# Department of Electrical and Electronic Engineering

## Vision

The vision of the Department of Electrical and Electronic Engineering is to reach its educational excellence in full compliance to the international standards of quality assurance.

The Department will produce quality graduates capable of taking the challenges of the rapidly changing field of Electrical and Electronic Engineering as well as capable of making significant contribution to individual and societal empowerment.

## Mission

The mission of the Department is to provide quality education at affordable cost in the areas of Electrical and Electronic Engineering to enhance capabilities of our graduates to favorably compete in the job market and contribute to the economic, scientific, and social development of the country.

The Department maintains a conducive academic environment to promote excellence in learning and research through constructive interaction between students, faculty, industry, and community. The department utilizes all available resources to instill latest technical knowledge and research capabilities, encourage critical thinking, attain problem solving skills, build ethical responsibility and develop verbal and written communication abilities among the students.

## Academic Program

The Department started its journey by offering undergraduate program in Electrical and Electronic Engineering (EEE) in 2004. Currently the Department awards degree in Bachelor of Science in Electrical and Electronic Engineering (EEE) and plans to open M. Sc. (EEE) program. Following a bi-semester system, it requires minimum 8 semesters to complete degree of B. Sc. in Electrical and Electronic Engineering (EEE). The syllabus is approved by the UGC and the program is accredited by the Board of Accreditation for Engineering and Technical Education (BAETE).

## In-take Capacity and Admission

In every academic year, in two semesters- Fall and Spring, the department admits students in

undergraduate program. In Fall 2018 and Spring 2019, a total of 100 students including 21 female students were enrolled in the department. The admission process is competitive and the students are required to appear in written exams to test students in Mathematics, Physics, English and assess aptitudes. Candidates selected in written test are then to face an oral interview to be finally enrolled in the department. The male female ratio of the admitted students is reasonably good considering the engineering program. Currently, the total number of enrolled students in the department is 657 out of which 98 are female students.

## Faculty and Facilities

The Department has a strong body of faculty members who are enthusiastic to deliver knowledge among the students. Out of 31 faculty members, 5 faculty members hold PhD degrees from well-reputed foreign universities in Australia, Japan, USSR and France and 13 faculty members hold M. Sc./M. Engg. degree from well-reputed national and foreign universities. The teacher student ratio is as reasonable as 1:25. The Department offers courses in all three of EEE - Power, Communication, Electronics and Biomedical to meet the demands of the EEE students.

The Department facilities include state-of-the art classrooms and laboratories, which are well equipped with up to date logistic support. The department has 16 well equipped and state of the art laboratories accommodate in 9 rooms. The laboratory facilities serve the purposes of practical demonstration and analytical experiments in the following engineering disciplines: Electrical Circuits, Electrical Machines, Digital Electronics, Digital Signal Processing, Communication, Microprocessor and interfacing, Measurement and instrumentation, Power electronics, Simulation and Computer Programming. There is a separate project lab with state of the art equipment like 3D printer for the research purpose of the faculty members and students.

## Areas of Strength and Best Practices

The main area of strength of the Department is its highly experienced and qualified faculty members who are committed to provide excellence in teaching and learning. Some of the faculty members have teaching experience in foreign universities. Currently, there are three professors in the department, who are specialized in the areas, namely, power, communication and electronics.

As an obligation to produce quality graduates the Department of EEE is adapting and implanting globally accepted Outcome-Based Education (OBE) teaching and learning structure.

As a part of continuous quality improvement, the self-assessment committee of the Department takes initiative to review the curriculum at a regular interval to meet the changing needs and demands of the industry around the world.

The Department introduced the system of moderation of questions for semester final examinations. The moderation of question by moderation board and scrutiny of exam scripts by scrutiny committee in each semester assures the assessment of quality of the students.

Besides taking regular quizzes, some faculty members take sudden quizzes just to check if the students could understand delivered lecture in the class or not. Sometimes open book exam is conducted to test students' comprehension skills. Some teachers use smart digital display make the course lectures more alive and more comprehensible for the students. In some courses presentations are made on emerging topics to the students live examples for practical learning.

