

TECHNICAL MAGZINE

Department of
Electronics & Communication Engineering

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**VELAGAPUDI RAMAKRISHNA
SIDDHARTHA ENGINEERING COLLEGE**

(AUTONOMOUS)

(Sponsored by Siddhartha Academy of General & Technical Education)

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.



Department of Electronics & Communication Engineering

Editorial Board	ISSUE	Academic Year
Dr D. Venkata Rao, Mr. K V Prasad	JUNE- APRIL	2021-22

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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, 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 Venkata Rao Dhulipalla

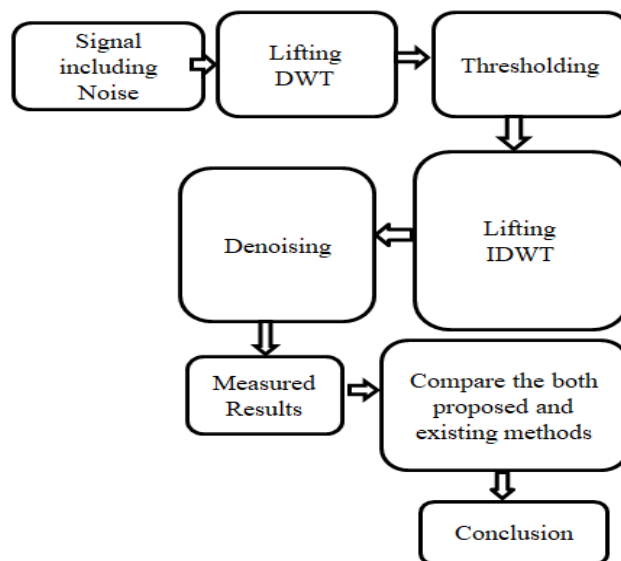
Design and Analysis of Lifting Wavelet-Transform for EOG Signal Denoising

S Meeravali, S. Rajitha, U Teja Sai, Durga Sri

During this work, efficient wavelet-based architectures are constructed and described, which may be useful for denoising Electrooculography data. Electrooculography (EOG) signal denoising is difficult event since signal and noise are in the same level of frequency spectrum. Proposing of wavelet architectures like lifting forward-inverse in MATLAB software for all this reduction and compare with existing proposed methods like db3, db5. After Simulation now adopt Intel Quartus Standard Edition for Digital Signal Processing (DSP), which is used for engineering modelling and production of the proposed denoising approach. For hardware consumption, a basic and efficient hardware architecture using FPGA device

Introduction: Biomedical engineering is a sort of engineering research that combines medical research with engineering research. This section's goal is to help and enhance our daily life by combining clinical and engineering knowledge as for the growing computing. Computer systems are fast, efficient, straightforward, and never get tired or ill, but people, while be smart and innovative, get ill, weak, and restrained. The Electrooculogram could be used as a route of communication and the basis of a Human– Machine Interface in the field of assistive technology. EOG signal denoising is very used nowadays for a number of biomedical applications.

Methodology:



Proposed of Lifting Based DWT_IDWT architecture is build for denoising of EOG signals in this study. By giving the EOG signals data as input from the fantasia-database, then hardware architecture simulation is done in the MATLAB software via the Intel Quartus DSP builder. Mainly, focused on the FPGA implementation by using the FPGA cyclone V in addition to the hardware simulation (5CSEMA5F31C6). Hardware use metrics such as memory bits, logic elements, clock, registers, pins, etc., using the DSP Builder Intel Quartus. By analyzing the denoising efficiency and hardware use of existing wavelets techniques like DB3, Db5, the lifting-based method provides more efficient denoising of EOG signals by using much less denoising hardware over previous systems.

