

TECHNICAL MAGZINE

Department of
Electronics & Communication Engineering

A.Y. 2018-19



**VELAGAPUDI RAMAKRISHNA
SIDDHARTHA ENGINEERING COLLEGE**

(AUTONOMOUS)

(Sponsored by Siddhartha Academy of General & Technical Education)

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Department Vision

To produce globally competitive and socially sensitized engineering graduates and to bring out quality research in the frontier areas of Electronics and Communication Engineering.

Department Mission

To provide quality and contemporary education in the domain of Electronics and Communication Engineering through periodically updated curriculum, best of breed laboratory facilities, collaborative ventures with the industries and effective teaching-learning process.

To pursue research and new technologies in Electronics and Communication Engineering and related disciplines in order to serve the needs of the society, industry, government and scientific community.

PROGRAM OUTCOMES

Program outcomes examine what a program or process is to do, achieve, or accomplish for its own improvement and/or in support of institutional or divisional goals: generally numbers, needs, or satisfaction driven. They can address quality, quantity, fiscal sustainability, facilities and infrastructure, or growth.

After completion of the Electronics & Communication Engineering programme, the students will be able to have:

PO1: Engineering knowledge: An ability to apply knowledge of mathematics, science, fundamentals of engineering to solve electronics and communication engineering problems.

PO2: Problem analysis: An ability to identify, formulate and analyze electronics and communication systems reaching substantiated conclusions using the first principles of mathematics and engineering sciences

PO3: Design/development of solutions: An ability to design solutions to electronics and communication systems to meet the specified needs.

PO4: Conduct investigations of complex problems: An ability to design and perform experiments of complex electronic circuits and systems, analyze and interpret data to provide valid conclusions

PO5: Modern tool usage: An ability to learn, select and apply appropriate techniques, resources and modern engineering tools for modeling complex engineering systems.

PO6: The engineer and society: Knowledge of contemporary issues to assess the societal responsibilities relevant to the professional practice.

PO7: Environment and sustainability: An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development

PO8: Ethics: An understanding of professional and ethical responsibilities and norms of engineering practice.

PO9: Individual and team work: An ability to function effectively as an individual, and as a member in diverse teams and in multidisciplinary settings.

PO10: Communication: An ability to communicate effectively with engineering community and with society at large.

PO11: Project management and finance: An ability to demonstrate knowledge and understanding of engineering and management principles and apply these to manage projects.

PO12: Life-Long Learning: An ability to recognize the need for, and engage in independent and life-long learning in the broadest context of technological change.

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Dr K. Sri Rama Krishna, Mr. K V Prasad

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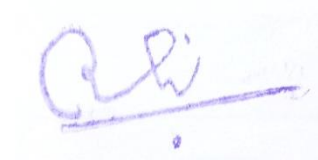
ABOUT THE DEPARTMENT

Established in the year 1977, the department of ECE offers B. Tech Programme in Electronics & Communication Engineering with an intake of 240 and two M. Tech Programmes in Communication Engineering & Signal Processing and VLSI Design & Embedded Systems . The department has been accredited by NBA of AICTE four times. More than 40% faculties are with Ph.D. qualification. Led by a team of highly qualified experienced faculty with specializations such as RF & Microwave, Antennas, Digital Signal Processing, Wireless Communications, and Digital Image Processing, VLSI and Embedded systems. The department provides excellent academic and research environment to the UG, PG and research students. A Centre of Excellence (TIFAC CORE- DST) in Telematics was established in the year 2009 with the state of the art facilities. Having successfully completed many research projects funded by UGC, AICTE, DST, NRSC-ISRO DLRL & ANURAG-DRDO etc., it is also recognized by JNTUK as "**Research Center.**" Faculty members extend guidance to research scholars, produce Ph.D.'s and publish their findings in peer reviewed national and international journals and conferences.

Message by HoD

As a part of nurturing the students with qualities like teamwork, *technical* skills and a glimpse of the competitive world of *engineering* and *technology we are encouraging students to publish articles in the frontier areas of electronics and communication engineering.*

I am confident that all the faculty members and student community involved with this magazine have put their efforts in this in a way that the magazine both entertains and ignites the reader's mind. I would like to thank the editorial team members for bringing out this magazine regularly. I express my considerable appreciation to all the authors of the articles in this magazine. These contributions have required a generous amount of time and effort. It is this willingness to share knowledge, concerns and special insights with fellow beings that has made this magazine possible.



Dr K. Sri Rama Krishna

Analysis and Design of Low Profile Multiband Antenna for IoT Applications

Increased intervention of IOT in everyday applications created an open challenge to the researchers regarding the usage of RFID technique. This requires the process of integrating IOT to various wireless standards. This work proposes, a very low profile planar circular patch united with Koch fractals and rectangles alternatively on its circumference fed by a microstrip line and two more Koch fractals on either side of the circular patch which operates over the bands of 1.5GHz-1.65GHz, 1.92GHz-2.17GHz, 2.56GHz-2.85GHz, 3.68GHz-4.0GHz, 4.73GHz-4.94GHz, 5.36GHz-5.57GHz at SHF, UHF and Microwave frequency bands ,GSM 850 MHz, GSM 900 MHz, LTE-700 MHz, LTE-800MHz, TV broadcasting. MIMO refers for Multiple-In-Multiple-Out transmission, which distributes the same information via numerous signals across different antennas at the same time whereas only using one radio network, where it is in the way of antenna diversity which is a tool for enhancing the data strength and durability of a radio frequency link by using several antennas. There at the point of transmission, the dataset is partitioned into numerous data feeds, which are then rearranged upon that receiving station by some other MIMO radio with almost the same no of antennas.

