



ELECTRO SANCHAR

The Electrons around you...

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Estd.2000

ABES ENGINEERING COLLEGE



ELECTRO SANCHAR 2018

Department of Electronics & Communication

Engineering, established in the year July 2000 has been accredited by "National Board of Accreditation (NBA)" upto 2019. ECE Department offers under graduate level programme with the annual intake of 180 students and Post graduate Programme with annual intake of 18 students in "Electronics & Communication Engineering". Department has seen remarkable growth in terms of quality of students intake, inclusion of post graduate programme. Department has well equipped Labs with necessary hardware and software to meet the curriculum requirements at undergraduate and post graduate level, they not only meet the academic curriculum but also industry requirements.

VISION

To contribute to India and the world through excellence in education and research in the field of Electronics & Communication Engineering and to serve as valuable resource for the industry and the society at large.

MISSION

To create an environment which shall encourage the development of innovation professionals and researchers in the cutting edge technologies of Electronics & Communication Engineering in line with industry requirements and to impart professional ethics with positive attitude.

TEAM MEMBERS

Sh. Neeraj Goel (Chief Patron)

Sh. Sachin Goel (Patron)

Dr. Gajendra Singh (Editor-in-chief)

Dr. Sanjay Kr. Singh (Editor)

Faculty Members

Ms. Ranjeeta Yadav
Dr. Raman Kapoor
Mr. Rakesh Kumar
Ms. Tania Gupta

Student Members

Ms. Tanisha Aggarwal
Ms. Preeti Anand
Ms. Shruti Singh
Mr. Siddhart Vats
Mr. Suryansh Singh

From The Desk Of Editor-in-Chief



Dear Readers,

"Education is not preparation for life. Education is life itself." It is my pleasure & great privilege to present to you the information bulletin cum magazine of the ECE department. For both individuals and nation, technical education is vital for technology development, either as a way of developing human capacity that would aid in industrialization and environment protection or personnel empowerment. A common belief is that education's purpose is to replace an empty mind with an open one. Let's go a little beyond and find out what exactly education meant in the past and how, over the decades it has fundamentally altered the present education in our country. In this bulletin, one can find all the information about ECE department as well as the recent activity of ECE department in academic and research. Finally, I wish all the best to all students, staff and faculty members of the department.

Sincerely,
Prof. (Dr.) Gajendra Singh
Director, ABESEC

From The Desk Of Editor



Dear Readers,

We are presenting you a magazine cum information bulletin called "Electro Sanchar". It is a matter of honor that our department is publishing this bulletin. The idea of updating the faculty and students with the current happenings in the department is creditable. It is glad to see the teacher-student community of our department strive to reach greater attitude. The Electronics & Communication Engineering department, ABES Engineering College, Ghaziabad takes its faculty & students through the journey of some of north India's leading educational institute/colleges through this bulletin. I hope this issue of departmental e-magazine will encourage the students, future students, staff and faculty.

Sincerely,
Prof. (Dr.) Sanjay Kr. Singh
HOD-ECE

A Note from HOD (ECE)

Dear Readers,

A warm and affectionate welcome from the Department of the Electronics and Communication (E&C) Engineering of ABES Engineering College. Electronics Engineering is a dynamically changing and widening branch of the engineering profession, having applications in every discipline of engineering. It is the driving force behind rapid development in latest technological growth. Electronics and communication engineering provides excellent career opportunities in various sectors of Industries. The department has a fine blend of qualified and experienced faculty and staff members. We are continuously striving hard to improve upon the quality of education and maintain its position of leadership in engineering and technology. The Department is equipped with state of the art Laboratories to provide adequate opportunities for the students to learn and innovate new skills and ideas.

The Industry Academia relationship helps in developing a powerful engine for innovation and economic growth. This relationship helps in modernizing teaching and learning methods by fostering an exchange of ideas and skills. It also develops people with the skills and competencies required for new innovations which transforms world-wide markets and industries.

The main goal of the department is to develop innovative professionals and researchers in line with the requirement of industry and research organizations. At ABES we are committed to create an environment for the students where they can develop critical thinking and problem-solving skills. I am confident enough that our students will prove to be an invaluable asset for any organization.

Highlights of ECE Department

(NBA Accredited up to 2019)

4 YEARS B.TECH. (ECE) | 2 YEARS M.TECH. (ECE)

Electronics Engineering Department stands tall amongst other branches of Engineering disciplines. Established in the year July 2000 and offer under graduate level programme in 'Electronics and Communication Engineering', the Department has seen remarkable growth in terms of quality of students intake, inclusion of post-graduate programme 'Electronics and Communication Engineering'.

The Department is headed by Prof. Sanjay Kr. Singh. He is assisted by a team of dynamic, competent and energetic faculty members and equally accomplished and qualified technical staff.

Department has sufficient labs equipped with necessary hardware and software to meet the curriculum requirements. There are two Professional societies student chapter in department for students which gives opportunity of interaction with industries in core electronics field.

Department has also established an R & D Lab, sponsored by AICTE equipped with latest Embedded system and VLSI design equipment and tools. Dept. of ECE has recently signed MoUs with The Tag Factory, Associated Electronics Research Foundation, System Infra Solutions Pvt. Ltd., Stroller Mounting Systems and CDAC Noida for better placement and academic activities. The department arranges trainings and Workshop programs during summer and winter vacation under the aegis of Career Diagnostics Cell (CDC).

ECE Department runs consultancy projects from Stroller Power and TechM. This year ECE dept. has successfully completed 3 MSME projects and applied for 3 more MSME projects in the area of ICT, Embedded Systems, VLSI, and Communication. Department is now setting up an incubator cell with an aim to offer our students the opportunity to work on real time problems & projects.

