal life etc. Robotic also used in medical purpose especially in surgery and physical therapy. This project aims to develop a telemetry based robotic hand, which is wirelessly commanded to a certain gesture by a sensing glove worn by a human.