GALGOTIAS COLLEGE
OF ENGINEERING & TECHNOLOGY

GELCOM
2017-2018

Volume 4

Department of Electronics & Communication

Chief Editor: Dr. Lakshmanan M (Prof. and Head, ECE Dept)

Faculty Editor: Mr. Hitesh Kumar (Asst. Professor)

Student Editor: Sristi Sharma
Prakhar Shukla

About ECE Department

The Department of ECE offers B.Tech and M.Tech courses in Electronics and Communication Engineering from Dr. A.P.J. Abdul Kalam Technical University, (formerly Uttar Pradesh Technical University / Gautam Buddh Technical University) Lucknow. Electronics & Communication Engineering deals with the electronic devices, circuits, communication equipments like transmitter, receiver, integrated circuits (IC). microprocessors, satellite communication, microwave engineering, antenna and wave propagation. The department aims to impart high quality education in ECE and conduct top notch research in ECE related fields.

The department provides state-of-art infrastructure and computing facilities to students and faculty. The faculty members are actively involved in different domains of research with special focus in four thrust areas:

1. Wireless Communication and Networks
2. Microwave and Antennas,
3. VLSI Design
4. Communication Systems
5. Signal and Image Processing.

The department has a regular hardware and software labs as well as the state-of-art research labs in microwave and antennas, where faculty and students are working on funding projects and offering consultancy services. Some of the available softwares in ECE department are MATLAB, HFSS, ns-2, ns-3, Riverbed Academic edition, OrCAD PSPICE, eSim, SCILAB, OR-Tools, Expeyes, etc. The Department follows a well proven pedagogy of sharing knowledge with the young and vibrant minds of the college. As we are affiliated to AKTU University, Lucknow, the curriculum and subjects are prescribed by AKTU University. In addition to instruction in core ECE subjects, we also teach elective subjects in advanced topics such as Voice over Internet Protocol, Filter Design, Digital Image Processing, Digital System Design using VHDL, Speech Processing, Advance Digital Design using Verilog, Microcontroller for Embedded Systems, etc.
The department imparts world class training and research besides promoting active industry-institute collaboration by identifying current trends and taking part in sponsored research projects and consultancy services. The department also has a worldwide reach with its vibrant alumni network. Working shoulder with shoulder with the institution, it is constantly aiming towards reaching greater heights to serve the needs of the society and meet the aspirations of the student community.

Vision of Institute

To be a leading educational institution recognized for excellence in engineering education and research producing globally competent and socially responsible technocrats.

Mission of Institute

IM1: To provide state of the art infrastructural facilities that support achieving academic excellence.

IM2: To provide a work environment that is conducive for professional growth of faculty and staff.

IM3: To collaborate with industry for achieving excellence in research, consultancy and entrepreneurship development.

Vision of Department

To be recognized as a center of excellence in Electronics and Communication Engineering for the quality and global education, interdisciplinary research and innovation, to produce committed graduates who can apply knowledge and skills for the benefit of society.

Mission of Department

DM1: To provide quality education by providing state of the art facility and solutions for global challenges.

DM2: To provide a framework for promoting the industry-institution collaboration and empower the students in interdisciplinary research.

DM3: To transform students into socially responsible, ethical and technically proficient engineers with innovative skills and usage of modern tools.

DM4: To make the students corporate ready with spirit and necessary interpersonal skills.

Program Outcomes

PO1 **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 **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.

PO7 **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 **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.

PO11 **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.

PO12 **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.

Program Specific Outcomes

By the completion of Electronics & Communication Engineering program the student will be able to:

PSO1: Design and develop models for analog & digital electronic circuits and systems.

PSO2: Design, develop and test electronic and communication systems for applications with real time constraints.

Program Educational Objectives

PEO 1	Graduates will excel in their career by acquiring knowledge in the field of Electronics and Communication Engineering with the usage of modern tools and emerging technologies.
PEO 2	Graduates will have the capability to analyze real life problems of the society and produce innovative solutions.
PEO 3	Graduates exhibit professionalism, ethical attitude, communication skills and team work in core engineering, academia and research organizations through professional development and life-long learning.