Strengths

- ✖ Dynamic and competent Faculty members.
- ✖ Career Diagnosis Cell (CDC) for employability
- ✖ enhancement
- ✖ Incubator Cell
- ✖ In-house training Center
- ✖ Electronics ICU for R&D
- ✖ Faculty & Student Publications (Session 2017-18): 50+
- ✖ Books Published: 6
- ✖ MoUs with Renowned Universities and Industries.
- ✖ Well equipped Project Lab & Modern Laboratories
- ✖ Latest Embedded system Lab
- ✖ Center of Excellence VLSI Lab
- ✖ (CADENCE)
- ✖ Frequent Industrial visits, Workshops and Guest Lectures



Better Advice Better Result

The Advisory Board is an informal group of experts who are consulted on various matters to do with Open Knowledge activities, strategy & operations but hold no legal responsibility for the organization. The concept of the Departmental Advisory Board (DAB) is based on a belief in the importance and value of shared leadership. Management, administration, Faculty members, parents & students work together to share advice and suggestions regarding departmental policies in accordance with the mission and vision of the department. The primary function of the advisory board is to provide advice & assistance to achieve the same.

Placement 2017-18

Total Placement from ECE: 193+

Prominent Recruiters:

- ✖ Enterprise Solutions Inc: 10
- ✖ Capgemini: 11
- ✖ Nucleus Soft. Export Ltd.: 11
- ✖ CapitalVia : 9
- ✖ Truechip Sol. Pvt. Ltd. : 8
- ✖ Vserve Infosys. Pvt. Ltd.: 6
- ✖ HCL Technology : 6
- ✖ Others: 132+

Members of the Advisory Board

- ✖ Prof. (Dr.) Gajendra Singh (Director, ABES EC)
- ✖ Prof. (Dr.) S. K Singh(HOD, ECE)
- ✖ Prof. (Dr.) D.S Chauhan(Vice Chancellor, GLA University, Mathura)
- ✖ Dr. Arti Noor (Director, CDAC Noida)
- ✖ Prof. Sampat Kumar V (Associate Dean, AKTU)
- ✖ Prof.(Dr.) B.K Kaushik (Associate Professor, IIT Roorkee)
- ✖ Prof.(Dr.) D. Vaithiyanathan (HOD (ECE), NIT Delhi)
- ✖ Prof.(Dr.) Sajai Vir Singh (Associate Professor, JIIT Noida)
- ✖ Mr. Navneet Kumar (System Application Engineer, Synopsis, Noida)
- ✖ Mr. Dushant Kumar (Director, System Infra Solution Pvt Ltd)
- ✖ Mr. Hemant Vats (Researcher, IMEC, Belgium, Neuven)

Academic Collaboration

Collaboration always pays off to learn and experience new technologies for both the partners. Academic and research collaboration is a very valuable tool that not only accelerates the progress but also enhances the quality of the work and extends the repertoire of the partners. Academic collaboration is beneficial to the faculty and students in learning new teaching tools and to increase the breadth of their knowledge and learning different approaches to solving a problem. The Department of ECE at ABES Engineering college always strives for academic collaborations with renowned universities and research centers across the country. The faculty members of the Dept. have been working together with the well reputed academicians from the leading universities/institutes/research organizations for their research:



Industrial Collaboration



Collaboration between universities and industries is critical for skills development (education and training), the generation, acquisition and adoption of knowledge (innovation and technology transfer) and the promotion of entrepreneurship (start-ups and spin-offs). Academic-industry collaboration can also expand the relevance of research carried out in public institutions and foster the commercialization of public R&D outcomes. The benefits of Academia- industry collaboration are also evident in developing countries. ABES EC plays an active role in bridging the gap between industry and academia. Dept. of ECE believes collaboration with industries as an important and strategic mission. Collaboration ensures that classroom and textbook knowledge is being disseminated to the society. Industrial collaboration is a key access for ECE students to practice research and innovation agenda in the business community. In the recent past Dept. of ECE has tied up with the following companies and list is going on.-





ECE Department Achievements

The Department actively promotes research and provides the faculty and students with opportunities to delve into high-quality research projects, and sponsored projects, leading to research publications, articles & book chapters.

Paper presentations and quiz competitions under IEEE MTTS chapter for various societies like ISTE student forum and ICEITE were organized by the ECE department. To minimize the gap between industry and academia, department has organized various Guest lectures for the students where the various eminent persons from the industry shared their views on the recent trends in the industry. The department also provides in-house trainings in the field of PLC, Embedded systems, LABVIEW, VLSI, MATLAB, Robotics etc.

The Department has organized various Seminars, Short-term Courses and Faculty Development Programs such as:-

- ❖ Recent Advances in Mobile and Wireless Communication, sponsored by NITTTR, Chandigarh,
- ❖ Short Term course on Embedded Systems, sponsored by NITTTR, Chandigarh,
- ❖ FDP on VLSI for Signal Processing and Communication, Sponsored by AKTU,
- ❖ Seminar on Recent Trends in VLSI and its Applications, Sponsored by AICTE,
- ❖ FDP on Wireless and Mobile communication conducted by NITTTR Chandigarh,
- ❖ ICT based FDP on Research Methodology, NITTTR Chandigarh,
- ❖ FDP on Digital Signal Processing, sponsored by AKTU

193+students of ECE department have been placed in reputed companies like, Capgemini, HCL, sapient, Pfizer, Hewlett Packard enterprises, Tech Mahindra, True chip and many more.

Career Diagnostics Cell (CDC)

Objectives

To Enhance the student employability skills through -

- ❖ In-House Training based on Student Interest
- ❖ Workshops
- ❖ Guest Lectures from Industries
- ❖ Projects

The Career Diagnostic Cell (CDC) diagnosed that industries look for certain eligibility areas for recruitment. Employability Program Cell (EPC) established by CDC with Intellectual Capital from Industry and Academia to organizes activities like Workshop, guest lecture and placement related activities.

The main goal of EPC cell is to explore the hidden knowledge and ideas of the students which is hidden inside them and shape the ideas by doing various activities. Department select the students on the basis of their knowledge, ability, and field of interest, for their development to become full-fledged technocrats. Some of the key events organized are listed below:

WORKSHOPS are organized in the field of:

Robotics: EPC frequently organizes workshops on Robotics with the help of renowned companies through which students get benefitted to design and application of robotics in different industrial areas.

Networking and Communication: The communication now a days is remote communication. Students learn how to get the accessibility of control room to the enduser in real time basis with the help of workshops run by networking and web based communication professionals.