The receiver is programmed to allow for minor temporal differences between signal pickups for extra noise or interruption, or even destroyed transmissions. MIMO antennas enable reliability in the transmission of data that traditional single antenna configurations Single In-Single Out (SISO) cannot provide when sending information on different channels.

Development of Acquisition Modules for Novel L5 Band Signal

The advent of Global Navigational satellite System (GNSS) receiver technology and advancements in the satellite signal structure has brought benefits in the civil aviation sector and defence related applications. To effectively utilise the benefits from the GNSS systems; the ground receiver, which employs the combination of typical super-heterodyne principle and the digital receiver principle, has to receive and process the signal to derive the user position. The baseband correlator in such a receiver performs the critical function of acquiring the available satellite signals that are visible at the given time, track the signal continuously to decode the navigation data and estimate the receiver position. The acquisition and tracking functions are performed by the acquisition and tracking loops that are built inside the digital receiver. The baseband correlator operation can be achieved through hardware or software based approaches (Software Defined Radio (SDR)). The software based approach provides predominantly two benefits: i) it can accept data from different types of hardware interfaces and ii) newly developed algorithms does not necessitate change in the hardware. The project is aimed to develop software modules for the acquisition of Indian Navigational Satellite System signal (navic) L5 band signal. Signal acquisition is a process of detecting satellite signal, its corresponding code delay in PRN code and Doppler shift in carrier frequency at the point of synchronization between the received signal and (locally generated) replicated signal. For acquisition, received L5 band signal is down-converted into Intermediate frequency (IF) in the front end of the receiver. IF signal consists of signals from all satellites. Further, IF signal is processed in the receiver to acquire and track the individual satellite signals. Tracking is a continuous process of correcting the locally generated carrier signal phase and code delay in PRN code to extract navigation data from the received signal. One of the major concerns during the implementation of the acquisition of signal is computational complexity and execution time for the digital signal processing during the correlation function. To overcome this, correlation in acquisition method is replaced with the Fast Fourier Transform algorithms. In this project, a sample navic signal is generated with the required specifications (like delay, carrier frequency, Doppler shift) using MATLAB and it is used for testing the developed acquisition modules.

Face Apperception Based Attendance Monitoring System

Facial biometrics has turned out to be the extant fascinating and intriguing technology of late. With artificial intelligence and the blockchain, this certainly represents a significant digital challenge for all companies and organizations- and especially governments. This technology finds its uniqueness in multitudinous orders of which attendance monitoring is one. A significant portion of the time allocated to a faculty for teaching purposes is consumed on the task of taking attendance of the students presently attending a class. Traditional way of doing so might sometimes lead to proxies, chaos and a loss of decorum in the class. To counter these issues, an automated attendance system is proposed which keeps track of students attending a particular class with the help of a continuous stream of pictures captured at random instants from a live camera located inside a classroom.

The chosen architecture is fit into the end-to-end solution proposed, connects a live stream of pictures obtained from a camera located inside a classroom to a remote server, via a thin client, where the majority of the necessary computing work is performed. The queries to the remote servers are in the form of images, which are obtained from the live camera. The images are processed and identifies the individuals present inside the frame, the details of which are returned to the thin client. The procured result is of the form of a list of students present, with their details such as registration number, student name and class room. This result can be automatically synced to the attendance system to provide an automatic updating of attendance without any human intervention.

Design of Microstrip Patch Antenna for Satellite Communication

The increasing demand for satellite applications lead to spectral congestion of conventional frequency bands allocated for satellite services. Hence, to satisfy this demand it is necessary for all the satellite systems to employ higher frequency bands like Ku band (12-18 GHz) etc. This paper presents a microstrip patch antenna that operates at 15 GHz such that it facilitates satellite communication at higher frequencies. This antenna is designed and simulated using High Frequency Structure Simulator (HFSS). It consists of a hexagonal patch with multiple slots and is fed through microstrip line feed. The proposed antenna is designed using glass epoxy FR-4 substrate which has a relative permittivity of 4.4 thereby reducing the cost of manufacturing. The proposed design is simple to fabricate and can be extensively used in many satellite applications.

Real Time Recognition of Heart Diseases

In recent year's world is facing high rate of heart diseases. WHO states that cardiovascular diseases are the world's largest killer's. 30 million people suffering from heart diseases and about 2 lakhs heart surgeries are being done per year in India. Out of 30 million people, 14 million people belongs to urban areas and 16 million people belongs to rural areas. As they are leading causes of death there is a need, to protect the people from urban and rural areas who are suffering from heart diseases. Hence this work proposed, a real time heart monitoring system to analyze the ECG signal of the subject and determine the heart functionality and disability. This model works based on the feature extraction of the subject under test and compare those with the available standard values of the healthy subjects. The features of extraction from each subject are RR interval, QRS complex, PR interval, ST interval and QT interval. The proposed model is compatible with the existing techniques in all aspects. From the acquired ECG, if any abnormalities are identified in the features of signal corresponding heart disease will be displayed.