Performance Analysis of Printed Planar MIMO antenna for V2V Frequency Band Applications

J. Tejaswini, K. Nikhitha, E. Akhila, G. Yathisha

Dual band antenna with microstrip feeding is developed and designed within an area of 351 mm^2 . It is used for the applications like WLAN, LTE and for the safety of the public devices with frequency range of 4.9 GHz. The proposed antenna consist of the s shape and c shape elements that radiate with the structure of monopole with the dimensions $13 \times 27 \text{ mm}^2$ and this monopole antenna is further converted into MIMO with dimensions $60 \times 60 \times 1.6 \text{ mm}^3$. The radiating effect of the antenna provides the good efficiency in the required bandwidth constraints. The antenna provides a return loss of -10 dB and provides 340 MHz and 650 MHz impedance bandwidths within bandwidth ranges of 2.4-2.74 GHz and 4.85-6.5 GHz. In the planes of magnetic and electric fields the proposed antenna produces radiations omnidirectionally as well as bidirectionally with the acceptable gains. The simulation results of the proposed antenna is done using CST software

Methodology:

The proposed antenna is designed using CST electromagnetic simulation software which uses methods FEM, FIT and TLM. We designed an inverted C shape radiating element to achieve 2.4-2.74 GHz and S shape radiating element for 4.85-6.5 GHz and both these are integrated to attain the finally proposed antenna. This monopole antenna is converted into MIMO with orthogonal configuration having four ports based on Spatial multiplexing concept.

Single Element Design:

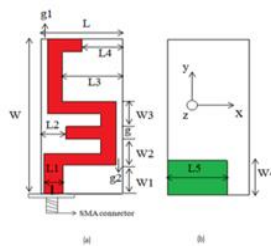


Fig 1: Top and Bottom view of proposed Single element



Fig 2: Fabricated Dual band antenna size comparison with a coin

Proposed MIMO antenna



Fig 7: Fabricated MIMO antenna

Quad Port MIMO Antenna of dimensions $60 \times 60 \times 1.6 \text{ mm}^3$ with dual frequency ranges of microstrip feeding consisting of S and C shape radiators is designed and developed which is applicable for the applications like LTE at 2.5 GHz band, Bluetooth/WLAN with 2.4 GHz, WLAN/WiMAX with 5 GHz. The desired dual band operation is achieved with the integration of the mirrored C shape with the S shape strip to monopole antenna.

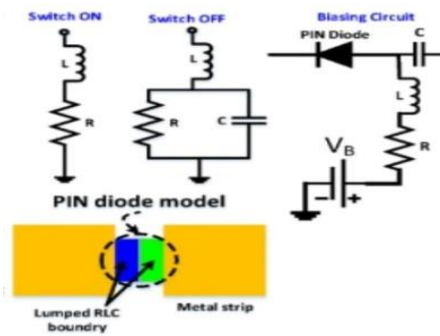
Microstrip feed dual band and triple band frequency reconfigurable antenna for diverse applications

K.Raghuadh ,T.S.S.Srinivas, V.Pranathi, K. Meghasree

A compact reconfigurable antenna which can operate at wide range of frequency bands like Wi-Fi (3.6 GHz, 5 GHz, and 5.9 GHz), ITU-band (7.725 GHz– 8.5 GHz) and X-band (8-12.5GHz). Gain of 10dB to 13dB which can be useful for commercial applications is designed. A circular shaped antenna with microstrip line feeding is designed with highest switching rate with the abet of two-diodes which provides state of flexibility in terms of frequency reconfigurability.

Frequency Reconfigurable Antenna using PIN diodes

Multiple frequency of operations achieved by introducing PIN diode BAP142LX. PIN diode is made ON and OFF using external bias to make it conduct or not. Diode is conducting for ON state and fails to conduct for OFF state. ON state is represented by series inductance L_s and resistance R_s . And at state antenna works at 25.45 GHz and 33.25 GHz with S_{11} of -22, -21dB OFF state by L_s connected in series with parallel combination of resistance R_p and capacitance C_p . And at this state antenna resonates at three different frequencies 25.35GHz, 25.45GHz and 33.35GHz. with return loss of -27dB, - 20 dB and -15.8 dB respectively.

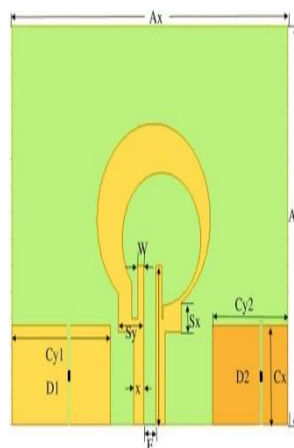


Methodology

The proposed antenna incorporates a circular patch with circular slot inserted in the proposed antenna which is connected to power by using micro strip line feeding. The two rectangular elements are connected at the lower part of the antenna which are physically connected to the RLC diodes of the antenna. When the diodes are in OFF case the rectangular patches show no effect on the output of the circular patch antenna.

