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SPECIAL POINTS OF INTEREST

The Editorial Committee

THE EDITORIAL

Every year on May 17, people from around the world will join International Telecommunication Union (ITU) family for celebrating World Telecommunication and Information Society Day (WTISD). This year we request you all to join us in ITUs "Connect 2030" agenda: using the power of Information and Communication Technology (ICT) for sustainable development. Technologies like 5G, Intelligent transport, Internet of Things (IoT), Artificial Intelligence (AI) and Blockchain etc., will help in human progress and expedite the social and economical development. Before COVID—19, almost half of the world's population were not using the internet, and growth in ICT connectivity was very slow as the clock was ticking faster. Hence all should come forward and coordinate in connecting everyone to the global digital economy and ensure that the connected life is more safer and trustworthy.

The theme proposed by ITU-T is "Connect 2030: ICTs for the Sustainable Development Goals (SDGs)" focuses on solutions and emerging trends contributing to five strategic goals: Growth, Inclusiveness, Sustainability, Innovation and Partnership. To achieve the above SDGs, ICT has come up with innovative policies, services and solutions to deliver the revolution at an extraordinary speed and scale.

1. Accelerated upscaling of critical services in health, education, financial services, smart agriculture, and low-carbon energy systems.
2. Reduced deployment costs addressing urban and rural realities.
3. Enhanced public awareness and engagement.
4. Innovation, connectivity, productivity and efficiency across many sectors.
5. Faster upgrading in the quality of services and jobs.

Furthermore, no technology is without risks and even widespread ICT also raises a number of issues that needs to be addressed like: Privacy, surveillance, cybersecurity, public concern about health effects, electronic waste and emissions and etc.

Source: en.unesco.org

Image Processing Enables COVID-19 Detection

Dr. B. Roja Reddy

The coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is an ongoing pandemic. This pandemic virus has affected everyone's daily lives. The government of many countries has asked the people to stay at home, and subsequently, businesses have been susceptible to transition into virtual workplaces. Many employees have been quick to adjust to the digital transformation. Online video conference software Zoom reports a 78% growth in profits, and Google Meet reports an approximately 60% increase in user traffics, where people spend 2 billion minutes in online meetings every day. Many countries are challenged by the medical resources required for COVID-19 detection which necessitates the development of a low-cost, rapid tool to detect and diagnose the virus effectively for a large number of tests. Many attempts have been conducted to find a suitable and fast way to detect infected patients in an early stage. Consequently, intelligent medical imaging has played an important role in fighting against COVID -19.

Although a chest X-Ray scan and chest CT scans are useful tools. These images generated by the scans must be analyzed accurately and quickly if large numbers of tests are to be processed. COVID-19 diagnosis can be represented as an image segmentation problem to extract the main features of the disease. This segmentation problem can be solved by developing an algorithm that has the ability to extract the smaller similar regions that can indicate infection with the COVID-19 virus.

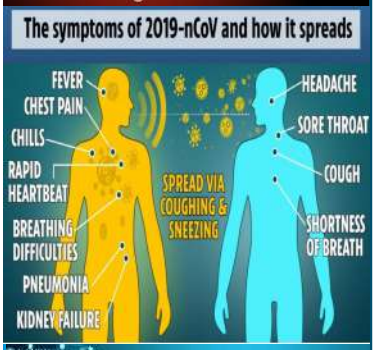
Threshold-based segmentation due to its simplicity, speed, and accuracy, threshold-based segmentation is widely used for image segmentation using either a bi-level threshold or a multi-level threshold. In bi-level thresholding, the image is segmented into two regions: object and background. Although the bi-level threshold is very useful in subdividing the image into only two parts, many applications are interested in more than two regions. In that case, another threshold technique called multi-level threshold has been used to segment the image into more than two regions. Although increasing the number of regions extracted from the image, the time needed to segment the image increases exponentially with the number of regions of interest.

As per the survey, the first approach: A new hybrid model to detect the COVOD-19 using an improved marine predators algorithm (IMPA) and a ranking-based diversity reduction (RDR) strategy to obtain the number of particles that can't find a better solution within a consecutive number of iterations. This model works on the x-ray images to extract similar small regions, in an attempt to obtain the regions that may contain COVID-19. Extracting these regions can be treated as an image segmentation problem. The performance of IMPA algorithm when compared with five state-of-art algorithms—Whale Optimization Algorithm (WOA), Sine-Cosine Algorithm (SCA), Salp Swarm Algorithm (SSA), Harris Hawks Algorithm (HHA), and Equilibrium Optimizer (EO) outperform all other investigated algorithms in the fitness values, Std, and a range of threshold metrics.

The second approach: Two imaging modalities, i.e., X-ray and CT, are used to demonstrate the effectiveness of AI-empowered medical imaging for COVID-19. Many current AI studies for segmentation and diagnosis are based on small samples, which may lead to the overfitting of results. To make the results clinically useful, the quality and number of data need to be further improved. Also, existing studies generally use U-Net for image segmentation and CNN models (i.e., ResNet) for diagnosis. It is worth noting that interpretability has been a core issue for AI application in health care. Follow-up is critical in diagnosing COVID-19 and evaluating treatment. Although there are still limited studies, it is belief that the methods from other related studies could be borrowed. 1) In the prognosis of other pneumonia diseases, machine learning-based methodology could inspire the follow-up study of COVID-19. 2) The follow-up inside and outside of hospitals could be combined as a long period tracking for the COVID patients. 3) Multidisciplinary integration, i.e., medical imaging, natural language processing, and oncology and fusion, could benefit the overall follow-up procedure of measurement for COVID-19.

Hence, it is important to combine imaging data with both clinical manifestations and laboratory examination results to help better screening, detection and diagnosis of COVID-19. These algorithms may demonstrate its natural capability in fusing information from these multi-source data, for performing accurate and efficient diagnosis, analysis and follow -up.

