



# ABES EC

## Dept of ECE

# Electro Sanchar

THE ELECTRONS AROUND YOU...

June 2017 Issue



Rank Band (151-200)  
NBA Accredited

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# ABES ENGINEERING COLLEGE

*"To improve is to change;  
to be perfect is to change often."*



## THE MAGAZINE TEAM

**Sh. Neeraj Goel**  
(Chief Patron)

**Sh. Sachin Goel**  
(Patron)

**Dr. M. K. Jha**  
Editor-In-Chief

**Dr. S.K. Singh**  
Editor

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Dr. Sachin Kumar Gupta  
Ms. Ranjeeta Yadav  
Ms. Khusbhu Bansal  
Mr. Rakesh Kumar

### Student Members

Sahil Gupta  
Vikash Singh Yadav  
Shivangi Arora  
Alok Verma

## About Dept. of ECE

The Department of Electronics and Communication Engineering was established in year 2000 under the UPTU code 032. The Department was established with a vision to impart valuable education in the field of Electronics and its allied areas and provides a platform of research in upcoming fields. Since its inception, the department has been providing quality education to the students with the annual intake of 240 students in B.Tech and 18 students in M.Tech. A strong positive reputation of the department and college pulls companies like Sopra, TCS, IBM, Samsung India Limited and many more for campus recruitment.

### 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 innovative 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.

# DESK FROM EDITOR-IN-CHIEF



## DEAR READERS,

"Education is not preparation for life.  
Education is life itself."

It is my pleasure and great privilege to present to you the information bulletin cum magazine of the ECE Dept. For both individuals and nation, technical education is vital for technology development, either as a way of developing human capacity that would aid in industrialisation 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 Dept. in academic and research. Finally, I wish all the best to all students, staff and faculty members of the department.

Sincerely,  
Prof.(Dr.) M. K. Jha  
Editor-In-Chief,  
Director

# DESK FROM EDITOR



## DEAR READERS,

We are presenting you with a new 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 and 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 & faculty.

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

# A NOTE FROM HOD

**DEAR READERS,**

As the Head of ECE Department, I welcome all of you. Our department has an intake of 180 UG level and 18 PG level students. We have 45 faculty members and 12 staff members. In today's technical era, to meet the growing requirement of ECE engineers across the globe, we are working on 4 broad area in electronic field, these are:-

**VLSI design and embedded system**

**Communication Field**

**Signal Processing**

**Electronics Device**



*Prof.(Dr.) Sanjay Kr. Singh  
HOD-EC*

To enhance practical knowledge of students we have:-

**1. CDC Cell (Career Diagnosis Cell):** To find the interest areas of the students and to provide them a proper technical support required in industries.

**2. Advisory Board:** We are having an advisory board comprising of highly experienced and qualified persons from industries like Synopsis, CDAC and renowned academicians from the reputed universities/institutes across the country.

**3. Advanced Labs:** Apart from the curriculum, we have highly advanced labs in collaboration with Texas Instruments, National Instruments and Rockwell Automation.

I assure you that by choosing the ECE branch, you have taken the right step on your path to success in life.

# Highlights of ECE Dept. (NBA Accredited)

## 4 YEARS B.TECH. (ECE)

## 2 YEARS M.TECH. (ECE)

### STRENGTHS

- Dynamic and competent Faculties.
- Career Diagnosis Cell (CDC) for employability enhancement
- Incubator Cell
- In-house training Center
- Electronics ICU for R&D
- Faculty & Student Publications (Last 4 Years): 100+
- Books Published: 6
- MoU with Renowned University & Industry.
- Well equipped Project Lab & Modern Laboratories
- Latest Embedded system Lab
- Center of Excellence VLSI Lab (CADENCE)
- Frequent Industrial visit, Workshop and Guest Lecture

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 at undergraduate and post graduate level, they also meet beyond the syllabus requirements. Project lab has been set-up to add up to the learning of the students.

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 MoU with Strolar Mounting Systems and CDAC Noida (In Process) for better placement and academic activities. The department arranges training and Workshop program during summer and winter vacation under the aegis of Career Diagnostics Cell (CDC).

Total Placement from ECE:  
150+.

Frequent Recruiters are:

- Tech Mahindra: 27
- Capgemini: 19
- Artech Infosystems : 5
- POLESTAR LL : 3
- Intone Networks Inc.: 6
- Gram Power : 3
- Hewlett Packard: 1
- Others: 90+

ECE Department runs the research projects funded by various government funding agencies with the help of students. In this year, the ECE dept. is applied for 15 MSME projects in the area of ICT, Embedded Systems, VLSI, 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.

# *The Advisory Board*

DEPARTMENT OF ELECTRONICS AND  
COMMUNICATION ENGINEERING

## Better Advice, Better Result

The Advisory Council is an informal group of experts who are consulted on various matters to do with Open Knowledge activities, strategy and operations but hold no legal responsibility for the organisation. The concept of the Departmental Advisory Board (DAB) is based on a belief in the importance and value of shared leadership. Faculty, administration, students, parents, and management 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 and assistance to achieve the same.

### *Board Members*

**Prof(Dr). M. K. Jha**  
(Director, ABES EC)

**Prof(Dr). S. K. Singh**  
(HOD-ECE)

**Prof(Dr). D. S. Chauhan**  
(Vice Chancellor, GLA University  
Mathura)

**Dr. Arti Noor**  
(Scientist-E, CDAC, NOIDA)

**Prof. Sampath Kumar V**  
(Associate Dean, AKTU)

**Prof(Dr). B. K. Kaushik**  
(Associate Professor, IIT Roorkee)

**Prof(Dr). Neeta Pandey**  
(Professor, DTU Delhi)

**Prof(DR.) Sajai Vir Singh**  
Associate Professor,  
JIIT Noida

**Mr. Prashant Dubey**  
(R&D Engineer, Synopsis, Noida)

**Mr. Dushant Kumar**  
Director, System Infra Solution Pvt  
Ltd.



## Let's Collaborate.....

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 Dept. of ECE, ABES Engineering college always strives for academic collaborations with renowned universities and research center across the country. The faculty members of Dept. of ECE has working together with the well reputed academicians from the leading universities/institutes/research organization for the 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, 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 the 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:-

**Rockwell  
Automation**

**NATIONAL  
INSTRUMENTS™**

**cādence®**

**TEXAS  
INSTRUMENTS**

**ENTUPLE  
TECHNOLOGIES**

**ANSYS**

**INTEX**  
DEMAND MORE



**System Infra Solutions Pvt. Ltd.**  
Solution for lifetime...

# ECE DEPT ACHIEVEMENTS



ECE Dept has always been the pioneer in the field of technical expertise research and innovation. To minimise the gap between academia and industry, Dept has organised various technical and non-technical events. Electronics Dept has recently conducted 5-day NITTTR based Faculty development program on Research Methodology in last January. Faculty members have published & presented technical papers in reputed national and international journal and conferences. Faculty members have attended various workshops at the different institute like TI workshop (AKTU), IOT-blue tooth low energy, CMOS –mixed signal & radio Frequency, VLSI, CADENCE and ADFT workshop. Most of the faculty members have presented a technical seminar on current trends. The department has organised an industrial visit for ECE students in putative industry: Deki capacitors, Huawei. Various technical competition like microprocessor Coding, circuit designing, paper presentation and quiz competition under IEEE MTTS chapter for students also been organised by ECE department. ABES has a large number of luminous and sparkling students. Majority of students are involved in Technocultural events 123-140 students from ECE department have been placed in reputed companies like HCL, Hewlett Packard enterprises, Tech Mahindra, Capgemini, True chip and many more.

IN 2016-17 ACADEMIC SESSION

**120+ STUDENTS PLACED IN TECH MAHINDRA, CAPGIMINI, HP, GENPACT, CYBORG TECHNOLOGIES ETC**

**SET UP 3 NEW LABS EQUIPPED WITH MODERN EQUIPMENT AND TOOLS**

**MORE THAN 30 PAPERS WERE PUBLISHED IN REPUTED JOURNALS/CONFERENCES.**

**ORGANISED INDUSTRIAL VISITS AT REGULAR INTERVAL. SIGNED MOU WITH CDAC NOIDA, STROLAR**

**CONDUCTED 3 FDP AND 2 WORKSHOP**

# Career Diagnostics Cell (CDC)

## Objectives

To Enhance the student employability skills through

- In-House Training based on Student Interest.
- Workshops
- Guest Lectures from Industry
- Projects



The Career Diagnostic Cell (CDC) diagnosed that industry look for the following as their key 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 knowledge & ideas of the students which is hidden inside them and finally shape the ideas by doing various activities.

Department select the students on the basis their knowledge, ability, and their field of interest, for their development/growth to become a full-fledged technocrats.

## WORKSHOPS

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 industry area.

