

IEEE RUET Student Branch Presents

# INSPIRA



RUET, Talaimary, Rajshahi-6204, Bangladesh



# জাতীয় বিজ্ঞান ও প্রযুক্তি জাদুঘর

আগরগাঁও, শেরেবাংলা নগর, ঢাকা - ১২০৭



## জাদুঘরের গ্যালারি পরিদর্শনের সময়সূচি

রোববার থেকে বুধবার

(সকাল ৯.০০ টা থেকে বিকেল ৫.০০ টা)

শুক্রবার (দুপুর ২.৩০ টা থেকে সন্ধে ৭.০০ টা)

শনিবার (সকাল ৯.০০ টা থেকে সন্ধে ৬.০০ টা)

বৃহস্পতিবার সামগ্রিক বন্ধ

- ★ জাদুঘরে রয়েছে শিক্ষার্থীদের জন্য বিজ্ঞান শিক্ষার অনেক প্রদর্শনীবস্তু এবং আধুনিক লাইব্রেরী
- ★ শক্তিশালী টেলিস্কোপের সাহায্যে মহাকাশের নক্ষত্র, গ্রহ ও উপগ্রহ দেখা যাবে
- ★ আরও রয়েছে আধুনিক প্রযুক্তি সমৃদ্ধ মিউজিয়াম বাস ও 4D মুভিবাস

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জাতীয় বিজ্ঞান ও প্রযুক্তি জাদুঘর

বিজ্ঞান ও প্রযুক্তি মন্ত্রণালয়

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IEEE RUET Student Branch Presents

# INSPIRA 2021

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**Prof. Dr. Md. Rafiqul Islam Sheikh**

Vice-Chancellor

Rajshahi University of Engineering & Technology

Rajshahi-6204, Bangladesh

## Message

It gives me immense pleasure to perceive that IEEE RUET Student Branch is going to publish the magazine "Inspira" this year. I wish it will be a successful and adequate publication to all the readers and well-wishers.

IEEE has become the world's largest technical professional organization having members in more than 160 countries. As being a local student branch, IEEE RUET Student Branch becomes one of the most active and vibrant student branches in Bangladesh. Through this magazine, "Inspira", they will be able to represent many articles regarding the IEEE and IEEE RUET Student Branch showing the latest advancement in science & technology of the world which is commendable.

I like to express my gratitude to all the faculty members and professionals who provide articles to make this publication a successful one. I also thank the sponsors and appreciate the dedication of the volunteers to publish the magazine on time.

I hope IEEE RUET Student Branch will continue their good works in future.



Prof. Dr. Md. Rafiqul Islam Sheikh

Professor, Dept. of EEE, RUET

Deepak Mathur

Director - Elect 2019-2020  
IEEE Region 10 (Asia Pacific)



**Muhammad Munir Chowdhury**  
Director General  
National Museum of Science and Technology  
Agargaon, Sher-e-Bangla Nagar, Dhaka 1207.

## Message

It's my great pleasure to know that IEEE RUET Student Branch is publishing their magazine "Inspira" this year. The magazine will represent articles showing the recent scientific & technological innovation in the modern world.

Since inception, the main objective of IEEE has been the educational and technical advancement of engineering and technology for the betterment of society. IEEE RUET Student Branch has been one of the most active student branches in Bangladesh section upon its establishment with its innovative and fruitful activities.

The National Museum of Science and Technology has been serving as the country's only science museum and continuing it's efforts to enhance science practices and establishing model science clubs across the country. This organization is dedicated and committed in achieving the government's annual performance agreement targets. The activities of this organization include mobile and permanent science exhibitions, educational activities, seminars, science lectures and publications and specially quiz competitions, science olympiad which have gained immense popularity over the country . Apart from this, these programs are going on in the doorsteps of the students through 10 modern movies and observatory buses in full swing.

I hope the activity of IEEE RUET SB will get more dynamic shape with passage of time so that they can offer multidimensional seminars, courses, workshops to enrich the country by technological innovation.

I would like to convey my gratitude to all contributors for sharing their knowledge and expertise for publication of the magazine. Moreover, tireless efforts of the volunteers of the IEEE RUET Student Branch deserves appreciation to publish such a resourceful magazine. My heartiest thanks to everyone to make this publication as a potential source of scientific knowledge.



Muhammad Munir Chowdhury



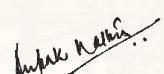
## Message

It gives me immense pleasure to express my appreciation for the IEEE RUET Student Branch for bringing publication of magazine "*Inspira*". As we are passing through unprecedented challenge posed by the pandemic worldwide, the volunteers of IEEE RUET Student Branch has taken this great initiative to connect its members, which is remarkable. I would like congratulate each one associated with this magazine. I am sure *Inspira* will effectively connect members and will provide an opportunity of showcasing their work and ideas.

I believe that IEEE RUET Student Branch will also share the magazine with other sections/student branches so that it reaches to larger audience and they will also know the best practices of the IEEE RUET Student Branch and about its members' creativity.

I am sure that IEEE RUET Student Branch will continue to excel.

I wish IEEE RUET Student Branch great success in all endeavours!



Deepak Mathur



IEEE RUET Student Branch

**Dr. Md. Samiul Habib**

Counselor, IEEE RUET Student Branch

## Message

I'm pleased to know that IEEE RUET Student Branch is going to publish a magazine "Inspira" this year. As a branch counselor of that branch, I have some aspirations, which are inspired by all the bright and enlightening young IEEE student members of our branch.

Over the years, IEEE has become a real facilitator for the educational and technical advancement of Electrical and Electronic engineering, telecommunications, computer engineering amongst all the scientific and technical societies, which are working for the betterment of the mankind. RUET, as an Engineering Institute, would also like to play a prominent role in this process. RUET is a keen activity organizer in the areas related to technology and professional growth along with the plethora of resources provided by IEEE will help us to keep the pace towards excellence and wider reach.

To make the IEEE RUET student branch a successful branch, we need a kind and collaborative support from everyone involved with it. I think their active and meaningful participation in branch activities is a way to do this. I hope through Inspira, IEEE RUET SB will be able to showcase the latest scientific & technological advancements around the world.

I would also like to invite you to extend your support and join us in the activities related to IEEE at our Student Branch.

Dr. Md. Samiul Habib  
Associate Professor, Dept. of EEE, RUET



IEEE RUET Student Branch

**Khalilur Rahman**

Chair, IEEE RUET Student Branch

## Message

It's my great honor and privilege to announce that IEEE RUET Student Branch is publishing the magazine "Inspira" this year. Surely, it will be another feather in the branch's cap.

Being one of the most prominent student branches in the IEEE Bangladesh Section, IEEE RUET Student Branch always focuses on the development of skills and make students prepared for professional life.

We always prefer quality over quantity. Even during this pandemic, we are continuing our activities through webinars. I cordially thanked all the writers, sponsors, and volunteers who worked hard to publish the magazine on time.

I hope the branch's activity keeps getting better with the help of our respected faculty members and beloved seniors. I request you all to continue your encouragement, as you did before to make this branch one of the finest Student Branch.

Khalilur Rahman  
Final year undergraduate student  
Dept. of EEE, RUET

# Preface

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IEEE RUET Student Branch works largely by promoting IEEE (Institute of Electrical and Electronics Engineers) among RUET students and helping them receive maximum benefits of it. In this regard, IEEE RUET Student Branch is publishing the magazine, "INSPIRA-2021" where some significant contents are IEEE RUET Student Branch activities, latest research articles, innovation of ventilator for COVID-19 patients by RUET and light of hope for COVID-19 health workers.

This publication would not be possible without the help of our respected teachers and sponsor – the authority of 'National Museum of Science and Technology'. A huge appreciation goes to them.

The members of the executive committee of IEEE RUET Student Branch put forth a concerted efforts into publishing it. Thanks to all the faculty members, sponsor, executive committee members and volunteers involved in this publication making it successful one. We hope readers will find this magazine effective since they can learn more about IEEE RUET Student Branch activities and the latest advancement of science & technology from the magazine.

*Shohanur Rahman*

Shohanur Rahman  
Editor, INSPIRA-2021  
Former Chair, IEEE RUET SB

# RAJSHAHİ UNIVERSITY OF ENGINEERING & TECHNOLOGY RAJSHAHİ-6204, BANGLADESH



Rajshahi University of Engineering & Technology commonly referred to as RUET is one of the prestigious public engineering universities in Bangladesh, located in the northern part of Bangladesh, in the city of Rajshahi. It is one of the leading PHD granting public research universities in Bangladesh.

It was established in 1964 as Rajshahi Engineering College and started its journey as Rajshahi University of Engineering & Technology in 2003.

The Vice Chancellor of the university is Prof. Dr. Md. Rafiqul Islam Sheikh.

The motto of Rajshahi University of Engineering & Technology is "Heaven's light is our guide".

The RUET campus has been described as representing a "spectacular harmony of architecture and natural beauty". This beautiful campus occupies 152 acres of land.

RUET was the second engineering college established in the then East Pakistan. To meet the rising demand of professional engineers in the then East Pakistan, the then Government of Pakistan established Rajshahi Engineering College as a faculty of engineering under University of Rajshahi. With only three departments: Mechanical Engineering, Electrical & Electronic Engineering and Civil Engineering, the journey of Rajshahi Engineering College started which then offered only bachelor's degree programs.

The journey of Rajshahi Engineering College began with only 120 students . It accepted its first class of 120 students in the academic session of 1964/65 and the second class of like number in the academic session of 1965/66. The teaching faculty consisted of 19 faculty members at that time.

In 1971, after the independence of Bangladesh, the administration of the college was controlled by the Ministry of Education of Bangladesh and academic curriculum was controlled by University of Rajshahi. In 1986, Rajshahi Engineering College was converted into an institute and it was named Bangladesh Institute of Technology [BIT].

In September, 2003, the institute was converted to university to enhance the technical education and research, named Rajshahi University of Engineering & Technology [RUET]. From then the university is financed by the University Grants Commission of Bangladesh.

About 5954 students are pursuing their higher study in this green campus including under-graduate and post-graduate with over 250 prominent faculty members in diverse field of expertise. The medium of instruction and necessary assessment of this university is English. Total 254 academic staffs and 389 administrative staffs are working in this campus. There are 5226 undergraduate students, 553 post-graduates, 176 doctoral students.

RUET campus provides residential facilities to its students. There are about 6 student dormitories for male students and only one student dormitory for female students. The female students are quite rising in number and that's why another dormitory for female students are being planned to be built. The dormitories are mostly in the name of heroes and leaders. The female dormitory is named Deshrono Sheikh Hasina Hall.

RUET has currently eighteen departments under four faculties: Faculty of Mechanical Engineering, Faculty of Civil Engineering, Faculty of Electrical and Computer Engineering, Faculty of Applied Science and Humanities. The university has taken to plan open more departments which is under process.



The laboratory facilities in RUET for the older departments are quite enough not only for their academic research but also for their consultancy services. But the new departments are not fully equipped with laboratory facilities. But steps are being taken to establish new laboratories for new departments and enhance the older ones.



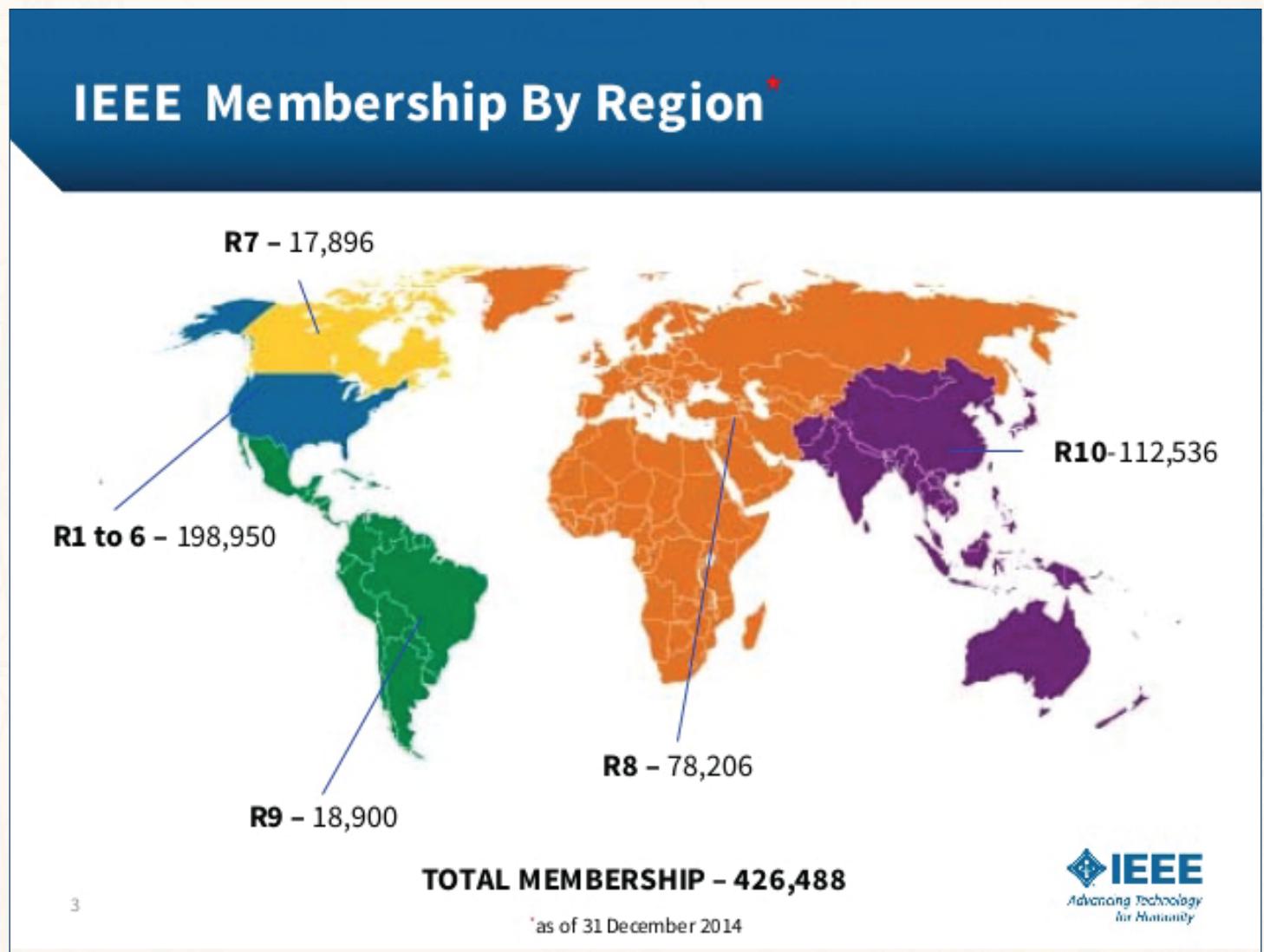
To improve extra curricular and curricular activities, students are involved in different organizations and clubs. These organizations and clubs organize different national programs in RUET campus. They also organize different competition and also participate in many programs and show their impressive performance. RUET won the IEEE Photonics GSF Award, USA in October 2009 and the Marubun Research Promotion Award, Japan in March 2009. Executive Committee of National Economic Council [ECNEC], to implement a mega project for RUET, in February, 2017, has approved 3.40 billion Taka, aiming to well decorate and development the whole campus and its education and research. The project was approved in the name of "Further Development Project of RUET".



**IEEE, Institute of Electrical and Electronics Engineers**, the world's largest professional organization drives to advance technology for humanity with more than **419,000** members in over **160** countries around the globe. It connects members with the biggest prestigious global community through publications, conferences, technology standards and professional and educational activities. It is a non-profit association which ignites its associates with new vistas of knowledge in this rapidly changing world. Actually, IEEE is more than just an organization. From a user's perspective, it is a tool for professionals, a social network and a source of knowledge. From the contributor's perspective, it is a collaborative platform made by engineers, professors and students that all started back in 1963 with a merging of two institutes; **IRE /Institute of Radio engineers** and **AIEE [American Institute of Electrical Engineers]**. In the 1840s, electricity had become a key impact and telegraph, the electrical industry was established. These connected the world with a data communication system. From there IEEE's root was introduced. The mission and vision of IEEE for the future are simple yet profound. The mission is to foster technological innovation and excellence for the benefit of humanity. The core ideal of IEEE is to be recognized for the contribution in technology and improve the global condition of technical professionals. To accomplish the mission and realize the vision, IEEE focuses on the work around several core values and these are trust, growth & nurturing, global community building, partnership, service to humanity and integrity in action. IEEE has 39 societies and 7 technical councils and **10 regions** supporting the worldwide technology community. It works with professionals' side by side students to develop their career in the EEE industry. For this reason, Student branches are an important part of local sections. The student groups are dedicated to bring up activities related to engineering and technological innovation. There are more than **3422** student branches in over 100 countries where **124,000** student members are involved. Besides student branches, local sections may include affinity groups, these are non-technical units dedicated to support and coordinate special purpose initiatives. Technical units are called chapters made up of members of one or more societies which are of common interest or objectives. There are more than **1834** chapters in operation. Either affinity groups or chapters can be developed within these groups of student branches. Each year it publishes over 200 publications and holds more than 1900 conferences. Digital library of IEEE, IEEE XPLOR makes online research more efficient. It houses more than 4 million scientific documents. It's an easily used platform for both researchers and practising engineers to get the very best technical papers. It is the most comprehensive and up to date source for IEEE content. It provides value added tools to work the research results and retrieves quality contents without the noise.

Members can easily access the world's most cited journals, enriched contents and multiple search options. Working closely with industry, it has developed 1300 internationally recognized standards and projects. In total, IEEE is one of the largest knowledge generators for technology professionals across government, academia and businesses.

The members of IEEE can stay current with the fast-changing world of technology. IEEE spectrum magazine is a platform where the members can explore new technologies and observe trends in engineering technology. IEEE.tv is an internet-based television broadcasting network and a special interest programme in technology and engineering. Discount on products, publications and conferences are offered to the fellow IEEE member. IEEE MemberNet is a networking tool that is employed to find members who are linked with common affinity and interest. IEEE also gives Opportunities to win prestigious certified awards and access to career resources. To enable and empower careers in technology, IEEE gives exclusive access to tools and employment resources. IEEE purposes to serve professionals involved in all aspects of the electrical, electronic, and computing fields and related areas of science and technology. It is operated by the volunteers and engineering sectors who give their best to contribute to technological progress for the benefit of mankind and society. It estimates and adapts new structures to provide values, opportunities and products to its members.