To meet the requirements for graduation, every student must complete group project/thesis of 6 credit hours. Each thesis/project group comprises of three final year students. The best practice in the Department regarding thesis/project work is that each group at the end of 4$^{th}$ year 1$^{st}$ semester is required to present their research progress. After the semester final exam of 4$^{th}$ year 2$^{nd}$ semester, the thesis/project groups are required to present their final report on thesis/project and defend them before and Defense Board. The Board is comprised of Professor Emeritus of EEE, internal faculty members of the Department and one external faculty member of the relevant field. To facilitate quality research and to meet necessity expenses involved during the thesis/project work, the Department provides a grant up to Tk.20 thousand to each group.

Connection of the Department with the industry is one of the requirements to adapting Outcome-Based Education. The department arranges industrial attachment training, tours, workshops, seminars are arranged frequently to give hands-on experience and to generate proactive learning.

The department publishes prospectus and curriculum that contains comprehensive information about the Department and its program.

The meritorious and highly ranked students of the class are acknowledged by the department through providing opportunities to be recruited as lecturers and teaching assistants.

## Department Achievements

Accreditation of B.Sc. in EEE program got renewal by the Board of Accreditation for Engineering and Technical Education (BAETE), Bangladesh in 2018. The program is accredited by BAETE since 2014. Thus the graduates from the Department of EEE, UAP can become a member of Institution of Engineers, Bangladesh (IEB). The External Program Review Team (EPRT) constituted by UGC and consisted of local and internal expert on the subject rated the program as "very good".

Opening of the Institute of Electrical and Electronics Engineers (IEEE) UAP student branch and IEEE UAP Women in Engineering (WIE) branch is another milestone of success. IEEE is the world's largest association of technical professionals with more than 423,000 members in over 160 countries around the world. IEEE Women in Engineering (WIE) is one of the largest international professional organizations dedicated to promoting women engineers and scientists and inspiring girls around the world to follow their academic interests to a career in engineering. Currently seventy UAP students have IEEE student membership following one of the largest student branch among private universities in Bangladesh. The student members of this branch are able to acquire different facilities nationally and globally to complement their academic skills.

Since its beginning, the department has been producing quality graduates every year. In Fall 2018, 83 students earned B. Sc. degree in EEE. Numerous graduates from the department are currently doing jobs in government and well-reputed private organizations in Bangladesh. Some of them are doing higher studies in Europe, Australia and North America. Some of the EEE alumni become entrepreneurs who are creating jobs for future EEE alumni.

EEE faculty members are profoundly involved in research and publish their research in quality journals. In July 2018 to June 2019 faculty members have published 10 journal articles and 18 conference papers.

## Seminars, Workshops, and Celebrations

Seminar and workshops have arranged for the students frequently where academician and professional resource persons share their research thoughts and ideas to students. Seminar on 'Principles of Coherent Optical Communication' in association with IEEE UAP Student Branch and IEEE Communication Society Bangladesh Chapter was organized in 2018 where eminent scholar and IEEE Fellow Joseph M. Kahn, Professor at Department of Electrical Engineering, Stanford University, CA, USA was the keynote speaker. Final year students and faculty members participated in the seminar.

Head, EEE is presenting token of appreciation to Professor Joseph M. Khan

### Workshop

In August 2018, Department of EEE arranged a workshop on 'Energy and Power Week 2018' in collaboration with the Ministry of Power, Energy and Mineral Resources (MPEMR). business management The objective of the workshop was to create awareness among the students on the growth and development of Energy and Power Sector.

## Celebration of PES Day 2019

UAP IEEE branch in association with Women in Engineering (WIE) affinity group celebrated IEEE with the theme, "More Power to the future" The activities like "Line Follower Robot Competetion" , quiz competition and idea generation session marked the celebration. IEEE, has celebrated IEEE Power and Energy Society Day 2019. At the event, the respectable speakers expressed their optimism to evolve teams that would pursue interest in robotics and mechatronics through such events. The photographs below provide a collection of snapshots of the activities arranged by IEEE UAP student branch.

The Project Club and IEEE UAP student branch organized Line Follower Robot competition

## Co-curricular and extra-curricular activities

As a part of co-curricular activity, in each semester a group of students participate for industrial visit to enhance practical knowledge about the industry. Last year, students of 4th year 1st semester students took part a day long industrial visit to Mymenshing Combined Cycle Power Station Ltd. The final year students of 22nd and 23rd batch went for week long industrial visit to Karnaphully Hydroelectric Power Station, Kaptai, Bangladesh Submarine Cable Company Ltd, Cox's Bazar and Cox's Bazar 132/11 kV grid substation in December, 2018. The students who study courses on Power System Analysis, Power System Reliability, Power Station Engineering and communication engineering are exposed to Power Generating Plants, Sub-Station maintenance, Switch Gear equipment, High Voltage Transmission and data management to immensely benefit to the students.