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

## GUEST LECTURES (From Industry)

**VLSI :** Speakers will emphasize on VLSI design approach at both back-end level and front-end level.

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

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

**Communication & Antenna:** Students will learn different aspect of communication technology and antenna designing.



# In-House Training Program

## Objectives

- To enhance the software and Hardware skills
- To enhance the employability
- To build up confidence of campus interviews

## DETAILS OF IN-HOUSE TRAINING TO BE HELD ON SUMMER 2017

- **VLSI** : 50 Students
- **NI Labview**: 25 Students
- **PLC & SCADA**: 25 Students
- **Embedded Systems**: 25 Students
- **Analog and Digital Electronics**: 45 Students

## Role of ECE Dept.

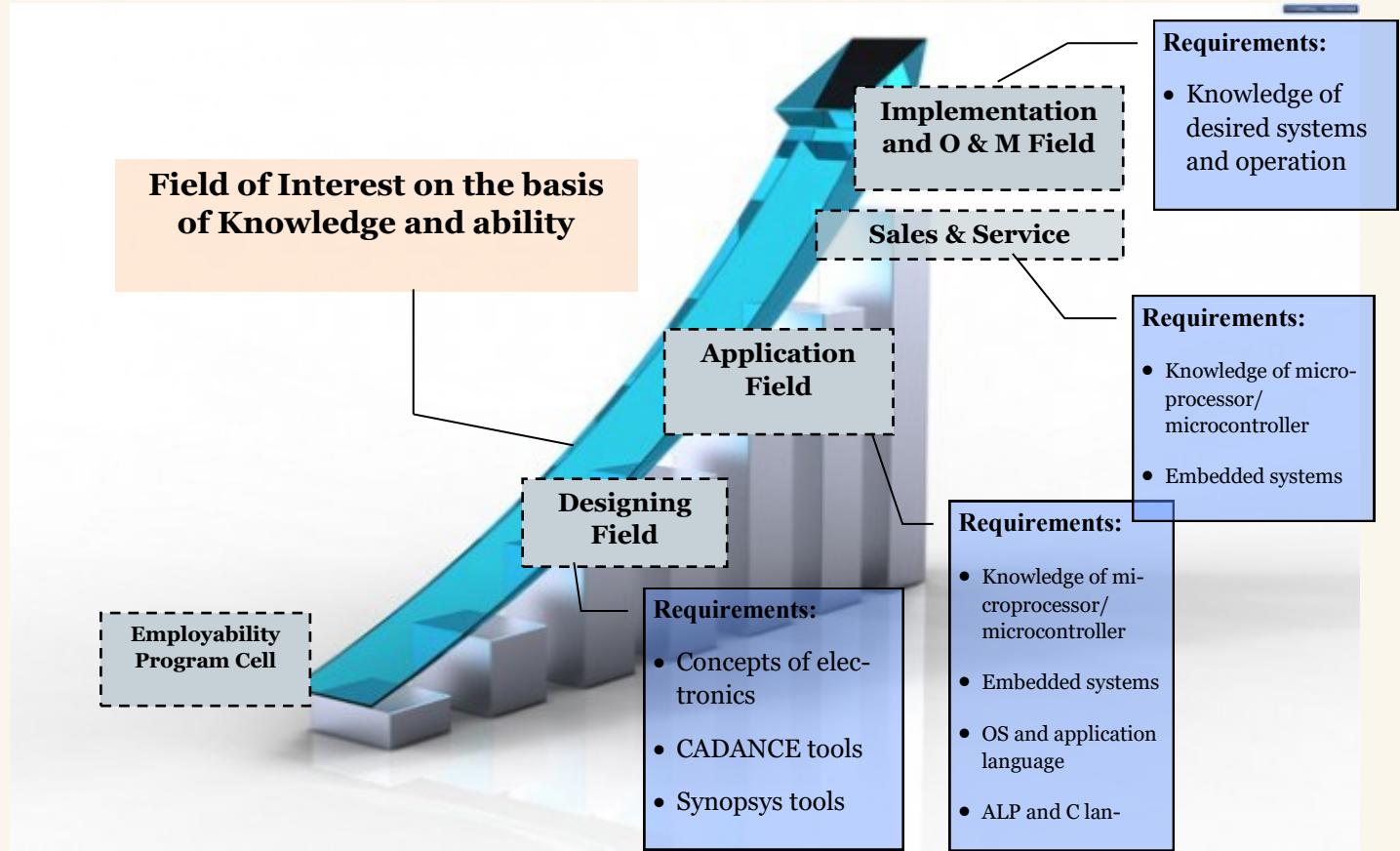
- Identify critical education and training needs.
- Select and develop Steering Team and Training Coordinator.
- Prepare and deliver a Steering Team education and planning training.
- Designate sources of job-specific training, both inside and outside the college.
- Document a plan for developing trainers and materials to meet identified needs
- Prepare templates for training materials and assist in creating modules.

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 is 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 training are:-

- **VLSI Design**
- **NI Labview**
- **PLC & SCADA**
- **Embedded Systems**

# ECE students employment enhancement program Unique Ethos



## Employability Program Cell (EPC) (EPC)

### COMPANIES FOR EMPLOYMENT

Cadance	Micro Chip Pvt. Ltd.	Micro Chip Pvt. Ltd.	Nokia
Synopsys	Trans Switch India Pvt.Ltd	Trans Switch India Pvt.Ltd	Renesas
ST Micro Electronics	Texes Instrument	Texes Instrument	Airtel
Analog Designer	Virage Logic	Virage Logic	Idea
	GE	Folescale Semiconductor Henry wels	Reliance Communication

## Some Moments from Industrial visit



## INDUSTRIAL VISIT

Industrial Visit is a routine activity for the engineering students during which students visit companies/industries. Useful information related the educational course which cannot be visualized in lectures are imparted on the students in a practical environment.

- To get the concept based knowledge of electronics components the students were taken to electronics manufacturing company. Eg: Deki Electronics, Noida. Technologies like film foil inductive & non-inductive construction, metallized non- inductive construction, wet / powder epoxy coating, plain / metallized polymer capacitors were introduced to students.
- In order to give exposure to the students in the field of assembling and testing of telecommunication products, the students were taken to companies like System Infra Solutions, Delhi. The students learnt about Operation & Maintenance of telecom sites, preventive and corrective maintenance of the Electrical Utilities, fault management of electrical infrastructures.
- Students have also visited companies to get the complete knowledge of Communication system like BSNL, Huawei India where students learnt about switching systems quipped with C-DoT, Ericsson's AXE-10, Fujitsu's FETEX-150, Siemens's EWSD and Alcatel's E-10B systems.

# 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 organisations. That helps our students in terms of industrial exposure and placements. Recently, we signed a MoU with Stolar Mounting Systems. Stolar Mounting Systems specializes in the development, manufacturing, and marketing of photovoltaic racking solutions. Since its foundation Stolar has released a wide range of high-quality and innovative mounting systems.

Department also in talk to with CDAC noida to sign a MoU for advance research, training and placement procedure. CDAC, Noida is a constituent unit of Centre for Development of Advanced Computing a Scientific Society of the Ministry of Communications.

# STUDENTS ACHIEVEMENT



**Failures, repeated failures, are finger posts on the road to achievement.**  
**One fails forward toward success.**

Student achievement measures the amount of academic content a student learns in a determined amount of time. Each grade level has learning goals or instructional standards that educators are required to teach. Our students are doing good in academic as well as extra-curriculum activities.

To name few of some, we would like to mention Anadi Mishra and his team secured 2nd position in tech-expo 17 (technical competition held in ABES-EC) project title is IOT based home automation. Abhimanyu Kumar, Ayushi, Aanchal and many more students won AKTU Zonal sports FEST.

Mr. Alok (student of 3rd yr, ECE) is real gem of ECE department, he won several prizes like First Position in IEEE Technical paper presentation, IEEE Circuit designing competition, ICEIT Circuit designing competition, JUGAAD Innovation, 3rd position in technomentum and he got the first position in IIT Indore Tech fest.

Mr. Sahil, 3rd Year ECE student has opened an e-commerce portal and he is working on regenerative braking circuit..

Apart from studies, ECE students actively participated in social services-HUHC (help us to help child), Swach Bharat Abhiyan.



# CLINCHHUB

*An initiative by the young entrepreneurs of the ABES EC*



ClinchHub is the company started by a team of four members with only one vision to build a hub where people can come to find and discover virtually anything they want to buy online in electronics. We are providing a destination in India by giving customers more of what they want – vast selection, low prices, fast and reliable delivery, and a trusted and convenient online shopping experience. We provide the widest range of robotics products on our website.

We provide various electronic components (like diodes, microcontrollers, multimeters, and other tools) of very good quality. "ClinchHub" brings all the components of electronics under one roof and also at the doorsteps of the customers. We believe in good quality of products at reasonable prices.

At ClinchHub, we only believe in 'Customer Satisfaction'. We dream to create India's most reliable and frictionless commerce ecosystem that creates life-changing experiences for buyers. We continue to relentlessly focus on using our investments in technology and innovation to transform the lives of our customers and all our partners. We strive to transform the way India shops and the way India sells.

We at ClinchHub can help you with anything to everything in Electronics products. Our unrivalled product range and unbeatable freight facility are supported by exceptional service levels. You can be confident that ClinchHub can provide your business with the products you need wherever and whenever you need them.

ClinchHub has a strong commitment to customer service. We understand the value of having a knowledgeable person there to answer your questions quickly. ClinchHub is redefining customer-focused distribution. Once you have made your selection, ordering with ClinchHub is easy.

Our new and improved website ensures that ordering component online is as easy as sending us an email. You can also visit our "Help hub" section and get help on how to register, order, finding products and lots more. Moreover, we are only a phone call away for anything that you may not find on this website, or call us at 91-9555903452.



## Interview

Sahil Gupta  
[ECE 3rd Year Student]



### **How does it feel to become first in the National Level tech-fest at IIT Indore?**

It really feels good when our hard work and efforts give positive results. Seriously, it was not possible without the support of my team members and faculty advisor. This is the milestone of my life, however, it encourages me to learn more and more. I want to share one thing, when we guys win this competition then very first thing we all say that “yes, now we will go back to college with a pride”. At the beginning of this event, I never thought of winning, just working to implement what I am learning, to the real world.

