# Micro-Electro-Mechanical Systems (MEMS): A Revolution in Miniaturization

Micro-Electro-Mechanical Systems (MEMS) represent a revolutionary technology that combines electrical and mechanical components on a microscopic scale. MEMS devices are characterized by their small size, low cost, and high performance, making them ideal for a wide range of applications, from consumer electronics to biomedical devices. This paper provides an overview of MEMS technology, its applications, and future prospects.

## What is MEMS Technology?

Micro-Electro-Mechanical Systems, or MEMS, is a technology that in its most general form can be defined as miniaturized mechanical and electro-mechanical elements (i.e., devices and structures) that are made using the techniques of microfabrication. The critical physical dimensions of MEMS devices can vary from well below one micron on the lower end of the dimensional spectrum, all the way to several millimeters. Likewise, the types of MEMS devices can vary from relatively simple structures having no moving elements, to extremely complex electro-

mechanical systems with multiple moving elements under the control of integrated microelectronics. The one main criterion of MEMS is that there are at least some elements having some sort of mechanical functionality whether or not these elements can move. The term used to define MEMS varies in different parts of the world. In the United States they are predominantly called MEMS, while in some other parts of the world they are called "Microsystems Technology" or "micromachined devices". and network efficiency.

While the functional elements of MEMS are miniaturized structures, sensors, actuators, and microelectronics, the most notable (and perhaps most interesting) elements are the microsensors and microactuators. Microsensors and microactuators are appropriately categorized as "transducers", which are defined as devices that convert energy from one form to another. In the case of microsensors, the device typically converts a measured mechanical signal into an electrical signal.
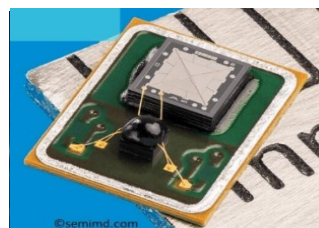


**MEMS**

## What are the Applications of MEMS technology?

MEMS technology has found applications in a wide range of fields, including consumer electronics, automotive industry, aerospace, and biomedical devices. In consumer electronics, MEMS sensors, such as accelerometers and gyroscopes, are used in smartphones and tablets for orientation sensing and motion tracking. In the automotive industry, MEMS sensors are used in airbag systems, tire pressure monitoring systems, and electronic stability control systems, among others, to improve safety and performance. In the aerospace industry, MEMS sensors are used in navigation systems, inertial measurement units, and vibration monitoring systems to improve the performance and reliability of aircraft.

**EDITORIAL BOARD:**

Dr. ARAVINDA K

(HOD-ECE)

**FACULTY COORDINATOR:**

Ms. SALNA JOY

Ms. SWATI NIGAM

# Micro-Electro-Mechanical Systems (MEMS): A Revolution in Miniaturization

## The Evolution of MEMS :

The evolution of MEMS (Microelectromechanical Systems) technology can be traced back to the late 1960s and early 1970s, with the development of the first silicon-based integrated circuits. This laid the foundation for the miniaturization of mechanical and electrical components, leading to the emergence of MEMS devices. In the 1980s and 1990s, advancements in micromachining techniques, such as photolithography and etching, enabled the fabrication of complex MEMS structures with high precision. This period saw the commercialization of MEMS accelerometers and pressure sensors, which found applications in automotive and industrial sectors.

The 2000s marked a significant expansion in the use of MEMS technology, driven by advancements in materials, fabrication processes, and design techniques. MEMS devices became smaller, more reliable, and more cost-effective, leading to their widespread adoption in consumer electronics, such as smartphones and wearables.

In recent years, the evolution of MEMS technology has been characterized by the integration of multiple functionalities into a single device, known as "multifunctionality." This trend has led to the development of MEMS devices with enhanced capabilities, such as combination sensors (e.g., accelerometer-gyroscope combos) and lab-on-a-chip systems for medical diagnostics.

## Future Prospects of MEMS Technology:

The future of MEMS technology looks promising, with ongoing research and development efforts focusing on improving the performance and functionality of MEMS devices. One area of research is the development of new materials and fabrication techniques to further miniaturize MEMS devices and improve their performance. Another area of research is the integration of MEMS devices with other technologies, such as microfluidics and nanotechnology, to create more advanced systems with new functionalities.