ARTICLE: 1 SWITCHING OPTICAL MEDIA IN THE BROADBAND ERA

Switching optical media in the broadband era: Twenty years ago, when telephone services were dominant, if work was undertaken only when lines were not being used, there was little effect on customers. Now, however, in the optical broadband era, information flows nonstop, 24 hours a day, 365 days a year, via Internet, cloud computing, video distribution, and other services. Therefore, the old approach cannot be used without affecting customers. We are conducting R&D to find ways of switching optical media that are appropriate for the modern era. Uninterruptible optical access line switching system approximately four years ago, we conceived principles that enable media to be switched without the disconnection or suspension of services and were able to demonstrate the practical implementation of this approach. Our technique involves (1) connecting an optical fiber (the detour path) of approximately the same length as the current optical fiber (the main path) in parallel with it, (2) disconnecting the main path and transmitting the optical signal over the detour path, (3) performing the switch work while the main path is offline, (4) adjusting the length of the detour path while it is transmitting the signal so that it is approximately the same as that of the main path after switching, (5) reconnecting the main path as the new line in parallel with the detour path, and (6) disconnecting the detour path. All of the steps in this procedure can be performed without interrupting the signal.

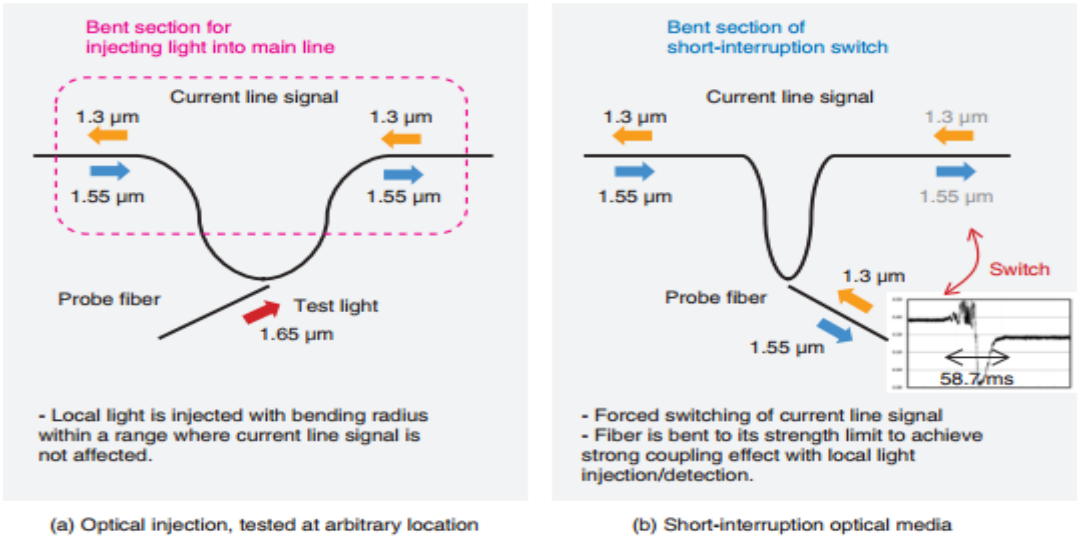


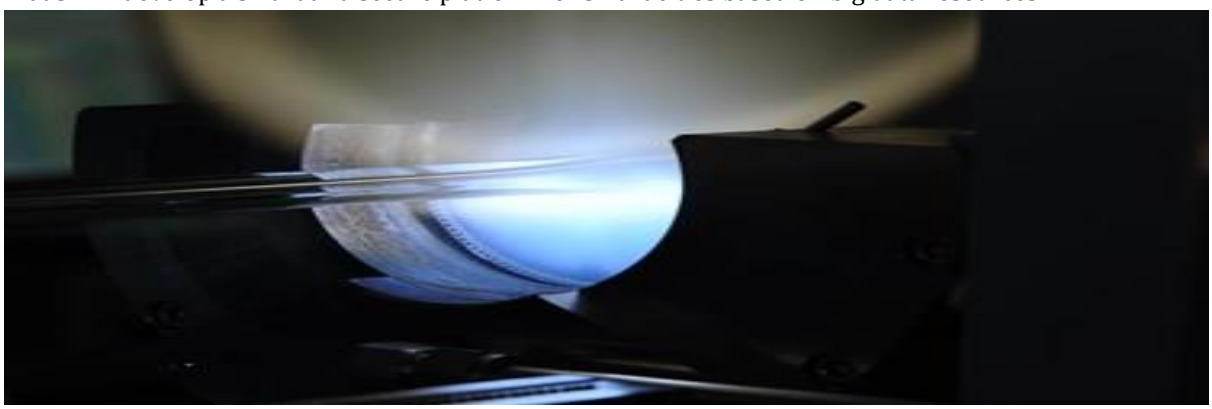
Fig. 3. Local optical injection/detection technology.