### **Despite the inset pressure of semester, you managed to involve in various extra-curriculum activities. How do you manage your time?**

Keeping a balance between studies and these extra curriculum activities are very difficult task, as you to keep yourself in the sync every time if once get disturbed then your hard time is about to come. I would really appreciate my department (EC department) to be so supportive to the students who indulge in these activities. Also, teachers are also very helpful. To have a balance I use to attend all lectures with full concentration this clear my basics to the subjects, seriously they help me a lot. This helps me to have time for these activities as when we revise things it takes less time once you listen to it carefully in the class.

### **Already you started an e-commerce platform ‘clinchhub’. Tell us about your company and what is your long-term goal regarding your start-up?**

First of all I would like to mention the names of my partners Sakar Aggarwal, Gaurav Patel, Prateek Gupta, and of course I. They all shares same passion towards learning. ClinchHub is the company which work in the field of robotics and embedded systems. Here you can purchase products, can give the order to manufacture your product and also have full guidance on any project.

In further, we are planning to promote our company to each and every college of Ghaziabad, and NCR. You can explore our website: <http://www.clinchhub.com/>

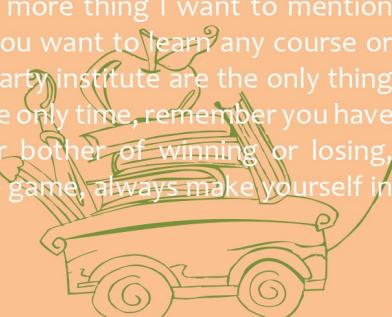
### **What role did the department play to fulfil your goals?**

Department is very helpful to me always. Teachers are very helpful and of co-operative nature. They always help me out much time. I never worried about the concepts and tips which I use to miss during my participation in various events. I use to get out of station due to some competition every year and they always help me to cover up the missed part of the syllabus. I also never face any attendance issue even when I was out for 15-20 for an event, the department uses to exempt my attendance. For students, our department is used to organize many workshops of embedded systems, VLSI etc. so that students can get a flavor of industry here at college premises. Faculties use to encourage students so that they can think out of the box.

Seriously what I have achieved, what I have done is because of full support of college and department. Thanks a lot, EC Department, especially Ms. Niti Gupta ma'am, who not only encourage us to perform our best in the competition but also helped me to tackle real world problems.

### **Any suggestion for juniors or future ECE students you would like to give.**

Firstly friends be sure what are you doing from the beginning of the engineering. Don't let the things postponed for next year or semester. Get updated about the events held in colleges. Very important, choose wisely among the events and training, there is no necessity of doing everything. Make google and YouTube your master. Do not go through theories only, start some project. One more thing I want to mention that don't think that if you want to learn any course or any training then third party institute are the only thing or summer vacation is the only time, remember you have google, YouTube. Never bother of winning or losing, these are the part of the game, always make yourself in learning mode.



**Whom do you give the credit for your achievement?**

My parents have always supported me since the time I was involved in making projects in school. They made me realize the importance of practical knowledge apart from theory. I got support from my college department and faculty members who guided me through various projects and provided me suitable resources.

**What motivated you to achieve this feat?**

My curiosity makes me to think over the technology behind electronics. I observe problems around me and try to find out the optimum solution. I put my efforts and dedication towards the goal. My self-motivation and never giving up attitude towards my work gives me strength to achieve any feat.

**What are your future plans?**

I want to become an ASIC Design Engineer. There is a huge market demand for ASIC Design Engineers and my knowledge and interest makes me suitable for this field.

**What is the main reason behind you're overwhelming victory?**

I do projects on regular basis. With every new project, I keep on increasing the level of the project which boosts my knowledge and experience. This enhances my abilities and consistency to do good level projects. Competitions are one of the motivating factor which boosts myself to achieve victory. So, I participate in as much competitions as I can.

**Would you like to give a piece of advice to students preparing for projects?**

Before working on any project, try to find out the feasibility, applications, and future scope of the project. A project which is good but not able to solve any kind of problem is waste of time as well as resources. Once, the motive of project is clear then work until you get the desired result.

**Despite the inset pressure of semester, you managed to involve in extra curriculum activities. How do you manage?**

Everybody has to give proper time to their study which cannot be compromised. I manage my time by not involving myself too much in entertainment stuffs. I take interest in my work which keeps boredom away. Apart from this, I dedicate my weekends for extra curriculum activities. Sometimes, I utilize my lunch break to work in laboratories.

**What role did the department play to fulfil your goals?**

I got support and guidance from my faculty members. My department helped me to use laboratory's equipment





**S.S. Bhowmick**  
**Chief Innovation Officer,**  
**NEX-G Mobility**

### **What do you think are the essential qualities companies look for in a candidate?**

A person who is innovative. We always look for people who are open to learn, open to adapt and open to innovate.

### **Many of us are still confused about what an engineer actually does! Please throw some light upon your job profile, and what it entails.**

An Engineer is a person who should have key to all problems. He may not be always having ready solution in his hand but an engineer is always supposed to get a solution by anyhow to get things going. An engineer should always have never give up attitude. This attitude has always helped in my carrier. I am firm believer that nothing is impossible, its just the instance when things are tough.

### **Which story in your portfolio are you most proud of?**

I felt proud when our company was recognized as Top 100 companies of Asia by Red Herring. I felt proud when our team's innovation and effort was recognized at an international event.

### **What have you done to improve your knowledge in the last year?**

We work on latest technologies like AI, Machine Learning, Deep Learning, 5G, SDN, NFV. We work on live projects to learn these technologies rather than simple reading them.

### **Describe your management style.**

Lead by example. Be part of team rather than be separate from team.

### **What has been your professional disappointment?**

I joined a startup company when I was having 2 years' experience. I was very passionate about that wanted to make it big. But the company after attaining 100 people team failed to deliver the desired products. It was quiet disappointing but that battle field helped me to learn a lot.

### **How do you deal with conflict?**

Best way to manage conflict is to discuss and find out solution. We have to respect view point of involved members and resolve conflicts accordingly.

### **How will you achieve your goals?**

I don't set any final goal. Goal is a variable parameter for me. It can be daily goal, which is learning for me. Meeting targets & delivering good service to client are my intermediate goals. And final goal is always to keep everybody around you happy & energetic.

### **Your message to the youth?**

My message to youth is to keep innovating. Learn the technologies to "UNDESTAND" not just clear exams. Love the technologies around you, respect nature and people around you.

### **One thing you find most wanting in the present academic system in India?**

Our academic system is good but just need some fine tuning. We should have session on thought process development or "SOCH". We should also promote nature, humanity and social responsibilities in our engineering colleges.





**Getting placed in think and learn is no less than climbing one of the highest peak, what hardships you have faced?**

Think and learn was the second company I sat in interview for before that I had cleared tech Mahindra. Pool campus placements are not very easy, you have to compete with students from all over NCR so I guess that was my biggest challenge to beat the best out of hundreds of students

#### Where do you see yourself 5 years from now life?

I will be as a business development associate in my company. Five years from now, I would want be at a much higher position in my field and to be an irreplaceable employee because that's the key requirement today.

#### Tell something about your interview and some points related to interview so that max students can have successful interviews?

First of all I believe it's hard to fake in front of someone who has been hiring people for a long time now so I would like to suggest a few points:

- First and foremost is to be positive and confident both these come from within and are the key to everything.
- Stay honest but don't be rude or blunt.
- Whatever you tell about yourself you must have a supporting example for it like if I say I am a team player so I must have an incident where I can prove it.
- The most important of a pi is the resume most of the interviewers go through the resume thoroughly make sure your resume is to the point and every word of it is true and you remember it well.

Like in one of my interviews I was asked to prove that I was not over confident. Also try and highlight one special thing that according to you is different from what others have done and you must have one such thing in your experience of B-Tech.

**Over the years in the department, how have you felt that the efforts of the department have helped you to become the person you are today?**

ECE department is a very well organized and supporting one I have had the privilege to represent it several times in the college and I have always lived up to the expectations of my teachers all because they were always there to guide me.

**If given a chance to relive those college days what is the one thing that you would do, which you were unable to do before?**

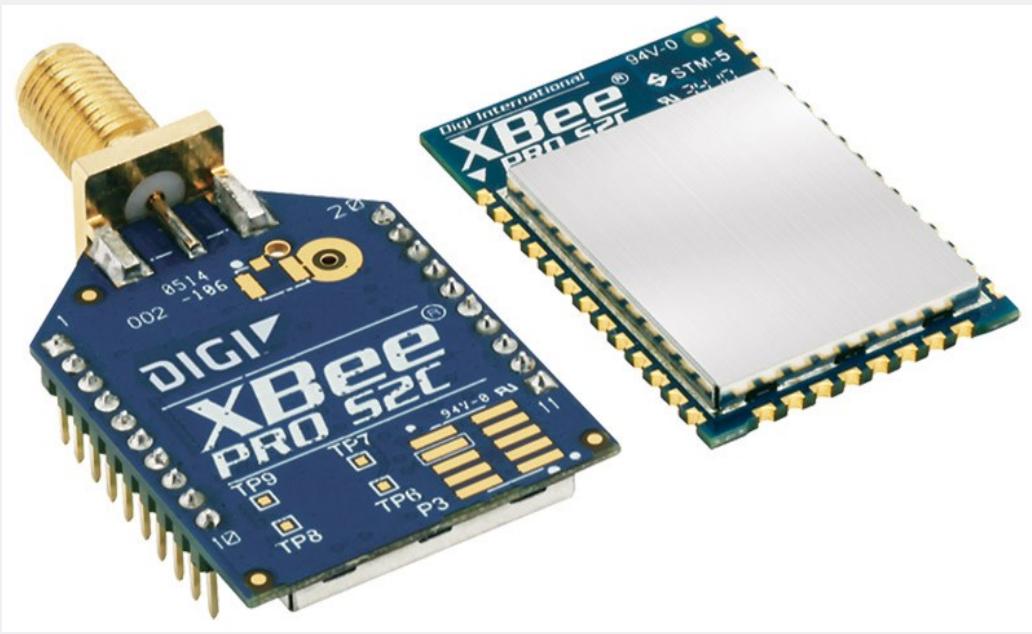
Well there are a few things on my list but first one would be taking part in at least one play in dramatics club which i couldn't.