## IEEE Region 10

A Region is an enclosure that is widely divided by bodily features, human impact features, and the interaction of humanity and the ecosystem. IEEE has been split up into 10 geographical units called 'Regions'. The United States of America has been divided into Region 1 to Region 6. Canada falls under Region 7. Europe, Middle East, and Africa have been categorized into Region 8. Again, Region 9 consists of only Latin America. On the other hand, **Asia and the Pacific** have been placed as **Region 10**. The main objective of the Region is to support the worldwide technology community to enhance the quality of living for humanity. As IEEE is the world's largest technical organization so the needs of its members are met swiftly after proper divisions which are known as Regions. Membership recruitment, retention strategies, and implementation are better carried out consequently. The volunteers are always informed, and their activities coordinated so that their respective regions remain most vibrant and active among 10 geographical regions in IEEE.

The geographic units of IEEE [Sections, Chapters, Affinity Groups, and Student Branches] prepare distinctive opportunities for members to participate in presentations and leadership conveniences so that they can make a positive reputation in IEEE members' jobs and careers.

Region 10 has the most extensive number of members compared to the other regions. It is usually referred to as the Asia Pacific Region. It is the unique Region in IEEE showing steady growth in membership and counts more than **135,000** members by the end of 2019, the number is almost **32%** of the entire membership of IEEE. A total of 58 Sections and 6 Councils alone are in Asia and Pacific along with

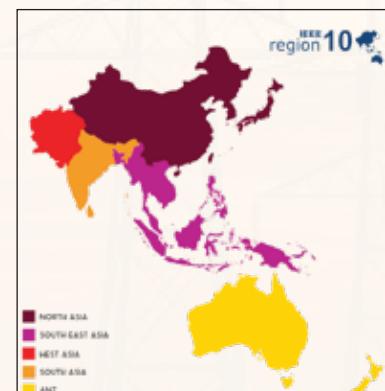
- > 35 Subsections
- > 44 WIE Affinity Groups
- > 46 YP Affinity Groups
- > 14 Life Members Affinity Groups
- > 697 Chapters, and
- > 1600 Student Branches

There is a total of 5 IEEE facilities under Region 10 which are in Singapore, Beijing, Bangalore, Tokyo, and Shenzhen to assist IEEE members in all ways possible. The organizational units collaborate to deliver better services and value to their members.

The IEEE Asia-Pacific office's main objective is to serve the members in the Region 10 by assisting its Committees and Director's in their activities. Operations are:

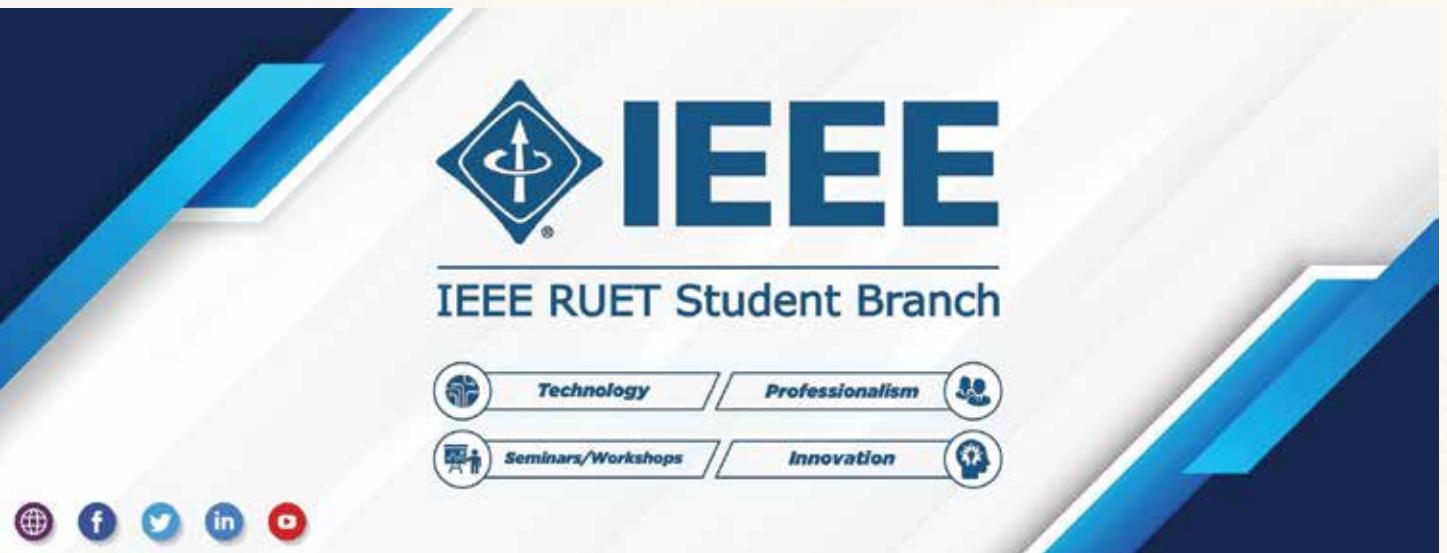
The office encourages the Director and Committee members to plan, organize and coordinate the meeting of Region 10. The office assists the Region 10 Coordinators in advancing IEEE membership and their activities.

The office encourages the formation of new IEEE organizational units. The office collects and reports responses from volunteers and members on IEEE procedures, benefits, and services for the region. The office endeavors to work with Societies to promote the IEEE, society memberships and technical activities in the region.



**But why should one join IEEE? Or how's it helpful for an undergraduate student or a professional?** Here are some potential benefits that you would like to look upon:

1. The opportunity to volunteer for a large variety of programs can build vast experience, technical and leadership skills, and a passion for hard work.
2. Access to a wide range of local and international specialized councils and societies.
3. Being a part of the vast network of IEEE members from all over the world.
4. Priority access or discount to national and international conferences or seminars around the world.
5. **IEEE SPECTRUM Magazine:** Every IEEE member gets a digital copy of this award-winning monthly magazine, focusing on the latest inventions and applying the newest technologies each month through e-mail.
6. **IEEE Potentials Magazine:** Another IEEE published a magazine that provides news and articles on most modern scientific research and business and career-related matters.
7. **IEEE Xplore Digital Library:** Delivering full-text access to the world's highest quality technical literature in engineering and technology.
8. **IEEE tv:** An online television network telecasts various technical and technological reviews and tutorials.
9. **IEEE E-mail Alias:** A unique feature only for the IEEE members that will give each of the members a very own e-mail id of the ieee.org domain.
10. **IEEE ResumeLab:** An online portal service that allows an IEEE member to develop a resume or curriculum vitae (cv) using a wide array of templates and standard samples. Members can also perform mock interviews with a big bunch of potential interview questions.
11. **IEEE Collaboratec:** Allows members to collaborate online with technical experts all over the world.
12. **IEEE Job Site:** Allow members to find out their dream jobs worldwide.
13. **Scholarships and Awards:** IEEE provides many scholarship programs and awards to its student members for their worthy innovations or research works.
14. **AskIEEE:** A service that allows access to documents from thousands of publishers around the world. And there are too many more to mention.



IEEE is the world's largest nonprofit technical organization which is formed with a goal to improve humanity with the resources of electrical and electronic industries. IEEE works with graduates and students where students are specially benefited as they can develop themselves by introducing new methods or ideas and standardizing the electrical and electronic industries. So, it is obligatory to inspire future generation to be a part of this organization. On this purpose Student Branches are formed where students can learn from graduates and work with them. And work for human development with the advancement of technology.

For the better outreach of IEEE, it has been split up into 10 geographical units referred as Regions. And IEEE RUET SB is under the IEEE Bangladesh Section which is in the Region 10. This region was formed on 1st January 1967. Region 10 has the most extensive number of members compared to the other regions. It is usually referred to as the Asia Pacific Region. It is the unique Region in IEEE showing steady growth in membership and counts more than 135,000 members by the end of 2019, the number is almost 32% of the entire membership of IEEE. IEEE RUET SB is under the IEEE Bangladesh Section which was formed on 20th November 1993. IEEE RUET SB is a prominent branch which was registered in IEEE on 16 September 2009, under the Dept. of ETE.

IEEE RUET SB is a branch which consists of enthusiastic and energetic members who work with a great deal of effort to support IEEE and promote IEEE among RUET students. The enterprising student body and experienced mentors give their best to promote IEEE and improve ourselves for a better career in Engineering and Technology. Here every student can develop himself as a better technical individual. This branch has been serving for technical professionals and students who are interested in bringing up working relationship and gain access to the latest technical research.

This branch comprises 3 chapters. The chapters are:

1. IEEE RUET IAS SB Chapter
2. IEEE RUET RAS SB Chapter
3. IEEE CS RUET SB Chapter

There is one WIE Affinity Group.

These chapters and groups helps the students to become more acquainted with their desired sectors, and can gain more knowledge about them. These can help themselves by developing their ability and work better in the future. IEEE RUET SB consists of about 121 volunteers. The volunteers and every member try to help out this Branch in every aspect as possible.

IEEE RUET SB tries to reach out every general student of RUET with the benefits of IEEE membership and the goals that IEEE wants to achieve for human society. Hence, IEEE organizes various events which are beneficial for the student body. Above 70 events in total have been held so far. These events are held throughout the year in which volunteers and every member give their best to make every event successful. IEEE RUET SB specially organizes events that are beneficial for the students for their academic and mental growth and also helpful for their career development. In addition, events that are wanted by the students are taken care of and carried out.

IEEE RUET Student Branch offers students different seminars, courses, workshops to develop their ability to grow as a professional being, so that the students can dedicate themselves to the prosperity of humanity. IEEE RUET SB is a prominent and vibrant branch which is determined to work very devotedly to outreach IEEE among students and make this branch more sufficient in the future.

## IEEE RUET IAS SBC



IEEE Industry Applications Society enables the advancement of theory and practice in the design, development, manufacturing, and application of safe, sustainable, reliable, smart electrical systems, equipment, and services.

IEEE RUET IAS Student Branch Chapter is working hard to fulfill the mission and vision of IEEE IAS. It's a very active student branch chapter that is organizing many effective workshops, seminars, industrial tours to gather industrial knowledge and to develop professional skills. Industrial tours, The workshop on Plasmonic Sensors, Short course on HVDC Power Transmission, From the Smart City to the Smart Grid: The Role of IoT, WORKSHOP ON MATLAB/Simulink and PLC, etc. are some of the event organized by IEEE RUET IAS Student Branch Chapter. Recently, IEEE RUET IAS Student Branch Chapter, in association with IEEE RUET Student Branch organized a visit to HDVC Back to Back Station, Bheramara, Kushtia on 5th March 2020. It's a very friendly platform for knowledge sharing and skill development. IEEE RUET IAS Student Branch Chapter is improving the efficiency of its activities day by day. We are planning to organize more workshops, seminars, project showing and industrial tours for the benefits of the members of IEEE RUET SB. Its members will get more benefits in the future.

IEEE RUET IAS Student Branch Chapter members will get the ability to enhance the professional skills and the opportunity for interpersonal connectivity in the industrial sector. Any current student member or graduate member of the IEEE RUET Student Branch is eligible to join IEEE RUET IAS Student Branch Chapter by applying and paying a nominal fee. IEEE Industry Applications Society is the best place for connecting thousands of other professionals from many different platforms for the betterment of your knowledge and skill.

## IEEE CS RUET SBC



IEEE Computer Society RUET Student Branch Chapter was formed in 2019. The motto behind forming this chapter includes sharing the knowledge of the latest technological inventions among each other and all the other branches, as well as providing help to all the enthusiastic members in their desired fields. In the past one year after its forming, IEEE Computer Society RUET Student Branch Chapter has arranged some effective event, the biggest of which was its flagship event labeled "IEEE Computer Society BDC Meet & Greet 2019: Rajshahi". This chapter arranges seminars from time to time on different topics, including higher studies' opportunities in different countries and so on.

The focus of this chapter has always been to provide enough help to the enthusiastic student members and to encourage them to take a step towards more technological advancement.

## IEEE RUET RAS SBC



IEEE RUET Robotics and Automation Society Student Branch Chapter started the journey with the intent on barter the knowledge in the field of Automation, Robotics and IOT based systems spread among the students of all kinds. The target of IEEE RUET RAS Student Branch Chapter has exhorted the progress to simplify human life with the knowledge of robotics and automation. In the era of robotics technology autonomously serve many fields in associate with the human being. IEEE RUET RAS encourage the IEEE members also non-members for work in the field of robotics, applies research on robotics for the development of the world. IEEE RUET RAS Student Branch Chapter sets a number of seminars, day-long workshops, as well as conferences on Robotics, Automation, IoT technology. IEEE RUET RAS Student Branch Chapter will mainly focus on automation to enhance the performance in the automation field, for this we will planning for a seminar every month and will also focus the practical as well as theoretical issues for development in this field in IoT based system and progress the research in this field in Bangladesh and try to spread the knowledge and importance of this technology in every kind of people.

## IEEE RUET WIE SB AG



IEEE RUET WIE Student Branch Affinity Group is a platform dedicated to promoting women engineers and scientists and inspiring girls around the world to follow their academic interests to a career in engineering. It is a team of lively and enthusiastic members who works hard to provide facilities to women to follow their academic interests in a career in engineering and science. It is a place where women can find opportunities to fulfill their dream and overcome the challenges to prove their worth. We give them a platform to excel in their skills in the field of science and technology and contribute to the welfare of humanity. It also helps to improve their discipline, teamwork and organizing skill while working in a professional environment. WIE members make lifelong friendships, acquire influential mentors, and make a difference for the benefit of humanity.

# Achivements of IEEE RUET SB



IEEE Ethics Competition, SPAC, 2010



IEEE Bangladesh Section  
Student/GOLD/WIE Congress 2013



IEEE Bangladesh Section  
Best Student Branch Award 2015



Student Branch Activity Presentation  
Award - ExCom Summit 2016



IEEE BDS SWYC 2016  
Poster Presentation Competition



Student Branch Activity Presentation  
Award - Section Congress 2016



Selected as Student Branch Partner  
of IEEE Region 10 SYWL 2020



"Story Writing Contest" Organized by  
IEEE IUB SB, 2020

# Journey with IEEE



## My Journey with the IEEE

Prof. Dr. S. M. Abdur Razzak, Senior Member of IEEE  
Professor, Dept. of EEE, RUET  
Advisor, IEEE RUET Student Branch

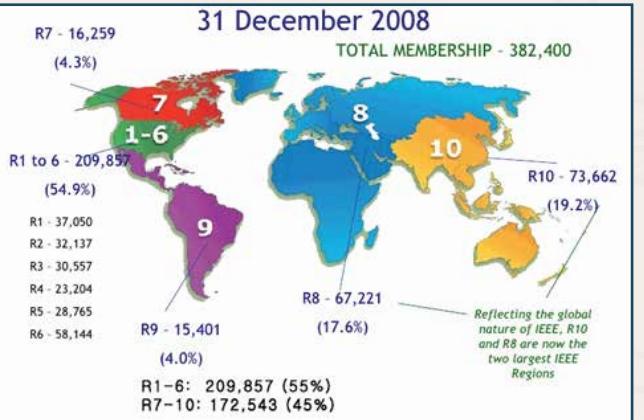
It was on the 26 March 2007 and I was attending the Optical Fiber Communication Conference and Exposition and the National Fiber Optic Engineers Conference (OFC-NFOEC) at the Anaheim Convention Center in California in the United States. It is indisputably the world's leading global conference and exposition for optical communications, electro-optics, and networking professionals. Beside researchers and scientists, representative teams from many companies take part in the event. The conference is comprehensive- from research to the marketplace, from components to systems and from technical sessions to the exhibition. Exhibiting companies showcase their products. OFC draws attendees from all corners of the globe to meet and greet, teach and learn, make connections and move the industry forward. While I was looking around the exhibition hall, I saw a booth labeled IEEE. I went close to the booth and someone from the IEEE team asked me whether I am a member. I asked them a complementary question, why should I join IEEE? One of them answered my question describing IEEE activities and opportunities. The IEEE president was around me. Meanwhile, he came forward and said, we are with IEEE because it is our identity and we feel proud to say that we are IEEE members. His words were so inspiring that I at once decided to be a student member, filled out the form and became a member.

So far it sounds good, but my travel to USA was not so good. I had the worst experience of flying during the forward journey to USA from Okinawa, Japan. It was a non-stop almost 14 hours flying entirely over the pacific and was pleasant until a forty minutes air turbulence terrified the passengers on board. The turbulence was so strong that at one point I forced to think I am dying. I became so scared that after reaching the hotel Travelodge in CA, I had to go to the city hospital. Since then, I always avoid long flight and I regretted a number of sponsored foreign trips because of flight phobia.

After coming back from the conference, I started motivating my fellow researchers at the Namihira Lab to become IEEE members. I contacted with the IEEE Fukuoka Section, Japan to find out the opportunities they offer for graduate student members and came to know that every year they give 'Excellent Student Award' based on research publications. At the end of the year 2008, I applied for the same, but shortly they sent an email notification to me stating that my ineligible as a candidate as the award is only for graduate students below 30 years old only. Needless to say that I was 30 plus. I did not lose hope and decided to make an appeal. I wrote a long email to the Chair, IEEE Fukuoka Section, JP describing why the criterion should be changed to 35 years and we, the foreign students, should be considered eligible for the award. Fortunately, he was convinced to make an amendment of the eligibility criterion on age limit and finally, in the same year I won the award. Readers should not think that it would be so easy if the country was other than Japan.

In the same year I got a travel grant to attend the CLEO PR 2007 in Seoul, South Korea. In 2008, I became a graduate student member of the IEEE LEOS (Lasers and Electro-Optics Society).

The purpose was to take part in its Graduate Student Fellowship competition. From LEOS website, I learned that only one award it gives to a graduate student member from the IEEE Region 10 (R10), the Asia Pacific Region. R10 includes Japan, China, South Korea, South East Asia, Pakistan, Afghanistan, Nepal, Bangladesh, India, Sri Lanka, Australia, New Zealand and Oceania. I submitted the application keeping no hope for a positive result, but surprisingly I won the award. The Award comprises of a travel grant of USD 2500 to attend and present papers at IEEE Sponsored Conferences along with award money of USD 5000.



**Fig.1 IEEE Regions and Membership by Region (2008)**

In 2010, I became a professional member and upgraded to Senior Member in 2013. Now I wish, if I could be a student member of the IEEE a bit earlier! Let me pen off (!) quoting the remarks, IEEE LEOS President had made during the annual AGM of the Society at the Ela Quality Resort Hotel in Belek area of Antalya region in Turkey in 2009, "We do IEEE to recognize others (talents) and to be recognized".