Human Action Recognition

Human Action Recognition is an evolving research area in computer vision for various applications like surveillance, theft detection, health monitoring and human computer interaction. It gained popularity because of its huge applicability in automatic retrieval of videos of a particular action using visual features like facial expression, body movements such as walking, jogging and running. The stages involved for activity recognition are: segmentation, feature extraction, activity detection and classification. K nearest neighbours (KNN) is a simple algorithm that stores all available cases and classifies new cases based on a similarity measure. KNN is a nonparametric classification technique which is used in statistical estimation and pattern recognition. As KNN is a supervisory technique, a reference information is required.

This project aims to observe and recognise different actions present in KTH data set. KTH data contains six different actions like jogging, walking, running, hand waving, hand clapping and boxing. All sequences were divided into a training set (8 persons), a validation set (8 persons) and a test set (9 persons). The validation set was used to optimize the parameters of each method while the classifiers were trained on a training set. On the test set, the recognition results were obtained. In addition to these actions, activities like cycling and surfing are also considered. By making use of this data set and appropriate training these actions can be recognised.

Smart Shopping Cart

The aim of this system is to develop a system to overcome this long queues and time consuming process at shopping malls. The system is placed in all the trolleys .The system consists of a barcode reader and all the products have barcodes. When a person puts any product in the trolley, the reader detects the item, item name and its cost will be displayed on the LCD screen.

By adding the products simultaneously, the bill also gets updated. The data will be continuously updated in the database. In this way the customer can directly pay the amount at the building counter. Since the entire process of billing is automated it reduces the human errors substantially. Also, the system has a feature to delete in the scanned products to further optimise the shopping experience of the customer. The hardware for this is based on the Raspberry-pi platform and Node MCU.

IoT Based Border Monitoring and Controlling Using Raspberry PI

Internet of Things (IOT) has provided a promising opportunity to build powerful Border systems and applications by leveraging the growth ubiquity of RFID, wireless, mobile and sensor devices. A wide range of Border IOT applications have been developed and deployed in recent years. In an effort to understand the development of IOT in Border, this work reviews the current research of IOT, key enabling technologies, major IOT applications in borders and identifies research trends and challenges. Main contribution of this work is that it summarizes the current state-of-the-art of IOT in borders systematically. With the advancement of Automation technology, life is getting simple and easier in all aspects. In today's world Automatic systems are being preferred over manual system. With the rapid increase in the number of users of internet over the past decade, it has become a part and parcel of life, and IOT is the latest and emerging internet technology. This work proposes the Border monitoring and controlling by using PIR sensor, metal detector and Raspberry pi.

IoT Based Parking Discipline System Using Raspberry Pi

Encroachment of vehicles on all major roads in the city has become a matter of concern. Urban parking management is receiving significant attention because of the explosive increase in the number of vehicles. There is a lack of monitoring as well as inadequate parking facilities and weakness in parking management which is responsible for growing illegal parking. The objective is to design an efficient parking discipline system using Raspberry Pi. Initially the vehicle will be parked in a parking space and if the vehicle crosses the margin the owner of the vehicle is liable to punish. When the vehicle crosses the margin the sensor recognizes it and the number plate of the vehicle is detected by using image processing technique. Then, the owner receives an alert message that the vehicle is parked in a wrong way and payment receipt. On the other hand if the vehicle is parked in non square permits, then automatic scanning is implemented and generates a report to the owner. The system mainly contains Raspberry Pi, IOT, Python, IR sensors, Instamojo (for payment and fines), OpenCV (for image processing) etc.

Smart Surveillance and Security

The need for surveillance and security in public as well as private spaces has become mandatory now a day. In order to meet such security requirements, CCTV's, Fid's, fingerprint scanners and many other devices had been installed. But the need to respond to thefts and unusual acts immediately has become a difficult task. So the time lapse to attend to a theft can be reduced by providing alarm or alerts by message to the corresponding authority, if such acts are captured by the CCTV camera. The proposed work aims at providing smart surveillance & security using Face recognition using OpenCV.

Performance Analysis of License Assisted Access LTE with Asymmetric Hidden Terminals

License Assisted Access (LAA) LTE (LAA-LTE) is a new type of LTE that aggregates the licensed LTE bands with the unlicensed bands via carrier aggregation. To operate in unlicensed bands, LAA-LTE adopts the listen-before-talk policy and designs its channel access mechanism similar to WLAN's DCF. In this project we consider an LAA-LTE eNB coexisting with asymmetric hidden Wi-Fi APs where the eNB can detect the APs while the APs cannot, which is caused by the asymmetric CCA thresholds. The behaviour of such a network is modelled by a joint Markov chain (MC), using which steady-state probabilities, throughput, are derived analytically. The objective is to propose an analysis in such a way that it correctly models the dynamics of LTE-WLAN coexistence, and identifies important design guidelines for fair coexistence.