**What tips would you like to share with your juniors?**

To my juniors I would say have an equal proportion of everything in your B.Tech that is from marks to practical knowledge from literary to sports everything teaches you something new and adds a value to your personality. Be confident positive and consistent in everything you do, don't do things just because they have to be done but do them with all your heart. This is the most important and beautiful phase of your life this time won't come back make the most of it.



# Articles by Faculty and Students

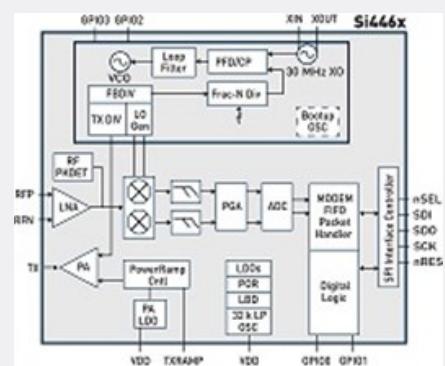


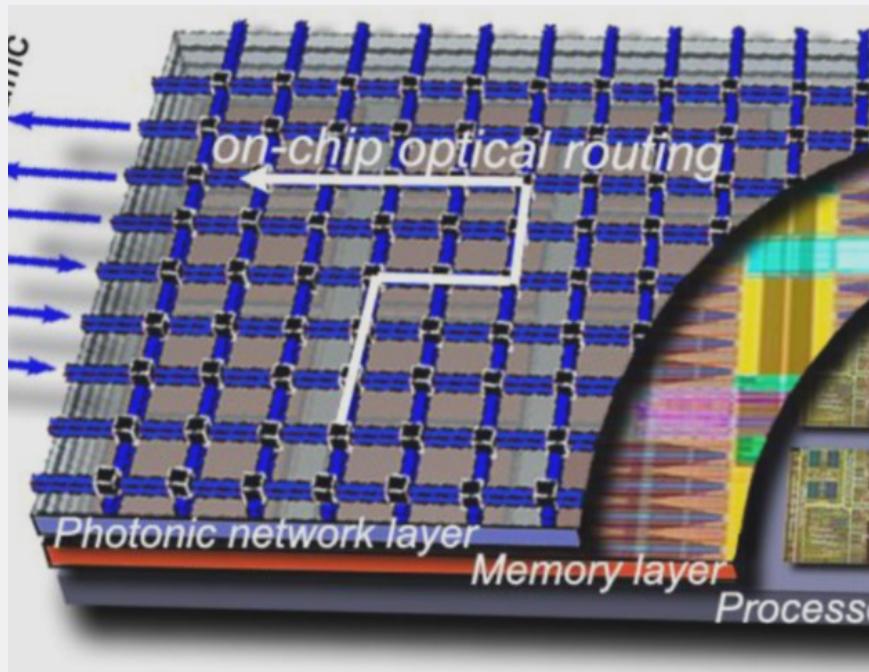
**Mr. Deepak Choudhary**  
Associate Prof, ECE Dept.

## Smart Heartbeat Sensor Transceiver on ZigBee (XBEE)

Medical professionals are currently evolving with the current technologies that are being developed. With wireless technology evolving with time, it is essential that the medical equipment's in the hospitals synchronize with the technology in order to provide better quality services to patients. The numbers of patients are increasing while the current medical professional's number is decreasing gradually due to retirement or etc. and upcoming graduates still in training. The conventional method (wired and manual data retrieve) only provides certain amount of data which enables the medical professional to identify and detect the level of sickness and seriousness of the patients conditions .The continuous wireless monitoring system introduces enables the medical professionals to have sufficient data and monitoring time of the patient in order to recognize and detect the level of patients sickness. This will enable the patient to be monitored closely for any sudden irregular physiological signs. Many researchers have developed wireless handheld devices in this field area. This work introduces a wireless body worn heart rate monitoring device using Zigbee module to be used by general ward in hospitals.

However, RF needs a certain time interval for it to provide the stable and accurate reading. Meanwhile, Zigbee provides the stable and accurate reading from start for both condition positions. It is also seen that a patient needs to be in a lying position in order to provide a better and stable reading due to sufficient blood flow of the body. The sensors obtain heart rate reading from the thickness of blood under the skin. Different age groups and gender provides different sets of heart beat data. This heart beats differ due to a person's condition. The experiments were done in a quiet location (room) to calm the subjects. However, some of the individuals are easily developed with anxiety and stress leading to higher heart beat values. The advantage of this situation is that the reading provides a certain interval that can be used as a threshold upon improving the body worn prototype.





*The Future of Computing*



**Dr. Himani Garg**  
Associate Professor  
ECE Dept.

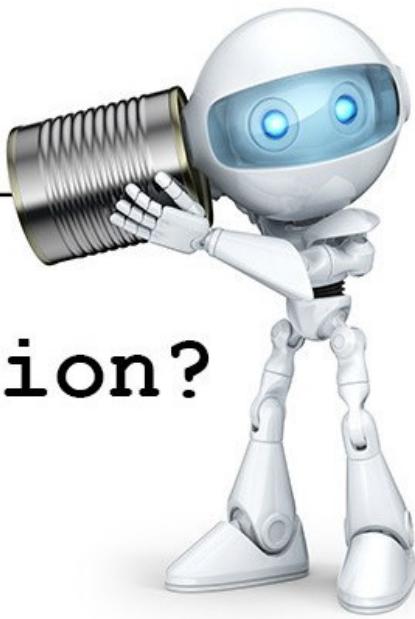
## OPTICAL COMPUTERS:- THE FUTURE OF COMPUTING

According to Moore's Law, the number of transistors chip doubles every 18 months, but as we continue to make transistor smaller, we will eventually run out of space on microchips. So, in order to keep advancing in computer technology without adding transistors as it is done today, we need to change the composition of the hardware. The next step into the future of computer is optics. Optics offers many benefits over today's electrical computers including: Higher bandwidth, superior processing power and enlarged storage space.

An optical computer is a computer that uses light(photon) instead of electricity to manipulate, store and transmit data and perform digital computations. Photons have fundamentally different physical properties than electrons and researchers are attempted to make use of these properties to produce computers with performance or capabilities greater than those of electronic computers. An electric current flows only about 10% of the speed of light this limits the rate at which data can be exchanged over long distances. By applying some of the advantages of visible or IR networks at the device and component scale, a computer might someday be developed that can perform operations 10 or more times faster than a conventional electronic computer.

To replace electronic components with optical ones, an equivalent "Optical Transistor" is required. This is achieved using materials with a non-linear refractive index. In particular, materials exist where the intensity of incoming light is effected by the intensity of the light transmitted through the material in a similar manner to the voltage response of an electronic transistor. This "Optical transistor" effect is used to create logic gates, which in turn are assembled into the higher level components of the computer's CPU. Optics has higher bandwidth capacity over electronics, which enables more information to be carried and data to be processed because electronic communication along wires requires charging of a capacitor that depends on length. In contrast, optical signals in optical fibers, optical integrated circuits, and free space do not have to charge a capacitor and are therefore faster. Another advantage is that optical data processing can be done much easier and inexpensively in parallel.

# Speech Recognition?

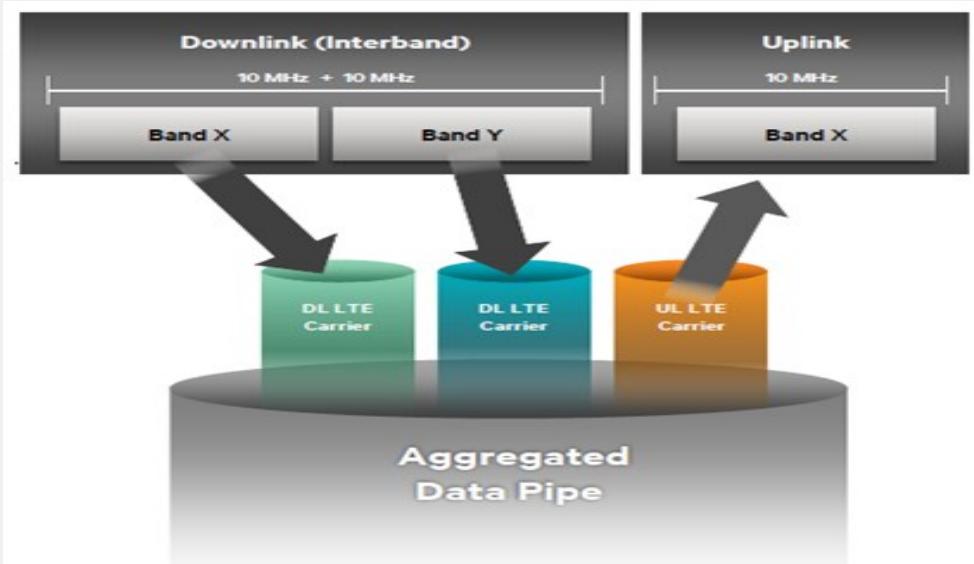


**Dr. Astik Biswas**  
Asst. Professor  
ECE Dept.

## FEATURE FUSION USING ANOVA ANALYSIS FOR SPEECH RECOGNITION

Nowadays, wavelet packet (WP) based features have been used extensively to maximize the performance of automatic speech recognition (ASR) in the complex auditory environment. However, wavelet features are less sufficient to represent the voiced speech. Recent researches on WP technique seek for complementary voicing information to overcome this problem. However, considering additional voicing features results in longer dimension and somehow affected the performance for unvoiced speech. This paper presents a new analysis of variance (ANOVA) technique to incorporate voicing information on WP sub-band based features without affecting its performance and dimension. It has been noticed that most of the voiced energy lies below 2 kHz. Thus, the proposed technique emphasizes the lower sub-bands for additional voicing information. Harmonic energy features (HEF) are combined with recently introduced auditory motivated equivalent rectangular bandwidth (ERB) like 24 band WP cepstral features (WERBC) to enhance the performance of voiced phoneme recognizer. Primarily, a standard phonetically balanced Hindi/English database are used to analyze the performance of the proposed technique across wide range of SNRs. Proposed features show a promising result in phoneme recognition experiment without affecting the feature dimension and performance.