### A journey with IEEE from Bangladesh to USA

*Alamgir Kabir Munna, Ph.D. Candidate in Electrical Engineering  
Florida Atlantic University, USA*

When I reflect on my four years of bachelor's study journey at Rajshahi University of Engineering and Technology (RUET), it always gives me a jubilant feeling. That four years created a giant leap in my educational, professional, and personal development. Student organizations are considered the backbone of campus. Besides philanthropy, establishing contacts, and developing skills, student organizations provide mindfulness to different issues on campus. I believe, joining the IEEE RUET student branch was one of the best decisions that I made during that particular time. I joined IEEE RUET Student Branch in 2011 as a student member and am currently registered as a graduate student member. Moreover, I am also an active member of IEEE Florida Atlantic University (FAU) student branch in USA. Initially, I was motivated to join this student branch to develop my volunteering, leadership, and organizational skills. In 2012 and 2013, I have actively participated in organizing different seminars, project competitions, Bangladesh student congress at RUET. I still remember, one of the seminars was related to higher study in the USA, which seeded the dream of achieving my PhD degree in USA. Later, in Fall 2016, I came to Florida Atlantic University for my PhD and immediately joined the IEEE FAU Student Branch. However, to enrich my leadership and organizational skills besides IEEE, I joined and served in several other organizations, including Engineering Graduate Student Council (as president), Bangladesh Student Association (as vice President), and Owls lending hand (as Risk Management officer). To recognize my leadership and organizational activities, FAU international office nominated me as an "International student of the year" in 2019, and later in 2020, I was awarded the "Best Leadership Award" from the college of engineering, FAU. Moreover, attending two conferences (IEEE NANOMED-2018 and IEEE-HIPOCT-2019) organized by IEEE gave me an exceptional opportunity to meet and create connections with renowned scientists and young researchers from my field from around the world. I always believe that student organizations fill the huge gap between what we learn in class and what we essentially need to know for our lives after university. It gives experiential management, organizational, communication, and learning opportunities to students, which can be reflected in later part of their life.



### IEEE, Humanity AND Networking Beyond Borders

*Junaid Mian, Mentor at IEEE Islamabad Section  
Lead Publicity & Promotion, Maker Fair IEEE YESIST12 2020  
Former Chairperson, IEEE SIGHT Islamabad Section, Pakistan*

When a student comes to an engineering institute, he/she takes it as after graduating, he will be able to secure good job or career. New Intakes don't usually have idea how it would be possible for them to be academically & practically achievers of their goals. Many in our parts of the world like India, Pakistan & Bangladesh come from backgrounds where we never get brought up to be entrepreneurs or innovators, but only have goals to get a settled household in the ends. After graduation, we become those who learned something else, get trained for something else at the start of career & ends up as ordinary settled households despite having lots of potentials in ourselves which most of the time get spoiled due to non-alignment of potentials, skills & career goals.

In 21st century, there came a shift in narratives of our academia due to non-productive setups which I mentioned above, universities & vocational training institutes started trying to mitigate the divides of newly graduates & experienced graduates by multiple ways like Out Come Based Education (OBE) systems. With all these OBE systems in our academia, there is a major role of technical & technical cum philanthropic societies like IEEE, ASME & ACM etc.

I being a member of IEEE for more than 8 years have the very best of IEEE like, I, sitting in Islamabad, Pakistan writing this up for a Student Branch in Rajshahi, Bangladesh which you may be reading in any part of the world if you get this write up even outside Bangladesh & Pakistan. So, let me share what IEEE has given me as its member & what else I could have got if I put more efforts to advance the humanity as its slogan says, "Advancing Technology for Humanity".

I started as a student Branch member in 2012 from International Islamic University Islamabad, became IEEE Young Professional Member & selected in IEEE SIGHT Executive Committee. We did a project which was aligned with UN Sustainable Development Goals on Climate Change. We, in our first year as IEEE SIGHT got featured in IEEE SIGHT Newsletter & got funding of \$3050 for which I am highly indebted towards my team members Haris Zaman as Secretary/Treasurer & Muhammad Moeiz Chaudhary as Vice Chair for their untiring efforts which we all got trained as IEEE Volunteers right from our IEEE Student Branches from Campus life. Due to having networks beyond borders we got a lot of help in our Volunteering Activities from my Brother Mr. Suyog Vyawahare from IEEE Bombay Section & Ms. Tasnim Binte Shawkat for their advices they gave us.

Currently I'm volunteering as SIGHT Executive member in IEEE Islamabad Section & volunteering with IEEE YESIST12 Promotion Committee just because of brotherhood beyond borders I have due to IEEE & our philanthropic attitudes towards humanity. I'm working as Sr. Communication Engineer in a news channel named "GNN TV" formerly known as CNBC Pakistan and can handle all challenges of my professional life just due to the training I got from IEEE along with my academics.

You may be finding quite boring in the end while reading this piece, the reason I unfolded all this stuff as I didn't want to become hardcore engineer with some kind of 9 to 5 routine guy with settled household because this is not the reason Almighty created us to wake up, go to office come back from office, eat & then sleep & spend your whole life. I believe no one comes to engineering institute with this motive but to become a better human being and a specialist which can reshape technical ideas into humanitarian ideas. To all young new comers & 2nd year Students, try to grab all societal problems as opportunities to solve them & become that engineer who do wonders for society along with academics and can uplift the society under those sustainable development goals which are future essentials for our societies to prosper ourselves for which Almighty sent us to the globe.

# Research Articles

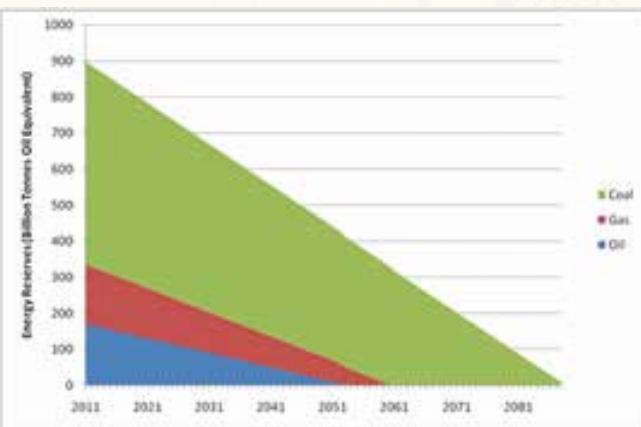
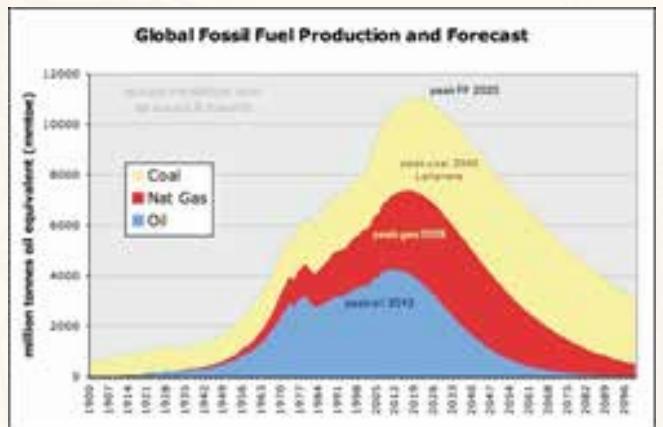
## RENEWABLES TO ELECTRICITY: CHALLENGES AND OPPORTUNITIES



*Prof. Dr. Muhammad Abdul Goffar Khan  
Professor, Dept. of EEE, RUET  
Former Vice Chair, IEEE BDS EXCOM 2015, '16, '17  
Former Counselor, IEEE RUET SB*

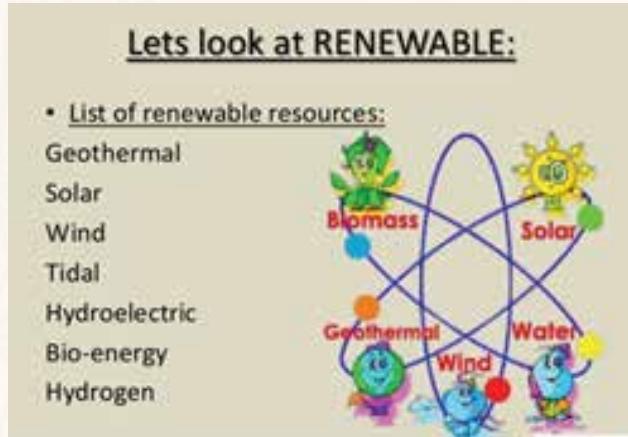
### 1. Introduction

It is needless to tell now that conventional (Fossil) fuels are going to be exhausted very soon. A clear decline in conventional energy and growth of renewables has been predicted in a recent report [1]. It is known from another report that presently at 2020, we are at the peak of all these resources [2]. As per other report, there will be no Oil after 2050, no Gas after 2060 and no Coal after 2100 [3]. Therefore it is now the right time to think for the alternatives, means the renewables.



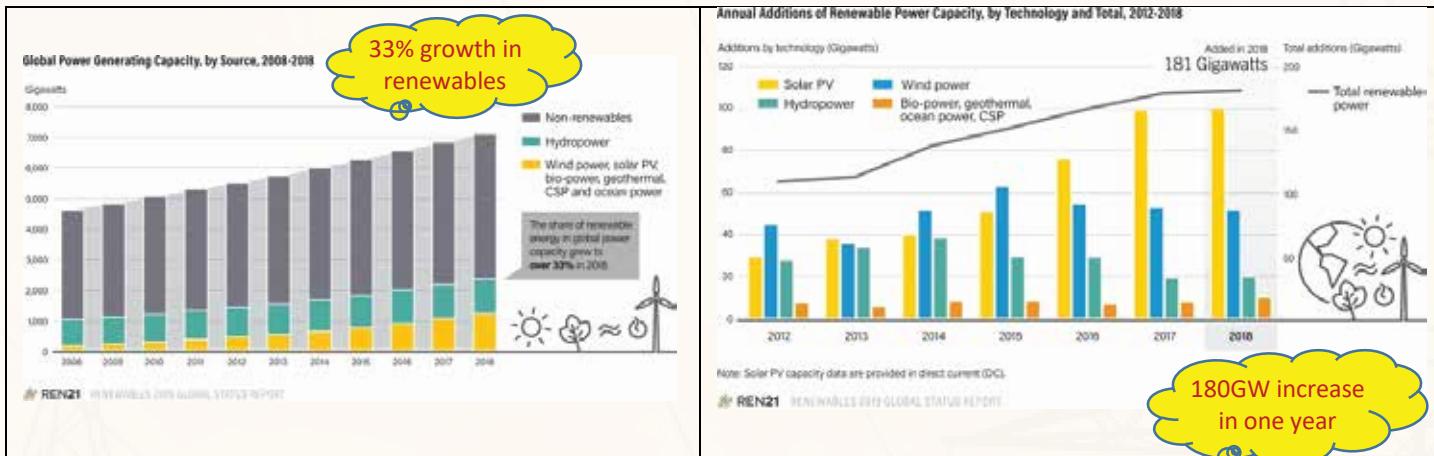
There are different renewable sources people have explored. Perhaps windmills are the most ancient form of energy conversion machines. Here we see a windmill established in 1787 in England, used to crush lime stones used for building construction. Surprisingly few such windmills are still in working condition [4]. Our forefathers used sailing boats using wind energy.

Among many renewable resources, most popular are (i) Wind (ii) Solar (iii) Ocean (iv) Hydro (v) Geothermal (vi) Bio-mass etc. [5]. There are numbers of ways to make these resources useful for human use. However I will remain limited within harnessing electricity from them, because to my opinion, Electrical Power is the only power which gives you power to do most powerful things. For example, almost all the 3Wheelers in Rajshahi



### 2. Global scenario

Let us talk about the world-wise electrical power generation from renewables. As per GENI [6] about 2000 GW power will be generated from all renewables (including hydro) by the year of 2030. Total 180GW power (about 10 times of total demand of Bangladesh) from all different types of renewables has been added in 2018 only, the growth is at a rate of 33% in recent years [7], out of which about 25% growth has been only in solar PV. On the other hand about 600GW power has been added from wind farms.



### 3. Solar-Electric generation

The largest solar-electric power conversion station is Pavagada Solar Park – 2050MW – Karnataka India 53 Km2 [8]. Another large power station is Tengger Desert Solar Park – 1547MW – China 43km2. In Bangladesh we have a 28MW station at Teknaf [9]. No need to talk that such power stations need vast open area. Bangladesh is a land full of irrigation farms and water and it is difficult to find unused land to install solar panels. An alternative can be floating solar power stations. Such a power plant has been planned at Kaptai lake, with a capacity of 50MW.



Pavagada Solar Park-2050MW-Karnataka, India



28MW-Teknaf-Bangladesh

### 4. Wind-Electric generation

Wind is another source of energy. In old days intercontinental ships could run depending on wind power. China is the pioneer in converting wind to electricity. The total capacity of wind power station in China is about 220GW. The largest one is Jiuquan Wind Power Base, China, 20GW. India has a big station at Jaisalmer Wind Park, India of capacity 1,064 MW. Denmark can generate more than its national demand, 140% power from wind. It exports the excess power to neighbor countries.



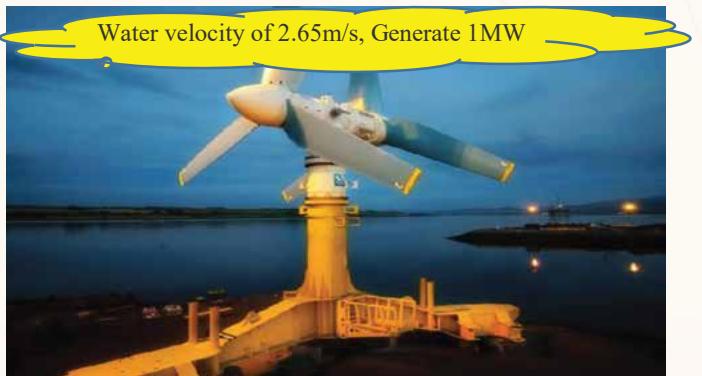
### 5. Wind power in Bangladesh

A report says that there are 20 thousand square kilometer area in Bangladesh where the wind speed is above 5m/s (An international benchmark to run wind turbines), which calculates the potential 20 thousand MW electricity generation [11]; although, until now, only three wind turbines with 3MW of capacity have been in operation for the last couple of years in Feni and coastal Kutubdia. Kutubdia wind farm is situated near a salt bed and saline water mixed air eats away metallic structures. However our government has taken a plan to install 3 more wind farms at Chandpur, Cox's Bazar and Khulna, each of 50MW capacity thereby having total 150MW generation. It is to be noted that although we have good potential of wind power, very less amount has been attempted so far.



### 6. Ocean Power

Ocean or tidal power is another resource to be considered. Almost three fourth of our planet is ocean, full of very unrest water, always oscillating. There are numbers of ways to convert ocean or tidal power to electricity, people have tried. About 75% area of our planet is sea or ocean, containing water which is always oscillating. Thus there is a bright prospect of converting this tremendous amount of energy to electrical power. Numbers of models have been proposed and numbers of prototypes have been tested [12]. According to the US Energy Information Administration, the theoretical annual energy potential of waves off the coasts of the United States alone is estimated to be as much as 2.64 trillion kilowatt-hours, which is about one fourth of its national demand. U.S. based Lockheed Martin is branching out from defense contracting in assisting with the design of Ocean Power Technologies' (OPT) Power Buoy technology to harness electricity from off-shore wave farms, as deployed here off the coast of Victoria, Australia. In a wave power station, water level moves up and down, pushing and pulling air through the turbine, which in turn generates electricity. Simple design and construction, can be placed on land near the sea. U.S.-Based Ocean Thermal Energy Corporation has proposed a method of generating electricity using the temperature difference between the cold deep water and warm surface water [13]. According to the US Energy Information Administration, the theoretical annual energy potential of waves off the coasts of the United States alone is estimated to be as much as 2.64 trillion Kilowatt-hours. Australia is leading the way to zero-emission electricity from under the ocean. Such machines are of very large size, difficult to carry and erect in deep sea. Greece has developed small sized generators which can be put in a bank, as per power demand. Each unit is of small size, can be easily transported and erected. U.S.-Based Ocean Thermal Energy Corporation has developed another way of harnessing electricity from ocean, Ocean Thermal Energy Conversion (OTEC) which utilizes the temperature difference between cold deep water and warm surface water.



Although Bangladesh has very vast area exposed to sea, unfortunately we do not have any attempt to install any such station to get electricity from tidal waves.

## 7. Stand-alone units

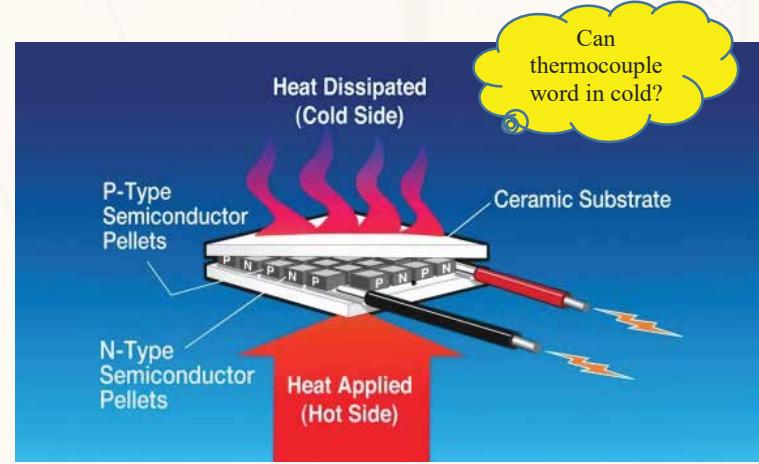
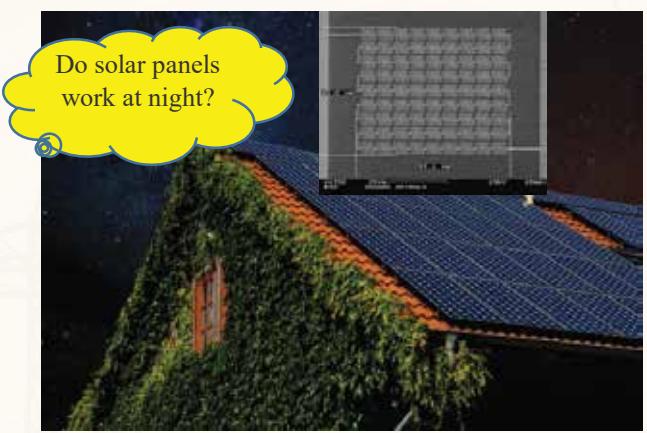
Apart from generating electricity using large machines and connecting to the national grid, few other attempts are in practice. Different standalone units are in use which can generate and utilize electricity in one unit. We can see solar based grass cutters and paste control unit. Boats also have a solar panel on it. Small water lifting plants are also very popular in our country, which needs no inverter or battery for storage, rather uses the electricity directly to run the pumps which have DC motors. There are other ways to use wind power to lift water directly, without converting to electricity. Such pumps are very useful in remote areas, where there is no electricity.



## 8. Alternate opportunities

Some deserved people have different ideas. One has the idea of generating electricity from solar panel at night. Researchers at the Idaho National Laboratory are close to the production of a super-thin solar film that would be cost-effective, imprinted on flexible materials, and would be able to harvest solar energy even after sunset!