One exciting area of research is the development of bioMEMS, which are MEMS devices designed for biomedical applications. BioMEMS devices have the potential to revolutionize medical diagnostics and treatment by enabling real-time monitoring and control of physiological processes.
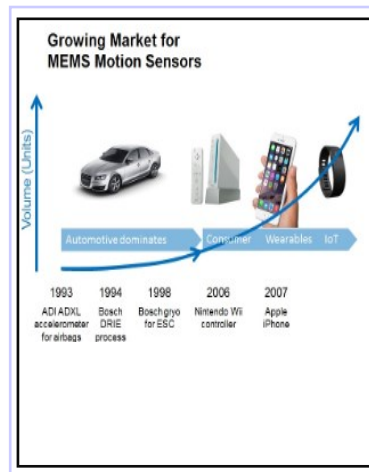


For example, bioMEMS devices could be used to monitor glucose levels in diabetic patients or to deliver drugs directly to diseased tissues, minimizing side effects and improving treatment outcomes.

## The Connect

## FACULTY ACHIEVEMENTS

| Name of the Staff | Name of the award/achievements | Year of Award | Awarding Agency |
|---|---|---|---|
| Dr. Arun Kumar | Reviewer | May 2023 | Internationational Journal of Communication systems |
| | Reviewer | Mar2023 | MDPI Journals |
| Dr. Rajesh G | Resource person | Feb 2023 | Patel Institute of Science & Management |
| | IEEE Senior Member | Feb 2023 | IEEE |
| Dr. A.B Gurulakshmi | Resource person | Mar 2023 | SRM Institute of science & technology |
| | Reviewer | Feb 2023 | ICRTEC 2023, IEEE mysore Subsection |
| | Guest Lecture | Jan 2023 | Siddartha Institute of science and technology, Puttur |
| Mr.S.Shashikiran | Guest Speaker | Jan 2023 | Dr.T.T.I.T, KGF |
| Mr.Srinivas babu N | Guest Speaker | Jan 2023 | Dr.T.T.I.T, KGF |
| Dr.M.Jayanthi | Guest Lecture | Feb 2023 | Siddartha Institute of science and technology |

# EXPERT LECTURES
Coordinators : Prof. Divya Sharma & Prof. Ajay Sudhir Bale)

| Name of the Industrial Expert | Company Organization | Topic/ Subject | Semester | Hours engaged | Date |
|---|---|---|---|---|---|
| Mr.Manjunath G K | Pravegasemi Pvt, Bangalore | Synthesis of Verilog Code and Simple Synthesis Examples | IV | 2 | 22-06-2023 |
| Mr. Sagar | Nokia Networks,Bengaluru | Digital Modulation techniques detection and estimation theory | VI | 2 | 20-04-2023 |
| Mr. Manjunath G K | FrenusTech Pvt Ltd, Bangalore | Synchronous Sequential Circuit Analysis | III | 2 | 20-01-2023 |
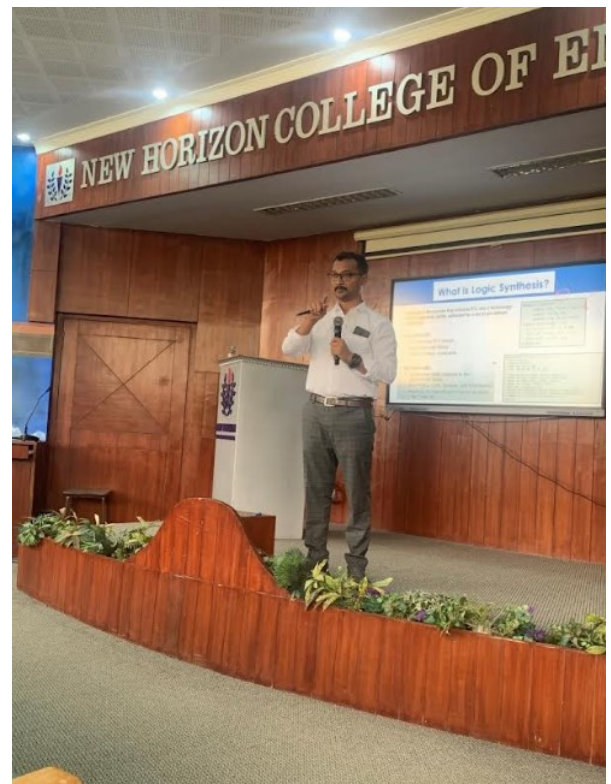
# ALUMNI TALK
### Coordinators: Prof. Ishani Mishra