Primary study have shown an approach to enhance the performance of wavelet features by considering additional HEF features. However, simple concatenation leads to have some redundant information and unnecessarily makes it longer in size. This recent techniques proposes an ANOVA based WP sub-band HEF components to maximize the performance of wavelet features. WP decomposed sub-bands are analyzed individually to extract harmonic components. The redundant information is discarded, and best thirteen relevant features are selected by using the ANOVA analysis. The dimension of proposed feature is same as baseline WERBC features. The Hindi and English phone recognition task is carried out to study the performance of proposed feature. Detailed phoneme recognition analysis is presented on a broad phonetic group of Hindi database. The proposed feature is proved to be effective in voiced phoneme classes without any influence on the unvoiced class. The new technique has shown significant performance in noisy condition at low SNRs. This technique may be suitable for speech recognition application in complex auditory environment.



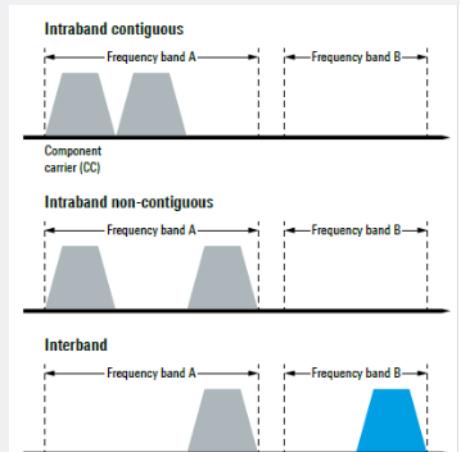
**Ms. Dipa Nitin Kokane**

Associate Prof, ECE Dept.

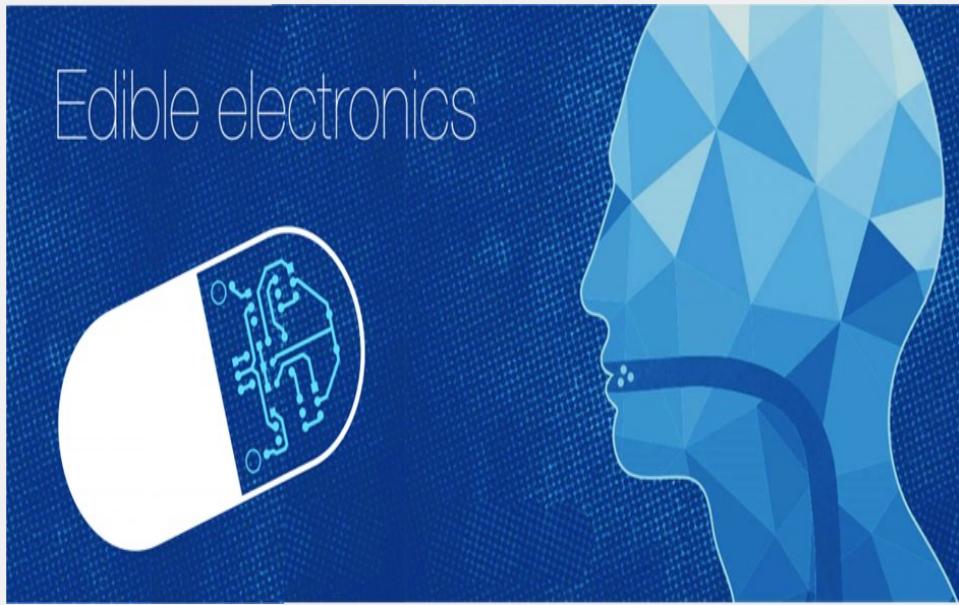
## Carrier Aggregation in Wireless Communication

In order to meet the demand of high data rate it is important to increase the bandwidth of transmission which can be supported by single channel. The method which is used for this is carrier aggregation or channel aggregation. In LTE and LTE- Advanced overall transmission bandwidth is increased by using more than one carrier. In release 8 LTE carriers have a maximum bandwidth up to 20 MHz. The same concept is used in LTE - Advanced which supports aggregation of up to five 20 MHz component carriers. Contiguous or noncontiguous elements of the spectrum may be used as carriers. In LTE carrier aggregation is supported by both Frequency Division Duplexing (FDD) and Time Division Duplexing (TDD) techniques which ensures high data rate throughput requirement. Each component carrier may take any bandwidth supported by release 8 namely 6,15,25,50, 75 or 100 resource Blocks and corresponding bandwidth of 1.4, 3, 5, 10 & 20 MHz. Another advantage of carrier aggregation is efficient use of fragmented spectrum irrespective of the peak data rate.

In practice we cannot continuous increase transmission performance by using MIMO techniques due to constraints on number of antennas, terminal size and cost. In order to achieve the requirement of IMT Advanced CA has been proposed to aggregate two or more component carriers to achieve high data rate over wide bandwidth (up to 100 MHz for a single UE unit). Carrier Aggregation will be one of the key technology to meet the data expansion needs with the anticipated availability of new fragmented spectrum over the coming years. The new spectrum availability triggers the standardization of new CA operating bands in the following 3GPP release driven by network operators.



Carrier Aggregation Types



**Mr. Navneet Sharma**

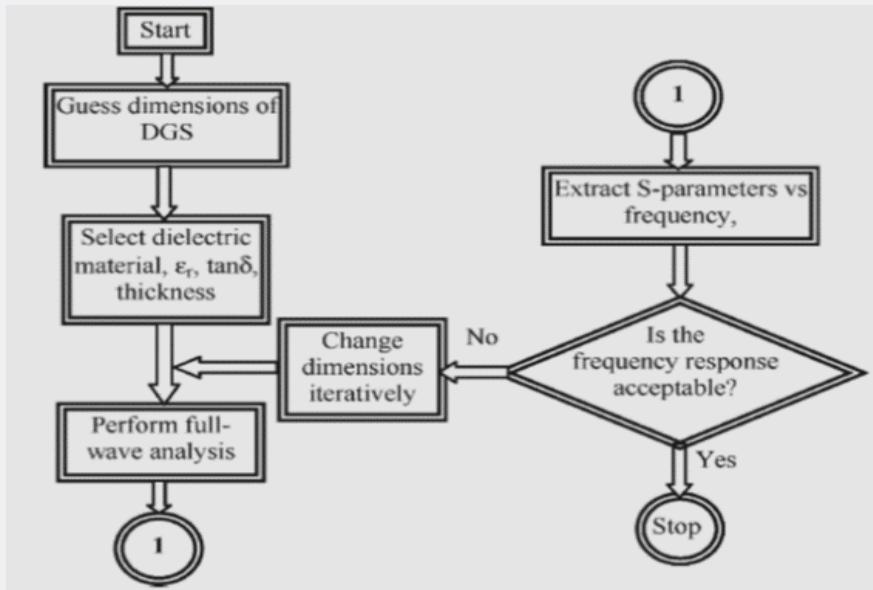
Assistant Prof, ECE Dept.

## EDIBLE ELECTRONICS

Medical devices are becoming smaller and more advanced, with researchers inventing tiny nano-scale devices that can even be ingested for internal monitoring or medication. Edible electronics could change the medical industry for the better. Tiny battery-operated electronic ingestible devices also known as "Smart Pills" are set to replace some traditional medicines in treating a range of diseases and have potential to eliminate many of the challenges associated with chronic implants such as risk of infection, chronic inflammation, and costly surgical procedures.

Imagine a "smart pill" that has the power to identify where and when a drug should be released in the body. This futuristic and unimaginable technology is almost there. We expect the devices to be tested on patients in the next 5 to 10 years.

Examples of ingestible electronics include edible cameras, ingestible event monitors, and integrated smart drug delivery systems. Ingestible devices have made great advances in the early detection and improved treatment of disease by using commodity polymers and off-the-shelf electronic components. Edible electronics represents a class of electronically active medical devices that can be deployed orally, reside in the gastrointestinal tract temporarily, and eventually pass through the body harmlessly [as waste]. One of the big advantages of edible electronics over implants is that they can perform sensing functions, deliver drugs and even stimulate tissue inside the intestinal tract. And the beauty of this method of delivery - simply swallowing a pill - means that a skilled health care professional isn't required and the devices don't need to be sterilised. This would make them ideal for use in challenging circumstances, such as war zones or remote locations. "They could be very useful for administering oral vaccines, especially against terrible diseases in third world countries. And they could be important for conditions such as diabetes and obesity."