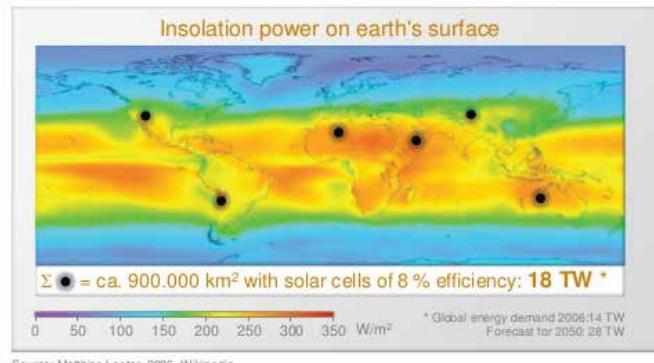
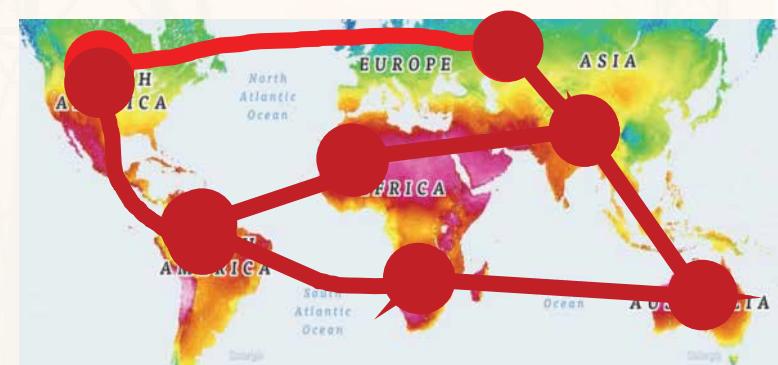
Thermoelectric generators work in high temperature, where a temperature difference is created from a hot material. Now some people has tried to utilize this theory in reverse way. They have tried to Harness Electricity From The Cold, Dark Night. A thermoelectric generator is built whose cold side radiates heat to the sky in a cold night. The Night-time power generation of  $25 \text{ mW/m}^2$  is demonstrated, sufficient for a LED.



## 9. Can the world have 100% renewables

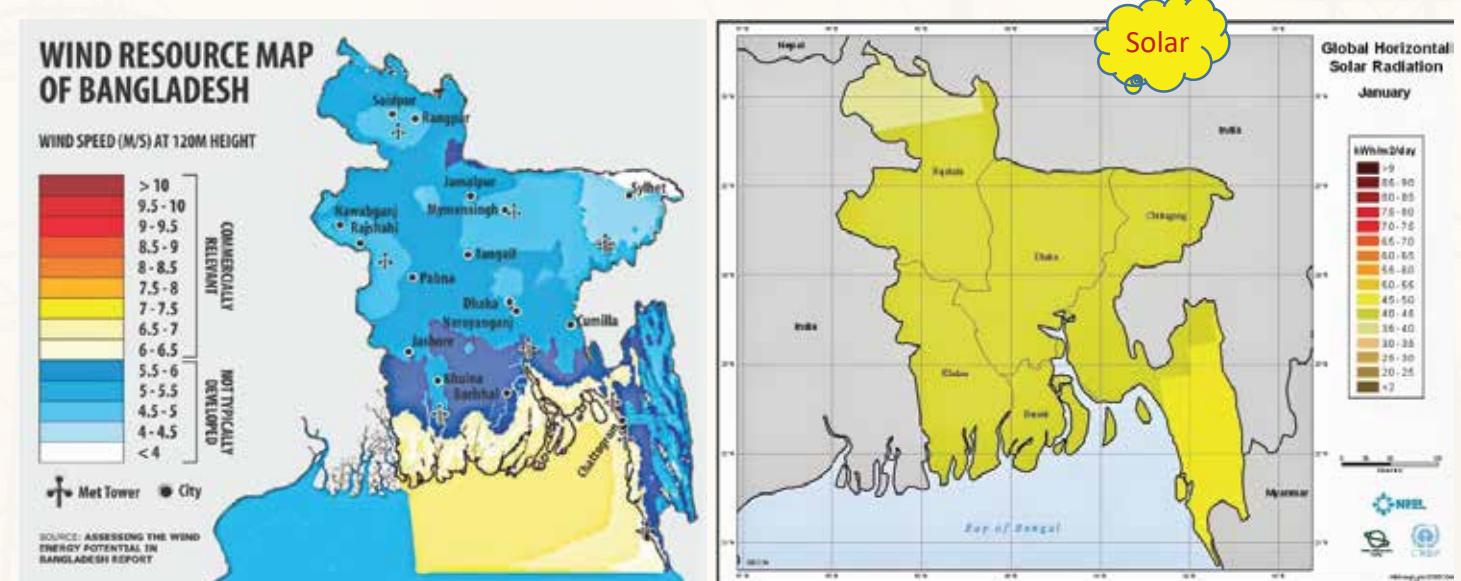
Now let us try the question: can the earth have 100% electricity from renewables. One professor from Nottingham Trent University has shown a calculation. The total world energy usage (coal+oil+hydroelectric+nuclear+renewable) in 2015 was 13,000 Million Ton Oil Equivalent (13,000 MTOE) - see World Energy Consumption & Stats. This translates to 17.3 Terawatts continuous power during the year.

Now, if we cover an area of the Earth 335 kilometers by 335 kilometers with solar panels, even with moderate efficiencies achievable easily today, it will provide more than 17.4 TW power. This area is 43,000 square miles. The Great Saharan Desert in Africa is 3.6 million square miles and is prime for solar power (more than twelve hours per day). That means 1.2% of the Sahara desert is sufficient to cover all of the energy needs of the world in solar energy. There is no way coal, oil, wind, geothermal or nuclear can compete with this. The cost of the project will be about five trillion dollars, onetime cost at today's prices without any economy of scale savings. That is less than the bail out cost of banks by Obama in the last recession. Easier to imagine the cost is 1/4 of US national debt, and equal to 10% of world one year GDP. So this cost is rather small compared to other spending in the world.



## 10. Can Bangladesh have 100% renewables

The last question: can Bangladesh have 100% electricity from renewables. As per NCBD Research Team Solar Fact Sheet, the power demand of our country will be about 240 TWhr by 2040. As Bangladesh is an agricultural country, most of its land is used for growing mainly paddy and other crops. It is difficult to get vast open area to install solar panel. However if we go for 101 system, means instead of placing panels in a continuous row, if we place one panel and leave space for another, then about 4 Acres of land will be required for placing solar panels to generate 1MW power. This calculation shows that about 0.55% of total land of Bangladesh will be required to generate 100TWhr and only 1.25% land will be sufficient to fulfil the national demand [12]. This calculation is based on solar panel only. If we can install wind farms and tidal wave based electricity generators, the things will be even easier.



So our conclusion is we can go for 100% renewables.

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## BIRDS' EYE

**Prof. Dr. Md. Al Mamun**  
Professor, Head Dept. of CSE, RUET  
Advisor, IEEE Computer Society RUET SBC

You would be surprised to know that right now by September 2020, 2,666 satellites are orbiting the Earth of different country of origin and purposes. Among them majority are from USA, 1327 of them. Russia has 169, China has 363 and 807 from different other countries. Satellite images have many applications in meteorology, oceanography, fishing, agriculture, biodiversity conservation, forestry, landscape, geology, cartography, regional planning, education, intelligence and warfare. Satellite images should not be confused with astronomical images collected by space telescope.

Satellite imaging usually means gathering information about the Earth's via recording the electromagnetic radiation from its surface on a space-borne platform. Of the two major types of remote sensing systems, passive and active, the first measures reflected solar electromagnetic radiation in the optical wavelength range (400 nm to 2400 nm) or that emitted from the Earth's surface in the microwave range (30 mm to 300 mm) while, in the second, the electromagnetic radiation of a specific wavelength is generated in the microwave range and sent out by the imaging system, after which the backscattered energy from the surface is recorded by sensors. Each Earth features have separate reflectance value. In short, these reflectivity are mapped in different domain to generate the phenomenon satellite images.

Satellite imaging companies sell images by licensing them to governments and businesses such as Apple Maps and Google Maps. Though there is some free public domain like Landsat, Modis, Sentinel, ASTER, Meteosat, the private domain satellite images have restricted access like GeoEye, Maxar, Spot Image, Black Bridge, ImageSat International and China Siwei.

We know that RGB images have 3 bands namely red, green and blue. Whereas satellite images can capture images in several bands. Like the Hyperion sensor onboard the EO-1 (Earth observing-1) captures 220 spectral bands from 0.4 μm to 2.5 μm. These images are called Hyperspectral. Each of these bands are enriched with lots of information that are entitled to several researches like: change detection, climate change, crop monitoring, deforestation, surveillance and many others.

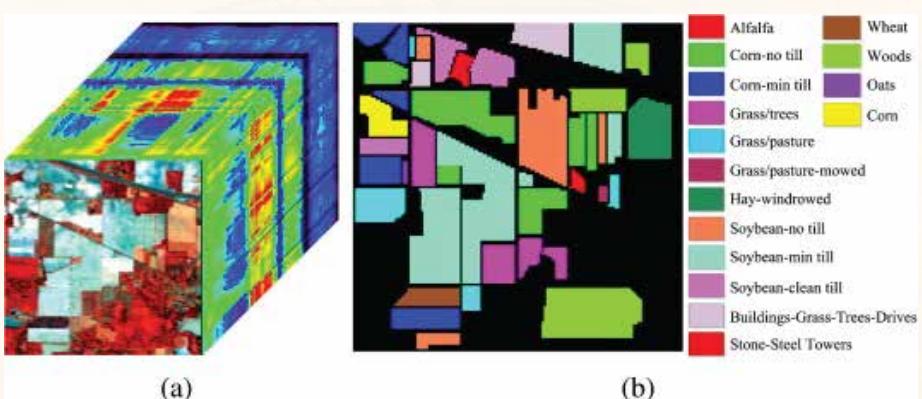


Fig: (a) Indian Pines test site (Hyperspectral image of 220 bands) in North-western Indiana, (b) Corresponding classification map. Source: ref [1].

So satellite image plays a significant role for mankind and other species on Earth if explored substantially. Here are some spectacular images of our Earth taken from the satellites.



Fig: A composite satellite image of our subcontinent with several different years of lighting combined together. Image Source: U.S. Defense Meteorological Satellite Program.



Fig: Parliament house of People Republic of Bangladesh. Image Source: Google [2]



Fig: Niagara Falls, United States of America. Image Source: Google.

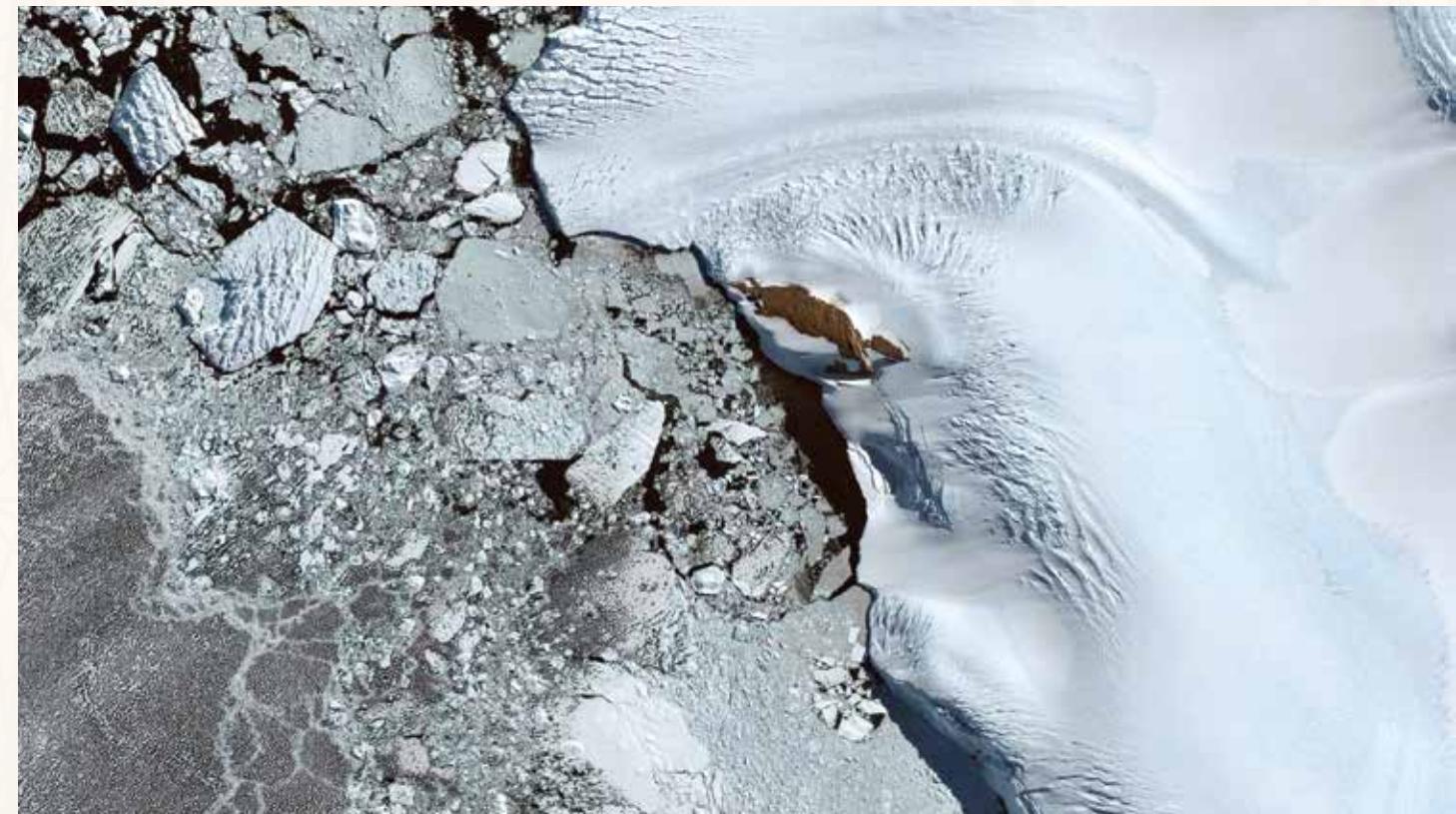


Fig: Antarctica. Image Source: Google.[3]



Fig: Benghazi District, Libya. Image Source: Google



Fig: Paray Vieille Poste, France. Image Source: Google.[4]

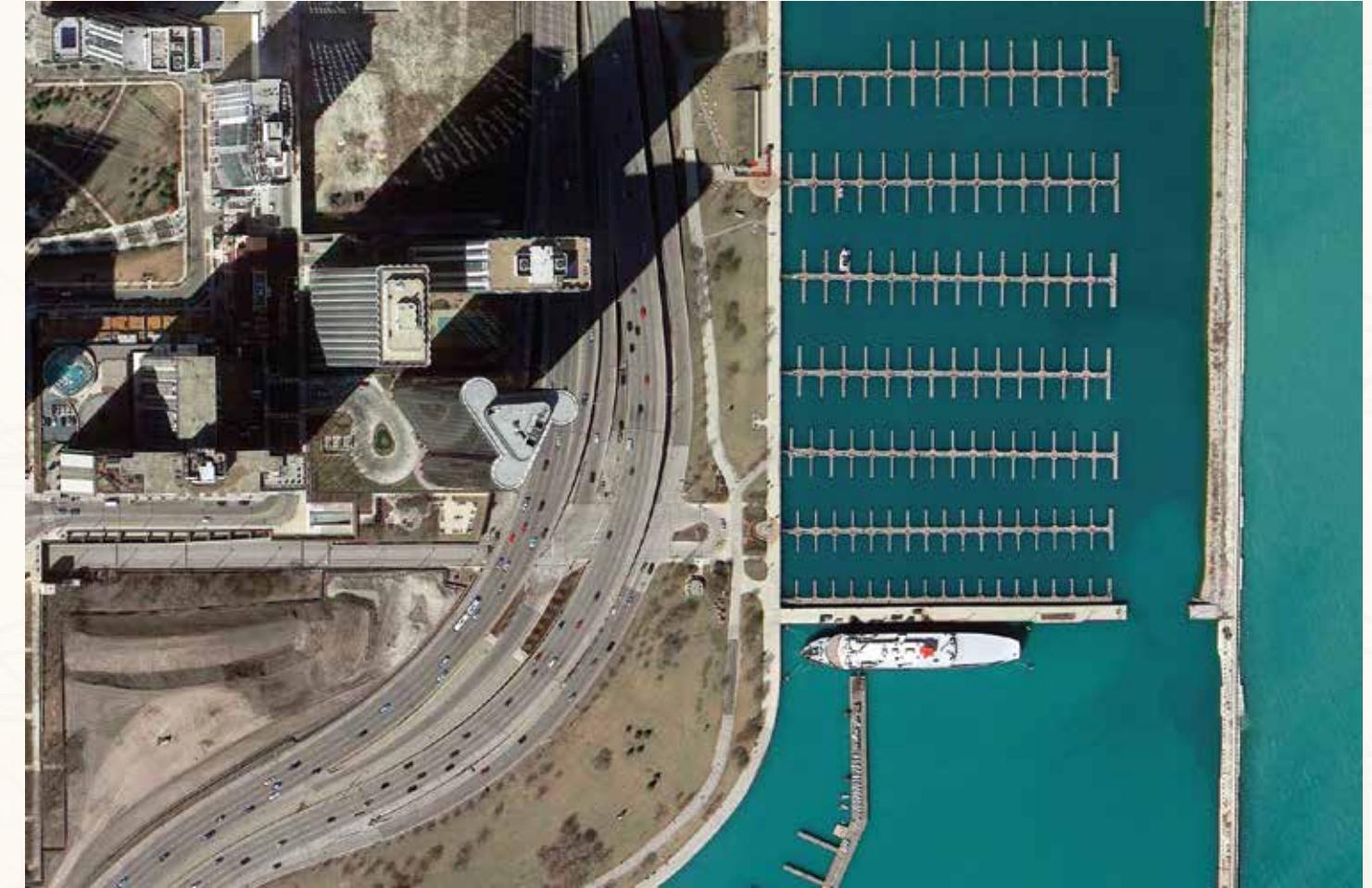


Fig: Cook Country, United States of America. Image Source: Google.[3]

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- [1] <http://lesun.weebly.com/hyperspectral-data-set.html>
- [2] <https://eos.com/gallery/>
- [3] <https://www.usgs.gov/>
- [4] <https://earthview.withgoogle.com/al-hasakah-district-syria-1954>



# THE STORY OF COMMUNICATION

*Milton Kumar Kundu*

*Assistant Professor, Dept. of ECE, RUET*

*Advisor, IEEE RUET IAS Student Branch Chapter*

Let me start with a very simple question. When you see the word "Communication", what comes to your mind? The answer will vary from person to person. But there are three (3) things which will definitely appear on your mind. They are, (1) Telephone, (2) Mobile phone and (3) Internet.