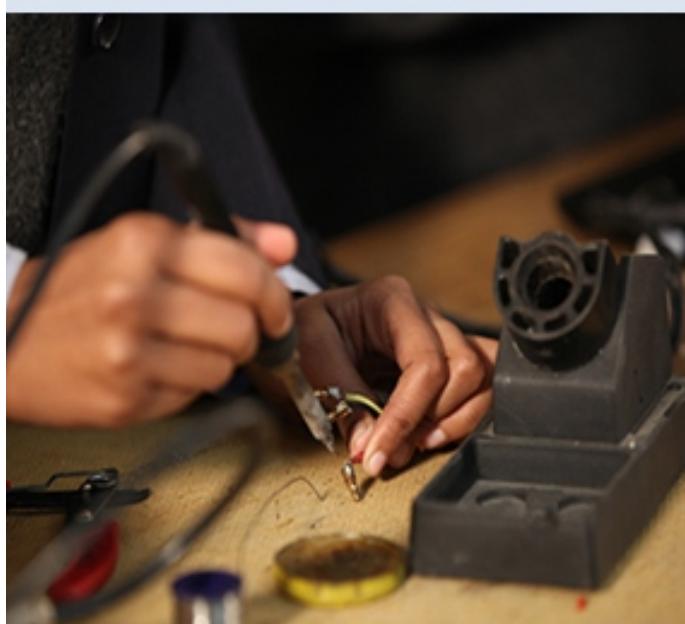
GUESTLECTURES (From Industry)

VLSI: Speakers emphasized on VLSI design approach at both back-end as well as front-end level.

Microelectronic devices: To design microelectronic devices, students learn from simulation design approach to fabrication through speakers from different organizations.

Embedded system design: Students learn different embedded system design approaches from various personals from companies.

Communication & Antenna: Students learn different aspects of communication technology and antenna designing to be used in various wireless and satellite communication systems.



In-House Training Program

Continuous technical training is crucial for any institution to improve the technical competence of its students. Professionally trained employees can assist the management and propose new ways to develop their companies' operations at a lesser cost or provide new and more competitive services. Technical training also important for any organization to apply a new technical system, which would require tailored professional training for its staff to enable them to operate such a system. To achieve that the CDC team of ECE Dept. along with Center of Building Skills and Employability (CBSE) conducted in-house training programs frequently to bridge the gap between theory and practical scenarios. Technical Training through ECE Dept. and CBSE helps organization to hire pre-trained resources from ABES Engineering College.

The different areas of in-house trainings are:-

VLSI Design, NI Labview, PLC & SCADA,

Embedded Systems, Robotics

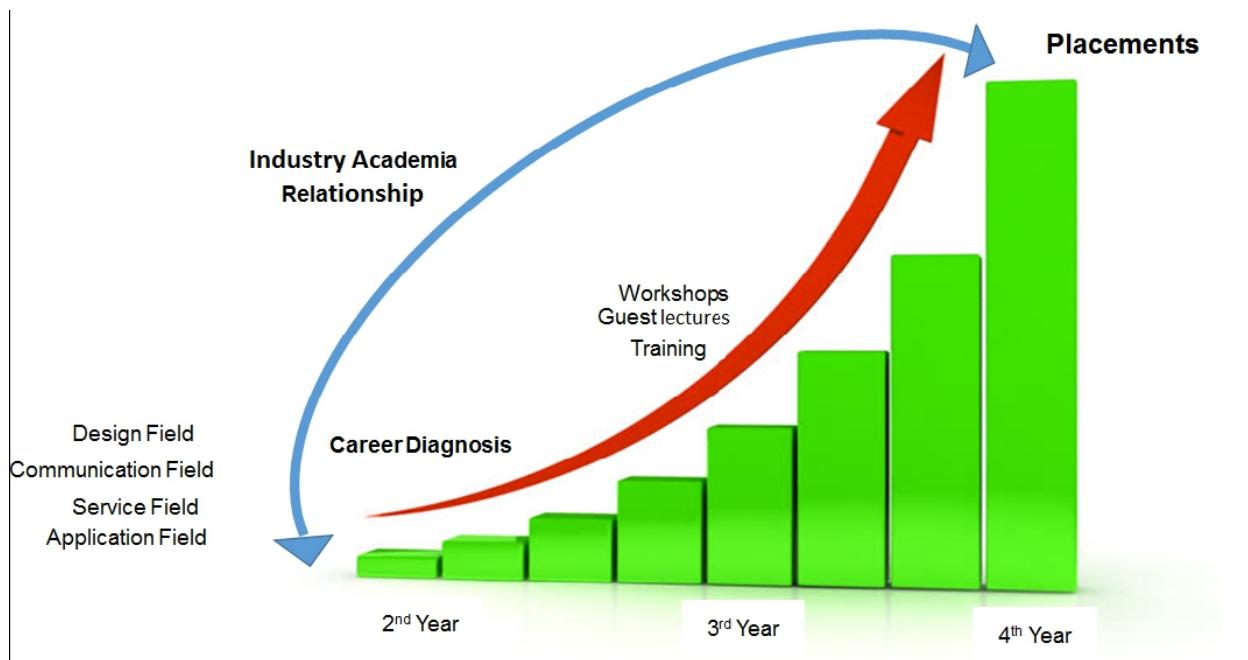
Objectives

- To enhance the software & Hardware skills
- To enhance the employability
- To build up confidence for campus interviews

Details of In-house Training held in Summer 2018

- VLSI: 2 Students
- NI Labview: 10 Students
- PLC & SCADA: 10 Students
- Embedded Systems: 3 Students
- Circuit & PCB Design: 16 Students
- Robotics: 3 Students

ECE Student Employment Enhancement Program



MOU



A Memorandum of Understanding between two companies for starting a new business is a legal binding agreement that is on paper. It is essentially a handshake on paper that displays each parties intent to agree or do business with one another. We are always seeking to establish an official partnership with the industries and research organizations. That helps our students in terms of industrial exposure and placements. We have signed MoUs with Stollar Mounting Systems, C-DAC Noida, The Tag Factory, System Infra Solutions Pvt. Ltd., Greater Noida and Associated Electronics Research Foundation.

- Stolar Mounting Systems specializes in the development, manufacturing, and marketing of photovoltaic racking solutions.
- CDAC, Noida is a constituent unit of Centre for Development of Advanced Computing a Scientific Society of the Ministry of Communications.
- The Tag Factory is well equipped to meet the growing needs of the global market providing a full range of RFiD Tags.
- SISPL has a very strong world class team to provide services & solutions impacting the global communications world.
- Associated Electronics Research Foundation - the benefits of scientific knowledge through development of projects, tools and services for the growth of industry as well as to promote consumerism.