SARS-CoV-2 Transmission - Air distance, air currents, duration in air, humidity, airborne transmission, duration on objects and surfaces, floor



The **coronavirus** COVID-19 is affecting :

212 countries

and territories

around the world and 2 international conveyances

Statistics can be found in the below link:

https://www.worldometers.info/coronavirus/

Department Activities

Workshops/Conference Organized

- One day workshop on "5G Technology" on 16th Oct 2019.
- One day workshop on "RF Instruments and Measurements", on 8th Nov 2019.
- One day workshop in " Wireless-technologies, global and Indian perspective", on 28th Dec 2019.

Invited talks delivered by faculty:

- Dr. K. Sreelakshmi on "Electronics—Non electronics engineers" Centre of learning and Development (CLD) BEL, Bengaluru on 27/08/2019
- Dr. H V Kumaraswamy on "Effectives Teaching techniques in DSP", VTU Training prg, Muddenahalli on 26/08/2019 .
- Prof. P Nagaraju, on "Effectives Teaching techniques in DSP", VTU Training prg, Muddenahalli on 27/08/2019 .
- Dr. H V Kumaraswamy on "Digital Signal Processing & applications", Dayananda sagar academy of Tech and Mgmt, Bengaluru on 16/10/2019 .
- Dr. G. Sadashivappa, "Faculty development program on Blumes taxonomy and CIE, SEE question paper taxonomy", Rajarajeshwari college of engineering, Bengaluru, 23-01-2020.
- Dr. G. Sadashivappa, "Trends and challenges in electronics & AI in WC", on 04 and 12 of Feb 2020.
- Dr. G. Sadashivappa, "Devices and circuits lab for teaching and non-teaching staff ", 15th July 2019, SJBIT.

Workshops attended by faculty/students:

- Advanced Functional Materials, Design Thinking
- Intellectual Property Rights and Innovations.
- 5G Technologies, Indian mobile congress (IMC) Lead 2019
- Virtual Instrumentation using LabVIEW.
- Evolve Faculty development program
- Latex for students, engineers and scientists.
- Principles of modern CDMA/MIMO/OFDM wireless communication.
- Engineering Statistics and Linear Algebra
- MS Excel and Google utilities titled " Excel with Excel
- Experiential Learning on Electronic Devices and Digital system Design.
- Implications of IoT using Android Applications
- Data Science & Deep Learning

ABOUT THE DEPARTMENT

Department of Telecommunication Engineering started in the year 1992 – 93. Dept offers one Under Graduate program and two Post Graduate programs. Moreover the department is recognized as a research center under VTU to carry out M.Sc. (Eng..) and PhD.

Programs Offered

- **U.G Program:**
  Bachelor of Engineering in Telecommunication Engineering with an intake of 60 under gone multiple cycles of Accreditation.
- **P.G Programs:**
  Master of Technology in Digital Communication Engineering with intake of 36, accredited by National Board of Accreditation, New Delhi.
  Master of Technology in RF & Microwave Engineering with intake of 18, accredited by NBA, New Delhi.
  The department has a total of 22 teaching faculty members, out of which 8 are PhD holders, 13 are pursuing PhD and competent technical and support staff.

Research Facilities

Department developed industry based labs such as Keysight (Advanced RF and Wireless Communication Lab), Tejas networks Lab to strengthen U.G, P.G. projects and Research activities. The details of the research labs are listed below:

1) RVCE-Keysight Advanced RF and Wireless Research Lab:

FACILITIES AVAILABLE	TECHNOLOGIES SUPPORTED
• Agilent Vector Signal Analyzer: EXA 26.5 GHz:	• GSM/GPRS/EGPRS
• 20 PC Workstations loaded with Agilent EDA Tools	• WCDMA/HSDPA/HSUPA/HSPA+
• Agilent MIMO Baseband Generator PXB	• AMPS/IS95A-B/IS2000/EVDOA-B
• Agilent Mixed Signal Oscilloscope,4 Ch, 4 GSa/s with 16 Digital Channels	• WLAN/BT/ZigBee/RFID/WiMax/LTE
• Agilent Vector Signal Generator	• MIMO
	• DC-HSDPA
	• SDR, Cognitive Radio

2) RVCE-Tejas Optical Research Lab:

FACILITIES AVAILABLE	TECHNOLOGIES SUPPORTED
• **Tejas 1600C SDH Optical Transport equipment**	• **SONET**
• **Tejas 3301 CWDM Equipment with ROADM facility**	• **SDH**
• **RXT2380RxT2.5G Test set up**	• **CDWM**
• **RXT2380 SW 25G Test set up**	• **DWDM**
	• **Packet transport**

Faculty Membership of Professional Bodies:

Sl. No.	Faculty Name	Association	Membership Detail
1	Dr. K Sreelakshmi	IEEE	MTT & AP Societies No: 93879876
2	Dr. K Nagamani	IEEE	Communication Societies No: 94839025
3	Dr. B Roja Reddy	IEEE	Signal Processing Societies No 94817651
4	Dr. Premananda B. S	IEEE	No. 92328975
5	Prof. K. Viswavardhan Reddy	IEEE	IEEE COMSOC, Sensors, SDN, IoT No. 90514368

ABOUT THE DEPARTMENT….

Faculty Membership of Professional Bodies (contd..)

Sl. No.	Faculty Name	Association	Membership Detail
6	Dr. Bhagya R	IEEE	No: 95663275
7	Dr. Shanthi P	IEEE (Antenna and Prop Society)	No: 95654327
8	Prof. Mohana	IEEE	No: 95188416
9	Prof. Shambulinga M	IEEE	No: 93869612

Faculty Achievements (2019-20) :

Sl. No	Faculty Name	Honored by Trust	Date
1	Dr K Sreelakshmi	Honored by RSST for best coordinating Industry -Institution collaboration activities of Samsung R&D on 26th Jan 2020.	26-01-2020
2	Dr. Premananda B S	Honored by RSST for Top 1% in NPTEL online course on CMOS Digital VLSI Design from Jan 2019 to April 2019	26-01-2020
3	Dr. K Saraswathi	Honored by RSST for acquiring Ph.D Degree	26-01-2020
4	Dr. Shanthi P	Awarded Ph.D Degree by VTU - Belagavi.	08-02-2020