Indoor Positioning and Navigation System

When we visit a new place such as an Airport or a University we need some guidance to travel to our desired location in that place. It is always not possible to ask someone to give the directions. As we know that GPS is an excellent application for outdoor navigation, but in indoors where we want to travel to a specific room inside a building GPS can't help us. Hence we need a simple system which can track our position and help us navigate. Now-a-days there are many indoor tracking systems which depend on Wi-Fi access points, blue-tooth beacons or some predefined nodes etc. But these need some additional infrastructure based and hence are not economical. The advancements in Micro-Electro- Mechanical systems (MEMS) have created an easy way to solve this problem. MEMS-based inertial sensors such as accelerometer, gyroscope, and magnetometer can be used for tracking the position of a person. The output from these sensors can be processed to get the direction and the distance the person has moved. This data can now be plotted on a map so that the person can identify his own location and also can also know where the desired location is.

An Invisible Eye (Blindar) for the Blind People

Blindness is a state of lacking the visual perception due to physiological or neurological factors. In general, blind and visually impaired persons have difficulty to sense what happen around them since they cannot see and only depends on their own intuition. Due to this the blind people are depending on others for every small needs. To help those a smart Electronic Travelling Aid(ETA) called BlinDar has been proposed.

An Electronic Travel Aid (ETA) called BlinDar is a form of assistive technology having the purpose of enhancing mobility for the blind pedestrian. BlinDar has sensors which alert the blind pedestrian about the danger with Buzzer sounds and also voice alerts in mobile through application. BlinDar is an simple, reliable, highly efficient ,cost effective, low power consumption, light weight, friendly user ,a smart guiding stick which uses an ultrasonic sensors to detect the obstacles apart from that it also contains a MQ2 gas sensor to detect fire in roadside path and water sensor to alert slippery surfaces.

One important feature of the Blindar is that it allows the blind person to send out a sms message, emergency call alerts with his/her current location by connecting Bluetooths of smart stick and mobile to the caretaker/relatives of the person in case of trouble or being lost. And also it allows LED light for identification of a blind person in dark nights.

Design and Simulation of Microstrip Patch Array Using DGS

In this major project a multi-band antenna based on slotted DGS technique is proposed. Multi-band performance and a thin profile characteristic can be maintained by removing rectangular slots in the rectangular patch antenna. This proposed antenna operates over a wide frequency ranges with applications in RADAR and wireless communications. The antenna performance can be studied based on the effect of the structure of the ground plane. The proposed antenna operates with a centre frequency of 9.5GHz. The antenna is going to be fabricated on a FR4 epoxy substrate with $h=0.8\text{mm}$, $\epsilon_r=4.4$ and centre-to-centre distance, $d=23.5\text{mm}$. The proposed DGS is three rectangular shaped defected ground structure units placed between microstrip antenna elements. This project provides structure that reduces mutual coupling and enhances bandwidth. The proposed defective structure significantly disturbs the fields and induces currents between microstrip antenna elements which in further reduces transmission coefficient. It is responsible for increasing fringing field which introduces parasitic capacitance. This parasitic capacitance increases coupling between conducting path and ground plane which is responsible for enhancement of bandwidth reduction in mutual coupling.

Resource Allocation for Licensed/Unlicensed Carrier Aggregation MIMO Systems Using Imperfect CSI

The extension of long term evolution (LTE) networks in unlicensed spectrum areas under the licensed assisted access concept aims at achieving higher transmission rates via the aggregation of the aforementioned bands along with the licensed ones within the 3G Partnership Project framework. A prospect carrier aggregation (CA) scheme should handle efficiently the coexistence of the LTE systems that compete for the same unlicensed spectrum areas along with their incumbent users (i.e., Wi-Fi). In this paper, a novel CA scheme is proposed for licensed/unlicensed MIMO LTE systems that allocates optimally the resources (power and resource blocks) of an evolved Node B to user equipment's. Furthermore, the proposed approach handles the coexistence matters within the unlicensed bands with an efficient decentralized way. The new scheme involves the solution to a mixed integer nonlinear programming problem and thus, an optimal low complexity method is proposed based on the Lagrange dual decomposition. Furthermore, the proposed technique is extended to the imperfect channel state information (CSI) case. To that end, a novel listen-before-talk scheme is developed via which the required unlicensed bands CSI are estimated in a blind manner.

Surface Wave Suppression in Patch Antennas Using EBG Structures

Surface Waves in Patch arrays is an important issue to be considered when antenna elements are placed together on the same substrate in modern antenna technology. There are numerous methods involved in minimizing the surface waves, out of which one method is Electromagnetic band gap (EBG) technology. Surface waves mainly arises due to surface currents excited on patch antennas whenever the substrate $\epsilon_r > 1$. It has become a major technique to reduce mutual coupling in the RF and microwave applications due to their unique band gap characteristics at certain frequencies. In this, a micro strip antenna array using Electromagnetic bandgap structures is proposed. The antenna performance can be studied based on the effect of the EBG Structure. The proposed antenna operates with a centre frequency of 5.6 GHz. Based on the evaluation, an EBG structure is to be designed using dispersion diagram and identify the stop band frequencies for the designed EBG, and finally mutual coupling will be reduced compared with the non-EBG patch array. By introducing these structures into the patch array various parameters like gain, directivity, radiation pattern, mutual coupling reduction in an antenna can be enhanced. The antenna structure with and without EBG structures are designed and simulated using ANSOFT HFS.