Industrial Visit

As a part of university curriculum and exposure towards industry, students regularly visit various industries. Industrial visit focuses on preparing the students to learn about the day-to-day workings of a particular industry and understand its operational issues. The visit also helps the students to keep update regarding the current management practices followed by the organizations and acquire traits that the industry demands from them.

- To get the concept based knowledge of electronics components, students were taken to Automation Engineers Pvt. Ltd. Knowledge about Transducers, Selection and sizing different types of sensor were introduced to students.
- In order to give exposure about technologies like film foil inductive and non-inductive construction, metalized non inductive construction, wet powder epoxy coating, plain/metalized polymer capacitors, students were taken to the company Deki Electronis, Noida.
- Students also visited companies like BSNL, Huawei India to get the complete knowledge of Communication systems where they learnt about switching system squipped with C-DoT, Ericsson's AXE-10, Fujitsu's FETEX-150, Siemens's EWS and Alcatel's E-10B systems.



Words from Alumni

1) The minute I stepped on the campus I felt I belonged. There are so many ways to get involved and everyone is so open to new people. Beyond its excellent academic program, ABES offers an environment where one can actively participate in a variety of activities on campus.

- Niyoti Saxena, 2016; System Engineer, TCS

2) Dreams comes true. ABES is the place where I realized my dream. The faculty of ABES help me to nurture this dream and help me in achieving the position where I am today.

I realize the importance of being part of a team and working together.

**- Priyank Keshri, 2016
Software Developer, Iconcept**

3) ABES certainly helps me to expand my knowledge horizon & I would always be grateful to ABES for giving me a multidimensional learning by providing the mix of academics, Industry exposure, attitude and leadership. ABES has helped me in improving my skills & potential by giving exposure to the fullest. I am thankful to the faculty members and the administrative management who have helped me to mound myself into a better individual.

**- Shubham Aggarwal, 2016
MBA(Pur) from LPU**

Students Achievement

ROBOCON 2018

The theme of ROBOCON 2018 was based on "NEMCON". It is a festival of Vietnam wishing happiness and prosperity. In this festival, people of Vietnam throw balls comprised of full of rice through a pole of height about 15m. Those who are able to do this, then distribute the rice to other people which brings good luck to all of them. The same task was expected to be done with the help of the robots in ROBOCON 2018.

In this event, a team of students participated and presented two Robots. One was a manual robot and another was an autonomous robot. The role of the manual robot was to handle all the balls to the autonomous Robot using a rack which consisted of 5 red and 5 blue balls.



Rent It Out (RIO)

An Initiative by the young entrepreneurs of the ABESEC enhancing the way people live away from home through the use of technology and our personalized services.

Rent It Out or RIO as it is lovingly known is India's



first and only customizable renting platform. Whether you are an owner looking for a verified tenant for your property, or you are a tenant seeking a standardized and affordable place to live on rent, we've got you covered. We take every syllable of it very seriously. We are essentially a technology company that happens to build first of their kind services and potential devices that would help people ease the process of living away from home.

Our key USPs include:

For Owners -

1. Zero Brokerage
2. Post property online for free
3. Property maintenance for the entire lease period by means of regular quality checks
4. Seamless rent assurance
5. Manage your property via Mobile App

For Tenants -

1. Zero Brokerage
2. Exclusive RIO offers - from local restaurants, stores, and malls
3. Get your own RIO Guardian to assist you 24x7 in case of any inconvenience
4. Pay your rent via Mobile App
5. Get tons of other daily use RIO services such as RIO Credit, Grocery Shopping etc.

Also, we're adding many new and pretty cool features that involve technologies like AI, Machine learning, and blockchain. Two of our co-founders Ankit Yadav and Shivam Singh are from ECE and ME branches respectively. As of today, we are a 10 member strong team and are always looking for passionate, skillful people who like to think differently and believe in building fundamentally new things.



BLITZ

ABESEC has been participating in the event for the last three years. This year the rank of team ABESEC jumped from sixth to **SECOND (at the national level) and FIRST RANK in north India.**

The team also won the prestigious **Solar Endurance Award**. In order to win the Solar Endurance Award the vehicle designed and manufactured by the team had to cover a specified distance by running only on solar panels. The vehicle successfully accomplished the feat running only on solar panels and without using battery. Ours is the only team from North India that has one any prize in any of the technical category events. The joy in the above achievement is compounded by the fact that ABESEC team has manufactured their own flexible solar panels. The process to manufacture the panels is totally indigenous and has been developed in the labs of the institute.

The technology to manufacture flexible solar panels is not available in the country. The requirement for flexible panels is met through imports from China. Successful manufacture of flexible panels and its flawless performance in the event has proven that **Make in India campaign** has inspired many to act.



TEAM JYOTISHMAAN



Tanisha Aggarwal



Prakhar Doneriya



Hitesh Sagar



Rameez Zafar



Chhavi Puri



Shreya Dewan



Shikha Rohilla



Interview

Mr. Sunil Oswald Mendonca
Senior Architect
NXP Semiconductors, Bengaluru



Q1. Please tell us something about your Education and Experience?

I have completed Electronics & Communication Engineer from NMAMIT (Autonomous university now, Mangalore university then). I have specialized in VLSI from CDAC Hyderabad. Currently I am Senior Architect at NXP Semiconductors, Bengaluru. I have nearly 20 years of work experience and have been associated with companies like ST Microelectronics, Genesis Microchip and NXP Semiconductors.

Q2. What do you think has been your biggest achievement in life?

It's a difficult and tricky question . Currently I work as Architect for cutting edge Automotive Electronics Technology with the global team, which I consider to be one of the biggest achievement for me.

Q3. If you were to go back in time, what one thing would you do differently?

I would focus more on concepts of Electronics & Communication so that I don't have to go back to basics again!

Q4. How do you normally deal with conflicts and disagreements at work?

Conflicts arise, when people's expectations are not met and we don't accept people. So I accept people and expect a little from them, rather than accepting myself and expecting a lot from others.

Q5. Is there any specific advice you'd like to give to B.Tech students?