**Flow-chart of design and analysis of conventional dumbbell DGS**

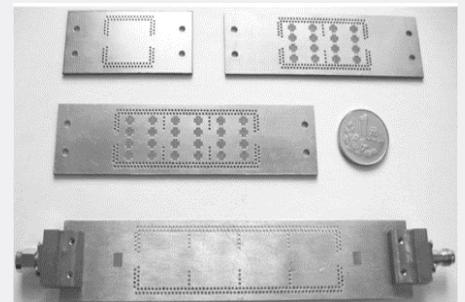
## Defected Ground Structure: Fundamentals, Advancement, and Applications in Modern Wireless Trends

Etched slots or defects on the ground plane of microstrip circuits are referred to as Defected Ground Structure (DGS). Single or multiple defects on the ground plane may be considered as DGS. DGS has been used in the field of microstrip antennas for enhancing the bandwidth and gain of antenna and to suppress the higher mode harmonics, mutual coupling between adjacent element, and cross-polarization for improving the radiation characteristics of the microstrip antenna.

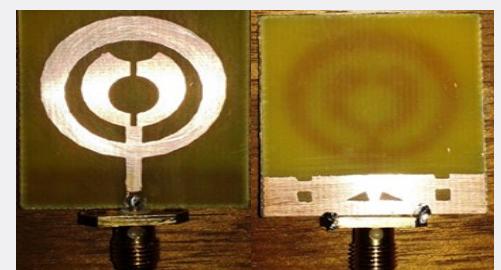
DGS is widely used now-a-days in active and passive devices. Each DGS shapes have its own characteristics and create effect on the performance of the device according to its geometry and size. DGS has been used in filters, coplanar waveguides, microwave amplifiers, and antennas to improve their performance. DGS is used for miniaturizing the size of component, enhancing the operating bandwidth and gain, reducing the mutual coupling between two networks, suppressing the higher order harmonics and unwanted cross-polarization and also for producing notched band to stop interference with any band. Therefore, the role of DGS in the field of microwave and microstrip antennas is diverse intended for a variety of applications, that is, miniaturization, multiband performance, bandwidth enhancement, gain enhancement, mutual coupling suppression between two elements, higher mode harmonics suppression, cross-polarization suppression, notched band creation, and circular polarization achievement.



**Dr. Sachin Kumar**  
Associate Professor  
ECE Dept.



**Coplanar waveguide with SIW technology embedded with DGS**



**Microstrip antenna with DGS patterns**



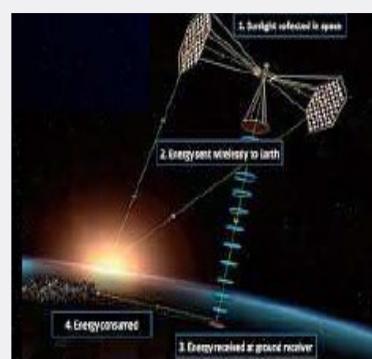
## WIRELESS POWER TRANSMISSION THROUGH SOLAR POWER SATELLITE

In the near future due to extensive use of energy, limited supply of resources and the pollution in environment from present resources (e.g. wood, coal, fossil fuel etc), alternative sources of energy and new ways to generate energy which are efficient, cost effective and produce minimum losses are of great concern .

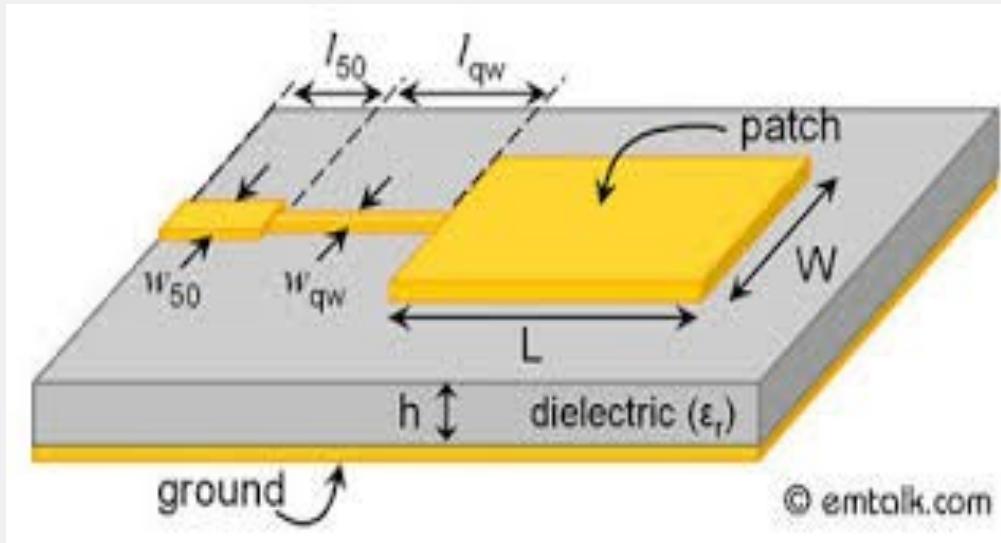
Wireless electricity (Power) transmission (WET) has become a focal point as research point of view and nowadays lies at top 10 future hot burning technologies that are under research these days. In this paper, we present the concept of Solar Power Satellites -The solar cells in the satellite will convert sunlight to electricity, which will changed to radio frequency energy, then beamed to a receiver site on earth and reconverted to electricity by using transmitting and receiving antenna with the technology of wireless power transmission (i.e., transmitting power as microwaves in order to reduce the transmission and distribution losses). The SPS is a gigantic satellite designed as an electric power plant orbiting in the Geostationary Earth Orbit (GEO). It consists of mainly three segments; solar energy collector to convert the solar energy into DC (direct current) electricity, DC-to-microwave converter, and large antenna array to beam down the microwave power to the ground. The first solar collector can be either photovoltaic cells or solar thermal turbine. The second DC-to-microwave converter of the SPS can be either microwave tube system and/or semiconductor system. A typical amplitude taper is called 10 dB Gaussian in which the power density in the center of the transmitting antenna is ten times larger than that on the edge of the transmitting antenna. Power will be transmitted over a 1-1/4 mile range to a receiving antenna (rectenna) and then fed into a commercial utility power grid. The power could be transmitted to the places where the wired transmission is not possible. Loss of transmission is negligible level in the Wireless Power Transmission; therefore, the efficiency of this method is very much higher than the wired transmission. Power is available at the rectenna as long as the WPT is operating. The great advantage of placing the solar cells in space instead of on the ground is that the energy is available 24 hours a day, and the total solar energy available to the satellite is between four and five times more than is available anywhere on Earth and 15 times more than the average location.



Power Transmission View



Space Solar Power



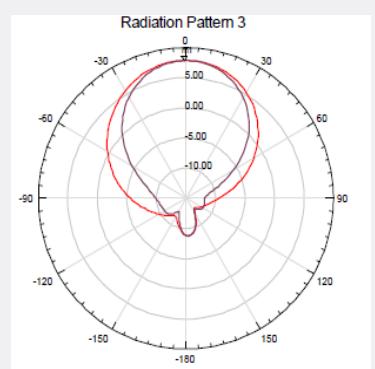
**Mr. Rakesh Kumar**

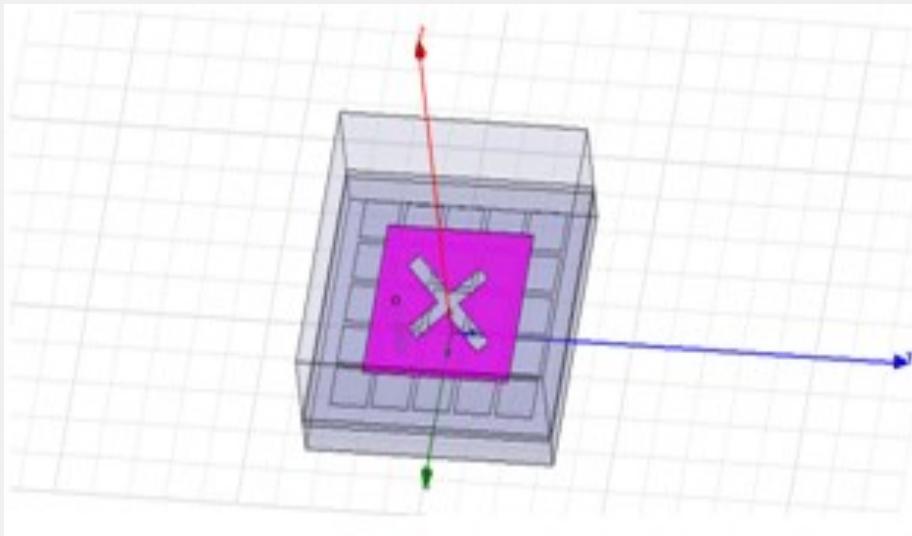
Assistant Prof, ECE Dept.  
ECE Dept.

## GAIN ENHANCEMENT OF EQUITRIANGULAR MICROSTRIP PATCH ANTENNA

Nowadays, Antenna is one of the most important components in the field of communication system. Satellite communication and wireless communication has been developed rapidly in the past decade. It is always desirable to develop low cost, minimal weight and low profile antenna that are capable of maintaining high performance over large spectrum of frequencies. This led to focus on the design of microstrip patch antenna which offers various advantages over other antenna configuration. For example, they are extremely low profile, lightweight, simple and inexpensive to fabricate using modern day printed circuit board technology, compatible with microwave and millimetre-wave integrated circuits (MMIC), and have the ability to conform to planar and non-planar surfaces. In addition, once the shape and operating mode of the patch are selected, designs become very versatile in terms of operating frequency, polarization, pattern, and impedance. The variety in design that is possible with Microstrip antenna probably exceeds that of any other type of antenna element.