U.G. Rank Holders (2015—2019 Batch):

Sl. No.	USN	Name of the student	Rank	CGPA
1	1RV15TE030	MEGHANA R K	I	9.37
2	1RV15TE009	ARCHIT BAJPAI	II	9.29
3	1RV15TE064	YOJAN CHITKARA	III	9.26

P.G. Rank Holders (2017-2019 Batch) :

M.Tech in Digital Communication Engineering

Sl. No.	USN	Name of the student	Rank	CGPA
1	1RV17LDC17	MRITYUNJAYA D HATAGUNDI	I	9.60
2	1RV17LDC09	DIVYA KHANURE.	II	9.49
3	1RV17LDC11	GOURAV G VAIDYA	III	9.45

M.Tech in RF and Microwave Engineering

Sl. No.	USN	Name of the student	Rank	CGPA
1	1RV17LRF12	SUDEEP D K.	I	9.07
2	1RV17LRF14	LAKSHMI DEVI R.	II	8.80
3	1RV17LRF07	KRUTHI M	III	8.73

Outside Interaction :

- Dr. G. Sadashivappa, "NBA Mock E&TC Program", SITCE, 17 and 18th of Feb 2020.
- Rakesh K R, "Jury Member for National science computation ", Bidadi, 2nd Feb 2020.
- Rakesh K R, "Resource Person for FDP on ICT and Outcome based education", GMIT Davangere, 21 and 22 of Jan 2020.
- Dr. K. Nagamani, Reviewer for 3rd IEEE ICEECCOT—2019, GSSSI-ETW Mysuru, 13 and 14th of Dec 2019 & Panel judge for evaluation of projects b/w 5-7 March 2020 @VITM
- Dr. Premananda B S, Session Chair for 3rd IEEE ICEECCOT—2019, GSSSIETW Mysuru, 13 and 14th of Dec 2019.
- Dr. H.V. Kumaraswamy, Expert team member for NBA MOCK Acc, MSRIT—ECE, 07th Nov 2019.
- Dr. B. Roja Reddy on "MATLAB and Its Application on DSP & DIP", in C. Byregowda Institute of Technology, Kolar on 21/10/2019.
- Dr. G. Sadashivappa and Dr. H.V. Kumaraswamy, Academic Audit, SIT—Tumakuru—Dept. of ECE, 28th Sept. 2019.
- Dr. H.V. Kumaraswamy, Mock Acc. For UG pgm, BIT Bengaluru, 24th Aug 2019.
- Dr. G. Sadashivappa, BOS, BOE, SIT Tumakuru 10 and 15th of Jun 2019.

Patents Filed by Faculty

- Mr. Nagaraja P, Dr. G Sadashivappa , "Circuit Fault Detection and Fault Location System", 03/09/2019, No: 201941035429.
- Mr. Nagaraja P, Dr. G Sadashivappa, "Embedded Power Saving Module for LED Panels", 13/09/2019, No: 201941036971

Faculty/Student Publications:

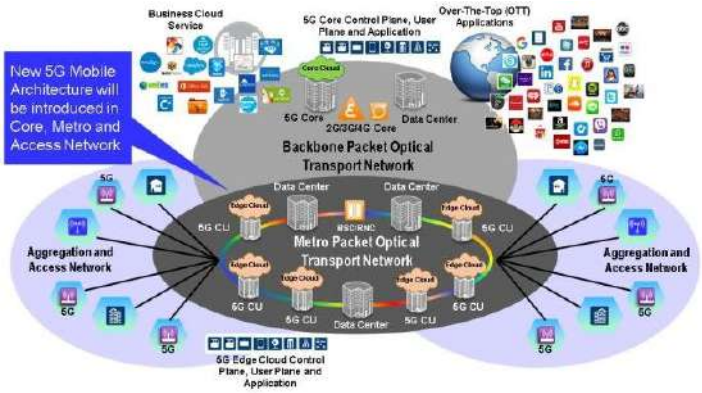
The faculty and student publications for the academic year 2019-20 is listed below:

- **No. of International conferences**
  10
- **No. of International Journals**
  11
- **Total Scopus Index**
  363
- **Total Google citation index**
  819

Students Extra circular Activities

`	Name(s)	Activity	Event/College name
	Cultural activities		
1	Miss. Jigyasa Hirawat (IV sem)	WAVES	BITS – GOA - Ist Position
		REVELATION	SIBM - Ist Position
		PRAVEGA	IISC-BANGALORE - 3rd position
		COLISEUM	RVCE-BANGALORE – Runner UP
2	Sudarshan Balaji (IV sem)	presented his research paper entitled as "Mathematics in Tiloyapannatti"	International Conference on Jainism: Scientific Foundations held at Rajasthan-India
3	Shantanu B.S (IV sem)	won several prizes (Badminton)	VTU South Zone
			Interzonal tournaments
4	Laxman Dixit (IV sem)	8th mile solo instrumental	RVCE – Ist prize
		8th mile battle of bands	RVCE – 2nd prize
		PES fest battle of bands	RVCE – 2nd prize
		Instrumental competition	
		Non percussion, hindustani classical singing and light vocals	
5	Niranjan D R (IV sem)	presented the research paper "Live Audio Mixing In Concerts Using Artificial Intelligence"	International Conference For Music And Dance, Bengaluru, India

The Impact of 5G on Optical Network Architecture.



Densification or an increase in the number of cell sites per unit area along with greater fiberization of cell towers : Cloudification or greater centralization of baseband resources that connect to "street level" radio nodes over optical fiber, Disaggregation or flexible and "software-centric" separation of control and data plane for higher scalability and dynamic resource allocation. 5G will represent a significant advance over previous mobile technology generations due to an explosion in the number of network-enabled IoT devices, greater fiberization and densification of cell sites and a "cloudified" RAN architecture. The magnitude of these changes is such that it is likely to have a transformational impact on the 5G optical network architecture extending right from the Access to the Metro and Core segments. The emerging cloud architecture with its software-centric network paradigm also presents opportunities for telecom vendors and service providers to evolve innovative products and services that can contribute to the overall growth of the global telecom industry.