Focus on fundamentals, enjoy the concepts as the wrong understanding of the concepts can lead to wrong decisions. Question yourself on the purpose of any task you take up.

Q6. What does Industry expects from fresh B.Tech graduates?

Along with technical skills, focus on soft skills like communication and presentation. If you want to excel in technical domain, go for MTech and even PhD.

Q7. There seems to be a disconnect between Industry and Academia, how do you think this gap can be filled?

Indeed, disconnect between Industry and Academia is one of the biggest challenge in India. Indian technical industry demands operation excellence and academics are mostly research oriented. A balance in the syllabus between research and the competency can help bridge the gap. In addition, having more and more industry connection with Universities will greatly help. For example, I am a member of the Board of Syllabus for multiple colleges, where industry feedback is given to Universities so that there is a sync between the two.



Shivangi Arora
ECE 4th Year Student

Q-1 In which companies are you placed and what is the domain of your job?

I was placed in two companies:

- 1) Ogrelogic solutions pvt ltd and the profile was of business development trainer.
- 2)British Telecom and the profile was of technical support engineer and the domain is communication field.

Q-2 How did the college help you with placements?

The preplacement classes organized by college helped me alot to prepare well for aptitude and technical test as well as for interviews and technical questions asked in interviews were from the syllabus itself and were basic questions which the faculties teach in regular classes.

Q-3What were your preparations for an interview?

The communication classes and SEEP classes helped me alot to prepare well for interviews. Mock interviews organized SEEP department played a very important role in my preparations as it made me confident and helped me to analyze myself. So I suggest every student to attend these classes sincerely.

Q-4 What kind of questions were asked during the interview and how did you answer those?

The interview started with a basic question 'introduce you' and then some questions about turning point in my life which taught me the best lesson till now. Then it involved some technical question related to communication networks. The main key to give interview confidently is self believe. So believe in yourself and you will do wonders.

Q-5Did you face any difficulties during placement drive?

Yes, the biggest difficulty sometime we face lack of self-belief, motivation and the fear of not getting selected. So don't take too much stress as many opportunities will knock at your door and just believe that a better opportunity is waiting for you.

Q-6What message would you like to give your juniors to achieve their goals?

This is my favorite question. I would like to suggest some important tips for my juniors:

1)Be regular in your classes firstly not because of marks but maintaining regularity is the most typical skill which should inculcated from very first day of your college which will ultimately help in your corporate life.

3)Focus on improving your managerial skills as it will help you in future.

4) Always focus on and visualize positive affirmations which will enhance your capability.

5) Believe in yourself and you will do wonders and excel in every field you will be part of it.

Articles By Faculty Members & Students

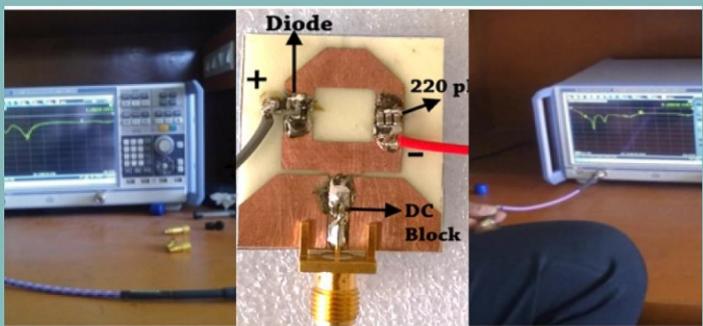
Future of UWB Antenna Design for Wearable Applications: An Analysis

**by Dr. Narbada Prasad Gupta
Professor, ECE, ABESEC**



Ultra Wideband (UWB) radio is a potentially revolutionary approach to wireless communication. Recently, the demand for short-range, very high data rate, and video transmission devices has tremendously increased within the wireless user community. It has motivated the growth of a new generation of UWB wireless access communication systems. Research efforts in this area have exaggerated since the year 2002 when the United States Federal Communication Commission (FCC) allocated the frequency range of 3.1-10.6 GHz for unlicensed UWB indoor wireless communication. UWB printed antennas have become a topic of sustained investigation in the fields of wireless communication. Among the most-favoured planar candidates, Microstrip Printed Antennas (MPA) have received extensive attention, due to their well-known properties. However, conventional microstrip printed antennas are narrowband. Although there are ways to increase the bandwidth of the antennas but available techniques result in higher fabrication costs due to the complication of the structures. In the same way, a Body-centric Wireless Communication System (BWCS) has become a key focal point for future communications from an end-to-end user's point of view. Wireless communication is becoming an integral part of the Human Body Communication System (HBCS). Human-to-human networking with the use of wearable sensors is possible due to advancements in wearable hardware and CAD tools. Recently, I have submitted PhD thesis to Rajasthan Technical University, Kota, in which design and

UWB Antennas for Wearable Applications



development of Ultra Wideband (UWB) Antennas for wearable applications have been discussed. In supporting the increasing interest in antennas and propagation research for body centric communication systems, the IEEE 802.15 standardization group has been established to standardize the applications intended for on-body, off-body or in-body communication. A wide variety of antennas has been reported by various authors for such applications. In antenna design; physical dimension, directivity, efficiency etc. are constrained by the wavelength of the radiation.

These constraints are also very relevant to body-centric antenna applications. It is essential to develop special antennas for off-body communication networks, which need monopole patterns for coupling to surface wave and patch-like pattern for surface/ space wave links. Such systems also need to minimize Specific Absorption Rate (SAR) and off-body radiation, unless they are used as wearable antennas for Personal Area Network (PAN). So, there is a scope of research in off-body communication over the complete UWB range. Parametric studies of all the reported antennas were carried out using Computer Simulation Technology (CST) Electromagnetic (EM) simulator v.12. CST MICROWAVE STUDIO® (CST MWS) is a specialist tool for the 3D EM simulation of high frequency components. It enables the fast and accurate analysis of high frequency (HF) devices such as antennas, filters, couplers, planar and multi-layer structures and EMC effects.