| Name of the Alumni and  Current Designation | Date of the Event | Contribution |
|---|---|---|
| Mr.Kishore Y C, (Year of Graduation- 2014 ) Staff Engineer MediaTek. | 08/06/2023 | "Introduction to Semiconductor Industry and Physical Design" |
| Ms.Sneha Srinivasan (Year of Graduation- 2019 ) Executive Data Scientist Nielsen Global Solutions. | 11/03/2023 | " Overview of Data Science in Media" |
| Meghanashree C, (Year of Graduation- 2022) Security Engineer Andpad Inc,Tokyo,Japan. | 16/02/2023 | "International Placements, Strategies to Crack the Interview" |

**The Connect**

# WORKSHOPS:

(Coordinator : Dr.M.Jayanthi & Prof Monika Gupta)

| Date | Resource person | Title | Semester |
|---|---|---|---|
| 08/02/2023 | Dr. Agalya V | Workshop on Design thinking, Critical Thinking and Innovation Design | IV |
| 20/05/2023 | Mr. Chandran SP | Advanced Embedded firmware and IoT Number of Participants | VI |
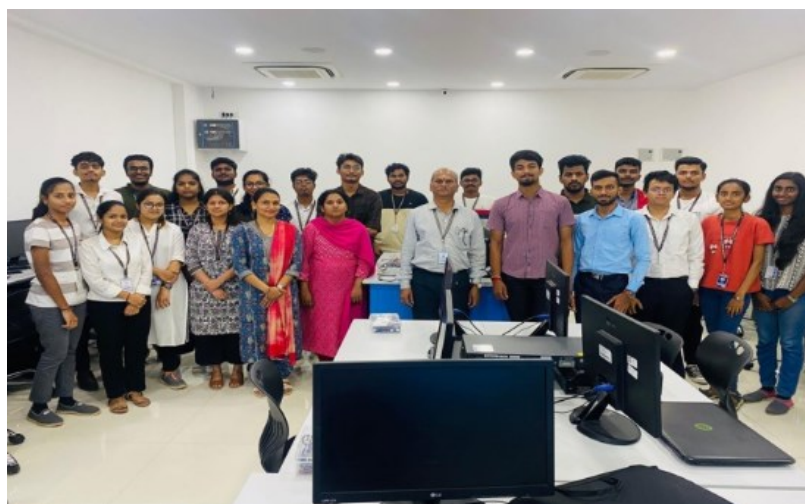
# TECHNOLOGY SHARING CLUB
(COORDINATORS : PROF. S. BHATTACHARYA , PROF. ISHITA DEB)

## What we're about:

We as a club will provide the right platform to develop your thoughts to innovations which will suffice the need of the hour. Also gives you sorted insight on technology be it former or newfound. An open forum will also be provided for discussions. Lack of Knowledge often leads to mishaps, here at our club we aim to prevent any such mishaps by enhancing your knowledge through fun-learning. We will also provide adequate opportunities for you to share technical thoughts and technical symposiums.
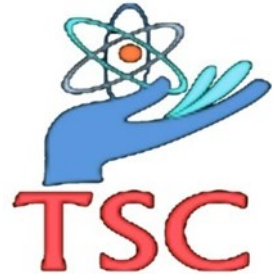
## Objective:

To provide insight into existing and evolving technology and product

| ROLE | NAME |
|------|------|
| President | R Vikas |
| Vice-president | Nandana P |
| Secretary | Akshaya Srinivasan |
| Treasurer | Shiva Shankar L |
| Committee Member | Nandana P |
| Committee Member | Chandan Gowda M |
| Committee Member | Karthik S |
| Committee Member | Nithya Bharadwaj |
| Committee Member | M Manasa |
| Committee Member | Chetas E Achar |
| Committee Member | Snehal |

**The Connect**

# TECHNOLOGY SHARING CLUB

| EVENT | DATE | DESCRIPTION |
|---|---|---|
| PERCEPTION | 05/01/23 | Knowledge gaining session |
| Workshop using Project Development using REPLIT | 13/04/23 | Introduces REPLIT for Major projects |

# ELECTRONICS HOBBY CLUB
(COORDINATORS : PROF. RICHARD , PROF. AMARJEET PAL)

## What we're about:

The goal of this club is to implement and demonstrate electronics-based hobby projects and products. By motivating the enthusiasts in trying out the avenues of hardware and software domains of the electronics and communication, this club is aimed at enriching the intelligence as well as wisdom of the technical community.