Final year Students at Mymenshing Power Station in November, 2018

Final Year Students at Bangladesh Submarine Cable Company Ltd.

Final year Students at Cox's Bazar 132/11 kV grid substation in December, 2018

Pro VC, UAP is presenting Interdepartmental Cricket Champions trophy to EEE Team

The department frequently arranges and participate in intra departmental and interdepartmental extra-curricular activities. There are different clubs in the department, each of which is fully functional through a working body consisting of a faculty advisor, president, vice president and student members. The department of EEE became "Champion" by defeating Civil Engineering department in interdepartmental football competition held in July last year. Honorable Vice-Chancellor, UAP has presented Champions trophy among EEE Champions. Later in this year in interdepartmental cricket competition the department received victory against English department and awarded the champion trophy on 15 January, 2019. Pro Vice Chancellor, UAP handed over Cham trophy to the students of EEE.

Vice-Chancellor, UAP is presenting Interdepartmental Football Champions trophy to EEE Team

In each semester the Cultural Club and the students from 2nd year 1st semester jointly organized a film festival for fresher's students. 4th year 1st semester students and cultural club jointly organized farewell program followed by cultural program for the outgoing students of 4th year 2nd semester. A picnic is organized during winter season in Fall semester for the students and the faculty members for recreation purpose. The students get to select a venue of their choice where they enjoy the sight of the landscape, arranges different competitions and events like raffle draw.