Then comes my second question, how do they work? As you are reading this, there is a very high probability that you come from an engineering background, most probably from Electrical, Electronic, Communication or Computer engineering. So, you all know the working procedure of these technologies. Telephone requires a wire to transfer your voice signal to another telephone in the form of an electrical signal. Mobile phone does not need any wire, thus it has initiated the revolution of wireless communication. On the other hand, internet has begun a new era of communication. At this very moment, almost every electronic device in the world is connected to internet.

Now a days, the most common and the easiest way to connect with anyone is through the mobile phone. When someone dial a number from his mobile phone, a high frequency radio wave (Radio frequency signal) is radiated from his phone which travels through the air medium to the nearest mobile phone tower. This Radio frequency (RF) signal gets weaker with distance, i. e. if the distance between the mobile phone and tower is large, signal attenuation will also be large. If distance between them is very large, then the RF signal will never reach the tower and that person won't be able to make the call.

Now, let's consider a scenario where you are in Bangladesh but your friend is on a ship in the Pacific Ocean. So, how can you communicate with your friend as there is no mobile phone tower in the Pacific? The answer is Satellite. You can talk to your friend through the satellite which will require a special mobile device named "Satellite Phone (Sat Phone)". This sat phone will directly send your signal (which is obviously a RF signal) to a satellite and that satellite will direct your call to your friend who must have another sat phone with him.

What if your friend is not on a ship but on a submarine which remains mostly underwater? Will the satellite still be able to direct your call to your friend? These are some tricky questions. Because we know, RF signal can travel through air or vacuum easily with a very low attenuation. But if that signal is to be travelled through water, the attenuation of RF signal becomes very high. So how can you talk to your friend?

If the distance between the submarine and the water surface is small, RF signal can penetrate through that thin layer of water. But if the distance between them is very large, then RF signal won't be able to reach your friend on the submarine. Researchers around the world are working on this problem and have come up with some very simple but elegant ideas. They have proposed under water optical and acoustic communication system using which the signal can be easily transmitted through water as light and sound waves, respectively. But, you must have a relaying station on the surface of the water to convert the RF signal coming from satellite into Light/Sound before passing it through water. These technologies have also opened a wide area of research.

So, problem solved. Right? Unfortunately, the answer is NO. These solutions came with a variety of problems. One of the major problems these technologies have is the Information Security. How? Let me explain. When the signal is transferred to your friend as the Light/Sound wave, anybody in that region can intercept that signal. So if you have sent a secret information to your friend, then the secrecy of that information is threatened as there is always a possibility that someone might hear the things you are saying to your friend. Researchers have also worked on this problem and found a solution in the shape of cryptography. That means, if you encrypt your information and gave the decryption key to your friend, then only your friend can identify the actual message you have sent him. But again, the decryption key can also be hacked.

At this point, you must be getting annoyed with so many problems. You may also decide not to call your friend at all as there are problems in every step, right? But, the technology won't let that happen as it is the power which promises to make your life better. So, researchers again began their search for a more secure information transfer technology and found that the characteristics of the medium itself can secure the data without any kind of encryption. This technology is commonly known as "Physical Layer Security (PLS)". This technology has the power to maintain a perfect secrecy of the transmitted information so that no one can hear what you are saying to your friend.

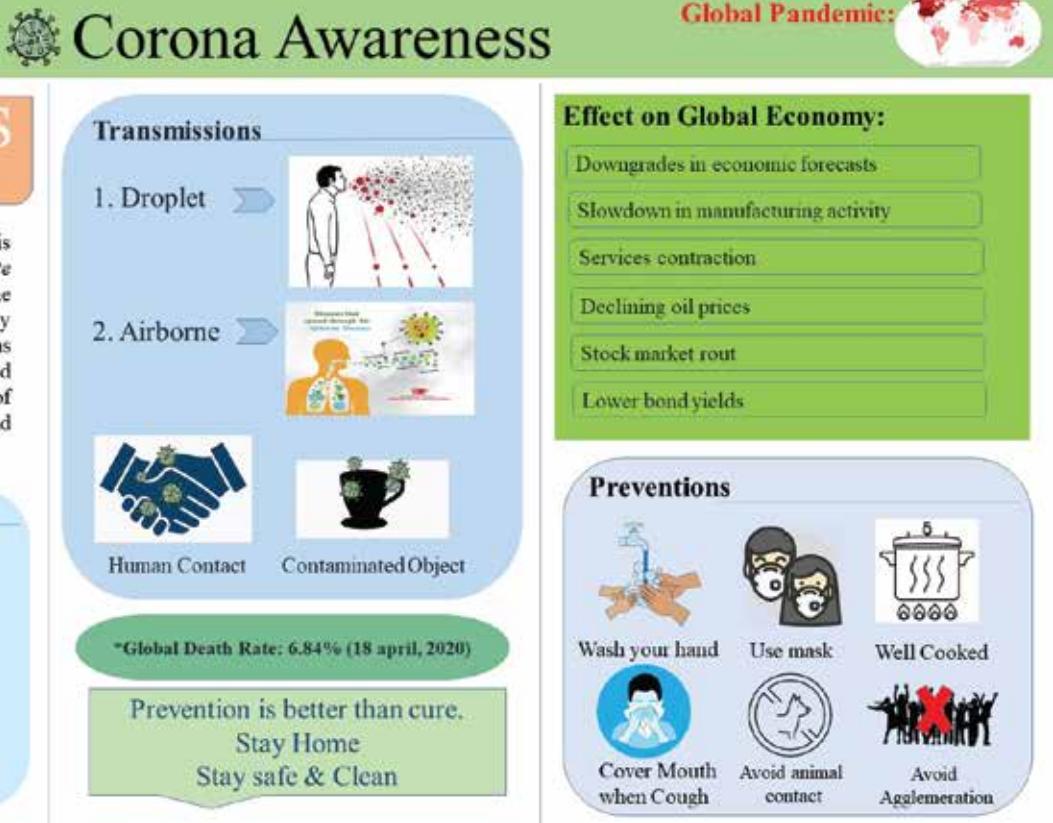
This is the end of today's story but the story of communication will continue. Until when? Truly speaking, I have no idea. I am just starting my journey to explore this amazingly beautiful world of research. But as the saying goes "The Journey Is More Important Than the Destination". So if you are interested to take a journey in this vast area of knowledge and have some fun with it, my door is always open.

**Acknowledgement:** I am thankful to Prof. Dr. Md. Zahurul Islam Sarkar, Dept. of EEE, RUET and A. S. M. Badrudduza, Assistant Professor, Dept. of ETE, RUET for their support and cooperation. I will be always grateful to them for their inspiration which has led me to start my journey in this research topic. I also thank all the members of our research group for their patience and effort.

# Covid-19

K. M. Redwanul Hasan Rana, Civil Engineering, RUET  
Winner of "ARTICLE WRITING on COVID-19" organized by IEEE RUET SB

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Winner of "POSTER DESIGN on COVID-19" organized by IEEE RUET SB



## Introduction

Coronavirus (CoV) is a major cause of viral infections that can often cause serious illness, including early Middle Respiratory Syndrome (MERS-CoV), Severe Acute Respiratory Syndrome (SARS-CoV-19), and COD-19. Of the many species of Coronavirus, 7 are known to cause disease in the human body including SARS-CoV-2. Coronaviruses are zoonotic, meaning they can transmit from animal to human.

COVID-19 is new species of the disease-causing SARS-CoV-2 Corona virus that has not been seen in humans before. This is enveloped, positive sense, single strand RNA virus.

## COVID-19: A History of Coronavirus

Coronavirus disease was first described in 1931, with the first coronavirus (HCoV-229E) isolated from humans in 1965. Until the outbreak of severe acute respiratory syndrome in late 2002, only two human coronaviruses (HCoV) were known – HCoV-229E and HCoV-OC43. Three groups of coronaviruses exist: group 1 (HCoV-229E and HCoV-NL63), group 2 (HCoV-OC43 and HCoV-HKU1), group 3 (no human CoVs as yet). SARS-CoV is an outlier to all three groups, although some place it in group 2. A novel coronavirus outbreak was first documented in Wuhan, Hubei Province, China in December 2019. As of this writing, it has now been confirmed on six continents and in more than 100 countries. As the world's health systems funnel resources into learning about, treating, and preventing infections in humans, new information is released daily.

## Symptoms

### Common symptoms:

- > Fever
- > Cough
- > Breathing difficulties

These symptoms that may appear 14 days after exposure (*based on the incubation period of MERS-CoV viruses*)

### Less common symptoms:

- > Aches and pains
- > runny nose
- > sore throat
- > shortness of breath & diarrhea etc.

### Critical symptoms:

- > Severe pneumonia or
- > Multiple organ failure and can lead to death.

## Spread of Coronavirus

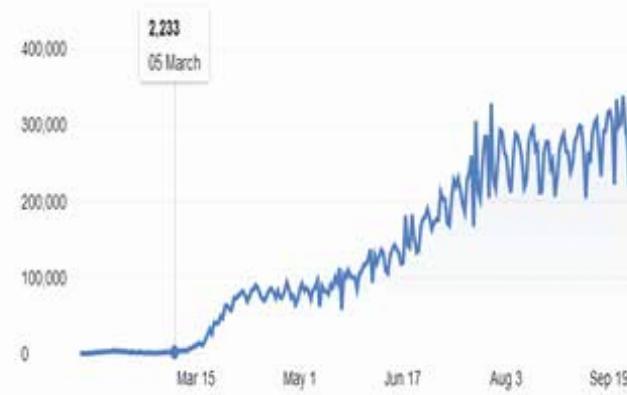
- Person to person transmission through sneezing or coughing
- Incubation period is between one and 14 days
- Touching contaminated objects

Collection of specimens for laboratory diagnosis

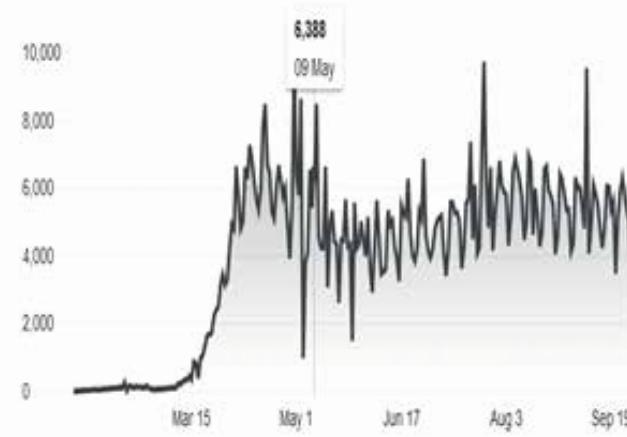
**WHO** guidance on specimen collection, processing and laboratory testing is available. Collect blood cultures for bacteria that cause pneumonia and sepsis, ideally before antimicrobial therapy. Do not delay antimicrobial therapy to collect blood cultures. Collect specimens from the upper respiratory tract (*URT; nasopharyngeal and oropharyngeal*) AND, where clinical suspicion remains and URT specimens are negative, collect specimens from the lower respiratory tract when readily available (*LRT; expectorated sputum, endotracheal aspirate, or bronchoalveolar lavage in ventilated patient*) for SARS-CoV-2 testing by RT-PCR and bacterial stains/cultures. In hospitalized patients with confirmed COVID-19, repeat URT and LRT samples can be collected to demonstrate viral clearance. For hospital discharge, in a clinically recovered patient two negative tests, at least 24 hours apart, is recommended.

## Cases Overview in Bangladesh & World

After 16-04-2020, Corona virus affected through the world. So below the chart we can understand that how many people were affected.



And understand the death of people through the noble Coronavirus.



The Covid-19 situation is given below for Bangladesh.

Cases	Recovered	Deaths
365K	277K	5,272

## Protect from Coronavirus

- Wash your hands frequently and avoid touching eyes, nose and mouth.
- Cover your mouth and nose with a flexed elbow or tissue when coughing and sneezing.
- Keep a distance of 1-metre between yourself and someone who has symptoms.
- If you have fever, cough and difficulty breathing, seek medical care.

# VENTILATOR FOR COVID-19 PATIENTS AT RUET

Md. Mahmudul Hasan, EEE'15, RUET

Samin Safayet, EEE'17, RUET

## Healthcare Facility Management

### Managing Placement

- Immediately isolate suspected and confirmed cases
- To reduce stress and anxiety, explain to patients what you do and why you do it
- Suspected and confirmed cases should be kept separate
- Maintain at least 1-metre distance between all patients

### Managing the Environment

- Limit the movement of patients within the health center to reduce potential infection throughout the healthcare facility
- If a patient needs to be moved, plan the move ahead: all staff and visitors who come into direct contact with the patient should wear personal protective equipment
- Perform regular environmental cleaning and maintain good ventilation

### Protecting at work from COVID-19

When entering a room with a suspected or confirmed COVID-19 patient, put on disposable gloves, a clean, long-sleeve gown, medical mask that covers your mouth and nose, eye protection such as goggles.

### Personal Protective Equipment (PPE)

#### According to Healthcare Activities

Hand hygiene is always important. Clean hands before putting on, and after taking off, PPE.

- Medical mask is used only when triage/points of entry screening personnel.
- Collecting respiratory specimens' workers should be used to goggles OR face shield, medical mask, gown, gloves
- Caring for a suspected/confirmed case of COVID-19 with no aerosol-generating procedure workers should be used in goggles OR face shield, gown, gloves, medical mask

- Caring for a suspected/confirmed case of COVID-19 with aerosol-generating procedure workers should be used in goggles OR face shield, respirator (**N95 or FFP2**), Gown, gloves

- Transport of suspected/confirmed case of COVID-19, including direct care workers should be used goggles OR face shield, medical mask, gown, gloves.

### Risk & Treatment for Coronavirus

Older people, and people with the medical conditions, such as diabetes and heart disease, appear to be more at risk of developing severe disease. There is no currently available vaccine for COVID-19. However, many of the symptoms can be treated.

### Control of Coronavirus

Government should be taken some necessary steps for control the coronavirus. The steps are:

- Fast-developed testing kit
- Smart quarantine information system
- Mobile phone technology data for contact tracing
- AI for improving diagnosis efficiency and patient classification

### Conclusion

The COVID-19 pandemic has devastated people's lives worldwide and brought about sweeping social change. The coronavirus pandemic and the subsequent advice of staying at home, if possible, preventing close encounters even on the street has exacerbated the harm caused by factors that are already isolating people and isolating many of the antidotes.

RUET authority and RUET students never fail to surprise us with their innovative ideas. Every year they amaze us with their new inventions or innovative ideas to solve different problems. During this corona crisis a team consisting of students from RUET, distinguished teachers of RUET, and former RUET students, named Durbar Kandari have shocked us with their low-cost ventilator.

The team was founded in the last week of March during the transmission period of the coronavirus in Bangladesh. Patriots from different backgrounds came together to tackle the corona situation by providing low-cost technological supports. With the guidance of the honorable vice chancellor, teachers and ex-students the team grew and came up with some brilliant solutions to problems that Bangladesh is facing during this epidemic.

Even though the research team formed with people related to RUET only, it has members from different universities and professions as well. Durbar Kandari is branched into different teams with different goals. Through well management of these branches and by reaching their individual goals they are moving forward to their aim.

Through hard work and their never losing focus they have already reached their first milestone by making a low-cost ventilator. This is the result of their perfect collaboration among the whole team.

Ventilators are basically used for patients with weak lungs. Ventilator helps patients to keep breathing even in situations when an individual is not capable of breathing on his own. It can not only force an individual's lungs to take oxygen and release carbon di-oxide but also it can decide how much oxygen the patient should take. This forced breathing can be done either through mouth or nose or by making a surgical way in the trachea. Durbar kandari is offering us all the features that normal ventilators have and also many other extra features in a lower cost.

This team blessed us with an invention like this at a time when the whole world is in need of ventilators. Bangladesh doesn't have enough ventilators, and, in this situation, it is almost impossible to buy ventilator. In this crisis Durbar Kandari has given as ventilators in low cost with bunch of extra features.

Durbar Kandari's ventilator comes with some great advantages. The ventilator has a range of 5-40 breathings per minute, it has inhale exhale ratio range of 1:2 to 1:4, it figures out how much air a patient's lungs need and delivers exact amount of air, this is also known as trigger breathing. This machine offers 40(cm H<sub>2</sub>O) of peak inspiratory pressure. Peak inspiratory pressure is the pressure that is applied to patient's lungs while using ventilator.





The ventilator's arms can take a break of 0.1 second after closing without hampering the inhale exhale ratio. This is necessary for the patients to keep the air in their body for required time. During this time the pressure that can be measured in the lungs is also shown in the display of the ventilator which will be a great help for the doctors to take decision based on the information. There are other plusses like humidifier to control the humidity of the air for the comfort of the patient. This ventilator can not only give a specific amount of oxygen for patients but also it can purify the package. The ventilator is an all in one package and it comes with a low budget.

The ventilator has bunch of features. It has different modes, alarm system, android application and web application. This invention supports volume control mode. There are two different modes. First one is AC mode where user can set the value of tidal volume, frequency, FiO<sub>2</sub> and PEEP. The machine will provide the air as instructed and breathing cycle will be completed whenever the user tries to breath. But the AC mode is not suitable for patients who are accustomed to fast breathing. The second mode is manual mode where an individual can set tidal volume, frequency, FiO<sub>2</sub>, inhale exhale ratio, peak pressure and PEEP. In this case the ventilator will provide air as instructed and complete breathing cycle in given frequency.

Another key feature of this ventilator is the alarm system. The ventilator provides five different alarms which are Exceeded PIP Pressure, Under Pressure Tube leak, Unmet Tidal Volume, Over Current Fault Gas Mechanical Fault Alarm. All these alarms indicate different faults in using the ventilator. If inspiratory pressure increases more than peak inspiratory pressure the system will stop pressuring the AMBU bag and inform authority by the exceed PIP pressure alarm. Any malfunction in breathing circuit will trigger Tube leak alarm. Under pressure alarm will notify authority about leakages and if the inspiratory pressure falls. The system can also notify if the tidal volume is not met or if there is any overflow of current in the circuit through the unmet tidal volume and over current fault.

Durbar Kandari has pushed the ventilator even further by developing android and web application. From any android device authority can connect to the ventilator through Bluetooth. The app will allow the user to set values for BPM, Tidal volume etc. User can also see the graph of pressure flow of patient using the app. This clearly gets the system far ahead of other ventilator systems.