K.S. Keerthi., II semester M.Tech (DCE) & Prof. Ranjani G

The emergence of 5G is expected to have a massive impact on the mobile backhaul architecture. Besides driving up the per-cell throughput by at least 10x when compared to 4G/LTE, 5G is also expected to lead to a massive 100x increase in the number of user devices through "Internet of Things (IoT)", a significant reduction in network latencies by a factor of 10x to support real-time tactile Internet applications and an ultra-reliable network for a seamless service experience. 5G is introducing several new features such as enhanced coordinated multipoint (CoMP), dual connectivity (X2 and eX2 interfaces) and carrier aggregation that will make radio access networks (RAN) more complex to construct. Together these changes will put greater demands on the transport network and have a disruptive impact on the optical network architecture to better accommodate these requirements.

Placement statistics for VIII Semester BE Telecommunication students:

- **Number of eligible students :** *58*
- **Number of offers made:** *50*
- **Number of students placed:** *36*
- **Number of students with open dream package:** *17*
- **Number of students with dream package: 33**
- **Placement statistics for PG DCE students:**
- **Placed IV sem DCE: 1 Internship: 17**
- **Placed IV RF&ME: 6 Internships: 07**
- **Internships for II sem DCE: 6**
- **Highest Package (LPA): UG: 29.17, PG DCE: 21, PG RFMWE: 6.5.**
- **Lowest Package (LPA): UG : 3.6, PG DCE: 5.5, PG RFME: 2.8**
- **Average Package (LPA): UG: 8.77, PG DCE: 10.4 PG RFME: 4.0**

MASSIVE MIMO FOR 5G COMMUNICATION

The unending demand for high-speed data rate is increasing as advancement in technology increases. An increased number of connected devices challenges the telecommunication company to upgrade to the latest generation. The new generation of wireless standard communication that is 5G network, raises the data rate up to 10Gbps, 1 millisecond of the latency and 100 times more the number of connected devices than the prior 4G network, also giving 100% more coverage and lower consumption of power for the devices which are connected. Usually, a single element antenna possesses a poor directivitywith a relatively wide and wide radiation pattern. For 5G technology, high directivity is strongly required. This can be achieved through constructing antenna arrays, in a suitable electrical and geometrical configuration, without the need for optimizing the size of antenna elements, which is the motivation behind the use of Massive MIMO.

The 5G system architectures have to be heterogeneous to meet with the above performance requirements to enhance the capacity and maintain user's connectivity. The use of massive MIMO communications – installation of multi antenna transmission or reception - can provide increased channel capacity and improve the signal strength by mitigating multipath effect. Therefore, massive MIMO technique is seen as one of the major driving element in 5G radio access technologies. It is a scalable technology with respect to number of service antennas that exploit the multipath channel characteristics to provide spatial processing that can improve the signal strength. This spatial processing can be used to increase data rates, improve signal reliability or reduce transmitted power with more efficient use of the radio spectrum.

Current LTE-A base station which is having 8 antennas with 3 sectors. Each sector covering 120 degrees, having four vertical panel and each of them has 2 polarisation which means it can get 8 antenna instructions. Considering one antenna panel, it has 8 different antenna elements each of them having dual polarisation. Which means that there are total of 8x8=64 antennas per sector and 64x3 = 194antennas per site. Result of which there are around 200 antennas on the base station side. So how massive MIMO is now different from LTE is in the use of connectors. Which means in LTE-A the number of connectors is 2 meaning which it can only steer the polarisation in pre-defined path; In case of massive MIMO, it takes same type of base station which is assigned for LTE-A before and instead of 2 connectors it has 64 connectors. Because of which massive MIMO makes sure that it is of the same size as previous technology extracting the signals from each of the antenna when data is transmitted in both uplink and downlink. But it is massive in flexibility in the number of connectors used. The benefits of massive MIMO are higher data rate that can be achieved with the help of multiple antennas and Spatial Multiplexing (SM) technique. This helps in achieving higher downlink and uplink throughput. It helps in achieving reduction in Bit Error Rate (BER) due to application of advanced signal processing algorithms on the received data symbols by multiple antennas. The systems with mMIMO offers high Quality of Service (QoS) with increased spectral efficiency and data rates. The wide coverage supported by MIMO system helps in supporting large number of subscribers per cell. Application of massive MIMO includes Internet of Things, Vehicular Networks, Railroad Networks, Public Safety Networks, Multimedia Communications, Security Applications and Artificial Intelligence.

Bhagyashree A J, 4th Sem M.Tech (DCE) & Dr. Bhagya R

ALIEN WAVELENGTH TECHNOLOGY

The advent of high-bandwidth over-the-top (OTT) services, the explosion of broadband and mobile data in emerging markets and the growth of large web-based internet companies such as Google, Amazon and Facebook is creating a disruptive impact on the wholesale bandwidth industry. Over the last few years, Alien Wave technology has emerged as a popular, technologically mature and cost-effective method to rapidly upgrade capacities on "brownfield" DWDM networks without having to invest in a new capital-intensive network.

ALIEN-WAVE TECHNOLOGY: CHALLENGES AND MITIGATION

Today, the majority of networks deployed worldwide predominantly carry 10G data rate channels. These networks were optimally designed to host OOK modulated channels. With the advancement of carrier-grade optical technology, industry is migrating to more efficient and complex modulated techniques that permit efficient transport of higher data rates and achieve better spectral efficiencies. Network operators who are exploring ways to augment their network capacity either have to roll out a new overlay network incorporating latest available commercial technologies or explore other means to supplement the existing infrastructure to adopt and absorb some of these latest technologies. AW technology falls in the latter domain. Operators exploring ways to convert an existing 10G infrastructure into a hybrid network carrying 10G and 100G (or greater-than 100G) coherent channels often come head-on with performance issues on 100G. The 10G environment has a detrimental effect on network performance in the presence of coherent channels. On the other hand 100G is a coherent technology that utilizes phase-shift keying. The power density difference in traditional 10G channels over 100G channels cause them to have greater impact on refractive index (RI) of the transmission media. The changing RI alters the phase of the wavelengths traversing through the transmission media, both of itself (nonlinear effect known as Self Phase Modulation (SPM)) as well as of other wavelengths (nonlinear effect known as Cross Phase Modulation (XPM)). Since coherent technology based 100G channels use phase encoding to transmit user data, they are adversely impacted by phase anomalies. This in turn leads to degraded channel performance both in terms of transmission reach as well as the ability to guarantee error-free transmission. Also, low values of residual dispersion amplify the probability of XPM on 100G. 10G are optically compensated for chromatic dispersion in the network.