The Club aims to cater to the various needs to keep in pace with the ever evolving field of electronics Innovation, Imagination and Application is the motto of the club. We aim to provide a platform for the students to showcase their innovative ideas. The Club deals from basics of electronics till the latest developments The Ideas learnt in theory classes can be applied in the real world.

## Objective:

To implement and demonstrate electronics-based hobby projects andproducts.

| Role | Name |
|------|------|
| President | Rohit P |
| Vice-president | Tanushree Aravind Kumbhare |
| Secretary | Praveen Kumar N |
| Treasurer | J Dhanush |
| Committee Member | Vishwas |
| Committee Member | Lokesh Biswas |
| Committee Member | Siva S |
| Committee Member | Pratheek KV |
| Committee Member | Santhosh Kumar |
| Committee Member | Likitha R |
| Committee Member | Rohith |

## *The Connect*

# ELECTRONICS HOBBY CLUB

| EVENT | DATE | DESCRIPTION |
|---|---|---|
| Electro-Build with US | 13/01/23 | To learn and Build circuits with Electronic components |
| Tinkercad workshop | 21/04/23 | To improve technical skills |
| Intro to professional hardware design | 27/05/23 | To improve coding skills |
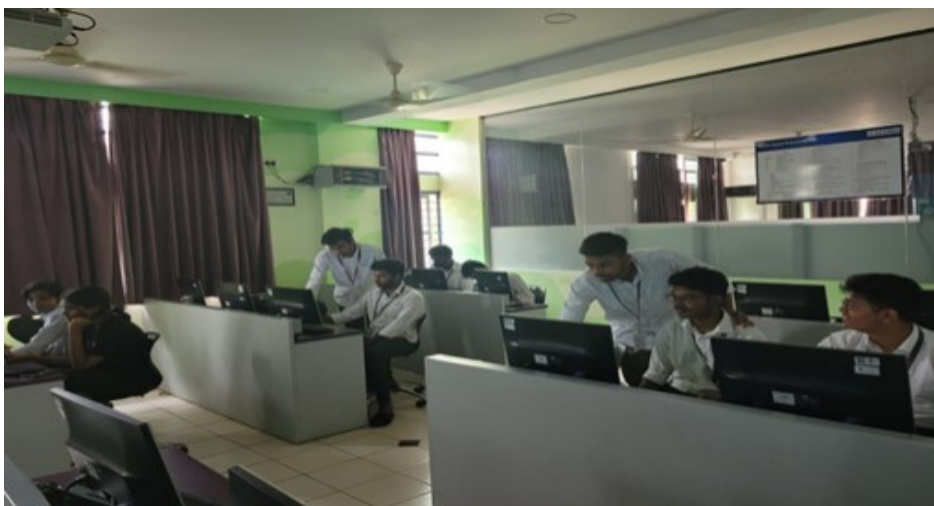
# PROFESSIONAL CONNECT CLUB
## (COORDINATORS : DR. GURULAKSHMI , PROF. DIVYA SHARMA)

**What we're about:**

We help you connect with professionals, professional bodies, research organizations and companies.

We organize guest lectures, seminars, workshops, conferences and competition on technologies, projects and products.

We organize field trips to companies, research institutions and industry exhibitions. We help to facilitate active participation in external technical events.

**Objective:**

To connect with engineering professionals and conduct tech-

| ROLE | NAME |
|---|---|
| President | Sahana Kulkarni |
| Vice-president | Venkata Bhavana Boggarapu |
| Secretary | Jayanth S |
| Treasurer | Abhijeeth Talari |
| Committee Member | Y Chitra |
| Committee Member | Rohanth Hari M |
| Committee Member | Deepak Yadav |
| Committee Member | Mohammed Hesham Umar |
| Committee Member | N Shashank Gowda |
| Committee Member | Deepthi L |
| Committee Member | Kriti Sujai Kumar Devatha |

## The Connect

# PROFESSIONAL CONNECT CLUB

| EVENT | DATE | DESCRIPTION |
|---|---|---|
| Workshop technical research paper writing | 21/04/23 | To improve writing skills |
| Workshop on MOKU | 06/04/23 | Knowledge gaining session |

# THE ROCKETRY CLUB
(COORDINATORS : PROF. LIPSA DASH)

### What we're about:

Everything begins with an idea and every great idea starts with a spark. Such a spark was to fuse the concepts of aerospace technology with the generic curriculum that gave rise to a student club of its kind, the NEW HORIZON ROCKETRY CLUB, a multidisciplinary workspace for inquisitive minds to brainstorm, collaborate and execute the potential ideas in the field of aerospace technology. The club focuses on gaining knowledge and skills through team projects and works on enhancing these acquired skills by conducting events and workshops for one's peers thereby instigating curiosity in them too. The club intends on creating an open ground for all students to share knowledge and grow together outside the classrooms.