For wearable systems applications, antennas are being made using textiles, where fashion dictates the structure and design. But, these textiles based antennas can be utilized only in narrowband operations due to a lower dielectric constant of the fabric materials. In this thesis, UWB antennas were designed on different substrate materials like FR4, RT Duroid, and foam based material; to achieve the desired characteristics required for off-body communication. The return loss characteristic, gain, antenna efficiency, radiation pattern etc. were obtained in UWB range from 3.1 to 10.6 GHz as prescribed by FCC. After the antenna parameters were optimized, the antennas were fabricated using standard Microwave Integrated Circuit (MIC) technique and measurements were performed on Agilent E5071C 20 GHz Vector Network Analyzer (VNA). For off-body communication, UWB antenna is important to analyze in the presence of the human body. Therefore, 4-layered human arm model comprises of skin, fat, muscle, and bone layers; has been considered to analyze the performance of UWB antenna. Some of the researchers reported using homogeneous phantom model. Wearable antennas for medical applications are a particularly challenging task, due to the rapidly changing environment and the need of miniaturized shapes. In the design of the conformal wearable antenna, performance parameters like physical dimension, directivity, and efficiency etc. are constrained by the wavelength of the radiation. These constraints are very relevant to body-centric antenna applications. These antennas can be utilized for implantable devices for in-body applications, where low frequency leads to a higher depth of penetration. In the off-body environment, it is important to provide constant communication among sensors and outside world as unobtrusively as possible.

So, the recent trends in the design of UWB antenna for wearable applications consider many aspects as discussed above. Researchers who are inclined towards this research area may adopt certain path for their work. Like, one may choose to design an entire system of UWB antennas by characterizing all the system blocks having UWB transmit as well as receive antenna, transmission media/channel etc. Further, one may opt to have certain miniaturization techniques to reduce the antenna size with similar or better performance of the system. Recently a new area which being focused is antenna optimization using various optimization algorithms. This involves creating advanced and complex electromagnetic devices that must be competitive in terms of performance, serviceability, and cost effectiveness. The process of optimization involves selection of appropriate objective functions (usually contributors are conflicting), design variables, parameters, and constraints as discussed above. Several goals must be satisfied simultaneously in order to obtain an optimal solution while designing an antenna. As these goals are often conflicting, no single solution may exist that is best regarding all considered goals. Trial and error process is a common method used for antenna design but this type of design has been subject to fundamental changes in the parameters. Modern antenna systems are computer aided, and both highly complex antennas and complete electronic systems are simulated together. So, to produce an efficient and automatic "trial and error" process, optimization becomes an important aspect. In future, researchers may also focus on adopting certain optimization techniques like fuzzy logic, neural, genetic algorithm, PSO and many more of such kind, for optimized design of an antenna.

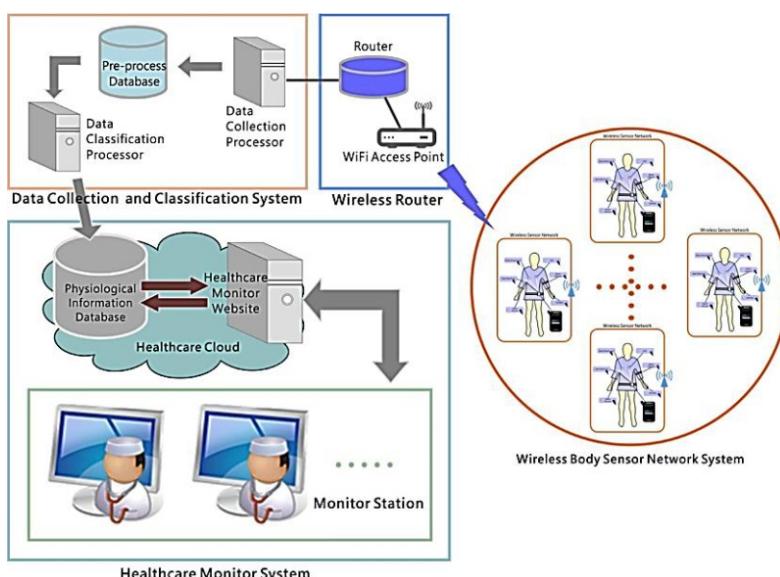
Wireless Body Sensor Networks for Remote Health monitoring

by Mr. Deepak Choudhary

Associate Professor, ECE, ABESEC



Wireless Body Sensor Networks have been popularly employed to measure people's physiological parameters, particularly for disease monitoring, prevention, and treatment. In this study, we propose a smartphone-based WBSN, named Mobile Physiological Sensor System (MoPSS), which collects users' physiological data with body sensors embedded in a smart shirt. A patient's vital signs are continuously gathered and sent to a smart phone in a real-time manner. The data are then delivered to a remote healthcare cloud via WiFi. After performing necessary classification and analysis, the health information of individual patients is also stored in the cloud, from which authorized medical staffs can retrieve required data to monitor patients' health conditions so that when necessary, caregivers are able to reach the patients as soon as possible and provide required assistance.



A. Mobile Physiological Sensor System (MoPSS)

The MoPSS has three functions, including sensing, communication and management. The first function, i.e., sensing, is to employ a

set of physiological sensors embedded in the mentioned wearable smart shirt to measure user's physiological signals.

Wearing this shirt, the patient is able to move freely and comfortably. The second function, i.e., communication, is referred to the processes of delivering physiological data and controlling instructions to a backend server through wireless networks. The transmission protocols include Bluetooth, WLAN (i.e., WiFi) and 3G/4G in the future, when 5G is online, it will be employed. The last function, i.e., management, represents that server-side is responsible for collecting, classifying and monitoring the physiological data, and furthermore, being able to issue warning messages to medical professionals or caregivers whenever the physiological data are abnormal.

The architecture of MoPSS platform as shown in comprises three main systems, the wireless body sensor network system (WBSNS), the data collection and classification system (DCCS), and the healthcare monitor system.