A few common methods to mitigate the impact of host 10G on alien 100G are as follows:

Better Channel planning: It is advised to place all 10G channels on one end of the available spectrum with 100G channels occupying the other end. Use of Guard bands, Finite Residual Dispersion, Channel Power Optimization.

Dhanya S Karanth, 2nd Sem M.Tech in DCE & Prof. Ranjani G

AUGMENTED REALITY AND VIRTUAL REALITY IN THE FIELD OF TELECOMMUNICATIONS

Telecommunication service has been growing and progressing from telephone to high reality communication systems that are based on evolution of network and media technologies. The services provided by telecommunication industries are at the core of various business systems that are required for healthcare, logistics, marketing, and sales. Telecommunication companies providing the service for other advanced technological solutions are working hard to keep abreast with the evolving market. One of their main priorities is to keep the service level as high as possible. However, providing uninterrupted services can be immensely complicated due to incidents like a power outage or equipment failure. To address such issues, telecommunication businesses conduct inspections regularly. But, conducting inspections can become increasingly time-consuming and expensive as telecom equipment gets more complex with time. The Augmented Reality (AR) technology of inserting virtual objects in the real world can be the answer to the challenges of travelling to a remote location. Instead of bringing the technician to the equipment, it can bring the equipment to the technician. The equipment can be viewed remotely with the appropriate instructions given to any person that is not necessarily expert in the area. The obvious benefits are the time savings, as the overall duration of such maintenance or repair gets significantly shorter. Also, the costs are much lower, as the technician does not need to travel to the equipment location physically. Another advantage of such remote inspections and consultations is that the inspector will be able to "visit" remotely more locations within the same time, thus ensuring that more equipment remains in the working order.

AR has been defined in many ways. Although VR immerses the user within an artificially created digital environment that is disconnected from the surrounding physical environment, AR overlays the virtual onto the physical to provide the user with information regarding the surrounding physical environment. The connection with the real world enables designers and design students to contextualize their projects and to visualize spatial relationships while situating them in physical space. Augmented Reality (AR) and Virtual Reality (VR) have the potential to become the next big platforms after PC, web, and mobile. For AR and VR to fully materialise, certain challenges need to be overcome: (i) Bulky and expensive devices (ii) Scarcity of "killer" content and applications (iii) Limited penetration of technically ready smart phones and devices. (iv) Insufficient network speed and latency.

The case of Pokémon Go, a location-based AR game, clearly illustrates the situation. The game was "simple" enough to work with smartphones without the need of any additional device and the content was a "killer hit" as demonstrated by the take-up. Despite the success, key issues emerged in terms of device capabilities and network. Pokémon Go requires the smartphone device to have long battery life, GPS sensor and compass. Users without these functionalities would drain their batteries within a few hours or have to settle for a pared down version of the game which detracted from their enjoyment and experience. On top of device capability issues, Pokémon Go also experienced issues on mobile networks. Despite only taking up roughly 0.1% of the overall traffic, the game accounted for >1% of all sessions on the network. This ten times differential was the result of communication sessions opening with Niantic servers every time an event happened in the game. Driven by the massive uptake, the cumulative effect from both bandwidth and sessions negatively impacted networks, especially when the game drove large groups of players towards specific geographical areas. AR and VR are both moving very quickly in terms of what's possible. Retailers need to provide rich customer experiences. The telecom industry needs to prepare for exponential growth in traffic and demand for data. Healthcare's future is going to be more visual, more immersive and more interactive and while there are many steps to be taken before AR-VR technology becomes integrated into daily clinical practice, it will eventually be incremental in the standard care that we receive in the future. It's not just about video games anymore. AR and VR are having a significant impact on businesses across all sectors. This is the technology that will give a competitive and progressive edge if implemented correctly.

Nikhil K. J., VI semester & Dr. Bhagya R

NON-CONTACT BASED VITAL SIGNS DETECTION USING RADARS

Vital Signs are a group of body functioning signs that help to understand the status of a human body. The four primary vital signs comprise of the heartbeat rate, the respiratory rate, body temperature, and blood pressure. The cardio-pulmonary rates serve as an aid in detecting any kind of stress that may occur physically or mentally. In this ever-revolving world of technologies and automation, the advent of non-contact-based detection has brought ease and serves as a right alternative to conventional contact-based measurements.

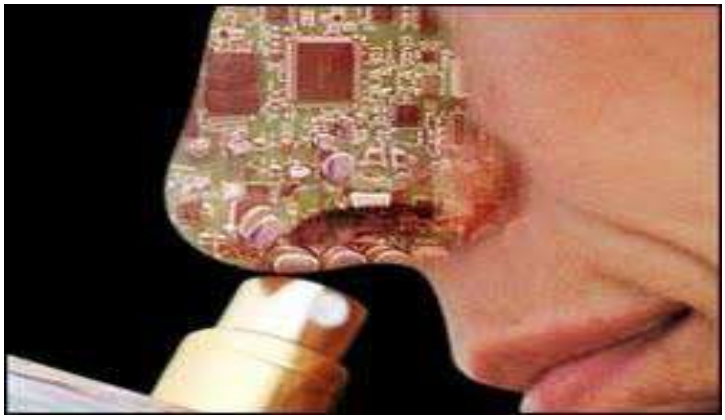
Apart from understanding the well-being of a person, vital sign detection is a powerful tool for a variety of civilian, military, and law enforcement applications. Accurate detection allows law enforcement agencies to get a description of the hostage crisis or help firefighters to find people trapped inside a burning building. This can serve as a boon during rescue missions carried out at an earthquake or avalanche site. In the aforementioned situations having contact with the target or victim is highly unrealistic. Hence, making use of radars that can cover a certain range seems to be a fruitful solution. There are four main types of radars used during vital signs detection.The first conventional radars are the simple Continuous Wave (CW) radars. In CW radar analysis various methods classified as numerical analysis and time-frequency analysis are used to extract the vital signs. Though CW radars emit stable frequency waves, the target range cannot be calculated, and it fails to detect multiple targets at once. The signals reflected due to random body movements of the subject are stronger than the vital signal.