The system is complex and requires precise control of path lengths, measurements, loss compensation, and the cancellation of interference. We are therefore undertaking R&D to build a system that is compact, smart, and compatible with a variety of scenarios in the field. If this system can be realized, we will be able to change an optical access line at any time.

Ms. Ruchi Aggarwal
Asst. Prof./ECE /GCET

ARTICLE: 2 NEW OPTICAL AMPLIFIERS AND FIBER TECHNOLOGYIES ARE NEEDED TO SUPPORT 400Gbit/s DATA RATES AND BEYOND

NEW OPTICAL AMPLIFIERS AND FIBER TECHNOLOGYIES ARE NEEDED TO SUPPORT 400Gbit/s DATA RATES AND BEYOND Over the last seven years or so, the European Union has been developing a closer technological relationship with Japan. Part of this relationship has focused on the technologies needed to support next generation communication networks. As part of this, a joint workshop was held in 2013 to discuss cooperation in the field of networked technologies and systems. Stream D of this workshop discussed technologies needed to realise high speed and large capacity broadband networks. On the agenda was how optical networks could be key enablers of high speed and large capacity networks, as well as the management of those networks. The technologies discussed included optical transmitters and receivers, with a focus on low power consumption and high efficiency, as well as ways of controlling and managing optical networks. Since 2013, the EU and the Japanese government have announced four communications research projects backed by €12million and involving more than 40 partner institutions. RAPID will use innovative radio network architectures to advance 5G technology, while iKaaS will develop a smart and secure platform for smart cities based on big data resources.



FESTIVAL, meanwhile, will provide joint EU-Japan IoT experimentation platforms, where experimenters can validate their smart ICT service development the final project – SAFARI, with €1.5m of funding – will develop programmable optical hardware that can support data transmission rates of at least 400Gbit/s per channel. ORC scientists are working with Coriant and the Technical University of Denmark and with NTT and Fujikura in Japan. "One is to develop the optical transport technology needed to transmit data at rates in excess of 400Gbit/s, along with way of providing networking flexibility and of controlling these high speed networks using software defined networking (SDN)."On top of that, there's interworking between SDN and the physical layer. We want to combine SDN with ultrahigh capacity fibre links using fibres containing multiple cores, each core running at close to the full capacity of current single mode fibre systems."

Ms. Ranjana Kumari
Asst. Prof./ECE GCET, Greater Noida.

ARTICLE: 3 BIG DATA -DATA ALL AROUND

Big Data- Data All Around: We live in a world which is highly driven by data. The quantity of computer data generated on earth is increasing exponentially from past few years. The term 'Big Data' remains a misnomer for few, as there is still quite a confusion about what it means. Hence, Big Data is the next big thing in computing. It is the main driving force behind many ongoing waves of digital transformation like- Artificial Intelligence (AI), Internet of things (IOT).

The velocity at which the data is generated is quite alarming. Almost every action, we do leave a digital trail. From online shopping to surfing our GPS equipped smartphones, communicating with our near and dear ones through social media or chat application, we leave a digital footprint with everything. With our every single like, comment, tweet, uploading any document, files it leads to storing of quintals of data every day. Highest contributor is the social media platform like-Twitter, Facebook, Instagram, Hike etc.

Until recently, data was limited to spreadsheets and databases due to its small magnitude. But with advancement in storage and analytics, we can capture variety of information ranging from photos, videos, stock records, sound recordings, 3-D models, tent files etc.

In nutshell, 'Big Data' refers to the processing of massive amount of digital data that cannot be analysed by traditional computing techniques. The data magnitude is so voluminous that it is uncomfortable to store and transport. Positively, it challenges us to create next generation data storage tools, techniques.

In early times, superconductors & algorithms allowed us to make sense of facts and statistics. In real time situations. When the traditional system was made, we never anticipated that we may ever have to deal with so much bulky data. Big Data can serve as an opportunity. Some unknown problems can be solved very effectively.