## Faculty Members

**Dr Tapan Kumar Chakraborty**
Professor & Head
Ph. D., Kanazawa University, Japan

**Dr Kazi Mohiuddin Ahmed**
Professor
Ph. D., Newcastle, Australia

**Dr Enamul Basher**
Professor
Ph. D., Leningrad Polytechnic Institute, Russia

**G. R. Ahmed Jamal**
Associate Professor,
M. Sc. (EEE), BUET

**A.H.M. Zadidul Karim**
Associate Professor,
M. Sc. (EEE), BUET

**Salma Nazia Rahman**
Assistant Professor,
M. Sc. (EEE), BUET

**Muhammad Towhidur Rahman**
Assistant Professor,
M. S. (Biomedical), Dhaka University

**M. Abdullah Al Amin**
Assistant Professor
B. Sc. (EEE), AUST

**Dr Tasnia Hossain**
Assistant Professor
Ph. D., University of Nice SA, France

**Sazzadur Rahman**
Assistant Professor
B. Sc. (EEE), BUET

**Masum Howlader**
Assistant Professor,
M. Sc., KTH, Sweden & KIT, Germany

**Muhammad Ahad Rahman Miah**
Assistant Professor
M. Engg. (Energy), AIT, Thailand

**Md. Moshiur Rahman**
Assistant Professor
M. Sc. (EEE), IUT

**Manobendu Sarker**
Assistant Professor
M. Sc. (EEE), BUET

**Shaikh Rashedur Rahman**
Assistant Professor
M. Sc. (EEE), IUT

**Khandaker Sultan Mahmood**
Assistant Professor
B. Sc., (EEE), IUT

**Tanima Tasmin Chowdhury**
Assistant Professor
M. Sc., (EEE), BUET

**Mirza Mursalin Iqbal**
Assistant Professor
M.Sc. (Power Engineering), Technical University of Munich, Germany

**Md. Ibrahim Ibne Alam**
Assistant Professor
M. Sc. (EEE), BUET

**Dr Tishna Sabrina**
Assistant Professor
Ph. D., Monash University, Australia

**Md. Khairul Alam**
Lecturer
B. Sc., (EEE), UAP

**Md. Abdullah Al Mahmud**
Lecturer
B. Sc., (EEE), UAP

**Sakhawat Hossen Rakib**
Lecturer
B. Sc., (EEE), UAP

**Kazi Mahtab Kadir**
Lecturer
M. Engg. (Elec.), University of Houston, USA

**Farhana Akter Mou**
Lecturer
B. Sc., (EEE), UAP

**Md. Abdullah-Al-Kaiser**
Lecturer
B. Sc., (EEE), BUET

**Shahnewaz Ahmed**
Lecturer
B. Sc., (EEE), BUET

**A.N.M. Nafiz Abeer**
Lecturer
B. Sc., (EEE), BUET

**Shoaib Mahmud**
Lecturer
B. Sc., (EEE), BUET

**Md. Faizul Bari**
Lecturer
B. Sc., (EEE), BUET

**Munmun Akter**
Lecturer (Ad-hoc)
B. Sc., (EEE), UAP

## Adjunct Faculty

**Dr Nikhil Ranjan Dhar**
Professor, IPE, BUET

**Dr Md. Ehsan**
Professor, ME, BUET

**Dr Aloke Kumar Mozumder**
Professor, ME, BUET

**Dr Md. Nasim Hasan**
Associate Professor, ME, BUET

**B.D. Rahmatullah**
Consultant, UNDP
Ex- DG, Power Cell, Bangladesh

**Dr Ferdous Sarwar**
Professor, BUET

## Awards received by Faculty Members

**Masum Howlader, Moshiur Rahman, and Ibrahim Ibne Alam – Assistant Professors and Khairul Alam,** Lecturer of the Department became "Champion" in a national competition in 'Power and Energy Hackathon 2018' organized by the Ministry of Power, Energy and Mineral resources held on 6-7 September, in Dhaka, Bangladesh. The Department was also awarded as "Champion" in 'Power and Energy Hackathon 2017' organized by the Ministry of Power, Energy and Mineral resources, Bangladesh in 2017.

## Research Fund Received

On February 2, 2019, the Department has received a 'Prototype Development and Commercialization Fund' for a project on**,** 'Cost effective - Real Time Data Logger', jointly from the Government Ministry of Power, Energy and Mineral Resources (MPEMR) and ESAB Innovation Center (EIC). The objective of the project is to develop a prototype device and verify its commercial viability. It is a very low-cost real-time data logger for solar system which stores important parameters of the solar photovoltaic system such as voltage, current, battery voltage, energy received from the panel as well less provided to load in SD card. It also uploads the data to the cloud and the user can monitor the data from mobile apps. The main purpose of the Real Time Data Logger is to measure real time electrical energy consumption in both residential and commercial loads. The data logger invented is much cheaper than what is available in the market --- the market ones cost around Tk 15,000 whereas the invented data logger will cost only 2,000 Tk. This data logger will help to achieve energy conservation from the user side. By implementing this, energy consumption from user side will be controlled and less so both user and supplier will be benefited.

## Research conducted

**Sakhawat Hossen Rakib,** Lecturer, EEE conducted research on "Development of Low Cost $SpO_2$ (peripheral capillary oxygen saturation) Meter to Monitor Oxygen saturation in Blood from Fingertip to Minimize Neonatal Deaths Due to Critical Congenital Heart Disease (CCHD)" as its Principal Investigator, funded by IEERD UAP, during May 2018- February 2019.

## Faculty Capacity Development Initiatives

**Kazi Mahtab Kadir, A.N.M. Nafiz Abeer, and Shoaib Mahmud** – three newly joined Lecturers participated in training on "Improving Learning & Teaching Skills (ILTS)" organized by UAP.

## Workshops and Short course attended

**Shaikh Rashedur Rahman,** Assistant Professor, EEE attended a day long workshop on "Switchgear & Power Protection and Power System Laboratory" organized by BATTCO Engineering, on 30 June, 2019.

**Md. Khairul Alam**, Lecturer, EEE attended a short course on "PLC Applications: Present State-of-the-Art" organized by Islamic University of Technology (IUT), from 26 - 29 November, 2018.

## Professional Services given to the Field

### Professor Dr Kazi Mohiuddin Ahmed

**External Examiner,** PhD Thesis, School of Engineering, University of Melbourne, Australia from 2013 to date.

### G. R. Ahmed Jamal, Associate Professor

**Quality Assurance Expert,** HEQEP, UGC from 2018 to date.

**Expert Member**, External Peer Review Team, Computer Science and Engineering Program, East West University, Dhaka, 3-5 July 2018.

**Trainer**, in workshops on preparation of OBE curriculum of:

a. Department of Law, Eastern University, Dhanmondi, Dhaka, 14-16 February, 2019.

b. Department of Electrical and Electronic Engineering, Eastern University, Dhanmondi, Dhaka, 23-25 January, 2019.

c. Department of Electrical and Electronic Engineering, Bangladesh University of Business and Technology (BUBT), Mirpur, Dhaka, 23 December 2018.

d. Department of Electrical and Electronic Engineering, Metropolitan University, Sylhet, November 1, 2018.