When the diodes are in ON case the rectangular patch that are connected to the antenna create extra voltage to the antenna which create multiple bands in different cases.

Schematic Antenna



A frequency reconfigurable antenna operating at multiple on demand frequency mode is presented. Circular and rectangular slots are used for multiband operations. A triple band and dual band set is obtained using the pin diodes in two different cases. The presented antenna attains good VSWR ratio at range of 2:1. Moreover good simulated results with operating in Wi-Fi, ITU-band and X-band.

Novel approach to predict the Chances of Breast Cancer by demographic data using Machine Learning Algorithms

M.Prema Deepika, K.Mani Raj,V.Hari Prasad, K.Suraksha, I.Samyuktha

Breast cancer is one of the major problems faced by women. Generally, breast cancer is detected using mammography, but many women are not aware of this technique and symptoms because breast cancer is a type of cancer in which one cannot identify symptoms at an early stage, which leads to a high mortality rate. If breast cancer is detected at an earlier stage, mortality will be less. So, in this paper an approach to predict the chance of occurrence of breast cancer using demographic data is presented. Demographic data collected from users, such as age, family history , BMI etc., are implemented using various machine learning algorithms such as KNN, K Means, Random Forest and Boosting algorithms to determine the chance of occurrence of breast cancer. If there is a chance of occurrence, then a message will be sent to their registered phone number, as “Please, once you take a Mammography test you have a chance of occurrence”. Else send as “You are Safe”. Random forest algorithm provided best and accurate result.

Introduction:

Nowadays, breast Cancer is one of the major problems faced by women. This is also one of the leading causes of female deaths worldwide. According to a survey conducted by IARC, breast cancer accounts for 25% of all cancer cases diagnosed in women.

Signs and indications of breast cancer include a lump in the breast, change in the shape of the breast, fluid coming from the nipple, change in the color of the breast, swelling of the breast. Breast cancer is of 3 types namely benign, malignant and premalignant.

Breast cancer has several causes of occurrence they are Obesity, lack of physical exercise, Intake of alcohol, Hormone replacement therapy, radiation, early menarche, infertility, old age, family history of breast cancer etc.

Among the causes, risk factors which have high chances of occurrence of breast cancer are considered.

Machine learning algorithms like KMeans, KNN , Random Forest are implemented on our data and compared their accuracy and chosen Random forest as it produces accurate result. Then Google form is created to take input from user and predicted the chance of occurrence of breast cancer and sent output as SMS to their phone number using twilio account.

Methodology:

We analyzed six machine learning algorithms (KNN, KMeans, RF, Stacking, Adaboost, Gradient Boost) on our dataset which is collected from women faculty of ECE department and patients having breast cancer from hospital, relatives. We collected 1600 samples out of which 543 samples has chance of occurrence of breast cancer and 1053 samples has no chance of occurrence. To evaluate models 80% of dataset is used for training the models and 20% for testing. From the results we have observed that RF and Stacking has better performance in terms of accuracy and recall score. Then we had created a Google form to take input from user and predicted the chance of occurrence of breast cancer. If there is chance then a SMS is sent to registered mobile number as “you have chance of occurrence “. If there is no chance then SMS will be sent as “You are safe”.

Using the machine learning algorithms breast cancer occurrence can be predicted at early stages. For more accurate results implemented different algorithms like KMeans, KNN, Random Forest, Stacking, Ad boost , Gradient Boosting and Bagging algorithms .After all the training ,found that RF given best results (accuracy=93.43% and recall score = 88.5%) and stacking has high recall score(93.1%) and accuracy of 95.31%. The Google form created takes the input from user. The data obtained from the form is implemented using different algorithms and RF provided accurate results. Using Twilio services the output of breast cancer chance of occurrence is send to the user to their Mobile numbers.