To overcome the inability of CW radars to provide range information, short range Frequency Modulated Continuous Wave (FMCW) radars were developed for localization and tiny vital signs detection. In FMCW radar, the frequency of the signal linearly varies with respect to time and it is also able to differentiate human subjects from the surrounding objects. Due to incoherence, the radar cannot detect the micro-Doppler signature which is present in the phase data. To overcome this and to simultaneously detect multiple targets, the simpler Stepped Frequency Continuous Wave (SFCW) radar can be used. As low power consumption is the main parameter in such situations, Ultra-Wide Band (UWB) pulsed radars prove to be a definite alternative to the CW radar family. UWB radars transmit short time domain pulses and are extensively used in biomedical applications because of their ability to penetrate through non-conductive materials and due to low power consumption. This feature is useful in search and surveillance applications but there is some power density limitation as a result of which, the use of UWB radars is limited to short distance application.

Though research proves that all four radar-based methods are efficient in extracting the heartbeat rate and respiratory rate, UWB radars have the upper hand due to their ability to detect multiple subjects while consuming the least power and having high SNR. Future work can include less complex signal processing methods of vital signs detection using these radars while at the same time focusing on low power consumption.

Shreya Ramakanth, Rohit HR, VIII sem, Dr. Saraswathi

ELECTRONIC NOSE



During the Past twenty years there has been enormous interest in the detection of simple and complex odours by means of electronic instrumentation. This has led to the commercialization of so called 'Electronic Nose' that typically comprise an array of partially selective sensors which suitable pattern recognition software, they have been applied to any different olfactory problems in industry e.g. from the quality assurance of foodstuffs through to medical diagnostics. Electronic nose works just like a human nose. In a human nose have roughly 400 different types of olfactory receptor proteins. So, when the smell is detected, Human brain is seeing a 400-dimensional fingerprint, which uniquely identifies a smell. It can store that fingerprint and differentiate the fingerprint from others.

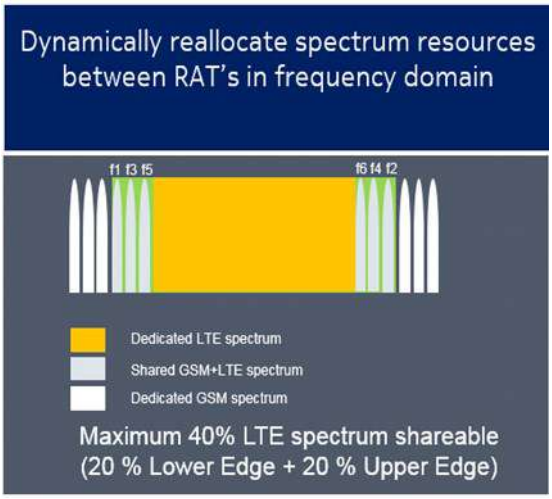
Basically, electronic nose is an instrument that attempts to mimic the human olfactory system. Humans and animals don't identify specific chemicals within odours and recognize a smell based on a response pattern. A traditional electronic nose has an array of chemical sensors, designed either to detect gases or vapors. These sensors are not tuned to a single chemical, but detect families of chemicals for example alcohols. Each one of these sensors is different, so when they are presented to a complex odour formed of many chemicals, each sensor responds differently to that odour. This creates a pattern of sensor responses, which the machine can be taught and another example could be in screening for colorectal cancer, where current tests are only 40% accurate and people don't like using stool samples.

Electronic nose is mainly used for detection of explosives, especially in the confined space, Accidents do happen sometime in these areas and usually involve human fatalities or death. Hence the presence of Atmospheric hazards in confined space are serious environmental problem that threatens the industry operation and safety of the workers, for example, on 07 may 2020, the leakage of styrene gas from the storage tank of the chemical plant happened at chemical factory in Andra Pradesh it caused many deaths and some other people is in critical condition, hence these kind of problems can be prevented by proper monitoring of explosives periodically by using an electronic nose, JPL electronic nose is the latest one using in NASA for monitoring the environmental conditions.

Meghana S, IV sem M.Tech (DCE) & Dr. B. Roja Reddy

DYNAMIC SPECTRUM SHARING FROM GSM (2G) TO LTE (4G)

The significant growth in Mobile broadband traffic, would require operators to buy new spectrum or re-farm the GSM spectrum to LTE. However, there's still a significant voice traffic that needs to be catered by GSM. To avoid a trade-off where GSM is impacted due to aggressive reframing, operators are looking for a solution where the spectrum can be dynamically shared between GSM and LTE technologies in co-located sites. Spectrum is a scarce and costly resource that should be used efficiently. Re-farming the existing spectrum to allocate the new generation is a very slow and costly process. Spectrum re-farming could take a decade but with spectrum sharing, this can be done overnight. Dynamic spectrum sharing (DSS) revolutionizes the introduction of new technologies with a breakthrough innovation that allows the deployment of both 4G and 2G in the same band and dynamically allocates spectrum resources between 4G and 2G based on user demand. DSS is a technology that allows the deployment of both 4G LTE and 2G GSM in the same frequency band i.e. 800, 900, 1800 and 1900 bands and dynamically allocates spectrum resources between the two technologies based on user demand.