Design of Adders for Digital Signal Processing Architectures

DSP plays an important role in many fields like audio processing, radar signal processing, telecommunication, and biotechnology. The majority of these applications use DSP algorithms like convolution, Discrete Fourier Transform (DFT), Fast Fourier Transform (FFT), Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) filters etc. These algorithms require a lot of arithmetic computations like addition and multiplication. Adder is one of the key components for these applications. In this major project, we considered an extensively used Residue number system (RNS) based on $\{2^n - 1, 2^n, 2^{n+1} - 1\}$ moduli set and proposed a residue adder with its VLSI implementation, where carry generation circuit (CGC) is used to eliminate the vestigial computations which in turn reduces area and power.

Imminent Dispersal System of Water for Clustered Households

Management of water resources in India is of paramount importance to sustain one billion plus population. By 2025, 1.8 billion people experience absolute water scarcity and 2/3 of the world will be living under water stressed conditions. As of now 33% of water sources are available through mountains, rivers, rains etc., People wastes somewhere between 0 to 45 litres of water especially in domestic purposes. To reduce this unnecessary water usage, there is need to be manage resources effectively. As per the survey, that has conducted for community reveals that on an average per head 100 to 150 litres per day is needed and further it can be increased in future. To overcome this issue of scarcity, Imminent dispersal system of water for clustered households is proposed which involves planning, developing, distributing and managing the optimal use of water. This design is implemented for equal distribution of water will be designed through a central server which incorporates a ARDUINO which connected to group of houses(limited) that helps in distributing water as per the need. Respective sensors are used to sense an amount of water flowing through pipes and sends information to controller. Water is directly pumped into houses and instructions are commanded through the controller as per the requirements.

Home Automation Using Brain Computer Interface for the Physically Challenged

A Brain-Computer Interface (BCI), also referred to as a Mind-Machine Interface (MMI) or a Brain-Machine Interface (BMI), provides a non-muscular channel of communication between the human brain and a computer system. With the advancements in low-cost electronics and computer interface equipment, as well as the need to serve people suffering from disabilities of neuromuscular disorders, a new field of research has emerged by understanding different functions of the brain. The Electro-EncephaloGram (EEG) is an electrical activity generated by brain structures and recorded from the scalp through electrodes. Researchers primarily rely on EEG to characterize the brain activity, because it can be recorded noninvasively by using portable equipment. The EEG or the brain activity can be used in real time to control external devices via a complete BCI system. A typical BCI scheme generally consists of a data acquisition system, pre-processing of the acquired signals, feature extraction process, classification of the features, post processing of the classifier output, and finally the control interface and device controller. The post-processed output signals are translated into appropriate commands so as to control output devices, with several applications such as robotic arms, videogames, wheel chair etc. The main aim is to help paralyzed and physically disabled people to control the home appliances using Electro-EncephaloGram (EEG) signals, so that they become independent in their daily life. The BCI (Brain-Computer Interface) is considered as a recent and a unique transmission medium between the human brain and a computer. This approach offers an alternative communication path and the control system. It is referred as an artificial system that circumvents the human body's normal adequate pathways, which are the neuromuscular output channels. Here, non-invasive Brain-Computer Interface approach is implemented. The Brain-sense brainwave sensor is used to sense the attention values of the brain signals and the eye blinks. The Arduino is used as main interfacing device. According to the brain attention values the devices will be selected and through relays the switching on and off of the home appliances is done accordingly.

Modernized IoT Enabled Child Safety System

Now a day's children safety became a serious issue. The parents often worry about their children in their day to day activities when they step out of home. Parents feel safe if they get alerts about travel route and their child safety at appropriate place. This aims at creating a suitable environment by following certain set of criteria of security and safety for children that will have a positive impact on the children and their family. The main objective of this is that, it deals with children safety and their daily activities are known to parents through GSM (Global System for Mobile Communication). Here GPS technology is used to track the exact position of child. When a child speaks some predefined words then by using microphone we detect the voice and a web camera is used for the parent to recognize the surroundings of the child by face recognition system. If a child is missing then through voice recognition child voice is detected and sends information to parents. Panic button can also be used to alert the parents once the child or student presses it. Pulse sensor is used to detect the heartbeat of child. How the speech is recorded & processed is shown by means of software. If the child doesn't want to carry module or if he misses it, then pulse sensor is used so heart beat and location details, that are combined with it are seen in the mobile app. Through face recognition we can recognize the child face and know whether he is an authorized child or not. For easiness of information to parents a mobile application will be developed.