Improving Healthcare- Analyzing vast no. of medical records & easy spotting of diseases so as to develop new medicines. It vastly improves human activities. It helps in predicting & responding to natural or man-made disasters. Scientists can use it to predict where the calamity is likely to strike next, to help in rehabilitation of survivors. A coin is characterized by both its sides. Similarly, big data may raise some questions and challenges: -

"WILL BIG DATA MAKE PRIVACY OBSOLETE

OR

WILL IT BRING TRANSPARENCY ACCOUNTABLE"

Privacy of data is the major drawback of this feature. The data contains a lot of information about our personal lives. Thus, there is a dire need to create a balance for it. Data is unquestioningly changing our world and the way we live is unprecedented. Big Data thus has proved to be of great use to human mankind.

IN FUTURE BIG DATA MAY BECOME EVEN MORE BIG

Dr. Jaspreet Kour
Assoc. Prof./ECE GCET, Greater Noida.

ARTICLE: 4 ARTIFICIAL INTELLIGENCE IN POWER STATION

Nowadays, a consistent, as well as continuous power supply, is required in the advanced and modern society. Globally, the enhancement in the energy sector is increasing day by day and also facing growing challenges like increasing demand, competence, varying supply & demand models & a lack of analytics required for optimal management. In this, the issues due to efficiency are mainly difficult, because of the occurrence of easy connections toward the power grid which means a huge amount of power is neither calculated nor payable, so it results in different losses & high CO2 emissions.

The power sector is used artificial intelligence (AI) & related technologies in developed states for communication among smart meters, smart grids & IoT devices. These technologies enhance the efficiency, power management & transparency to enhance the usage of renewable energy sources.

Power systems are increasing on the base of geographical region, assets additions & electricity generation, transmission & distribution.

The techniques of artificial intelligence have become very famous for resolving different issues that occurred within power systems such as control, scheduling, planning, forecast, etc. So the methods deal with complicated tasks that are faced through applications within current huge power systems using more interconnections that are connected to meet enhancing load demand. In power system engineering, the utilization of these methods has been successful in several regions.

Mr. Ausaf Hasan Tarique
Asst. Prof./ECE GCET, Greater Noida.

ARTICLE: 5 ARTIFICIAL INTELLIGENCE IN POWER STATION

BLOCKCHAIN IN AGRICULTURE – IMPROVING AGRICULTURAL TECHNIQUES

Even though blockchain technology gained traction because of its role in the financial sector, it has a vast range of applications beyond cryptocurrencies. The technology is set to drastically transform many industries, including healthcare, law, real estate, banking, etc.

However, one little-explored industry that blockchain has the potential to revolutionize completely is agriculture. More importantly, it has a growing number of issues that we urgently need to solve. Blockchain technology can help the agriculture sector in numerous ways.

Uses Cases of Blockchain in Agriculture: we are discussing four use cases of blockchain in agriculture:

1. Crop and Food Production
2. Food Supply Chain
3. Controlling Weather Crisis
4. Managing Agricultural Finance

Use Case 1: Crop and Food Production: While improving profitability under unfavorable environmental conditions, the agriculture sector has many challenges to overcome, such as:

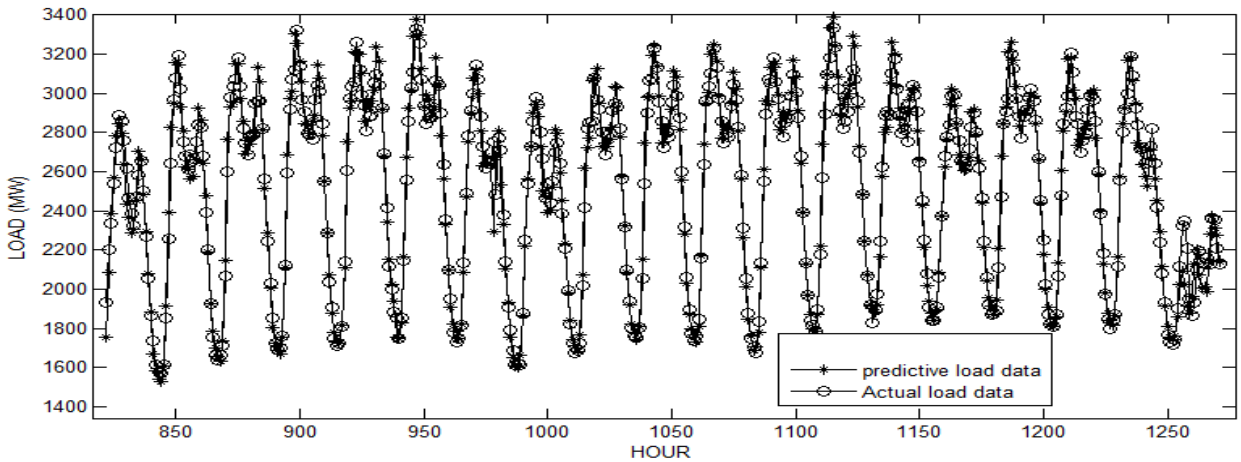
- catering to the needs of the increasing population by growing more food with minimal resources
- reducing environmental footprint
- maximizing customer satisfaction
- enabling transparency across the supply chain
- ensuring fair income to farmers
- handling weather fluctuations

Prof. Piyush Jain
Asst. Prof./ECE GCET, Greater Noida

ARTICLE: 6 ELECTRICAL LOAD DEMAND FORECASTING BY USING ANN & GA

Electric load demand forecasting is a central and integral process for planning forecasting operations and facility expansion in the electricity sector. It has fundamental importance and a lot of active research work is going on in this subject during several years. Many classical models have been proposed for improving the accuracy of load demand time series modeling and forecasting. Intelligent models like artificial neural networks (ANNs) can have superior features over conventional methods in modeling and forecasting. They can deal with complex patterns and have data driven nature. ANNs perform well even with a missing or incomplete data with their capability of generalization.

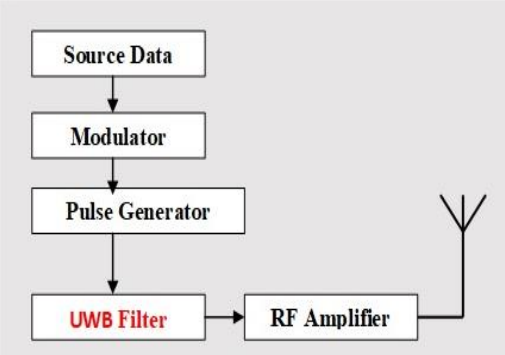
In this article important forecasting models i.e., neural networks-based models and GA trained artificial neural network model have been described, together with their inherent forecasting strengths and weaknesses. Our discussion about load demand time series models is supported by giving the forecasting results via simulation, for electric load demand time series for Delhi region. To evaluate forecasting accuracy as well as to compare different models, three performance measures, viz. RMSE (Root Mean Square Error), MAPE (Mean Absolute Percentage Error) and REP (Relative Error Percentage) have been used. It has been observed that performance of GA trained artificial neural network model is better than Backpropagation training algorithm trained artificial neural network models.

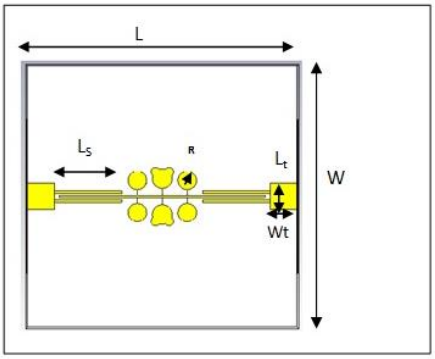


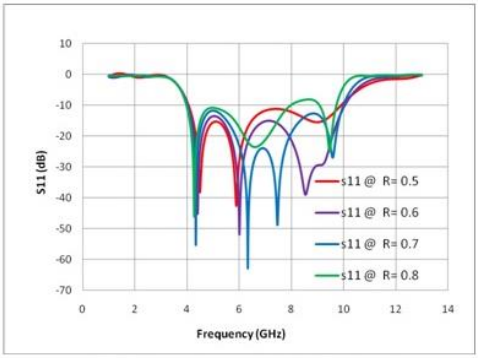
Actual and Forecasting Values of Load Demand