They have done everything in their power to digitalize and make the system more accessible to the authority. They are developing a web app which will help the doctors to monitor multiple ventilators at the same time. It will also allow the authority to remotely access multiple ventilators via internet. Through patriotism and strong will this research team has come this far. They delivered an invention which is the most wanted device in a catastrophic situation like this. They not only delivered ventilators at lower cost but also pushed the system even further. This team is continuing their pursuit to better the life of others. They have already designed a low cost AMBU BAG to support the less earning people of our country. They also have other future projects like helmet ventilation system which will have their own designed CPAP BiPAP. They are planning to solve other social problems with their innovative ideas even after this crisis. In conclusion we hope they provide us with more innovations like these in the coming days.

Thousands of people are infected by deadly coronavirus everyday world wide. Being a contagious disease, Doctors and health workers are also infected by the coronavirus during taking care of affected patients. But, doctors can't leave their patients. But it is also important to save doctors and health worker's lives too.

To ease these situations, a team of ex ruetian, the members of an organization named 'Artificial Intelligence Bangladesh' step ahead with a brilliant idea. They developed a remote-controlled robot named Dr. Sitara Begum who will carry medicine to the patients and measure the patient's body temperature. If doctors command her to do so. The robot is capable of carrying 5-10 kilograms of weight and can work one and a half hours continuously. Developers also develop this robot in such a brilliant way that it can connect patients with doctors through a live video feed. Doctors can take care of and express his concerns through Dr. Sitara.

Dr. Sitara Begum has been named after Bir Pratik Dr. Sitara Begum. Currently, the robot is under trial. Developers are modifying it continuously under the supervision of experts. It will be produced very soon to help doctors and healthcare workers after trial. Shahida Afrin, project manager, said the robot was created keeping in mind the health risks of doctors and other medical personnel during the pandemic. She added technical team members who worked hard continuously under the leadership of team leader K.M Farzadul Islam. The robot was taken to RUET for trial and technical advice from experts. Prof Rafiqul Islam Sheikh, Vice-Chancellor of RUET, said that the robot can keep a crucial role if it is successfully tested at the field level. It would move Bangladesh one more step forward in Information Technology. The former head of the CSE department of RUET, Dr. Bashir Ahamed added, the robot requires some modification. The robot will be able to play a successful role after accomplishing the required modification.

Dr. Sitara will play a vital role in developing medicare management of the hospital during this pandemic. It can work as an assistant to the doctors and the nurses. Doctors will be able to control the activities of the robot by sitting at their places through a computer or mobile phone.



## Women in Engineering

Tahsin Tabassum

Chair, IEEE RUET WIE SB AG

**What is engineering?** Engineering is the branch of science and technology concerned with the design, building, and use of engines, machines, and structures. Engineers figure out how things work and find practical uses for scientific discoveries. It is engineers who are instrumental in making the innovations available to the world. From a very early age, it was considered that engineering is for men. Women were often under-represented in the academic and professional fields of engineering. But time has changed. Many females have contributed to the diverse fields of engineering historically and currently. Nowadays women are walking beside men in the field of technology and engineering. The history of women as designers and builders of machines and structures predates the development of engineering as a trade. Prior to the creation of the term 'engineer' in the 11th century, women had contributed to the technological advancement of societies around the globe. A possible reason for comparatively lower female participation in engineering fields is the prevalence of values associated with the male gender role in workplace culture. For example, some women in engineering found it difficult to re-enter the workplace after a period of absence. Because men are less likely to take time off to raise a family, this disproportionately affects women.

A new study co-authored by an MIT sociologist develops a novel explanation that is- The negative group dynamics women tend to experience during team-based work projects makes the profession less appealing. Also, women often feel marginalized. Although the number of female engineers today has greatly improved, it's still surprisingly low. Inspiring girls from a young age about the creative aspect of engineering is key to recruiting more women to the sector. However, women are being careful and positive regarding their career and workplace more now. The perspective of society for women in engineering is also changing as the ability, leadership, communication skills of women are emerging in a new and beautiful way. Also, a number of organizations and programs have been created to understand and overcome this tradition of gender disparity.



Such as '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. There is also an organization called Women's Engineering Society (WES) which is a charity and professional network of women engineers offering inspiration, support, and professional development. The whole world is hoping that the percentage of women in engineering will increase more in the next few decades.

## Application of IoT in Problem Solving of Developing Countries

M. M. Arif Bakhtiar, General member

### What is IoT?

In easy words, IoT is a system of computing devices with a unique identity and the devices can transfer data through the internet without the help of any computer or human. The Internet is used all over the world nowadays, the main purpose of the internet is communication. IoT devices use the internet to communicate with other devices. IoT is an amazing technology that can change the whole present world with comfort and accuracy.

### How IoT work?

The main parts of IoT are sensors/ devices, internet connectivity, data processing, and user interface. Firstly the sensors collect real-time data and send through the internet to the cloud or server, data is processed to display and then the user interface displays data to the user.

We know that sensors need computer programs to work properly. But if a sensor needs a new program instantly, that couldn't be possible if the sensor is located in a remote area. But IoT can do that, IoT supports real-time data uploading through the cloud. So one can program his sensor in his device, maybe the sensor is located in far away from him. The developed countries are already started using IoT technologies observing the benefits of this technology. The developing countries can use IoT in different fields too. We are going to discuss that.

### Agricultural Field

Agriculture is a major field in many developing countries. And irrigation is a very important parameter in agriculture. Plants need irrigation instantly when they need water. Irregular watering can affect the yield and productivity of the plants and their life. Some years ago, in developing countries, mechanical water pumps were used. But mechanical water pumps are being replaced by electrical water pumps in recent years because electricity is available nowadays. Farmers need very much time to irrigate their field, in this time he can't do other works and it's a boring task for a farmer to irrigate their land daily. But IoT can change his life, he can irrigate his land by one tap on his smartphone, sound's very easy, isn't it?

### Security

Security is a major problem in developing countries at home, streets, and offices. Many of the developing countries are densely populated. So it is hard for the police to find culprits even they have close circuit television footage. And it's always too late for the victim to reach the police. Sensors and cameras can be used together in real-time monitoring.



It is hard to monitor much footage at once for a single person but using machine learning such as face recognition, fingerprint with IoT the culprits could be detected and caught in real-time.

### Traffic

Traffic jam is a common event in some densely populated countries. Also, traffic rule-breaking is a common phenomenon. Both machine learning and IoT can be used to detect the rule breaker. If every vehicle has a unique and digital identity and the roads have a sensor that detects speeds or motion it is very much easy to find the rule breaker in real-time. A human cannot measure the speed of multiple vehicles at a time but for a sensor, it is an easy task.

So, IoT can solve some problems in developing countries.

## The Hydrogen Epoch of Reionization Array (HERA)

Fatema Akter, Secretary, IEEE RUET WIE SB AG

The Cosmic Dawn of our universe is one of the last unexplored frontiers in cosmic history. The hot, young universe expands and cools slowly in the background while gravitational instability around concentrations of dark matter causes primordial density fluctuations to grow. The Cosmic Dawn represents a specific epoch in this growth, where the first stars and galaxies formed and illuminated the universe en route to forming the astronomical structures we see today. Ultimately, this early population of gravitationally condensed material produced sufficiently energetic flux to reionize the Intergalactic Medium (IGM) from its previous neutral state in a period called the Epoch of Reionization. This period is the rapid transition from separated large reionized "bubbles" to the merged reionized state and to structures that begin to resemble the denizens of our current universe. The structure of the IGM thus contains a panoply of information about the underlying astrophysical and cosmological phenomena governing cosmic evolution.



The Hydrogen Epoch of Reionization Array (HERA) is a staged experiment to measure 21 cm emission from the primordial intergalactic medium (IGM) throughout cosmic reionization (redshift,  $z = 6 - 12$ ), and to explore earlier epochs of our Cosmic Dawn ( $z \sim 30$ ). During these epochs, early stars and black holes heated and ionized the IGM, introducing fluctuations in 21 cm emission.

HERA is designed to characterize the evolution of the 21 cm power spectrum to constrain the timing and morphology of reionization, the properties of the first galaxies, the evolution of large-scale structure, and the early sources of heating. The full HERA instrument will be a 350-element interferometer in South Africa consisting of 14 m parabolic dishes observing from 50 to 250 MHz. Currently, 19 dishes have been deployed on-site and the next 18 are under construction.

HERA has been designated as a Square Kilometre Array (SKA) Precursor instrument. HERA is designed to bring both the sensitivity and the precision to deliver its primary science on the basis of proven foreground filtering techniques while developing new subtraction techniques to unlock new capabilities. The result will be a major step toward realizing the widely recognized scientific potential of 21 cm cosmology. HERA's primary science goal is to transform our understanding of the first stars, galaxies, and black holes, and their role in driving reionization. Through power-spectral measurements of the 21cm line of hydrogen in the primordial IGM,

HERA will be able to directly constrain the topology and evolution of reionization, opening a unique window into the complex astrophysical interplay between the rest luminous objects and their environments. The spectral nature of 21cm cosmology means that the signal at each observing frequency can be associated with an emission time (or distance) to determine both the time evolution and three-dimensional spatial structure of ionization in the IGM. This 3D structure encodes information about the clustering properties of galaxies, allowing us to distinguish between models, even if they predict the same ionized fraction. With a new telescope optimized for 3D power-spectral measurements and with support for theoretical modeling efforts, the HERA program will advance our understanding of early galaxy formation and cosmic reionization.

### The Ocean Energy Shaharior Anik, Chair, IEEE RUET RAS SBC

The subject area Ocean Energy provides information about the use of resources of the world's oceans as an energy source. This may be in the form of mechanical energy from waves, tides, or currents, or in the form of thermal energy from the Sun's heat. The ocean can produce two types of energy- **1.Thermal energy from the sun's heat** **2.Mechanical energy** from the tides and waves. Oceans cover more than **70%** of the Earth's surface, making them the world's largest solar collectors. The sun's heat warms the surface water a lot more than the deep ocean water, and this temperature difference creates thermal energy. Just a small portion of the heat trapped in the ocean could power the world. Ocean thermal energy is used for many applications, including electricity generation. There are three types of electricity conversion systems:

- 1.Closed-cycle,**
- 2.Open-cycle,**
- 3.Hybrid.**



**2. Waves approach land**  
Regular waves, like radio or light waves, have a constant frequency and amplitude. Ocean waves, on the other hand, interact with each other, the environment, and the weather. By the time a wave approaches land, it's unlike any other. This is where researchers aim to extract the energy.

**1. Closed-cycle** systems use the ocean's warm surface water to vaporize a working fluid, which has a low-boiling point, such as ammonia. The vapor expands and turns a turbine. The turbine then activates a generator to produce electricity.

**2. Open-cycle** systems actually boil the seawater by operating at low pressures. This produces steam that passes through a turbine/generator.

**3.Hybrid** systems combine both closed-cycle and open-cycle systems.

Ocean mechanical energy is quite different from ocean thermal energy. Even though the sun affects all ocean activity, tides are driven primarily by the gravitational pull of the moon, and waves are driven primarily by the winds. As a result, tides and waves are intermittent sources of energy, while ocean thermal energy is fairly constant.

Before they break onshore, ocean waves pack immense energy. The energy of a single wave, for instance, could power an electric car for hundreds of miles. Researchers are working to harvest and convert that energy into cost-effective and reliable electricity.

**But how are ocean waves converted to electricity, exactly?** It's a process that begins with the sun:

1. The wind blows across the ocean, creating waves. The sun heats up air at different places around the globe, which creates wind that blows over ocean surfaces. The wind creates surface waves, like those that crash on a beach. The waves range in sizes (from ripples to nearly 100 feet tall) and can travel thousands of miles before they reach land with almost no energy loss.

**3. Waves Encounter Machines**  
Ocean waves are converted to electricity with wave energy converter, or WEC, devices. Researchers expect typical full-scale WEC devices to be anchored miles offshore in deep water where wave energy is strongest. Because WECs extract energy from waves of all sizes that move in multiple directions, identifying the type of machine that can most-effectively do this work is a key goal of the U.S. Department of Energy.

**4. Machines convert waves into electricity**  
In short, ocean waves will move a WEC and that motion drives a generator that creates electricity. How machines take this motion of low-speed ocean waves with high energy content and convert them into the high-speed motion required for generators is not fully understood. Neither is how to do this economically and reliably, while also surviving harsh ocean conditions.

**5. Electricity is applied to the grid or other needs**  
Wave energy could power the swaths of coastal homes and businesses. In fact, developing just a third of the available wave energy near Pacific states.

Wave energy is highly predictable and can be developed close to load centers to reduce transmission needs and ease integration onto the grid.

### HVDC in Bangladesh Khalilur Rahman, Chair, IEEE RUET SB

**Why HVDC in Bangladesh:**  
Bangladesh has huge demand in the electric power sector. There is always a gap between installed capacity and demand capacity.

The demand is very high compared to its generation. In 2009, the peak demand was about 5,500 MW compared to its power-generating capacity was only 3,800 MW, implying a peak deficit of 1,700 MW. So to supply the demand, Bangladesh was looking to buy electric power from outside of Bangladesh. So, they began to plan on how to improve the installed capacity. The HVDC technology helped Bangladesh to improve its installed capacity.

*[For now, the Total Installed Capacity (Including Captive Power & Renewable Energy) of Bangladesh is 22,727 MW as of 2nd December 2019. The demand forecast for Bangladesh is 17,304 MW in 2020 and 33,708 MW in 2030.]*

Every country uses different utility standards of electrical power as there grid voltage is different. If synchronous interconnection is used between two countries, then a grid of both countries would operate at the same nominal frequency and voltage. As a result, faults in one grid will affect other country's grid. But in an asynchronous interconnection will allow independent operation for both the country's grid and it would facilitate complete control of the power exchange. Asynchronous interconnection has also additional equipment to protect one system against damaging faults and it would negate the need for and surges from the other system. Therefore, for the safety of both countries, an asynchronous High Voltage Direct Current (HVDC) link was selected. To meet the required power demands of Bangladesh, HVDC technology was introduced.

#### **The first HVDC power station in Bangladesh:**

A new chapter was opened between Bangladesh and India in October 2013. The first-ever HVDC transmission line in the region is HVDC Back to Back Station, Bheramara, Kushtia situated in the western border of Bangladesh.



The HVDC Back to Back Station, Bheramara, Kushtia is operated by the state-owned Power Grid Company of Bangladesh Ltd (PGCB). It is the first-ever interconnection between the two countries in South Asia. The HVDC Back to Back Station in Bheramara, Kushtia began flowing 500 MW power from India to Bangladesh on 5th October 2013 after completion of the interconnection infrastructure. As of now, the power station has two Blocks. Both blocks have the capacity up to 500 MW each. Both work in parallel, so the total capacity of the station is up to 1000 MW power. Block 1 has been in operation since 2013 and Block 2 in commercial operation since 2nd July 2018. The 230-kV grid voltage of Bangladesh is connected via this substation and overhead lines to India's 400-kV grid.

Bangladesh is set to build another 500MW back-to-back High Voltage Direct Current (HVDC) station in Cumilla District. This station will import electricity from India as well.

#### **Why HVDC Back to Back Station is used:**

There are three general types of the asynchronous interconnection of HVDC transmission: Point to point transmission, Back to Back station, Multiterminal systems. Based on technical, operational, and economic considerations, the HVDC back to back interconnection was set up. HVDC back to back connected two alternating current systems on either side, without intervening transmission. A 400 kV switching station in Baharampur, India has two ends. One end of a 400 kV direct current (DC) transmission line is connected and the other end of the line was connected to a 400 kV transmission line at the India Bangladesh border and ends at the 1000 MW HVDC Back to Back Station. The station converts the power in DC then again change it to AC of 230 kV switching station in Bheramara, Bangladesh.

#### **The benefits of using HVDC in Bangladesh:**

The benefits of using HVDC stations are many. The main one, the control of the flow of power rapidly and securing the safety of both national grids from each other faults. The asynchronous interconnection is allowed adequate operational flexibility for connecting the power systems of both national grids. Also, the grid frequency is not the same as the countries.

Bangladesh's grid frequency is 49.5 to 51 Hz. Where India's grid frequency is constant at 50 Hz. As a result, no direct connection is possible. So, HVDC helps in connecting incompatible electrical frequencies. It also helps in exceeding short-circuit power levels. Also, the interconnection costs of HVDC are less than that bought from the rental plants.

Bangladesh reduced its energy deficiency by importing electric power from India. India gained revenue by selling its available energy to Bangladesh as well. For emerging countries like Bangladesh, the availability of reliable power transmission is very crucial.

#### **Contribution of Siemens:**

This HVDC Back to Back Station, Bheramara, Kushtia was established with the help of a world-famous company Siemens. The company is responsible for the complete construction of the HVDC system in Bheramara. All the electrical components including the protection, control and monitoring systems for the HVDC system, the converter transformers, thyristor valves, and the AC filters are supplied by Siemens.

#### **Conclusion:**

The significant challenge was choosing the mode of cross border grid interconnection in Bheramara, Kushtia it was the first time in South Asia. Bangladesh and India's cooperation helped in overcoming the barriers to reaching a purchase power agreement.

### **Crazy Predictions on Future Technology**

Taioba Ahmed Sowa, Newsletter Editor  
IEEE RUET SB



Here are some predictions or visions that have turned outrageous in present. Though I can't assure you the historical accuracy about all of them, they will doubtlessly remind you how confident predictions can never be guaranteed when it comes to future of tech.

1. "Everyone's always asking me when Apple will come out with a cell phone. My answer is, 'Probably never.'" by David Pogue, tech-writer, The New York Times, 2006.

This worst prediction of all time was proved wrong in 2007 by launching the iPhone in the market. Though in 2012, he gave his defense on that logic.

2. "The Americans have need of the telephone, but we do not. We have plenty of messenger boys." by Sir William Preece, Chief Engineer, British Post Office, 1878. Which turned out to be the worst prediction ever. As we know how telephone had taken place in the world for communication.

3. "Fooling around with alternating current (AC) is just a waste of time. Nobody will use it, ever." by Edison, 1889. But from the present scenario, it is evident how absurd the prediction of Edison was. Later on his prediction, the alternating current has taken over dc and is being used mostly everywhere.

4. "Machines will be capable, within twenty years, of doing any work a man can do" by Herbert Simon, 1956. Even after 44 years of Simon's 1976 target, we can think of kajillion things machines can't do that a man can. But thanks to AI we are nowhere near the independently thinking computer which Simon most probably alluded.

5. "The time has come to close the book on infectious diseases. We have basically wiped out infection in the United States." by William Stewart, 1967. Though some predictions are totally outrageous this man's quote was notable as he was the Surgeon General of the United State. Even after that HIV/AIDS, Severe Acute Respiratory Syndrome (SARS), and Influenza A virus subtype H1N1 are some of the diseases the State has gone through.

6. "Two years from now, spam will be solved." by Bill Gates, founder of Microsoft, 2004. During the World Economic Forum in Switzerland in 2004, Bill Gates, the founder of Microsoft made his wrong vision on spam through Microsoft indeed did a great job to eradicate the spam, at last, it wasn't successful as he predicted. Unfortunately, it has only increased.