Agribot for Smart Farming

Now a days it's a challenge to improve development of crop in respect of its growth and to reduce costs which leads to an innovative idea of using an automated irrigation system which will further help in better management of water and human resources. An automated irrigation system has to be developed using sensors technology with Microcontroller unit to efficiently utilized for irrigation purpose. The system has soil moisture sensor connected to the robot and a RF transceiver is used to turn on and off water supply which will be pumped to plants for irrigation. An algorithm has been build out with threshold values of humidity sensor used to sense the humidity in air. Robot is capable of supplying fertilizer to the crop, so that farmer is not exposed to the fertilizer. Supply of fertilizers is in the hands of farmer. This project can convert manual irrigation into an automated irrigation which with the help of soil moisture sensor will detect water content of soil leading to turn ON/OFF of water supply and also fertilizer sprinkling to farm. The information about various sensors and fertilizers was accessed by the farmer, the corresponding action to be taken through GSM (Global System for Mobile communication) module. Human efforts can be reduced using this technique and increase saving of water and fertilizers by efficiently irrigating the plants. The design has been made with better resource management, low man power and low power consumption. Processing unit collects the input signals (information about soil moisture, humidity and fertilizers) via sensors. As the microcontroller starts obtaining the signals, it creates an output which can be viewed on LCD(Liquid Crystal Display). Keywords–Arduino Uno, Soil moisture sensor, humidity sensor and GSM Module.

Design of Multiplier Circuits for DSP Applications

Digital signal processing (DSP) is one of the most powerful technologies that have applications in many fields like audio processing, digital image processing etc. These applications will make use of the DSP algorithms like Fast Fourier Transform (FFT), convolution etc. All the DSP algorithms require arithmetic operations such as multiplication and addition. These operations dominate the execution time of most DSP algorithms. Reducing the time delay is very essential for many applications. In general, the performance of the multiplier circuit determines the system's performance as the multiplier is the slowest element in a system, it requires more computational time as compared to adders. So, in this major project we want to explore the basic arithmetic circuits used for DSP applications, mainly focusing on multiplier circuits and try to optimize these multiplier circuits by using residue number system (RNS).

Smart White Grub Monitoring System

Soil-dwelling pests are often neglected for monitoring. In India, every year a largescale of Agricultural crops are destroyed by these soil-dwelling pests and White Grubs have most Significant damage among them. White grubs are the larvae of scarab beetle that feeds on the rootlets of the plants. It is considered as the national importance pest of India. Several Technologies are being adapted from the past few years in order to control White Grubs. Apparently, they serve as either slow methods or costly. A different framework is developed to sort out the problems faced by the earlier technologies. The use of Smart Greenhouse technology has aided in finding the location of grubs' larvae efficiently .The proposed method is mainly invented to find the second instar and third in star of grubs as they are the most damaging stages in the grub lifecycle. MQ-135 is used in the developed hardware to detect the CO2 bursts emerged from the grubs. The main building block of project is Arduino Uno. To get the desire function of Arduino Uno, we use Arduino IDE. Also we have used a robotic arm for pick and place operations at each and every place without using number of kits and we can move the robot help of servomotors.

New Compact Microstrip Patch Antennas: Design

To design new multi-band antennas based on patch resonator with comparative results to each other. Both antennas are compact in size and have high quality responses which can be applied in many handheld and personal communication devices. Methods/Analysis: New microstrip patch antennas based on modified first iteration of Minkowski fractal geometry and applying central small square cut in the main resonator have been presented in this paper with and without inserting corner square patches. Both antennas have designed using single layer and dual feeds to operate as multi frequency devices. The antennas have been modeled and optimized by using the Microwave Office (MWO) simulator based on the method of moments. The projected antennas have been designed using FR4 substrate with a relative dielectric constant of 4.4 and a substrate height of 1.6 mm.

Compared with the microstrip patch antenna without inserting corner patches using same main patch resonator dimensions and substrate specifications, the designed antenna with corner patches exhibits more operational frequencies as well as as greater frequency ratios with respect to the first fundamental frequency. Findings: New microstrip antennas based on patch resonator with and without inserting corner patches have been proposed. The first antenna exhibits multi-frequency behaviour, where resonances appear to take place at frequencies of 2.49, 3.03 and 6.63 GHz, within 2 to 7 GHz frequency range. The second antenna exhibits a higher number of resonant frequencies that appear at 2.14, 2.55, 5.03, 5.81, 5.9 and 6.14 GHz respectively under same previous frequency range. The first three operational frequencies have decreased or shifted by inserting corner square patches due to increased electrical physical dimensions of the second antenna. Also, these corner patches act as EM perturbation elements to stimulate the second antenna with more resonant frequencies within 2-7 GHz frequency sweeping range.

Theoretically, there is an important relation between antenna dimensions and guided wavelength. This relation specifies if antenna dimension is less than quarter guided wavelength (λ_g), then the antenna is impractical because radiation resistance, bandwidth and gain are decreased and therefore the antenna size is enlarged. By the way, the dimensions of Antennas 1 and 2 have been found to be $(0.259 \lambda_g \times 0.259 \lambda_g)$ and $(0.269 \lambda_g \times 0.269 \lambda_g)$ respectively according to their fundamental frequencies which are satisfactory. Both antennas have small sizes and high quality responses which can be applied in many handheld and personal communication devices. Novelty/Improvement: In this paper, new multi-band

antennas based on patch resonator have been proposed. The proposed resonators have been initiated from the transformed version of the first iteration of Minkowski fractal geometry. These antennas have compact dimensions with good return loss and radiation pattern performances which are desired features to be adopted in many communication devices

Speed Control of Motor Using Bi-Directional Power Converter Providing Charging Feature