In this Article a novel microstrip antenna has been shown which can be used for various applications such as weather radar, Surface ship radar, communication satellite and in wireless network equipment For which a triangular microstrip antenna is chosen having two stacked patches with three triangular slots in the ground plane is designed for dual frequency operation and large gain performance. Air is used as dielectric between feed patch and parasitic patch. The proposed stacked microstrip antenna with slotted ground plane provides a better performance like high gain, good directivity and narrow beamwidth as compared to that of existing microstrip antenna. This proposed antenna is also very much light in weight and cost effective. The proposed antenna is worth for multi operations such as communication satellite, weather radar, surface ship radar and wireless network equipment.





Cross slot patch Antenna with RIS

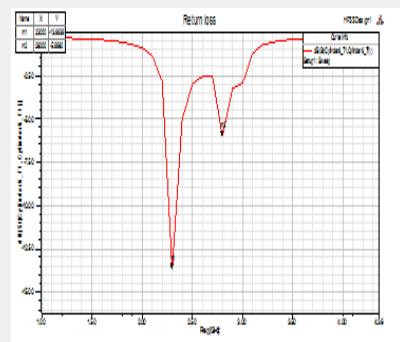


**Ms. Rakhi Kumari**

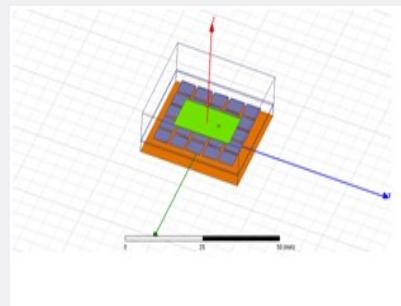
Assistant Prof, ECE Dept.

### IMPROVED CHARACTERISTICS OF MICROSTRIP PATCH ANTENNA USING REACTIVE IMPEDANCE SURFACE

This Article present circular polarized micro strip antenna using Reactive Impedance Surface (RIS) below feed patch and metallic patches on substrate layer. The reactive impedance surface (RIS) not only reduces the size but significantly enhances both the bandwidth and the radiation characteristics of an antenna. The proposed antenna structure consists of a micro strip antenna fabricated on one side of FR4 substrate and RIS on other side of FR4 substrate. Small reduction in antenna size and improvement in gain of circular polarized antenna by using RIS and 5x5 array of patches fabricated on low cost FR4 substrate is proposed. Gain is enhanced from 8 dB to 14.6 dB when 5x5 array of parasitic patches is fabricated on a FR4 substrate layer. Meta-material are periodic structures and have been intensively investigated due to the particular features such as ultra-refraction phenomenon and negative permittivity or permeability. A patch antenna is used as the radiation source. The Ansoft HFSS is used for the simulation. The antenna size is reduced by 10.04% and bandwidth increased by 77.11% (1.097GHz). Low-profile antennas may be a ideal solution in situations where size, weight, cost, performance, ease of installation are constrain. These antennas are used in high performance aircraft, spacecraft, satellite and missile application due to their better cost benefit dynamics. These antennas are low profile, conformable to planar and no planar surface, simple and inexpensive to manufacture. They are very versatile in term of resonant frequency, polarization, pattern, and impedance. The RIS substrate which is the collection of the metallic patches on the metallic backed surface. For miniaturiza-



A microscopic view of Nano Robot





**Ms. Geetanjali Raj**

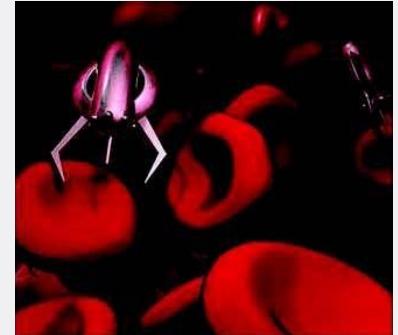
Assistant Prof, ECE Dept.

## SAY GOODBYE TO PILLS, NANO ROBOTS CAN CURE

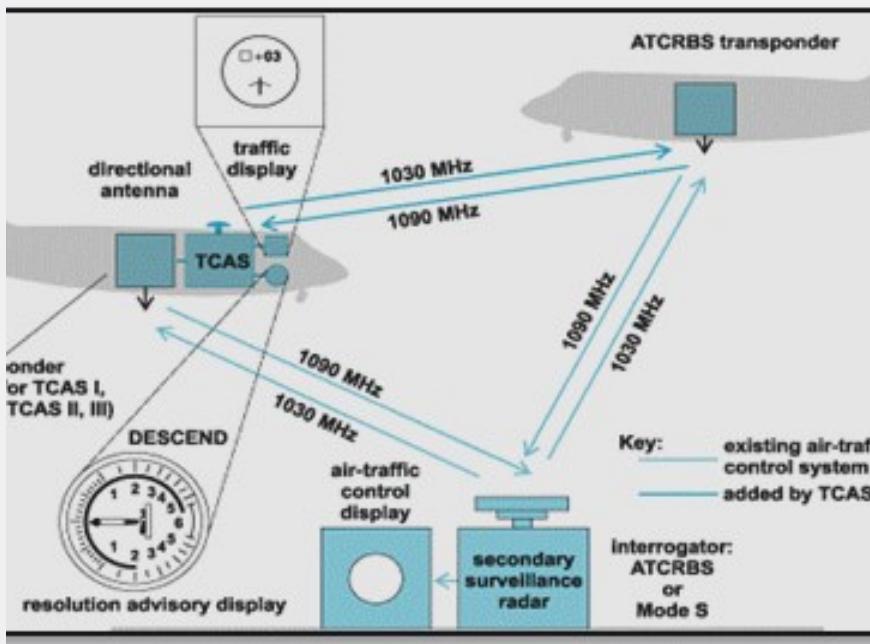
Nano robots will be able to repair damaged or diseased tissues. The circulatory system is the natural path for these devices and the nano robots will pass through the blood stream to the area of defect.

They attach themselves to specific cells, such as cancer cells and report the position and structure of these tissues. A creative methodology in the use of these devices to fight cancer involves using silicon nano machines with a thin coating of gold and light in the near infrared spectrum. Light in the 700-1000 nanometer range will pass through the tissue and reaches the defective cell. When this infrared light strikes the particular type of nano robot, the device gets hot due to the oscillation of the metal's electrons in response to the light using an MRI, the nano robot is specifically placed in the cancerous region, and then the light causes the devices to heat to 131 degrees Fahrenheit which destroys the cancerous cells but doesn't damage surrounding tissues. This is the new technology, without any draw-backs. These nano robots can cure any disease without affecting any other cells or tissues.

The future vision: Imagine going to the doctor to get treatment for a fever, instead of giving you a tablet the doctor implants a tiny robot into your bloodstream. The robot detects the cause of your fever, travels to the appropriate system and provides a dose of medicine directly to the infected area. This is going to happen in a few years of time from now. Each person is going to have a nano robot in his body which is going to monitor human body system. So the time arrives to enjoy with the robot within our self.



A microscopic view of Nano Robot



**Air-to-Air Surveillance**

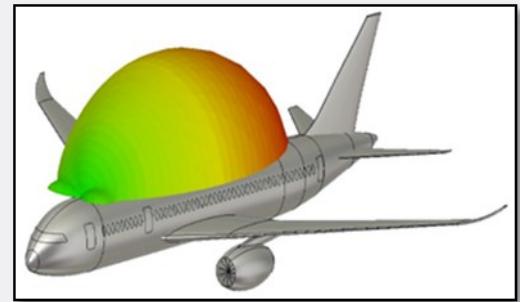
## HOW TO DESIGN AN ANTENNA FOR AVOIDING MID-AIR COLLISION BETWEEN CIVIL AIRCRAFT

TCAS/ACAS (Traffic/Aircraft Collision Avoidance System) is an airborne system designed to increase the cockpit awareness of nearby aircraft and to serve as a last defense equipment against the mid-air collisions between the aircraft. The transmission and reception frequencies of the TCAS antenna are 1.03 GHz and 1.09 GHz respectively. The existing TCAS antenna has some drawbacks such as low gain, large beamwidth, frequency and beam tuning/scanning issues etc. Antenna issues like unwanted signals reception may create difficulties in identifying the possible threats. In this article, a Novel Microstrip Antenna Array has been shown which can be used for TCAS/ACAS application.

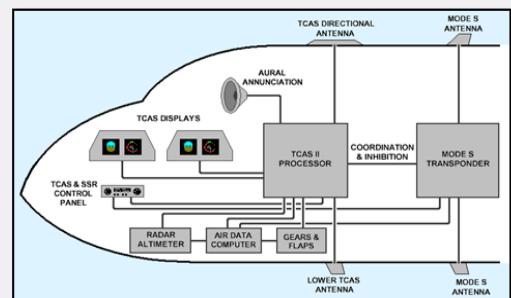
The proposed microstrip antenna array provides a better performance like high gain, good directivity and narrow beamwidth as compared to that of existing monopole TCAS/ACAS antenna. The whole antenna array structure can cover the 360° surveillance region around the aircraft with proper excitation of the corresponding ports. Hence, TCAS system can measure the bearing angle of an intruder aircraft while tracking. This proposed antenna is also very much light in weight and cost effective. It has been designed using the dielectric most suited for the intended frequency of operation. The length and width of the patch has been calculated comply with the space bracket available on the fuselage of the aircraft. The proposed antenna will be fitted on the fuselage at the top of the aircraft. The proposed antenna will not be left open at the top of the aircraft. It will be encapsulated inside an aerodynamically shaped enclosure, known as 'Radome'. For a high speed carrier a radome or an antenna of lower profile must be used to reduce the air drag. Properly designed shaped-encapsulation will optimize the drag performance. Apart from the design considerations it also saves on the maintenance front as it is not directly exposed in the line of the airflow. Hence, this Antenna can be embedded in the body of the aircraft, so that it will offer minimum resistance to the airflow. Therefore, with these proposed implementations in the system, this TCAS antenna would be expected to meet the requirements of the advanced avionics standards in terms of design simplicity, lightweight and high performance.