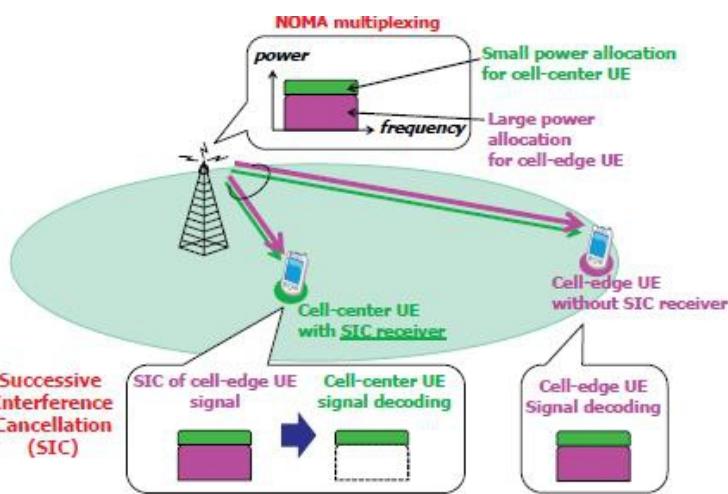
Non Orthogonal Multiple Access (NOMA)

by Ms. Dipa Nitin Kokane

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The expanding interest of mobile traffic and the Internet of Things postures testing necessities for 5G wireless communications, such as more spectral efficiency and massive connectivity of users. Non-orthogonal multiple access (NOMA) is a fundamental empowering innovation for the fifth-generation (5G) wireless networks to meet the requirements on less latency, maximum reliability, massive connectivity, improved fairness and high throughput. The basic idea behind NOMA is to serve multiple users in the same resource block, such as a frequency and time slot, subcarrier or spreading code. The NOMA Concept can be viewed as special cases and proposed as a 5G multiple access schemes. In this multiuser assigning strategy is different from Traditional orthogonal multiple access technologies. It can provide much more device connections by assigning non orthogonal resource allocation. NOMA is supporting many users by assigning non-orthogonal resource and hence introduces a controllable and measurable amount of inter-user interference that can be mitigated with the aid of sophisticated multi-user detectors at the cost of increased receiver complexity.



Various novel approach of NOMA schemes recently has been investigated for Fifth Generation, such NOMA in power-domain and NOMA in code-domain, including multiple access strategies relying on low-density spreading, sparse code multiple access, lattice partition multiple access, multi-user shared access, as well as pattern division multiple access. Moreover, standardization work on NOMA has been started in the Third Generation Partnership Project (3GPP) named multi-user

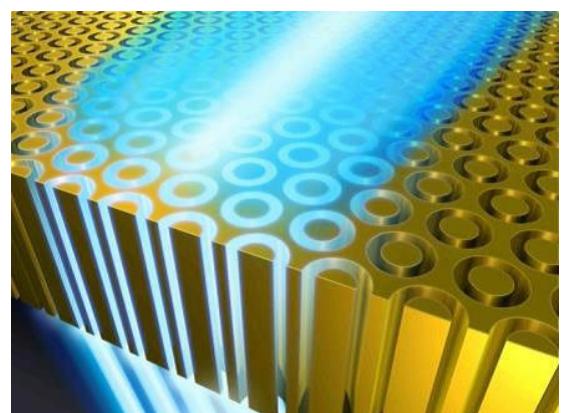
superposition transmission (MUST). In Power-domain NOMA superposition coding is utilized in the transmitter section and successive interference cancellation is used at the receiver end. The superposition coding principle is to combine many users in the same time slot and frequency band. NOMA can expand the number of network connections by introducing measurable amount of symbol collisions.

Photonic Metamaterials

by Ms. Manidipa Roy
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The word “Meta” is taken from Greek whose meaning is “beyond”. “Metamaterials” has the exotic properties beyond the natural occurring materials. These are the materials that extract their properties from their structure rather than the material of which they are composed of. Electromagnetic field is determined by the properties of the materials involved. These properties define the macroscopic parameters permittivity ϵ and permeability μ of materials. Electromagnetic metamaterials (EM) are the materials which have a new sub section within electromagnetism and physics. EM is used for optical and microwave applications like, band-pass filters, lenses, microwave couplers, beam steerers, and antenna radomes. A metamaterial affects lesser on electromagnetic waves as compared to wavelength of electromagnetic radiation.



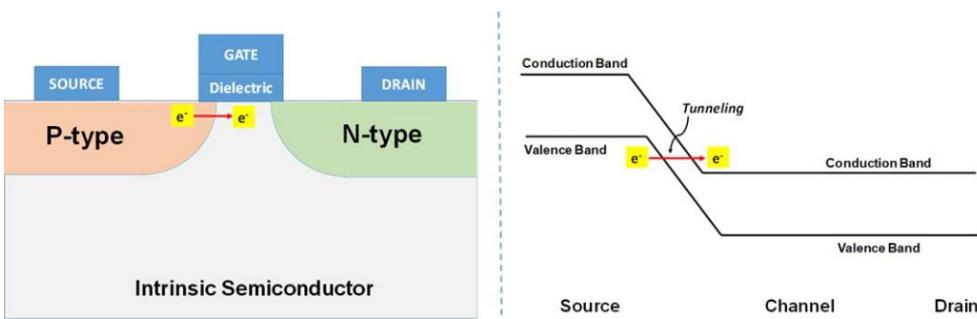
The Photonic metamaterials are the type of electromagnetic metamaterials that designed to interact with optical frequencies is known as Optical metamaterials. Photonic metamaterials radiate the source at optical wavelengths. Furthermore, the sub wavelength period differentiates the photonic metamaterials from photonic band gap structure. This is because the optical properties do not arise from photonic band gaps, rather from a sub wavelength interaction with the light spectrum. The metamaterials with the capability of zero index of refraction (ZIMs) and negative values for index of refraction (NIMs) is the active area of research in optical materials.

Tunnel Field Effect Transistors (TFETs)

by Dr. Raman Kapoor
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The semiconductor electronics industry owes its tremendous success to the physical down-scaling of its building block - the transistor. An incredibly long journey has been completed from large vacuum tubes to transistors with gate lengths lower than 14 nm. Since 1965, the number of transistors per integrated circuit has doubled every two years in accordance with Moore's law. However, the debate on the future of scaling has gained momentum over the past few years.