This can be easily understood with the help of an example. An operator with 12 MHz of spectrum has 5 MHz LTE carrier and 7MHz GSM carrier deployed, with dedicated spectrum allocations for each technology. With increasing Mobile Broad Band (MBB) traffic, there's an urgent need to deploy more resources for LTE. However, with traditional reframing LTE can be upgraded to the next available static bandwidth option of 10 MHz, which can severely impact the Quality of Service of GSM users if limited to just 2MHz. Traffic is never uniform across sites and there are always low and high traffic peaks and troughs throughout the day across technologies. DSS allows such a spectrum sharing mode possible with real time coordination, where LTE gets to use the entire 10 MHz on individual sites, where GSM traffic is low allowing up to 50%more capacity. With Dynamic Spectrum Sharing (DSS), it is possible to allocate GSM carriers within the LTE nominal Bandwidth. GSM+LTE spectrum consists of dedicated GSM part of spectrum, part of GSM spectrum which is shared with LTE and dedicated LTE part of the spectrum. GSM carriers shall always be allocated on each edge of the LTE carrier. Maximum upto 40% (Maximum 20% Lower edge of the spectrum + Maximum 20% higher edge of the spectrum) of the LTE bandwidth shall be shared with GSM RAT with GSM+LTE DSS solution.

Similarly, this DSS solution can be applied to upcoming technologies such as 5G. For operators, DSS technology means they will be able to unleash the potential of 5G quicker, both for consumers and in industry, and ensure coverage over a wider area than ever before. It will also lay the foundations for the future technologies that will rely on 5G. DSS benefit for the end-user would be better 5G coverage, with lower latency and higher quality for consumers sooner. DSS on low bands will also be significant in enabling low latency applications and deeper in-building coverage.Dynamic spectrum sharing will no doubt play an integral role in ensuring a seamless global rollout of 5G and this test is a significant step towards offering this next-generation connectivity for all.

Tejaswini G Babajiyavar, 4th Sem M.Tech & Dr. Bhagya R

"5G", A Solution to a Safer and Smarter World

The outbreak of the ongoing pandemic COVID-19 has made the society rethink the essentiality of communication across the globe. The Covid-19 outbreak is impacting our lives in an unimaginable manner and has made us question our position or state in the present and in the future. It has put us in a situation where we question ourselves of what is to be expected in the near future. The 5G communications is helping the digitalization of certain industries and domains so that they can function uninterruptedly when struck by such pandemics in the future. The focus is not only to perform efficiently but also to serve the society as a whole. With 5G in play there are greater chances for the reduction of time to design and build as well as the agility to change the process of production in the line. "Time to market" has been a keen aspect along with the "Time to manufacture". 5G deployments have ensured the rapid development of new supply chains and logistic modes along with the process connecting the manufacturers, suppliers and the user community. The improvement of employee safety and help has been ensured in the future.

The Public safety has always been a prime aspect of any Government governing any part of the globe. The 5G has played an exquisite role in bringing new ways to connecting the people to any required services and enhance public safety during all emergencies when occurred. The concept of detecting the "hotspots" to find places of communal gatherings during the ongoing situation has been achieved through 5G communication (use of drones for this purpose). Social care plays an important role during critical situations. 5G has always held great potential to improve protection and inclusion and thus reducing stress and anxiety during these hard times.

The foundation for a healthy and sound nation is its health care system. The way the citizens of the nation are treated and are provided the health care facilities can decide how successful the nation can be. 5G also plays an essential role in healthcare. Facilities such as HD quality telemedicine and mobile health have been provided. There are also current technologies which can be enhanced with the implication of 5G in such areas and domains. Thermal cameras implemented at airport security have been an upgraded application with the implementation of 5G. In the future such technologies can be further enhanced with the progress in 5G. The wireless sector has experienced a never seen progress due to the 5G implementation.

As of now and then, the new technologies are being introduced in any working sector the progress towards the betterment of humankind can be achieved. 5G communications has such power to redefine the way the mankind can see the world and face any challenges put forth in front of them during any casualties or crisis or pandemics in the near future. 5G deployment has played an important role in keeping the world in one piece during such crisis and always continues to do so.

Aneesh Bharadwaj, Dhanush T.N., VIII Sem, Dr. Premananda B.S.

A QCA based Polar Encoder in 5G communication

Communication links are susceptible to errors due to random noise, interference, device impairments, etc. that corrupt the original data stream at the receiving end. Channel coding basically employs a set of algorithmic operations on the original data stream i.e., encoding at the transmitter, and another set of operations on the received data stream at the receiver i.e., decoding to correct these errors. A transmission with more errors will have a higher block error rate (BLER), which means that the decoder will have to perform more iteration to try and decode the original message. It is required to develop high performance channel codes that mitigate the effect of the errors in a communication link. The complexity of a code determines how much power it consumes, memory needed, computation power required, and latency it incurs.

Channel coding plays an important role in New Radio Access Technology (NRAT) for the 5G as it needs to support various use scenarios and diverse set of applications. Channel coding for 5G scenarios require variety in code rates and code block lengths with high throughput, high reliability, low latency and low decoding complexity. Channel coding schemes for existing LTE systems i.e. LTE Turbo Code and LTE-TBCC (Tail- Biting Convolutional Code) may not support all new requirements for 5G. Polar code discovered by Erdal Arikan in 2009, is a new contender in this race. Polar code is a class of linear block code based on the concept of Channel polarization. Polar code has explicit code construction and simple decoding with modest complexity and memory requirements which render them appealing for 5G NR scenarios such as battery constrained IoT applications. Polar code with effortless methods for variable code rates and code shortening (variable code lengths) can achieve better performance than that of state-of-the art codes. Polar code has become one of the most attractive code words in the coding theory community. Polar coding can be used for channel coding technique in 5G standardisation. The astonishing characteristic of this coding technique is that the implementation complexity, especially the decoding part, is considerably less when compared to existing turbo codes. Moreover, polar codes and their emerging array of variants and hybrids are shown to out-perform turbo codes in terms of error-correction performance in a wide range of use-cases. The better error-correction performance along with lower implementation and operation complexities make polar codes a genuine step up on turbo code technology.