Prof. Hitesh kumar
Asst. Prof./ECE GCET, Greater Noida

ARTICLE: 7 PERFORMANCE ANALYSIS OF DGS BASED UWB BANDPASS FILTER WITH CIRCULAR STUB







INTRODUCTION :In the current scenario Ultra-wideband (UWB) communication system offers numerous wideband applications such as microwave medical imaging, ground penetrating radar (GPR) and RFID tag for inventory control and asset management. Always compact and inexpensive UWB transceivers are required for such wireless applications. Therefore UWB transceivers should be compact and inexpensive. An UWB transmitter with different blocks is depicted in Fig.1,where the information is first encoded, digitally modulated, and then converted into pulse using pulse generator. Impulse data is transmitted using UWB antenna. Therefore noise should be removed before transmission.

UWB band pass filter is an essential component of transceiver section. Therefore compact band pass filter design extensively growing very fast from 2002 while U.S. Federal Communication Commission (FCC) allowed to commercial use of frequency with the range of 3.1-10.6 GHz. There are several techniques are used to design wide band pass filter. The band pass characteristics of the filter with a pass window is 3.1-10.6 GHz at a centre frequency of 6.85 GHz with an insertion loss is 0.2 Db. A 25 mm × 25 mm microstrip stub loaded three mode resonator band pass filter have pass band only 3.4 GHz -4.67 GHz only and has insertion loss of 0.06 dB. Although a good insertion loss achieved in this design, but ground plane material is gold, therefore fabricated prototype is very expensive. Another novel microstrip line UWB band pass filter has been reported using multiple mode resonator (MMR) with insertion loss of 2 dB and group delay varies from 0.2 to 0.43 ns. A compact UWB band pass filter is designed using MMR with high insertion loss of 0.2 dB at centre frequency of 6.8 GHz.

FILTER DESIGN PROCEDURE : THE FR4 substrate with the dielectric constant of 4.4 and height of 1 mm is used to design the proposed UWB band pass filter. The proposed filter have arrow head defected ground structure which enhance the pass band as well as roll off factor.

CONCLUSTION AND FUTURE SCOPE: A UWB filter with wideband characteristics has been designed and analyze. The MMR techniques is not only offer low insertion loss as well as better matching with transmission line.

Dr. Gaurav Saxsena
Assoc. Prof./ECE GCET, Greater Noida

ARTICLE: 8 WBAN- A FUTURE HEALTH CARE TECHNOLOGY

Ubiquitous healthcare is an emerging technology that promises increases in efficiency, accuracy and availability of medical treatment due to the recent advances in wireless communication and in electronics offering small and intelligent sensors able to be used on, around, in or implanted in the human body. In this context, Wireless Body area networks (WBANs) constitute an active field of research and development as it offers the potential of great improvement in the delivery and monitoring of healthcare. WBANs consist of a number of heterogeneous biological sensors. These sensors are placed in different parts of the body and can be wearable or implanted under the user skin. Each of them has specific requirements and is used for different missions. These devices are used for measuring changes in a patient vital signs and detecting emotions or human statuses, such as fear, stress, happiness, etc. They communicate with a special coordinator node, which is generally less energy constrained and has more processing capacities. It is responsible for sending biological signals of the patient to the medical doctor in order to provide real time medical diagnostic and allow him to take the right decisions.

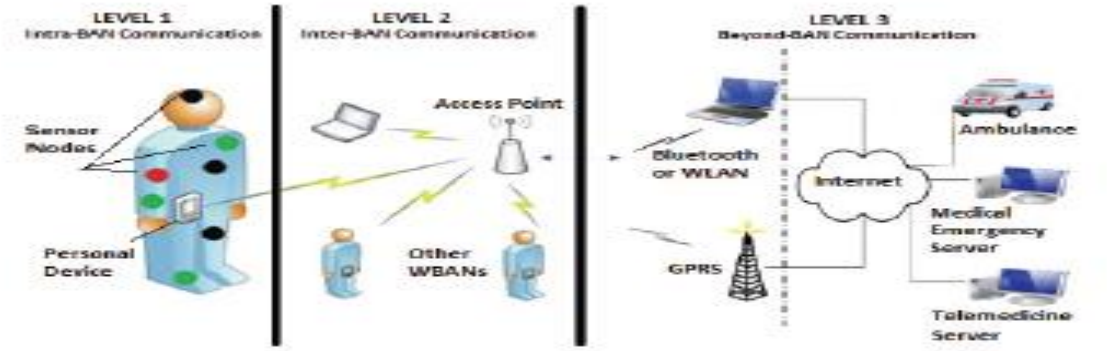


Fig. 1. General architecture for Wireless Body Area Networks

As exposed in Fig.1, the WBAN common architecture consists of three tiers communications: Intra-BAN communications, Inter-BAN communications and beyond-BAN communications. Intra-BAN communications denote communications among wireless body sensors and the master node of the WBAN. Inter-BAN communications involve communications between the master node and personal devices such as notebooks, home service robots, and so on.