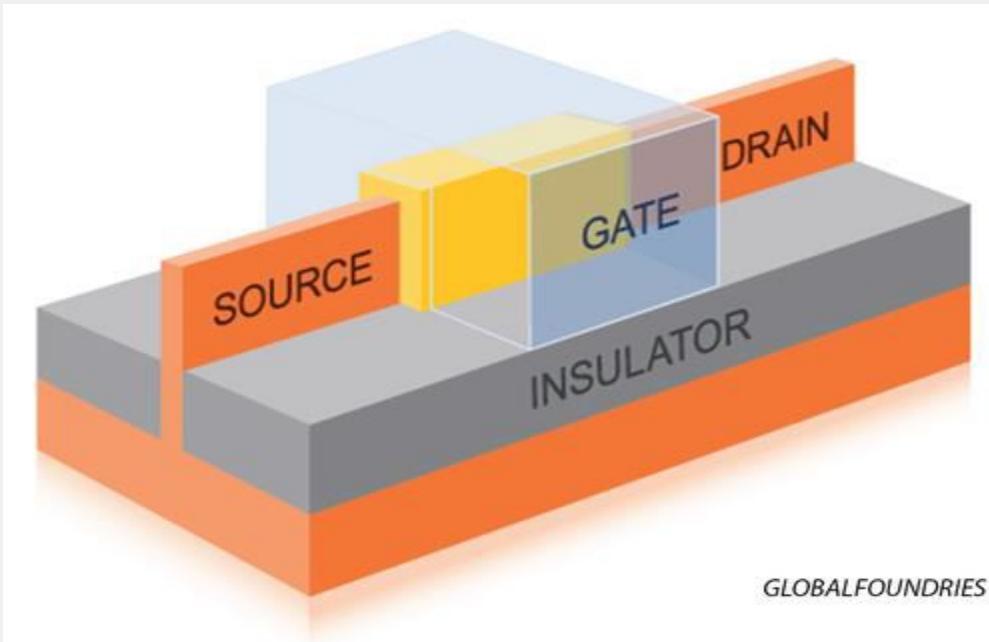
**Mr. Debjit De**  
Research Scholar,  
NIT Rourkela



**Antenna Radiation Pattern**



**TCAS/ACAS System Block Diagram**



FinFET Basic Structure

**Mr. UTKARSH ARORA**

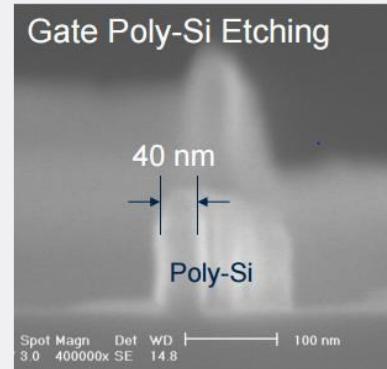
Student, EC Final Year

GLOBALFOUNDRIES

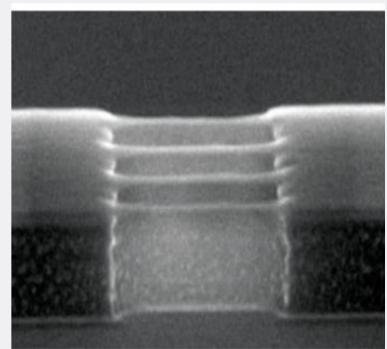
## EMERGENCE OF FINFET OVER CMOS

From the time of its patent in the year 1963 and its actual implementation in the corner of the year 2000. CMOS technology has emerged to be one of the most robust and speedy technology, the reason of such a high preference of CMOS over the existing technologies were primarily its high switching characteristics, low noise margins and ideally zero static power dissipation. Apart from all these traits there were some factors of CMOS technology that somehow proved to be a hurdle on the way in the miniaturizing of Integrated Circuits. This led to the need of inventing such a Technology that could provide better controllability and should possess all the pros of CMOS and BIPOLAR technologies. This led to the invention of FinFET which has better controllability and is made by inserting CNT(Carbon Nano Tubes) in the channel area of a particular MOSFET, by raising the channel area a little higher than the conventional Mos structure(Fig.1). The current in a FinFET depends on the number of FINS in the mood and thus can be increased in the fabrication steps rather than increasing it by increasing the Voltages of the MOSFET.

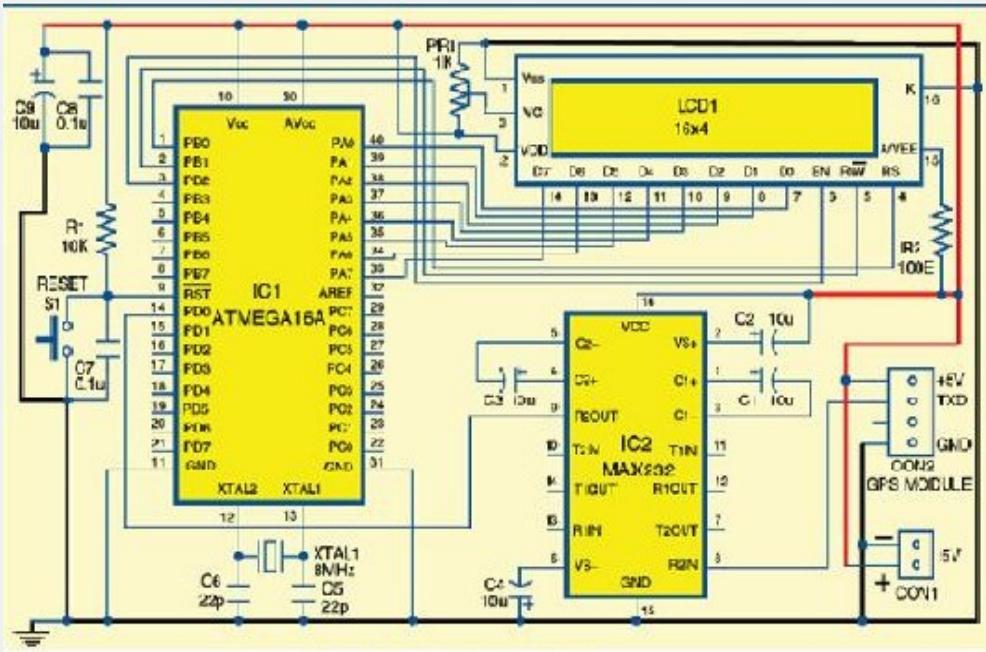
FinFET has now almost overtaken the complete Digital Industry. Due to the less dependence of Digital circuits on saturation region operation of the MOSFET and therefore less dependence on channel length modulation, digital circuits can be more effectively scaled down in comparison to Analog Circuits. As a recent innovation Qualcomm introduced the worlds first 10 nm processor CENTRIQUE 2400 which is based on FinFET technology. Samsung RnD Korea diclared the use of 5 nm circuits and its implementation in the following two decades. The use of CNT in FinFET which not only reduces the device operation time but will also increase the durability of the chip against mechanical factors, as CNT are the hardest material available in nature increases the life of the chip making them more economical.



First Bulk FinFET in World



IEEE proposed FinFET



**GPS Clock Circuit Diagram**

## MICROCONTROLLER DRIVEN GPS

GPS satellites (and now other global navigation systems commonly referred to as GNSS) include three or four atomic clocks that are monitored and controlled to be highly synchronized and traceable to national and international standards (known as UTC). So for time synchronization, the GPS signal is received, processed by a local master clock, time server, or primary reference, and passed on to "slaves" and other devices, systems, or networks so their "local clocks" are likewise synchronized to UTC. Typical accuracies range from better than 1 microsecond to a few milliseconds depending on the synchronization protocol. It is the process of synchronization to GPS that can provide atomic clock accuracy without the need for a local atomic clock. Still, local atomic clocks are sometimes desired as a long-term back-up solution to loss-of-GPS, either in the case of a weather-related outage, GPS interference, or other scenarios.

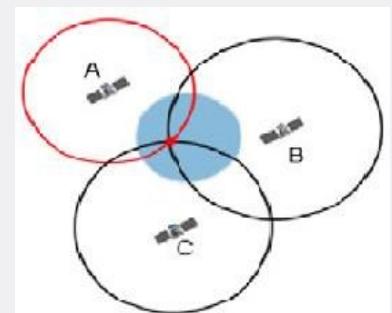
In any case, GPS clock synchronization eliminates the need for manual clock setting (an error-prone process) to establish traceability to national and international standards so various events can be correlated even when they are time-stamped by different clocks. The benefits are numerous and include: legally validated time stamps, regulatory compliance, secure networking, and operational efficiency. The Global Positioning System provide more accurate time than can be obtained from terrestrial radio stations. These GPS clocks combine time estimates from multiple satellite atomic clocks with error estimates maintained by a network of ground stations. Due to effects inherent in radio propagation and ionospheric spread and delay, GPS timing requires averaging of these phenomena over several periods.

Applications of GPS clock involves:

1. Digital clocks with GPS synchronization can be made which would be highly readable systems consisting of one master clock and several slave clocks.
2. In telecommunications, a synchronous network is a network in which clocks are controlled to run, ideally, at identical rates, or at the same mean rate with a fixed relative phase displacement, within a specified limited range. These accurate clocks can be used here.
3. Employee time tracking device can made using GPS clock.

**Ms. Suruchi**

Student, EC Final Year



**Trilateration of Satellite**



**GPS Clock Output**