The implementation of a Polar encoder for 5G communications has to implement efficiently. The concept of lesser area and lower power leading to faster processing speed has been a constant notion in the field of electronics and communication. In order to overcome the discrepancies found in these technologies, the Quantum-dot Cellular Automata (QCA) has been introduced. QCA is one amongst the most effective technologies planned as a replacement for CMOS technology in the coming future. QCA design provides us with lower energy dissipation and a higher processing speed at Nano-level. QCA has a wide range of applications in communication. One such application is the Polar encoder. The QCA based design of the polar encoder has been done using the bottom up approach and further research work is being carried out too achieve higher efficiency and 100% fault coverage.

Looking to the future, for polar codes to be crowned as the universal coding method, the main challenge is to break the data rate barrier, while retaining error-correction performance as well as the low-complexity advantages. Data channels typically operate in much higher data rates than control channels. 5G peak mobile broadband data rates are expected to be around 20Gbps. Beyond-5G systems are expected to operate at Terabit/s data rates. Today's most advanced polar code implementations currently deliver only around 5Gbps. There is however a solid theoretical framework underlying polar codes that will be built on and should not prevent them from full ascension over time.

Dhanush T.N., Vaishnavi S. Parashar, VIII Sem, Dr. Premananda B.S.

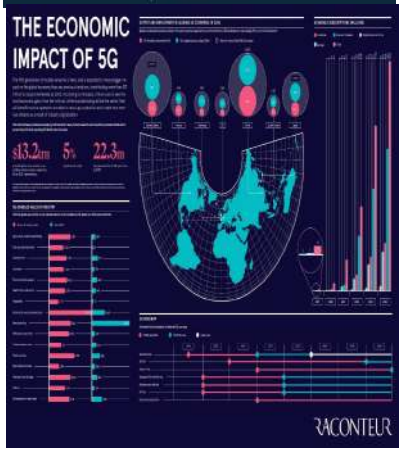
An interdisciplinary VIII semester project on electric vehicles is developed by Rahul V, VIII Sem. Telecommunication Engineering student, along with the industry support of **Mr. Gurjit Singh**, Gill Instruments Pvt Ltd, Bengaluru under the guidance of Dr. Bhagya R, Associate Professor, Department of Telecommunication Engineering and Dr. Dinesh MN, Associate professor, Department of Electrical and Electronics Engineering. The prototype of the electric vehicle is developed to improve the speed and range of the currently available vehicles in the Indian market. The project is funded by RV College of engineering.

A Group Photo after WTISD National Conference 2018-19

Students who received Arunodaya Scholarship for the academic year 2018-19.

1. Soundarya S
2. Megha G Patil
3. Laxman Chandrashekar Dixit
4. M Pooja

Glimpses of WTISD Edition - May 17-18 (2019) ***Editorial Team, Project exhibition & Group Photo***



Source: Qualnet & https://www.computerworld.com/article/3445370/what-is-5g-today-and-what-the-future-holds.html

World and 5G

5G is the fifth generation wireless technology for digital cellular networks that began wide deployment in 2019. As with previous standards, the covered areas are divided into regions called "cells", serviced by individual antennas. Virtually every major telecommunication service provider in the developed world is deploying antennas or intends to deploy them soon. The frequency spectrum of 5G is divided into millimeter waves, mid-band and low-band. Low-band uses a similar frequency range as the predecessor, 4G. Operators around the world, including India, are developing a 4G or long term evolution (LTE) footprint in a bid to provide better coverage to the consumer. 5G will not be an overlay network, it will work in tandem with 4G. So, for operators to be relevant in 5G, they would need to have a very good quality 4G network. Asia-Pacific region countries, including South Korea, China and Japan, are teaming together to research on frequencies for 5G mobile telecommunications to secure early both 5G frequencies and their position as leaders in the technology. Chinese operators are on track to launch commercial 5G networks by 2020 and are expected to establish China as the world's largest 5G market by 2025. Countries including South Korea, China, Japan, the US, the UK and Brazil are expected to roll out 5G networks by 2020. Even the Pakistan Government is contemplating roll out of 5G networks soon. The 5G vision will be realized in the converged network in three fundamental ways: through densification, virtualization and optimization of the network.

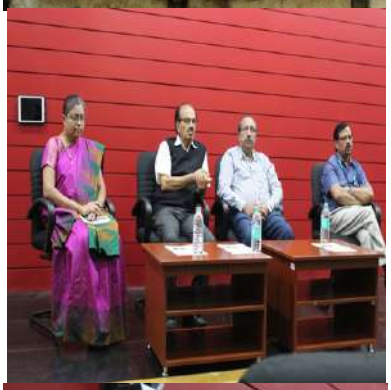
If 5G is really going to deliver speeds 10 or more times faster than 4G, it will require more base stations in a given area—increasing the density of the network itself. Mobile network operators (MNOs) have begun this process in their 3G and 4G networks, with increased sectorization and the addition of small cells. Regardless of how 5G is ultimately defined, it will require more densification across macro sites, in-building and within small cells. Densification adds complexity to the network because it increases the number of cell borders, where interference becomes a problem and handoffs introduce the possibility of dropped connections. In a 5G world, networks will need to depend on intelligent, automatic spectrum allocation to maintain quality as well as speed. Wireline infrastructure will also require upgrades to provide adequate fronthaul, backhaul and power.

NAGALAKSHMI PRANITHA, IV SEM M.Tech (DCE) & Dr.NAGAMANI K

All the Figures included in this magazine are taken from "GOOGLE"

Fourth Sunday of September of every year is reserved for Department Alumni Meet

DEPT ALUMNI MEET ON 21-09-2019 @AUDIO—VIDEO SEMINAR HALL



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VISION

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MISSION

1. Provide comprehensive education that prepares students to contribute effectively to the profession and society in the field of Telecommunication.
2. Create state-of-the–art infrastructure to integrate a culture of research with a focus on Telecommunication Engineering Education
3. Encourage students to be innovators to meet local and global needs with ethical practice
4. Create an environment for faculty to carry out research and contribute in their field of specialization, leading to Center of Excellence with focus on affordable innovation.
5. Establish a strong and wide base linkage with industries, R&D organization and academic Institutions.

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