. Medical applications comprise healthcare solutions for aging and diseased populations mainly. Typical examples include the early detection, prevention and monitoring of diseases, elderly assistance at home, rehabilitation after surgeries, biofeedback applications which controls emotional states and assisted living applications which improve the quality of life for people with disabilities. Generally, body sensors used in health monitoring3 can be either: (a) Physiological sensors used to measure human body vital signals internally or externally, like body temperature, blood pressure or Electrocardiography (ECG); or (b) Biokinetic sensors able to collect human body movement-based signals as acceleration or angular rate of rotation. To offer additional information about ambient temperature, environment pressure, light or humidity, ambient sensors can be combined to body sensors. In fact, since these sensors are in charge of monitoring the environment, they can provide valuable additional information for medical diagnosis and treatment, which is often the case in home environment.

WBAN applications can involve additional requirements, tightly related to the medical application as well as the patient condition. For example, applications using implanted sensors should rely on mechanisms minimizing energy consumption in order to extend battery life; while achieving maximum throughput and minimum delay is a perquisite for applications with high criticality, like operation of elderly heart patients. All these statements and requirements motivate us to study the different WBAN applications and to highlight the constraints to satisfy for the well-functioning. We study also the different technologies used and try to associate the WBAN applications with the appropriate technologies in order to achieve the maximum of QoS.

Mr. Vinay Singh

Asst. Prof./ECE GCET, Greater Noida

ARTICLE: 9 WHAT BRAIN-COMPUTER INTERFACE COULD MEAN FOR THE FUTURE WORK

Brain computer interfaces (BCIs) are slowly moving into the mass market. In the next few years, we might be able to control our PowerPoint presentation or Excel files using only our brains. And companies may want to use BCI technology to monitor the attention levels and mental states of their employees. Obviously, there are myriad ethical questions and concerns surrounding the use of BCI technology in the workplace. The technology is well ahead of the policies and regulations that would need to be put in place. But, it's time for business leaders to start building a BCI strategy as soon as possible to address the potential risks and benefits.

To put it in the simplest terms, think of a BCI as a bridge between your brain and an external device. As of today, we mostly rely on electroencephalography (EEG) — a collection of methods for monitoring the electrical activity of the brain — to do this. But, that's changing. By leveraging multiple sensors and complex algorithms, it's now becoming possible to analyze brain signals and extract relevant brain patterns. Brain activity can then be recorded by a non-invasive device — no surgical intervention needed. In fact, the majority of existing and mainstream BCIs are non-invasive, such as wearable headbands and earbuds. The development of BCI technology was initially focused on helping paralyzed people control assistive devices using their thoughts.

BCIs aren't a perfect technology — there's no telling what sort of mistakes or mishaps we'll encounter as companies and individuals begin to use these devices in the real-world. What's more, BCIs — like any technology — can be hacked. Hackers can access a BCI headband and create/send manipulated EEG data. A hacker could also intercept and alter all data transmitted by your BCI. It's possible that a hacker could steal your "pass thoughts" user credentials and interact with your devices (laptop, car, etc.). These risks can directly impact our physical integrity. Brain data could also be stolen to be used against you for extortion purposes. The potential for serious abuse is significant. When companies begin to use and analyze brain data, how will they prioritize privacy and data security and meet the industry's top standards for protecting employee data? Who will ultimately own the data that's collected? And what are employees' rights when their companies begin to roll out these technologies? Needless to say, the technology is well ahead of the policies and regulations that would need to be put in place.