### Objective:

To demonstrate and implement the concepts of Aerospace Technology

| ROLE | NAME |
|---|---|
| President | Bharatdeep Hazarika |
| Vice-president | Bhargav Dayal |
| Secretary | Ananya Sundar |
| Treasurer | Ayush Bansal |
| Committee Member | Rithesh B |
| Committee Member | Sumanth K B |
| Committee Member | Avneesh Tamra |
| Committee Member | Abhishek Bedant |
| Committee Member | Sai Kiran |
| Committee Member | Mohd Adnan Khan |
| Committee Member | B Akhil |

# The Connect

# ROCKETRY CLUB

| EVENT | DATE | DESCRIPTION |
|-------|------|-------------|
| Connect X | 08-12-2022 | Competition |

# PLACEMENTS
## (COORDINATOR : PROF. SABITABRATA BHATTACHARYA)

| S.N | Name of the Organization | No of students placed | Salary Offered |
|---|---|---|---|
| 1 | Accenture | 5 | ₹4.50L |
| 2 | Brillio | 6 | ₹8.50L |
| 3 | Capgemini | 68 | ₹5.88L |
| 4 | Cinepebble | 1 | ₹4.80L |
| 5 | Cognizant | 39 | ₹5.50L |
| 6 | DXC TECHNOLOGY | 14 | ₹4.50L |
| 7 | Epiphany | 3 | ₹6.00L |
| 8 | Epsilon | 1 | ₹5.00L |
| 9 | Ernst & Young | 12 | ₹6.37L |
| 10 | Happiest Minds Technologies Pvt. Ltd | 6 | ₹5.40L |
| 11 | HEARTCORE | 1 | ₹28.00L |
| 12 | I Exceed technology solutions | 3 | ₹4.50L |
| 13 | IBM India | 1 | ₹4.50L |
| 14 | KPIT | 28 | ₹4.50L |
| 15 | L&T Technology Services Ltd | 3 | ₹4.00L |
| 16 | LeadSquared | 1 | ₹6.00L |
| 17 | Mi Maze Co. Ltd | 1 | ₹26.50L |
| 18 | Microchip Technology (India) Pvt. Ltd | 1 | ₹10.00L |
| 19 | Netradyne Technology Pvt Ltd | 1 | ₹9.60L |
| 20 | MindTree | 10 | ₹5.25L |
| 21 | musigma | 3 | ₹5.00L |
| 22 | Prodapt Solutions Pvt. Ltd | 1 | ₹4.00L |
| 23 | Nineleaps Technologies | 1 | ₹6.50L |
| 24 | Oracle | 2 | ₹8.89L |
| 25 | Speridian Technologies | 2 | ₹3.50L |
| 26 | Steer Engineering | 2 | ₹4.00L |
| 27 | TCS | 12 | ₹3.36L |
| 28 | Torry Harris Integration Solutions | 4 | ₹5.00L |
| 29 | Visa | 1 | ₹32.74L |
| | **Total No of students placed** | **221** | |
| | **Total No of offers** | **221** | |

# The Connect

# STUDENT CORNER—*A GLIMPSE TO THE CREATIVITY OF STUDENTS*



M Chandana
1NH21EC084



1NH18EC135

By Greeshma
21.01.23



Sheetal Choudhary
1NH21EC147



Cedric Baby
1NH21EC033

**The Connect**

# DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## Vision

To create high quality engineering professionals who can serve the society and earn global recognition.

## Mission

🔶 To build strong foundation in Electronics and Communication Engineering aspects by exposing students to state of the art technology and research

🔶 To strengthen the curriculum through interaction with industry experts and to equip the students with the required competency.

🔶 To mould students to share technical knowledge and to practice professional and moral values.