Credit Card Fraud Detection Using Minority Oversampling and Random Forest Technique

N.S.S Pranavi, T.K.S.S Sruthi, M.Suresh Naik, B.J.N Sirisha

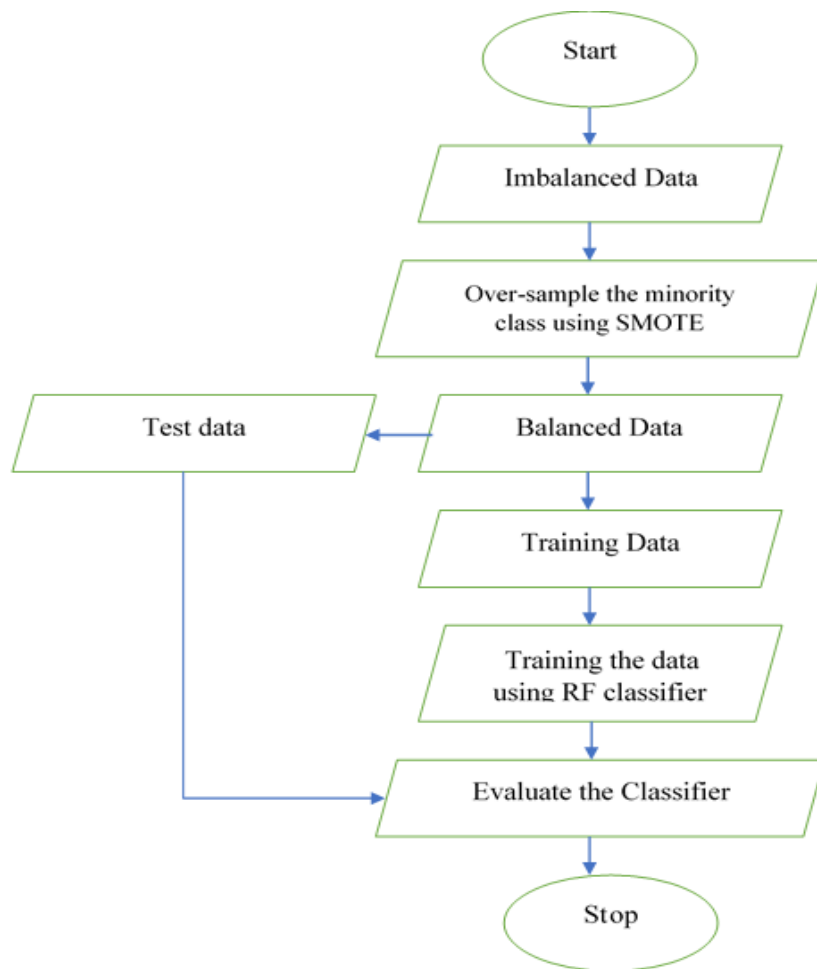
The usage of credit card is rapidly increasing and as a result, the cases associated with credit card fraud are on raise. So, fraud detection has become an important instrument and, in many cases, the best strategy to prevent fraud. For this purpose we have analyzed various Machine Learning algorithms like KNN, Logistic Regression (LR), Decision Tree (DT) and Random Forest (RF) and it is inferred that RF works best on performance measures like accuracy, precision, recall, F-1 score, Mathew's Correlation Coefficient(MCC). We also proposed a framework which detects 100 % fraud transactions by reducing false negatives using minority oversampling (SMOTE) in combination with RF.

Introduction:

Due to the advancements in technology, the usage of internet came into picture thus resulting in the rise of virtual payments via credit cards. Although having a lot of advantages using online payment mode, there is a scope of fraud too. This relevant problem suggests classification and detection as a solution to curb frauds which demands the use of Machine Learning (ML), Deep Learning (DL) etc. ML has become the most preferred approach to fraud detection because of its capacity to react fast, greater accuracy and less human effort. Credit card fraud detection with ML is achieved by bringing all the meaningful features of card users transactions such as date, User-zone, product category, amount, provider, client's behavioral patterns etc. This information is then run through a subtly trained model that finds patterns and rules so that it can classify whether the transaction is legit or fraud.