7. "Apple is already dead." by Nathan Myhrvold, former Microsoft CTO, 1997. Microsoft CTO Nathan Myhrvold commented this when people like him in the computer industry would never believe how Apple has taken power with a smartphone.

8. "I think there is a world market for maybe five computers." by Thomas Watson, president of IBM, 1943. Of course, 1943 is quite a long time history and when he presented his vision, the computer also was not so small in size. At that time it was quite predictable people would never a computer which was so large as a house in size.

9. "When the Paris Exhibition [of 1878] closes, electric light will close with it and no more will be heard of it." by Erasmus Wilson, Professor of Oxford. From our present scenario and last century, it's quite clear how amiss his prediction marked. Without electric light our life and all other invention could never be thought of.

10. "The world potential market for copying machines is 5,000 at most." by IBM, to the eventual founders of Xerox, 1959. That was quite a farcical prediction of copying machines. Because from current situation it's visual that how in every minute we need copying machines.

11. "There is not the slightest indication that nuclear energy will ever be obtainable. It would mean that the atom would have to be shattered at will." by Albert Einstein, 1932. From Albert Einstein, it's quite an outrageous thing to hear from the present scenario. Because how nuclear energy is being used and the future plans using this energy are predicted, it clearly didn't match his vision.

12. "Nuclear-powered vacuum cleaners will probably be a reality in 10 years." by Alex Lewyt, president of vacuum cleaner company Lewyt Corp., in the New York Times in 1955. This was predicted when all over the world atomic power was thought to be taken over. But it didn't go to the mark. Still, now it is not in use.

13. "The cinema is little more than a fad. It's canned drama. What audiences really want to see is flesh and blood on the stage." by Charlie Chaplin, Charlie Chaplin, who was a successful stage performer could never have thought how a box-like technology would take over entertainment medium.

14. "Rail travel at high speed is not possible because passengers, unable to breathe, would die of asphyxia." by Dr. Dionysys Larder, Professor, University College London. Though he predicted it in concern of health rail travel was successful.

15. "The energy produced by the breaking down of the atom is a very poor kind of thing. Anyone who expects a source of power from the transformation of these atoms is talking moonshine." by Ernest Rutherford. Though energy is now used everywhere in our life.

16. "That is the biggest fool thing we have ever done. The bomb will never go off, and I speak as an expert in explosives." by Admiral Leahy. The atomic bomb was first exploded later that year. He predicted this when he advised President Truman during the Manhattan project to pursue the development of the atomic bomb.

17. "Almost all of the many predictions now being made about 1996 hinge on the Internet's continuing exponential growth. But I predict the Internet will

soon go spectacularly supernova and in 1996 catastrophically collapse." by Robert Metcalfe, 1995. Even after 24 years of his target 1996, the internet didn't collapse rather it increased and has spread all over the world.

18. "We will never make a 32-bit operating system." by Bill Gates, 1989. Microsoft launched a 32-bit operating system, Windows NT 3.1 in 1993.

19. "A rocket will never be able to leave the Earth's atmosphere." by New York Times in 1936

20. "X-rays will prove to be a hoax" by Lord Kelvin, President of the Royal Society, 1883. This prediction didn't match the present situation.

21. "The horse is here to stay but the automobile is only a novelty-a fad." by the president of the Michigan Savings Bank, 1903. In 1903, the President of the Michigan Savings Bank suggested Henry Ford's lawyer not to invest in the Ford Motor Co. as he thought automobile merely a novelty.

It is the future that can never be predicted 100% correctly and when it comes to technology it can change any time. Even great people can do mistakes about it when they unconsciously make predictions about the future.

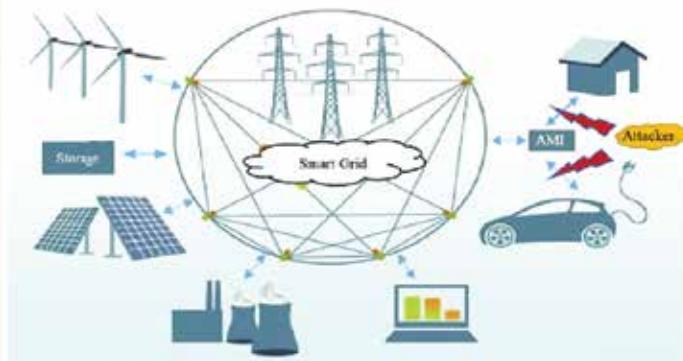
## Smart Grid and its perquisite | How Much Requisite The System

Arefin Islam, Secretary  
IEEE RUET SB

The word 'SMART' is becoming a very common word, right? Smartphone, Smart home, Smart appliances. Have you ever wondered about Smart Grid? How it looks like and how it is beneficial to all of us? Talking about Smart Grid, let's find out the definition at first.

According to the Wikipedia, 'An electrical grid which includes a variety of operational and energy measures including smart meters, smart appliances, renewable energy resources, and energy efficiency resources' So, it is nothing but a huge interconnected network where all the data associated with the

generation, transmission, and distribution are all together for analyzing in the purpose of making the system more efficient.



So, the big question is why we need a Smart grid, what are the benefits of it.

### Power Quality

Power quality was not a big concern in the back '90s, but now it becomes a big issue for Power Engineers. It refers to the ability of the electrical equipment how much power they can consume for the total amount of power supplied to them. The power quality of a power system network depends on the power factor, types of load, demand vs generation curve and as well as on the shape of the sine wave that indicates changes of direction of flow.

Smart Power Grid system can collect the data from all the consumers and equipment, calculate them and take necessary steps with associate power equipment to maintain the quality of the power at a good scale.

### Efficient Generation

One of the main reasons is to have the real-time data of the system is to have the exact amount of load of the system, because it is directly related to the generation. As we all know, there is no technology until now to store electrical energy efficiency on a large scale. So, the only option for a generation company is to generate as much power as the consumer need at that time. For this, they need real-time load data.

### An effective way to use resources

Smart Grid is the best way to make the full use of renewable sources. Energy from solar panels on every roof, wind turbine, and other sources can be

used effectively and their generated power can be transmitted through the grid.

### Safety

Safety is one of the major advantages of a smart grid system. As this kind of grid system collects real-time data from various points of the system, it can immediately detect any kind of fault or breakdown on the system, not only that it can take steps automatically to reset the system in the previous state.

### Economy

In this era, you can't ignore the economic factors in any sector. A new system is acceptable only when the model is economical. The smart grid system is way better in this aspect than the conventional one. It saves extra cost by making the system efficient, preventing fault and saving the costly equipment from being damaged.

On the other hand, as this system can accurately calculate and predict, the generation companies can make their plan accordingly so they will be profitable as well as meeting the demand of the consumers. Top of the discussion, no wastes of energy.

### Epilogue

After all of this discussion, you should be clear about the benefits of the smart grid system. So, there is no need to discuss more why we need this one. But one thing we must be aware of that, to convert the whole system we will require many sensors, smart equipment and so on that will not be an easy task to manage for developing and 3rd world countries.

Still, we can hope for the best that one day, our whole system will be smart at the same time 'WE' as well.

## Microcontroller: The wonder of Modern Electronics

Arif Ahmed, Graphic Designer, IEEE RUET SB

A microcontroller can be considered as the wonder of modern electronics. It has paved the way through countless opportunities for the development of the existing and new embedded systems.



Thanks to the Integrated Development Environment (IDE) and higher-level programming languages such as C, C++ the programming of microcontrollers has become more user friendly and less complicated.

### Introduction:

A microcontroller is a system on an integrated circuit (IC) consisting of a processor, memory, I/O ports, and some timer/counter circuitry. The fabrication of microcontrollers is commonly done by VLSI (Very Large Scale Integration) technology. A microcontroller can be of 8 bit/16 bit/32 bit/64 bit/128 bit. It can be used to control various devices by interfacing various sensors and peripherals.

Despite being simple in function in comparison to the complex microprocessors, microcontrollers can efficiently perform many complex tasks according to the instructions provided by the programmer.

### Structure of a Microcontroller:

A basic microcontroller comprises the following basic components:

**1. Central Processing Unit:** The central processing unit or CPU acts as the brain of the microcontroller performing arithmetic operations. It is also responsible for the generation of control signals and the management of the data flow

**2. Memory:** A microcontroller comprises both volatile and non-volatile memory embedded inside of it. The volatile memory is also known as RAM (Random Access Memory). It functions as temporary storage for the microcontroller as it loses everything if the power is interrupted. On the other hand, the volatile memory stores data even if the power is interrupted. It stores different data and also the machine code which consists of instructions for the CPU to perform.

**3. I/O ports:** The input-output ports of a microcontroller consists of both parallel and serial ports. The parallel ports can be useful for interfacing displays, printers, memory, etc. with the microcontroller. The serial ports are used for interfacing serially connected peripherals.

**4. Counters/Timers:** These are very significant for a microcontroller to function properly. These perform all timing and counting related functions of the microcontroller. A microcontroller may have more than one timer and counter according to the construction and application.

**5. Interrupt Control:** This function inserts a delay in the ongoing set of instructions. An interrupt can be of two types. Internal interrupts, which are used by the interrupt instruction in the code. On the other hand, external interrupts are used by using an external signal to the interrupt pin of the microcontroller.

**6. Analog to Digital Converter:** An analog to digital converter converts the input analog signal into a digital signal. The operation of ADC is useful for interfacing different analog sensors to convert the signals into digital for the microcontroller to process.

**7. Digital to analog converter:** A digital to analog converter basically converts digital signal to analog signals. It is useful for driving analog devices.

### Applications:

1. Microcontroller has a vast application in robotics and automation
2. It is used in many digital measuring and control instruments
3. It can be found in different displays (LED/LCD)
4. It is also used in peripheral devices such as keyboard, mouse, printers etc
5. It is widely used as peripheral controllers in personal computers

### Advantages:

1. The programming of a microcontroller is rather easy due to the IDE (Integrated Development Environment) and High level programming languages.
2. It is very cost efficient and compact in size due to large scale integration.
3. The performance of the microcontroller is significantly fast.
4. It contains many programmable pins that can be used according to the will of the programmer himself.

5. The troubleshooting is very user friendly and easy to do with very minimal experience in the field.

### Disadvantages:

1. The architecture of a microcontroller is quite complex because of having several components on a single chip.
2. It is unable of directly interfacing with high power devices or peripherals.
3. It can perform a limited operation simultaneously.

## Electronic Waste in Bangladesh

Ashraf Al-Khalique, Publicity Coordinator

IEEE RUET SB

Electronic waste or E-waste is a popular, informal name for electronic products at the end of their "useful life". These can also be described as any waste that has a circuit board or cathode ray tube. These wastages are produced from individuals & small businesses, large businesses & governments, equipment manufacturers, etc. Most of the E-Wastes come from Electronic products & they contain many toxic substances. In Bangladesh e- wastes are mainly produced from Televisions and computer monitors, Computers and computer peripherals (e.g. monitors and keyboards), Audio and stereo equipment's, CFL bulbs, Video cameras, Telephones, cellular phones, and other wireless devices, Fax and copy machines, Video game consoles, medical and dental equipment, etc. These e-wastes release heavy metals and toxic substances such as Mercury, Lead, Cadmium, Zinc, etc. Most of this e-waste is produced from specific e-waste concentration areas. In Dhaka, the concentration or highest disposal /storage of E-waster are in Islampur, Kamrangirchar, Ginger, Mirpur (11, 12) and Mohammadpur, etc. Now, these e-waste has environmental, economic, and health hazards on the people and the country.

E- wastes affect the environment by emitting hazardous components like Mercury, Lead, Cadmium and some part of an electronic device consisting of the same components. For example, a cathode ray tube releases Pb, Ba which releases Phosphor into the groundwater. Printed circuit board discharges Sn, Hg, Pb into the ground & water.

# EVENT RECORD

Burned wire releases Hydro Carbon ashes into the environment.

Major health hazards created due to e-waste are kidney, liver, and neurological disease caused by inhaling or being in touch with Cd, Hg. Moreover, several physical problems like hearing problems, behavior problem, and mental damages are caused by Pb.



Furthermore, the government is facing huge costs to handle e-Waste and they cause a serious disposal &management problem. AS a result, it is hampering economic development.

Fortunately, many initiatives are being taken and laws are being enforced by our government. These processes are mainly known as the e-waste management system. Following actions can be taken as part of way forward:

1. Inventory of E-waste in large cities of Bangladesh
2. Develop E-waste policy and guideline with consultation with the relevant stakeholders
3. Establish efficient collection system at least for selected electronic waste
4. Registration and capacity development of E-waste recyclers
5. Introduction of Environmental Management System in E-waste sector
6. Establish E-waste tracking mechanism in order to update the inventory
7. Awareness raising and development of communication material (poster, leaflets, brochure, TV spot)
8. Monitor e-waste trafficking and shipment.

## My journey to IEEE RUET SB

Salma Akter, Volunteer, IEEE RUET SB

I have had social anxiety my whole life and I have been missing out many things for this reason. Like the time, when I really wanted to participate in a book reading competition, but I didn't have the courage to stand up and ask the teacher to sign me up. I really regret that and many decisions like this one.

In 2019, I decided that I couldn't let opportunities go anymore for my incompetence to speak up. So, I signed up as a volunteer for IEEE RUET Student Branch. I took that decision on a whim, and I am glad that I did. That decision was a big turning point for me. I had to do a lot of things I always feared and never thought I could do. It took a lot of energy just to introduce myself in front of other members. It wasn't easy for me.

I thought of quitting many times. The other members of the branch were very supportive. They are the main reason I didn't quit. I had a really great time working with them. Sometimes the pressure and responsibilities were exhaustive, but I enjoyed it. It helped me to be mature and responsible. I learned to make big decisions and improvise when needed. People mainly join IEEE to thrive in their technical skills. But my concern was to overcome my incompetence to communicate with others. After my one-year journey with the IEEE RUET student branch, I can say that I have succeeded in conquering my fear. I am thankful to the beautiful people of this branch for relying on me and supporting me in achieving my goal. They are a bunch of hard-working and compassionate people who ensure a friendly environment for newcomers. The experience I gathered here working with these people, will always be beneficial for me in life, both professional and personal.

People ask me often what I achieved here. I want to say, I am a more confident and responsible person now. Obviously, my technical knowledge has improved by attending various seminars and workshops organized by our branch, but my actual achievement is the confidence and sense of responsibility formed in me.

## Special Activities of IEEE RUET SB

YEAR	EVENTS
2015	RoboTour & Programming Contest Green Brain 2015
2016	Intra RUET Robo-App Challenge Robodroid-Championship
2017	1st Industrial visit
2018	The Ultimate Innovator Hunt
2019	Workshop on Antennas and Propagation (WAP)
2020	Industrial Visit at HVDC Back to Back Station Techshield-2020

## Physical Events of 2020

### Join IEEE: Be a Part of The World's Largest Technical Community

10 January, 2020

IEEE RUET Student Branch

Advancing Technology for Humanity

JOIN IEEE

BE A PART OF THE WORLD'S LARGEST TECHNICAL PROFESSIONAL COMMUNITY

Joining Deadline Conducted by  
IEEE RUET SB  
20 December, 2019

Offered Benefits

- IEEE Xplore digital library
- IEEE Technical Societies
- IEEE Mail service
- IEEE Spectrum
- IEEE Projects and Competitions
- IEEE Technical Programs
- IEEE Community and IEEE TV
- IEEE Resume Lab

Our Activities

- Competition
- Workshop
- Seminar
- Science
- Technology
- Communication

For Any Query

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Free Membership of

- Power & Energy Society
- Signal Processing Society

The Institute of Electrical and Electronics Engineers or IEEE is the world's biggest platform for Engineering Students and Professionals consisting of over 4,00,000 professionals and over 70,000 student members. 'Advancing Technology for Humanity' holding this motive, the institute is dedicated entirely to the advancement of technology with all the available resources for more than a century. Its glorious history shows that many famous scientists and engineers have worked with the institute.

## Workshop on MATLAB Simulation

24 January, 2020



IEEE RUET Student Branch successfully organized a skill developing workshop on "MATLAB Simulation" with around 90 participants on 24 January 2020 at EEE Hall Room, EEE building, RUET. The workshop started at the scheduled time at 10 am with a satisfied amount of participants after providing useful kits. The appearance of our respected guests, Md. Abu Hanif Pramanik sir (Lecturer, Dept. of ECE, RUET), Md. Mabbubur Rahman sir (Lecturer, Dept. of ECE, RUET), Belal Hossain sir (Lecturer, Dept. of EEE, RUET) made the event fruitful.

Our honorable speaker, Dr. Tushar Kanti Roy sir (Assistant professor, Dept. of ETE, RUET) gave a short speech and started conducting his session on MATLAB Simulation. Throughout the session, participants worked practically along with Tushar Kanti Roy sir. IEEE RUET Student branch volunteers were present to meet the demand of participants. After the completion of the session, the feedback was taken which was extremely good. Then a small token of appreciation was given to our respected speaker by Alok Kumar Paul sir (Assistant professor, Dept. of EEE, RUET). Finally, the workshop came to an end at 12 pm after distributing certificates and refreshments among the participants.

## Seminar on Thesis Paper Writing & Research Publications

30 January, 2020



IEEE RUET WIE Student Branch Affinity Group successfully organized a seminar entitled "Seminar on Thesis Paper Writing & Research Publications" in association with IEEE RUET Student Branch on January 30, 2020, at RUET auditorium. Honorable Speaker, Prof. Dr. S. M. Abdur Razzak, Professor, Dept. of EEE, RUET, conducted the session about Research paper writing procedures as well as research publications and guided the aspiring participants throughout his insightful speech. An interactive Q&A session was followed by that. The presence of an Honorable guest,

Prof. Dr. Md. Abdul Goffar Khan, Dept. of EEE, RUET, and his valuable speech encouraged all the participants. Following that, Tasnim Binte Shawkat (Assistant Professor, Dept. of ECE, RUET) and Milton Kumar Kundu (Lecturer, Dept. of ECE, RUET) honorable special guests of the seminar, also enlightened everyone by their promising speech. After that, a gift as a token of appreciation was presented to our honorable speaker, Prof. Dr. S. M. Abdur Razzak sir for conducting the program in such a beautiful way.

Right after that, Tasnim Binte Shawkat Ma'am announced the winners of 'Call for event proposals' organized by IEEE RUET WIE Student Branch Affinity Group and 'Online CV Writing Contest' organized by IEEE RUET Student Branch. Small gifts were presented to both the winners as appreciation by Prof. Dr. Md. Abdul Goffar Khan sir and Prof. Dr. S. M. Abdur Razzak sir. With a photo session, the program came to an end. With nearly 220 participants including both IEEE members and non-IEEE-members from different universities, it was a remarkable seminar and was the first event of IEEE RUET WIE SB AG in 2020.