## Program Educational Objectives

PEO 1: To produce graduates with understanding of fundamentals and applications of Electronics and Communication Engineering.

PEO 2: To hone graduates with ability to apply, analyze, design and develop electronic systems.

PEO 3: To enhance graduates with latest technologies to enable them to engineer products for real world problems in Electronics and Communication.

PEO 4: To build leadership qualities, management skills, communication skills, moral values, team spirit and lifelong learning ability for the graduates.

## PROGRAM OUTCOMES

**B. E graduate should possess the following Program Outcomes-**

**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems in Electronics and Communication Engineering.

**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems in Electronics and Communication Engineering reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes of Electronics and Communication Engineering that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments in Electronics and Communication Engineering, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities in Electronics and Communication Engineering with an understanding of the limitations.

**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice in Electronics and Communication Engineering.

**Environment and sustainability:** Understand the impact of the professional engineering solutions of Electronics and Communication Engineering in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PAGE 19

ISSUE 17, JUL 2023

**The Connect**

# DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## PROGRAM SPECIFIC OUTCOMES

| Program Specific Outcomes | |
|---|---|
| **PSO1** | To demonstrate the ability to design and develop complex systems in the areas of next generation Communication Systems, IoT based Embedded Systems, Advanced Signal and Image Processing, latest Semiconductor technologies, RF and Power Systems |
| **PSO2** | To demonstrate the ability to solve complex Electronics and Communication Engineering problems using latest hardware and software tools along with analytical skills to contribute to useful, frugal and eco-friendly solutions. |

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION

Today the world has shrunk and the global village is marching towards technological revolution predominantly due to innovations in the field of Electronics and Communication. The field of Electronics and Communication opens the doors to a myriad of opportunities and exciting challenges for the go-getters.

The department of electronics & communication engineering is accredited by the National Board of Accreditation (NBA). The vision of the department is to create high quality engineering professionals who can transform society and earn global recognition.

http://newhorizonindia.edu/nhengineering/department-of-electronics-and-communication-engineering/

The department is bestowed with well designed and well maintained infrastructure. It is well equipped with interactive classrooms and laboratories with latest equipment for students to experiment and state of the art facilities. The department also offers the VTU research centre for Ph.D. and M.Sc. (Engg.), for research.The enthusiastic teaching fraternity of the department besides being highly qualified, have the acumen to instil in students the urge to do better and bring out the best in them. Most of them have considerable experience in academics and research as.Few of them have industrial experience as well.The Electronics & Communication Engineering Program with its autonomous status is re-designed to cater to the needs of industry. The courses focus on intriguing areas like Embedded Systems, Communication, VLSI, Signal Processing, and Information technologies. Industry-relevant technology courses are a feather on the cap in the department.To run the same technology experts from reputed organization like IBM, HP, Texas Instruments, Sankalp Semiconductors, Audience Communication, Intel, ISRO, IISc. and other reputed institutes visit the department. The interaction of students with the experts gives them a niche over their peers in a world where technological growth and development is fast pacing and prepares them to chalk out solutions for the real world problems.To keep them updated on the technological scale, various workshops, seminars, competitive events, conferences and industrial visits are also organized on a regular basis.

To give them practical exposure and develop their technical and interpersonal skills the students of ECE department are required to execute various projects throughout their studies. Also they're motivated to publish research papers, and participate in national and international conferences as well. They take the lead in planning and executing various activities through Electronics Hobby Club, Technology Sharing Club, and Professional Connect club which definitely gives them an enthralling experience. Furthermore the students also undergo special placement training through value added programs. Most of them get placed in reputed organizations such as Intel, Texas Instruments, AMD, Qualcomm, ARM, Schneider Electric, Bosch, Cisco Systems, Juniper Networks, Vmware, Sony, Nokia, Accenture, Cap Gemini, IBM, HP, TCS, Infosys, Wipro, Mindtree and many more. Some students pursue higher studies in Indian and foreign universities, while there are quite a few of them who start their own ventures thereby contributing immensely in the growth of our society. As the famous quote goes "All work and no play makes Jack a dull boy. Students also engage themselves in cultural, sports and social activities. Many have taken it one step ahead and won gold medals and several trophies in sports and cultural events organized at different levels and several other institutions.Overall, the department provides a very positive and nurturing environment, for students to develop and grow into into knowledgeable, skilled and productive Electronics & Communication Engineers.