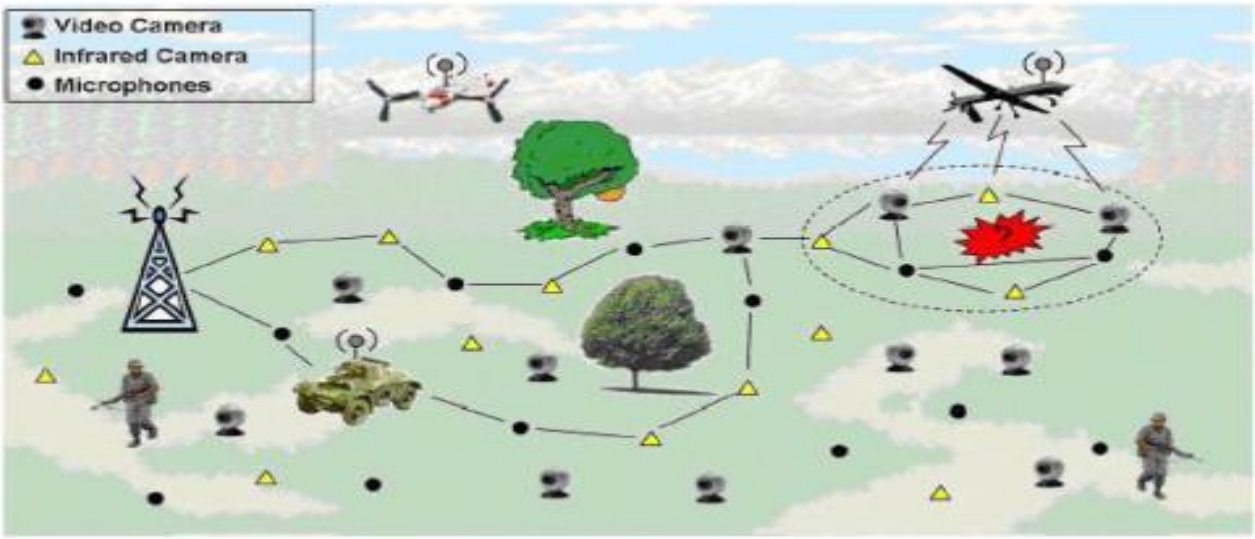
Still, the technology is slowly moving into the mass market. A growing number of startups and large tech firms are working on safer, more accurate, and cheaper BCIs. I expect to see business leaders embracing this technology and trying to leverage brain data to achieve better work efficiency and greater safety. I recommend that business leaders start building a BCI strategy as soon as possible to address the potential risks and benefits.

Mr. Gavender Singh

Asst. Prof./ECE GCET, Greater Noida

ARTICLE: 10 NEXT GENERATION DEFENCE SYSTEM WITH WIRELESS SENSOR NETWORK

The rise of Wireless Sensor Networks (WSNs) has brought revolution in the field of technology. These networks comprise of a large number of densely deployed sensor nodes which works through collaboration. In WSNs, each sensor node has limited resources such as, low energy, less bandwidth, limited memory and small computational power. These nodes are very inexpensive in terms of cost, so resource limitation is not a big problem. If a node runs out of energy, so instead of replacing the battery, we can replace the entire node with a new node. There are different types of sensors available like temperature sensor, humidity sensor, multimedia sensor and others.



Due to these variant sensors, WSNs got applications in different fields such as environment monitoring, agriculture monitoring, industrial monitoring, health monitoring, home applications and military operations. Sensor Networks were initially designed for military operations and surveillance. WSNs have been emerged as an excellent tool for military applications involving intrusion detection, various parameters monitoring, information gathering and, smart logistics support in an unknown deployed area. These networks can provide different services to military and air force like information collection, battlefield surveillance and attack detection. Because of their capabilities of real time transmission, WSNs play an important role in military operations. These networks offer several advantages over traditional sensor devices such as fault tolerance, robustness and low budget deployment. In case of enemy attack, some nodes will be damaged but node damage in WSNs does not disturb the complete network. Due to their unique characteristics, these networks are well-known among the research communities and industrial partners.

Mr. Gaurav mehra

Asst. Prof./ECE GCET, Greater Noida

Eminent Recruiters:

Idea	Cummins	Cognizant	appin
Ericsson	wipro	Infosys	Aon Hewitt
Samsung	Tech Mahindra	IBM	intec
vivo	Nokia Connecting People	headstrong a GENPACT company	Relcom Group