There are many physical limitations on classical scaling as degradation in critical has considerably reduced the potential enhancements provided by shrinking device dimensions. Consequently, the

search for alternate materials and device systems which can avoid scaling or at least reduce the pace of scaling has attracted significant interest. Major alternatives include: extension of current CMOS technologies (Extended CMOS) and device architectures which are entirely different from existing CMOS technologies (Beyond CMOS). Extended CMOS includes nano-wires, III-V compound semiconductors, carbon nano-materials, etc. Beyond CMOS includes those devices, where conduction mechanism is different from typical CMOS devices, such as tunnel field effect transistors (TFET) and impact ionization (IO) transistors. Amongst Beyond CMOS alternatives, TFETs have attracted significant interest. TFETs have shown that the fundamental limitations of large off-state leakages and poor sub-threshold slope of conventional MOSFETs are largely overcome. This is because the conduction between the source and the drain is not governed by classical thermionic emissions but the quantum phenomenon of tunneling. This tunneling occurs between the valence band of the source and the conduction band of the channel. Another major difference between a TFET and a conventional MOSFET is that the source doping in a TFET is opposite to that of the drain and the channel is generally intrinsic or very lightly doped. TFETs can be realized in many 2-D as well as 3-D architectures such as planar, double gate, dual material gate, heterojunction, gate-all-around etc. The major benefits of TFETs include steeper sub-threshold behavior, lower off-state current, higher on-state current for same gate voltage and better immunity to short channel effects. Going forward some of the reliability issues need to be resolved before devices which use TFETs as the active component can become a major commercial success.

HIGGS BOSON AND HIGGS FIELD

by Ms. Anjana Bhardwaj
Assistant Professor, ECE, ABESEC



There are four types of forces in nature. They are 1) Gravitational Force-By Newtonian mechanics, it is the force between any two objects 2) Electromagnetic Force-It is the force between two charged particles 3) Strong Nuclear Force-It is the force between the neutrons and protons 4) Weak Nuclear Force-It is responsible for radioactive decay.

In electromagnetic force, two electrons interact to give out photon, where photon is massless (speed of light) for a self-consistent equation. Whereas in weak nuclear force, the decay of nuclei produces W and Z Boson which have mass (100 times of proton). This ruins the consistency of the symmetric equation. In 1964, Peter Higgs and a group of scientists proposed a paper in which all of the space consists of Higgs field. In this field photon does not interact hence they do not have any mass. Whereas the W and Z Bosons interact which give them their mass. This field consists of Higgs Boson. Like electric field consists of electrons the Higgs field consists of Higgs boson.



To proof this theory a Large Hardon Collider was built by CERN in Geneva, Switzerland between 1998 and 2008 in collaboration with 10000 scientists. It has a circumference of 17 Mile and as deep as 175 meters. The aim of the LHC is to allow physicists to test the predictions of different theories of particle physics, including measuring the properties of the Higgs Boson and searching for the large family of new particles predicted by super symmetric theories as well as other unsolved questions of physics.

On 12 July of 2012, the collision of protons leads the Higgs Boson in CERN. It survived for 10^{-22} seconds. Then it

decomposed into some other forms of energy such as dark matter. Higgs boson resulted in once in billionth collisions hence it is very rare. The mass of Higgs Boson can be calculated from Einstein's famous $E=MC^2$. Electroweak symmetry breaking (due to a Higgs field or otherwise) is believed proven responsible for generating the masses of fundamental particles such as elementary fermions (including electrons and quarks) and the massive W and Z gauge bosons.

SELECTING THE RIGHT IOT GATEWAY

Author: Preeti Anand

IoT gateway platforms are an essential component in planning any IoT architecture. Selecting the right one should often be the starting point.

As the trend for the Internet of Things (IoT) accelerates with the number of connected devices surges, the demand for IoT gateways has also increased and is forecast to continue to grow exponentially.

The global IoT gateway market is set to grow at a rate of 30.9% between 2017 and 2023 (according to a research report 'IoT Node and Gateway Market by Hardware, by End-Use, and Geography-Global Forecast to 2023' by Markets and Markets).

The need for IoT gateways is realised because isolated systems are rapidly transforming to the ubiquitous Internet-enabled system (also known as 'connected devices') that can be used to capture and communicate information by leveraging diverse wireless connectivity technologies to IoT gateways for unified edge-analytics.

In other words, IoT gateways play a vital role by providing the fundamental building blocks to develop secure and powerful wireless connectivity between IoT devices and IoT Cloud based applications.

The Internet of Things (IoT) is starting to appear everywhere in many shapes and forms. But security is one of the hurdles that could trip up the growth of the IoT. Following security principles used in enterprise computing can help clear that hurdle.

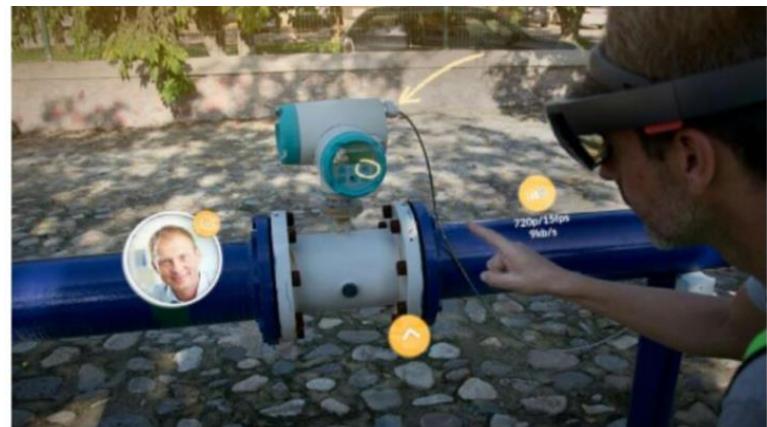


COMBINING THE PHYSICAL WITH THE VIRTUAL

Author: Soham Gautam

Mixed reality is starting to have an impact on the commercial world bringing the physical and virtual together. Mixed reality (MR) is, “a technology that looks to blend the physical world with the virtual and provide the user with a better understanding of the real world.” A virtual reality (VR) headset with transparent lenses and using it to create solutions that look to address real-world corporate problems. Comparing mixed reality (MR) to VR and augmented reality (AR) Bumford suggests they support very different applications.

“VR requires a closed tethered helmet that provides the user with a fully immersed, pre-built environment. AR, by contrast, overlays digital displays in the real world, using pre-set digital markers. When it comes to MR it blends the two. You get to see the real world without the need for pre-set digital markers to formulate content.



“MR does everything in real time, merging real and virtual worlds to produce new environments and visualisations”.

Crucially it enables physical and digital objects to co-exist and interact in real time.