Batteries are the primary energy-storage devices in ground vehicles. Now days battery fed electric drives are commonly being used for electric vehicle applications, due to various advantages such as nearly zero emission, guaranteed load levelling, good transient operation and energy recovery during braking operation. To fulfil these requirements converters with bidirectional power flow capabilities are required to connect the accumulator (battery) to the dc link of the motor drive system. Battery fed electric vehicles (BFEVs) is required to function in three different modes namely acceleration mode, normal (steady state) mode and braking (regenerative) mode. During acceleration and normal modes the power flow is from battery to motor where as during braking or regenerative mode the kinetic energy of the motor is converted into electrical energy and fed back to battery. The DC-DC converter is required to perform mainly two functions, first to match the battery voltage to the motor rated voltage and second to control the power flow under steady-state and transient conditions, so that the drive performance is as per the requirement. In the present work closed loop operation of bi-directional dc-dc converter feeding a dc motor and its energy recovery due to regenerative braking has been demonstrated. The characteristics of battery operated electric vehicle under different drive condition are also presented. The effectiveness of the system is verified through the simulations using Simulink/ MATLAB.

ECG Heart Monitoring System

Now-a-days, mostly young people are losing their lives due to heart attack. WHO states that cardiovascular diseases are the world's largest killers? In India there are 30millionpeoplesuffering from heart diseases and 2 lakh heart surgeries are being done every year. One of the best ways to obtain health information is from an Electrocardiogram (ECG). Through an ECG characteristics patient's heartbeat, heart conditions can be analyzed. In the existing technologies, most available health care devices do not provide clinical data regarding patient's heart activities. Many wearable devices were invented, but their performances were not accurate for practical applications. This system is reliable, flexible ECG monitoring system. Careful placement of sensors in armband gives desired result. In this project development of a light weighted portable ECG monitoring device based on an android phone are presented. The device can detect electrocardiograph potential through the electrodes of silver chloride from the skin. The obtained signals were then transferred to a ECG sensor for the amplification and filtering purpose, further the signals are processed by the micro-controller and sent to mobile phone as a message via IOT where the data can be displayed in real time based on the parameters deviation from their standard values.

Compact Multi-Band Reject UWB Monopole Antenna Using EBG Structures

The Ultra Wide-band (UWB) communication systems have been thriving rapidly due to its potential of high data rate transmission, low power consumption, constant gain and group delay over the whole operating frequency band. They have got a wide range of applications in antenna design. EBG structures are very promising structures to exterminate the problems created by surface waves, while at the same time improving the performance. It can be predicted that by inserting the EBGs, the gain of the antenna can be increased and also the surface waves can be reduced. This work focuses on designing a low profile compact multi band notched UWB monopole antenna. Multi band rejection characteristics of the proposed antenna can be achieved by engraving a ring-shaped slot on the radiating element and EBG structures above the ground plane on the vicinity of feed line. To avoid the interference with narrow bands with frequency ranges from (2.4 – 2.6) GHz – Bluetooth, (3.3 – 3.8) GHz – WiMAX, (5.15 – 5.825) GHz – WLAN band and (7.25 – 8.4) GHz – X-Band, it is necessary for UWB antenna to have band notched characteristics.

Extraction of Vegetation Regions from Resources at-Ii High Resolution Satellite Images Using Mean Shift Algorithm

The research on remote sensing has been simplified these years with the availability of high-resolution satellite data. With the help of remote sensing one can focus on sustainability and maintaining of earth's precious resources like trees, water, minerals etc. With the combination of satellite images and digital image segmentation techniques, manpower and processing time can be reduced. Estimation of change detection and generation of 3d models through satellite images got importance at present for the purpose of estimating resources. In this context it is proposed to identify and extract the vegetation and land cover present in the given area. Mean Shift Algorithm is one among many methods used for extraction of different objects. This algorithm is used for extracting the vegetation in the data along with thresholding, SVM and morphological methods. Mean Shift can be done based on finding statistical parameters like Homogeneity etc., with the help of these parameters vegetation extraction is done. Orfeo Tool Box and QGIS are used for this project and it is an open source tool for remote sensing applications. It can process high resolution raster images at terabyte scale. All OTB's algorithms are accessible from Monteverdi viewer. Keywords: Textural analysis, SVM, Tree identification, Vegetation extraction. Software tools used: OTB, QGIS

Resource Allocation for Unlicensed/Licensed Carrier Aggregation MIMO Systems Using Perfect CSI

The extension of long term evolution (LTE) networks in unlicensed spectrum areas under the licensed assisted access concept aims at achieving higher transmission rates via the aggregation of the aforementioned bands along with the licensed ones within the 3G Partnership Project framework. Carrier Aggregation enables the usage of the combination of licensed and unlicensed bands while efficiently handling the coexistence problem that occurs since heterogeneous LTE systems compete for available unlicensed bands along with their incumbent users. This CA scheme is proposed for licensed/unlicensed MIMO LTE systems that allocates optimally the resources (power and resource blocks) of an evolved Node B to user equipment's. This approach handles the coexistence problems in a decentralized way. MINLP is used in this approach but a new method called water filling method under the perfect CSI case is applied for increased performance of the channel (capacity is increased with respect to SNR).