## Application Requirements, University & Scholarship Search in US

20 February, 2020



For manifestations of research and higher education, IEEE Computer Society RUET Student Branch organized a seminar on "Application Requirements, University & Scholarship Search in the US". Mr. Ruhul Amin, the coordinator in EducationUSA, a global organization supported by the US government working to guide students getting into a U.S. University, was the speaker of the interactive seminar. This seminar provided current, accurate and updated official information that shows the scopes in higher studies in the US. The one and half hour presentation in the

seminar, covered the basic process of application in the US and their requirement, Scholarship information and best-fit Universities. This section provided a question-answer segment so that joining individuals can quench their thirst for higher studies. It is the greatest opportunity for those students who are interested to go for higher study in the US.

Speaker's Profile: Ruhul Amin  
EducationUSA Outreach Coordinator  
Edward M.Kennedy Center

## Seminar on Humor Research & Higher Studies in Abroad

23 February, 2020



To fulfill student's interest in humor research and answer their questions about higher studies abroad the "Seminar on Humor Research and Higher Studies in Abroad" took place on Feb. 23, 2020, at 5:00 pm. The event took place in the EEE Hall room. The seminar was conducted by Nabil Hossain, Ph.D. Candidate, University of Rochester, New York. The seminar was also attended by honorable Dr. Md. Abdul Goffar Khan sir (Professor, Dept. of EEE, RUET), Md. Yeakub Ali Sir (Lecturer, Dept. of Electronics & Telecommunication Engineering, RUET), and Belal Hossain Sir (Lecturer, Dept. of EEE, RUET). A handful of students attended the seminar to fulfill their interest in both topics. The seminar was divided into two sections, the first section was about FunLines where the spokesman introduced the audience with his research "Stimulating Creativity with FunLines: A Case Study of Humor Generation in Headlines" and the second section was about higher study opportunities in abroad. Students were offered the opportunity with an interactive session with the speaker where they could know more about the topics from the speaker. The seminar ended at almost 7:00 pm. Food and kits were provided for the attending students in the seminar. After the seminar, the speaker was presented with a small token of appreciation by the honorable faculty member Md. Yeakub Ali Sir (Lecturer, Dept. of Electronics & Telecommunication Engineering, RUET).

## Seminar on IoT based System & Electric Vehicle

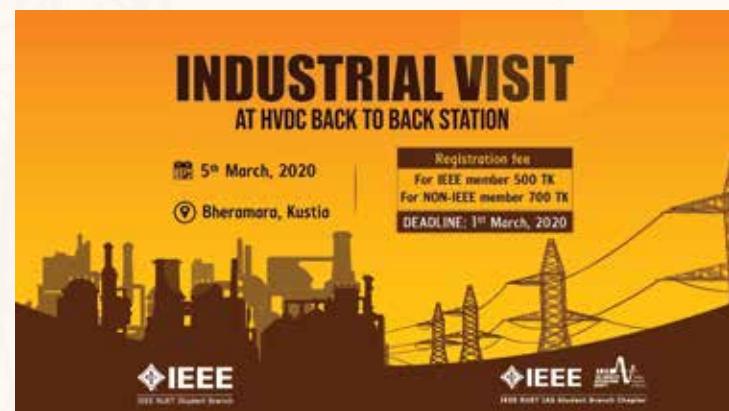
27 February, 2020



To spread out the knowledge of IoT also known as "Internet of things" & its improvisation on Electric vehicles, IEEE RUET RAS Student Branch Chapter organized a "Seminar on IoT based system & Electric Vehicle" in association with IEEE RUET Student Branch. Our honorable teacher, Prof. Dr. Md. Rokunuzzaman, (Professor, Department of Mechanical Engineering) was the designated speaker of this seminar. Prof. Dr. Md Nurul Islam (Professor & Head Dept. of Mechanical Engineering, RUET) was our chief guest. Throughout the seminar, the speaker highlighted different knowledge on IoT including its applications and talked about some applications of IoT which are already being used & some outstanding applications which can be done using IoT to make our daily life easier. Alongside he talked about some IoT projects as well as discussed his own. He also brought up some light on automation with some simple yet clear and technical words. Later on, he highlighted how automation can affect on Electric Vehicle industry & how it can affect the future of our world. Lastly our chief guest, Prof. Dr. Md. Nurul Islam presented a small token of appreciation to our speaker, Prof. Dr. Md. Rokunuzzaman.

## Industrial Visit at HVDC Back to Back Station

5 March, 2020



From the urge to get the slender essence of real-life industrial experience, IEEE RUET IAS Student Branch Chapter, in association with IEEE RUET Student Branch organized a visit to HDVC Back to Back Station, Bheramara, Kushtia on 5th March 2020 with around 45 enthusiasts. Prof. Dr. S. M. Abdur Razzak (Professor, Dept. of EEE, RUET), Milton Kumar Kundu (Lecturer, Dept. of ECE, RUET), Suvra Prakash Biswas (Lecturer, Dept. of ETE, RUET), Abu Hanif Pramanik (Lecturer, Dept. of ECE, RUET) and A.S.M.Badrudduza Kanon (Lecturer, Dept. Of ETE, RUET) joined along with the devotees. On the breezy morning of 5th March at 8:10 am, to requisite the knowledge the journey towards HVDC station was started from RUET main gate by RUET bus. Meanwhile, on the bus, snacks were given to participants. After reaching the destination, participants were divided into two groups. One group was briefed on the control system and valve house -where the main rectification occurs in the facility and side by side, and the rest observed the transformers, transmission lines, filter section, and other parts and how the parts contribute in this station.

An executive Engineer demonstrated how 1000MW power is transmitted from India to Bangladesh via HVDC back to back parallel operation. Point to be added that as per the demand of our nation the HVDC Back to Back station supplies the power from India (which was contracted) to Bangladesh. The station makes the voltage from AC to DC and again converts DC to AC because it controls the power supply and keeps the frequency steady. Later on, two groups switched their position and got the opportunity to gather all the basic information about the sub-station.

Throughout the tour, students got the opportunity to get familiar with various devices that were only encountered in books. Which allowed them to visually examine thermistors, transformers, filters, rectifiers, inverters, etc. first hand. After finishing the tour, two groups gathered in the conference room where our respected Milton Kumar Kundu expressed the utmost gratitude towards the officials. Prof. Dr. Md. Abdur Goffar khan (Professor, Dept. of EEE, RUET) presented a token of appreciation to Sakhawat Hossain and gifted small presents to all the speakers. The visit was concluded with lunch in Ruppur. Finally, at 6:40 pm the journey ended at Rajshahi by providing certificates to the participants. It was a successful first industrial tour of this year, as it inspired the enthusiasts to dream big and work in these types of prestigious power field.

## TechShield 2020

24 September, 2020



IEEE RUET RAS Student Branch Chapter and IEEE RUET WIE Student Branch Affinity Group in association with IEEE RUET Student Branch sponsored by Asian Traffic Technologies Limited organized "TechShield 2020", a pilot event of IEEE Yesist12 (Youth endeavors for social innovation using sustainable technology) and a contest for those with innovative ideas. IEEE YESIST12 is an international talent show for students and young professionals to showcase their innovative ideas to solve humanitarian and social issues. The contest was divided into three rounds. The first round of "TechShield 2020" included only abstract submission. In this section of contest almost students from 25 different universities submitted their ideas. 31 proposals were selected in the first round. The second round consisted of showcasing the developed idea, explaining, and demonstrating virtually. Only the top teams participated in the second round. On 24th September 2020 from 10 am to 1.30 pm, the judgment of project showcasing and presentation took place. The judges were Prof. Dr. Md. Al Mamun, Professor Dept. of Computer Science & Engineering, RUET, Dr. Sajal Kumar Das, Head & Assistant Professor of Mechatronics Engineering, RUET and Tasnim Binte Shawkat, Assistant Professor, Dept. of Electrical and Computer Engineering. On the same day at 5 pm the result was announced, and the closing ceremony was held. Prof. Dr. Md. Faruk Hossain, Head and Professor, Dept. of Electrical and Electronic Engineering, RUET joined the closing ceremony as the chief guest and Prof. Dr. SM Abdur Razzak, Professor, dept. of electrical and electronic engineering, RUET declared the result on behalf of IEEE RUET SB. During the closing ceremony of this pilot event, Ms. Tasnim Binte Shawkat, Assistant professor, dept. of electrical and computer engineering, RUET, Naveenthakrishnan Ramanathan, Chair, MakerFair Track, IEEE Yesist12 2020 and Ramneek Kalra, Project Engineer, Wipro Limited, India, and IEEE Yesist12-2020 volunteer were present there.

The champion team was one man army, 1st runners up were- RUET Amplifier, মাস্টারমশাই, 2nd runner up was the Mandalorian, the 4th positioned team was Geeky Blinders and the recommended team for the special track was Cybertron. Finally E-monuments were presented to our respected judges and guests for their amazing contribution throughout the event from IEEE RUET SB. Thus this successful pilot event ended at 6 pm.

# TOP 3 ABSTRACTS IN TECHSHIELD 2020

Project Name: Disaster Managing Scout Rover  
Team Name: One Man Army.  
Md. Jawadul Karim., Dept. of ECE, RUET

## Abstract

The following project is based on moving rover which acts as both pre and post disaster managing. The structural design of the rover is based on Mars Rover "Curiosity" and "Perseverance". For movement in any rough and uneven surface, may it be mud, rocky surface, sand or soil, the rover will be able to cross those places. The front two wheels will act as a steering mechanism for the rover. The main body of the rover will be considerably higher from the surface. So, it can move also in water. For detecting the water level, there will be a water level sensor attached to one of its legs, allowing the user to know the water level. The rover will consist of a 4 degrees of freedom (DoF) robotic arm which will not only be able to pick and lift up items but also clear any obstruction in its path by moving them aside. It will also assist in doing things like opening a drawer, pressing buttons, rotate valves. Apart from these functions the rover can also grab or hold particular objects of its own without any user commands. The rover will have multiple sensors (11) in it, mainly for knowing the weather parameters. Now these sensor data can be obtained by the user using a mobile app only used for displaying and storing the sensor data obtained from the rover wirelessly using radio frequency.



Fig : Prototype Version of the rover

The head of the rover will consist of a WIFI Camera with a high gain antenna which will give live footage of the rover surroundings by moving the head both horizontally and vertically. A night vision camera will also be provided for better visual at night. In addition to it there will be an option for measuring distance of any object from it. The head will also have a high power led light which will automatically glow in the dark allowing the rover to move efficiently at night. The frontal and the surface of the rover body will have two long range flash lights which will act as a beacon or visual locator in conditions like stormy weather or in sand storm. The rover will have a vibrator sensor which will notify the user and others if there is earthquake in the particular area. It can also detect flame presence of its surrounding. In addition to these, it will also have extra two gas sensors used to detect any harmful gas and also help to detect flammable gases nearby. When moving in stormy weather, sandstorms or at night, it's not easy to locate the current position. So, the rover will have a magnetometer allowing us to locate the Cardinal Position (East, West, North, South) and also ground level the rover is standing on. Plus, a GPS Module through which we can locate it in map. Now this information will be sent constantly to the user.

Project Name: Master Moshai  
Team Name: Information  
Md. Omar Faruque & Md. Ashraful Alam  
Dept. of EEE, KUET

Let's say there is a child of two or three years old sitting before a humanoid robot. Now the baby has toy like A,B, C, D, ক, খ, গ, ঘ i.e. English, Bangla letters ,0 to 9 numbers. If the child put a toy like A, the robot will say 'Say A', if the baby takes a kaw(ক), the robot will say, 'Say kaw(ক)'.

Thus the robot can recognize all English, Bangla letters, 0 to 9 numbers. Here we can use sponge wood or cork wood to make toy like A,B,ক,খ i.e. letters and numbers.



Fig :The robot detecting 'A' put by a child

So basically we made an educational robot that can recognize letters and teaches those letters a child in a joyous and funny way. Note that the humanoid robot also attracts children tremendously. Besides it is very important for children to learn writing letters properly. Thus if we can make an interactive session where robot will read and pronounce the letters, word even sentences written by a child it will make a very affective way to teach them writing in a joyous mode. Hence to serve this purpose another important feature in our robot is letter ,words even sentence reading as well speaking. But the difference between ours and all other globally available educational robot is that our educational robot is cheap and affordable for any middle class family. Because it will cost only 25 \$ or 2000 BDT. Besides it will really have some Artificial intelligence to take decisions, some humanoid characteristics like vision and speaking that are not yet available in Bangladesh and even not globally with this much low price.

Project Name: BoticaBot  
Team Name: Cybertron  
Md. Sabit Shahriar Haque, Dept. of EEE, AUST

## Main objectives

- To lessen the hassle of the patient to take medicine.
- To enable the patient able to take medicine on their own.
- Dispense of medicines from pillbox at a scheduled time.

- To notify the patient via different devices used by him.
- To notify the patient via the pillbox using alarms.
- Alert the patient to refill the stock.
- To ensure real-time health statistics monitoring of medicine intake by any family member from anywhere around the globe.
- To ensure user-friendliness.



## Working Procedure

At first the patient or attendant chooses a certain drawer and puts the medicine in the designated drawer. The user has to set the time at which he or she needs to take the pill. Then he has to enter the total no. of pills in the drawer. When it is the preprogrammed time the user will be notified by the buzzer of the pillbox. The alarm has to be set off through the app. The patient takes the medicine and pushed back the drawer. The user has to press the button as many times as the number of pills he or she has taken. If the device senses that the stock is running low it will warn the user beforehand. The pillbox is connected with the cloud. When the user pushes the button, the confirmation is sent to the cloud.

## Efficiency

This pillbox is going to save a lot of time of the user. Besides, there are so many old people who have Alzheimer and can't remember a lot of stuff. As a result, they need to hire someone to take care of them. This smart pillbox will save their money.

## Online Events of 2020

1. Article Writing & Poster Design on Covid-19	18 April, 2020
2. IEEE PES Day Meetup	5 June, 2020
3. Fight Against Covid-19 Pandemic using Machine Learning	14 June, 2020
4. AI and Edge Computing using IBM Power 9 platform with IEEE RUET Student Branch	24 June, 2020
5. Transition to the 5G Network & Envisions for Implementing Broadband Plan	13 July, 2018
6. CareerSpark Webinar Series	11 July, 2020- 18 July, 2020
7. Applications of Different Nonlinear Control Techniques for Converter-Interfaced Renewable Energy Sources	21 July, 2020
8. Intra RUET E-Sports Tournament: Valorant	25 July, 2020
9. A Complete Guideline for Participating in IEEEExtreme and Experience Sharing	8 August, 2020
10. The Role of Electric Vehicles in Next Generation Power Systems with Renewable Generation.	13 August, 2020
11. Celebrating University Day 2020	1 September, 2020
12. Mega Webinar Event on ISS based Stem Education, Digital Economy and Empowering Hi-Tech Technology	14 September, 2020
13. 100% Electricity from Renewable Sources: Challenges and Opportunities	18 September, 2020
14. TechShield-2020	24 September, 2020

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**Tasnim Binte Shawkat**

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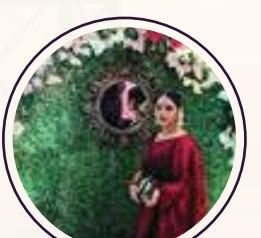
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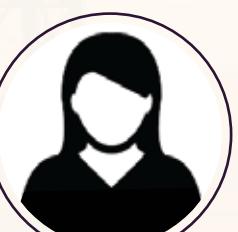
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## GALLERY

### Reminisce of IEEE RUET SB Activities



Industrial Visit at HVDC Back to Back Station, Bheramara, Kushtia, 2020



Seminar on IoT based System & Electric Vehicle, 2020



Seminar on Thesis Paper Writing & Research Publications, 2020

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Seminar on Humor Research & Higher Studies in Abroad, 2020



Workshop on MATLAB Simulation, 2020



Workshop on Plasmonic Sensors, 2019

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Celebration of IEEE Day 2019



ICECTE 2019



IEEE Annual General Meeting 2019

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IEEE Annual General Meeting 2019



10th Anniversary  
Celebration of IEEE RUET Student Branch, 2019



Short course on  
POWER ELECTRONICS CONVERTERS, 2019



Seminar on 'Career Prospects & Opportunities of Artificial Intelligence in Japan' 2019



Workshop on Antennas and Propagation, 2019



Celebration of PES Day 2019



IEEE Bangladesh Section SYWM Congress 2018



IEEE DAY 2017



Workshop on IEEEExtreme Programming Competition 11.0



Seminar on Fast Charging of Solar Based Electric Vehicles, 2019



Short Course on HVDC POWER TRANSMISSION, 2019



Insights of A Dissertation Research Project/Thesis, 2019



1st Technical Tour 2017



Celebration of IEEE Day 2016



IEEE DAY 2015



Celebration of IEEE Day 2018



9th Anniversary of IEEE RUET SB, 2018



Seminar on IEEE Membership Development, 2018



Robodroid-Championship 2016



Green Brain 2015



Introduction to Nuclear Power Plant in BD, 2015



ICEEE 2017:  
The 2nd international conference of RUET



The Ultimate Innovator Hunt, 2018



Projects Showcasing  
The Ultimate Innovator Hunt, 2018



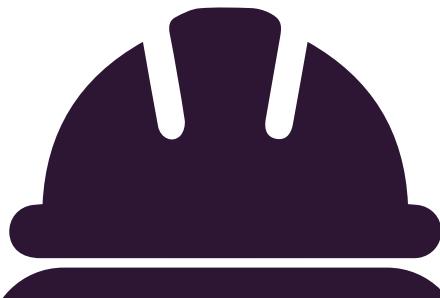
Celebration of IEEE Day 2014



Delegate, IEEE Region 10 Student/ GOLD/  
WIE Congress in Auckland, New Zealand, 2011



Delegate, IEEE Region 10 Student/ GOLD/  
WIE Congress in Hyderabad, India, 2013



## Future Plan



Industrial tour



International Symposium



International Virtual Summit



International Conference on Energy, Power  
and Telecommunication Engineering



Through highs and lows, IEEE RUET STUDENT BRANCH has accomplished numerous achievements from where it started 11 years ago. Starting from scratch, it has matured into one of the most prominent student branches in Bangladesh. IEEE RUET Student Branch has established their worth and their capability throughout this long journey. We aspire to watch it grow up to its full potential and be triumphant in every upcoming challenge in the coming days. We are very thankful to all teachers & students for staying with IEEE RUET SB. Your valuable presence encourage us to arrange more effective programmes. We tried to expose a little part of IEEE RUET SB activities in "Inspira-2021". Please excuse us if there is any mistake and pray for us so that we can represent IEEE RUET SB globally through our activities successfully.



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## Affinity Group & Chapters