## Department Goals for the Next Year

The Department shall start offering M.Sc. in EEE program and establish High Voltage Engineering Laboratory and Advanced Research Laboratory as part of improving research and testing facilities.

## Publications of Faculty Members



### A. Peer-reviewed Journal Papers

Aravind, C. V., Subramaniam, U., **Khan**, M. S. A. & Alam, M. I. I. (2018). Options and Opportunities for Energy Management in Malaysian Grid Systems—Putrajaya as a Case Study. *Journal of Electronic Science and Technology*, 16(4), 316-324.

**Azim**, A. (2018). Real time Implementation of Remote Rover Training System. *International Journal of Computer Networks & Communications Security,* 6 (10), 219-22.

**Azim**, A. (2019). Low Precision Arithmetic Operations in Deep Neural Network: An Overview., *The International Journal of Engineering and Science,* 8 (4), 39-44.

Hasan, M., & **Ahmed**, J. G. R. (2019). Effect of Dust on Output Power of Conventional Solar Panels in Bangladesh. *Asian Journal for Convergence in Technology,* V (I), 798.

Foysal, M., & **Ahmed**, J. G. R. (2019). Empirical Ratio of Higher Optical Transitions in Semiconducting SWCNTs. *Asian Journal for Convergence in Technology*, V (I), 770.

**Khan**, M. S. A., **Rahman,** M. M., Sarker, M., Rokonuzzaman, M. & Aravind C. V. (2018). Performance evaluation of duobinary single mode fibre using wavelength division multiplexing. *Journal of Engineering Science and Technology*, special issue, 94-105.

**Khan**, M. S. A., Akter, M., Howlader, M., **Rahman,** M. M., Mou, F. A. & Aravind, C. V. (2018). Simulation analysis of intensity modulation for high speed N×40Gb/S transmission over standard single mode fibre using wavelength division multiplexing. *Journal of Engineering Science and Technology*, special issue, 133-144.

**Khan**, M. S. A., **Kadir,** K. M., Alam, M. I. I., Alam, M. K., Wong, J., Iqbal, A., Iqbal, A. (2018). Implementation of Efficient B2G and V2G in Practical Cases. *Journal of Electronic Science and Technology*, 16(4), 325–340. DOI: 10.11989/JEST.1674-862X.80715105.

**Khan**, M. S. A., Miah, M. A. R., Rahman, S. R., Iqbal, M. M., Aravind, C. V. & Iqbal, A. (2018). A technical analysis of security management in terms of crowd energy and smart living. *Journal of Electronic Science and Technology*, 16 (4), 367-378. **DOI:** 10.11989/JEST.1674-862X.

Rahman, S. N., Bashar, S. S., Mahmud, M. A. A., Miah, M. S., **Karim**, A. H. M. & Marium, M. (2019). A Security System for Kindergarten School Using RFID Technology. *Journal of Computer and Communications*, 7(4), 21-30.

### A. Conference Papers

Anan, A., Alam, M. & **Chakraborty**, T. K. (2019). Study of Single-Phase Hybrid Multilevel Inverter for Obtaining 13-Level output Voltage Using Three H-Bridge Units. *Proceedings of the 4th IEEE International Conference on Electrical Energy Systems( ICEES 2019)*, 21-22 February 2019, Chennai, India.

Anan, A., **Chakraborty**, T. K**.** & Mahmood, K. S. (2018). A Single-Phase Cascaded H-Bridge Multilevel Inverter with Reduced Switching Devices and Harmonics. *Proceedings of the 6th IEEE International Conference on Smart Energy Grid Engineering* (pp. 222-225). Canada: IEEE, Ontario Institute of Technology. **DOI:** 10.1109/SEGE.2018.8499512.

Bashar, S., Mahmud, M., Miah, M. S., **Karim**, A.H.M.Z. & Hasan, Z. (2019). A Machine Learning Approach for Heart Rate Estimation from PPG Signal using Random Forest Regression Algorithm. *Proceedings of the International Conference on Electrical, Computer and Communication Engineering* (pp. 1-5). Bangladesh: IEEE. DOI: 10.1109/ECACE.2019.8679356.