Air Pollution Detection and Control

In present day modern world vehicles have become part and parcel of every one's life. Situations and circumstances have their predominant role in the usage of vehicles in this modernized urban life. As to consider both sides of the coin, this has its own effects, one of the main side effects being air pollution. Each and every vehicle will have emission but the main problem occurs in the case when it is beyond the standardized values fixed by the pollution control board of India. The main reason behind this breach of emission level being the incomplete combustion of fuel supplied to engine, which is due to the improper maintenance of vehicles. This emission from vehicles cannot be completely avoided but, it can be definitely be controlled.

With the evolvement of semi-conductor sensors for detecting the various gases, this project aims at using those semi-conductor sensors at the emission outlets of vehicles which detects the level of pollutants and also indicates this level with a meter. When the pollution emission level shoots beyond the already set threshold level, there will be a buzz in the vehicle to indicate that the limit has been breached and the vehicle will stop after a certain period of time , a cushion time given for the driver to park his/her vehicle. During this time period, the GPS starts locating the nearest service stations. After the timer runs out, the fuel supplied to the engine will be cut-off and the vehicle has to be towed to the mechanic or to the nearest service station. The synchronization and execution of the entire process is monitored and controlled by a micro controller. This project, when augmented as a real time project, will benefit the society and help in reducing the air pollution.

Design & Analysis of Multiband Sierpinski Gasket Fractal Antenna Using Iteration Method

Wireless communication systems require antennas of higher gain, multiband support and small design dimensions. To provide better impedance matching and size reduction, geometrical interpreted fractal antenna is suitable. This allows the antenna to operate at different frequencies. To increase performances with respect to gain, bandwidth and multiband resonance, an array can fulfil the requirements. This paper shows the design and simulation of the Sierpinski Gasket array for multiband applications (4GHz to 8GHz, 8GHz to 12GHz) up to 4th iteration. The patch antenna with fractal geometry is selected due to ease of fabrication and low cross polarization radiation. Sierpinski gasket is known by the name, Sierpinski triangle having triangular slots using mid-point geometry of the triangle. This array makes use of micro strip feed where FR4 epoxy is used as the dielectric substrate. A low profile dielectric is used to get the radiation in maximum amount. This antenna finds applications in Wi-Fi, satellite communications and transmissions. The simulation of the proposed antenna can be done using High Frequency Structure Simulator HFSS V13 software.

Design and Modelling Of Carbon Nano Tube Field Effect Transistors

We present a model of Carbon Nanotube Field Effect Transistors (CNTFETs) directly and easily implementable in simulation SILVACO software for electronic circuit design. The model will be based on analytical approximations and parameters will be extracted from quantum mechanical simulations of the device and depending on the nanotube diameter and the oxide capacitance. In order to determine the values of CNTFET equivalent circuit elements a new procedure, based on a best fitting of simulation values of output device characteristics, will be proposed. To verify the versatility of the proposed model we use it in the SILVACO simulator to design some Analog electronic circuits, demonstrating the importance of the quantum capacitance dependence on polarization voltages and examining the effects of the CNT quantum resistances.

Real Time Indoor Air Quality Monitoring System Using Arduino Uno

Humans spend more than 80% of their time indoor, therefore indoor air quality has a critical effect on the quality of health. So it is necessary to keep our indoor environment clean and healthy. The air quality has major influence on the health of people and to ensure good health. The main objective of this project is to provide real time information to assist the better living of the people. Because of the large variety of indoor pollutants, the design of an air monitor should be multi-sensory, portable, and within acceptable sensitivity.

The system will detect the level of the several gases like Carbon Dioxide (CO₂), Sulfur Dioxide (SO₂), and Volatile Organic Compound (VOC) and also the presence of dust, temperature, and humidity. The system will alert the user if levels of these gases are exceeded through Wi-Fi module on their smart phones.

The air pollution monitoring device developed in this project is based on Arduino UNO. The Arduino board connects with Ubidots platform using ESP8266 Wi-Fi Module. As the cities usually have Wi-Fi hotspots at most of the places, so the device can be easily installed near any hotspot for its operation. The Ubidots is a popular IoT platform which is easy to use and program. The sensor data is displayed in terms of ppm with different levels and different events created in the monitoring IoT device. The sensing of data and sending it to the Ubidots server using Wi-Fi module is managed by the Arduino Sketch. The Arduino sketch is written, compiled and loaded to the Arduino board using Arduino IDE.

IoT Based Smart Bistro Using Arduino

A restaurant is a place where people pay to sit and eat meals that is cooked and served on the premises. In traditional restaurants system orders are taken by a waiter and they bring the food when it is ready. After eating the customer will pay the bill. This system requires much manpower, and if too many waiters are hired, it may be a waste of resources during the non-busy hours. To overcome the limitations of the above system we design a smart restaurant which can help the management to avoid human error and enhance business development. In this project, the customer comes to the restaurant, selects his dish and submits his order which is wirelessly routed to the kitchen assistant. A conveyor delivery machine runs directly from the kitchen to the customer tables. When the dish is prepared in the kitchen, assistant places the item on the conveyor belt, and it delivers the food to the table of the customer who ordered it by using RFID technology. A recorded voice asks the customer to pick the food as soon as the item reaches the desired table. A Bluetooth module is used for wireless communication between the customer and the worker. Through this project, the owner of the restaurant saves money as it is a one-time investment and he need not pay monthly wages to the workers.



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