Bashar, S., Miah, M. S., **Karim**, A. H. M. Z., Mahmud, M. & Hasan, Z (2019). Extraction of Heart Rate from PPG Signal: A Machine Learning Approach using Decision Tree Regression Algorithm. *8th IEEE International Conference on Informatics, Electronics & Vision & 3rd International Conference on Imaging, Vision & Pattern Recognition*, 30 May – 2 June 2019, Eastern Washington University, Washington, USA.

**Chakraborty**, T. K., Anan, A., Rakib, S. H., Prodhan, M. I., Kamal, M. M. & Mahabubunnabi, M. (2018). Generation of 13-Level Output Voltage from Single-Phase Multilevel Inverter Consisting of Cascaded Three H-Bridge Units. *Proceedings of the 2nd IEEE International conference on power Electronics, Intelligent Control and Energy systems* (pp. 479-482). India: Delhi Technological University.

**Chakraborty**, T. K., Anan, A. & Rakib, S. H. (2018). Experimental Investigation on Single-Phase Multilevel Inverter for Generating 21-Level Output Voltage Using Four H-Bridge Units. *Proceedings of the 4th IEEE Southern power Electronics Conference* (pp. 648-651). Singapore: Nanyang Technological University.

**Khan**, M. S. A., Kadir, K. M., Hasan, M. R., Ahmed, K. R., Raqibul, M. & Mohammad, N. (2018). Investigation of Advanced Implementation of Permanent Magnet Synchronous Generator in Renewable Energy. *Proceedings of the 2018 IEEE 7th International Conference on Power and Energy* (pp. 349–354). Malaysia: IEEE. DOI: 10.1109/PECON.2018.8684116.

Khan, M. M. A., **Mahmood**, K. S. & **Rahman**, M. M. (2018). Differential Quadrature Phase Shift Keying Modulation in Optical Fibre- Modelling, Design, Case Implementation and Limitation. *4th IEEE International Conference on Advances on Computing, Communication and Automation*, 26-28 October, Taylor's University, Malaysia.

Munmun, A., **Khan**, M. S. A., Mahmood, K. S., Amin, M. A. A. & Alam, M. K. (2018). An Advanced Technical and Parametrical Comparison of Satellites in Asia Region with Uplink EIRP (dB) Vs. Transmitting Antenna configuration. *4th IEEE International Conference on Advances on Computing, Communication and Automation*, 26-28 October, Taylor's University, Malaysia.

**Rahman**, M. M., **Mou**, F. A., Bhuiyan, M. I. H., & Islam, M. R.(2019). Extremely low effective Material loss of air core photonic crystal fiber for THz guidance. *IEEE region 10 symposium (TENSYMP)*, 7-9 June 2019, Kolkata, India.

**Rahman**, M. M., **Khan**, M. S. A., Hossain, R., Raihan, S. & Sarker, M. (2018). Simulation analysis of EDFA in optical fiber with WDM system in the perspective of Bangladesh. *IEEE International RF and Microwave Conference*, 17-19 December, IEEE, Malaysia.

**Rahman**, M. S., Akter, M., Miah, S. & Hossain, T (2018). Influence of the Compositional Variation of $Zn_xCd_{1-x}S$ ($0 \leq x \leq 0.45$) Buffer on the Performance of $Cu_2ZnSnSe_4$ Solar Cell: Simulation based Study. *15th IEEE India Council International Conference*, 16-18 December 2018, Amrita Vishwa Vidyapeetham, Combatore, Chennai, India.

**Rahman**, M. S., Islam, M. M. A., Kanon, A. A., Sarker, H. & Moniruzzaman, M. (2018). Performance Evaluation of Sn-based Perovskite (CH3NH3SnI3) Solar Cells with All Inorganic Oxide Transport Materials: Simulation based Study. *International Conference on Material Science and Semiconductor Devices,* 30-31 December 2018, Dhaka University, Bangladesh.

**Rahman**, M. S. & Ahmed, N. (2018). Impact of Gate Underlap Design on Analog and RF Performance for 20nm Tri-Material Double Gate (TMDG) MOSFET. *IEEE Region 10 Annual International Conference*, 28-31 October 2018, Korea.

**Rahman**, M. S., Miah, S., Marma, M. S. W. & Sabrina, T. (2019). Simulation based Investigation of Inverted Planar Perovskite Solar Cell with All Metal Oxide Inorganic Transport Layers. *International Conference on Electrical, Computer and Communication Engineering*, 07-09 February 2019, Cox's Bazar, Bangladesh.