Methodology:

At first, we have analyzed four ML algorithms (KNN, LR, DT and RF) on imbalanced dataset which contains 2, 84,315 legit transactions and 492 fraud transactions. To evaluate these models 80% of the dataset is used to train the model and 20% of the dataset is used to test the model. These models are then trained and evaluated using test data based on accuracy, precision, and recall, F1-score, confusion matrix and MCC. From the results we have observed that RF algorithm performs better when compared to other algorithms. But from the confusion matrix we have noticed that false negatives are high in number. False negatives are considered as the fraudulent transactions that are wrongly classified by the model as legit transactions which is a serious problem. To counter this and solve the class imbalance problem we have used SMOTE (Synthetic Minority Over-sampling Technique) in combination with RF algorithm. SMOTE is a over sampling technique in which the size of the minority class (fraudulent transactions) is raised keeping the majority class (legit transactions) constant. The process flow of our proposed frame work is shown in Fig.1.



SMOTE and RF based framework.

From the flowchart we observed that when SMOTE is applied in combination with RF algorithm precision, f1-score, MCC are improved and recall is 100% (false negative are reduced to 0), this shows that our framework can detect 100% fraudulent transactions.

Detection of Metastases of Breast Cancer using Deep Learning

Md. Shahid Akram, D.Adarsh, N. Bhavya Sree, Gayatri Priya

Metastases are the potential of cancer cells to spread to different parts of the body. Metastases have an impact on a breast cancer patient's life expectancy. The traditional approach to locating metastases is a time-consuming process and it is more prone to yield misleading results. The use of an automated image processing technique on Whole Slide Images (WSI) will eliminate erroneous labeling and speed up the classification process compared to a traditional diagnosis system.

Introduction:

According to WHO figures, breast cancer is the second most common malignancy, with roughly 2.26 million cases expected in 2020, and breast cancer metastasis is the leading cause of increased mortality rates. Detecting the presence of metastases at an early stage allows for better therapy, reducing the spread of cancer or tumor cells and increasing the likelihood of survival. The traditional way of detecting metastases is time-consuming and can end up with false predictions. So to overcome these problems, we choose an automated image processing technique, which provides more precise results in a short period. We have taken the whole slide images as the input which is high-resolution digital versions of the histopathology images. Trained different neural networks and made the prediction using them to locate the presence of metastases.

Methodology:

Ensemble learning is a machine learning technique in which two or more models are trained together as a single model to provide the best predictive model. Averaging, voting, stacking, bagging, and other ensemble procedures are available. We have implemented a stacked ensemble, which is also known as stacked generalization. We have implemented a stacked ensemble, which is also known as stacked generalization. To begin, we trained three different neural architectures using various fully connected layer scenarios. Following that, we selected the best model from each trained network scenario and trained it as a single ensemble model. The ensemble model is more accurate and performs better than individual models. The proposed idea of Ensemble Learning is implemented and evaluated. We found that by implementing this approach the false predictions are minimized and performing well in terms of locating the metastases.

Implementation of Enhanced Energy-Aware Cluster-Based Routing Algorithm in WSN's

P.Teja Venkata Sai, P.Ravindra Kumar, S.Girish Kumar Varma, Md.Zulfath Ameena, Santosh

Despite the wide improvement in wireless sensor networks, energy consumption is still considered as the most important challenge in this kind of networks. There must be a perfect solution for this kind of challenge that is a routing algorithm based on clustering else the networks will be in difficult situation. In this regard, an optimized routing algorithm based on consciously distribution of cluster heads and their load balancing among them has been suggested.

As the name of algorithm says, the network is divided into cells by the algorithm and cluster heads are formed. These points are sent as initial points for k-means algo.

Algorithm of Proposed method:

Start Base Station will broadcast a message requesting information of id, energy levels, position of each node. Nodes all over the network will send the requested information like energy levels, id etc. to base station. Based on the information received by base station, cellular network division will takes place. Base station will broadcast the information about cluster heads all over the network. After receiving the information about cluster heads by the nodes, perform clustering. Receiving the data from the nodes of a cluster, aggregation of data performed by the cluster head. Cluster head will send the aggregated data to the next level cluster head. At each cluster head aggregation of data will takes place and then send that data from one level cluster head to another level. Finally, large aggregated data will reach the destination.

If the cluster head dissipated certain amount of energy after sending the data, it may send a control message to the base station about the energy consumption else it may proceed with the process of sensing the data. If the base station received the message about the consumption of energy from more than half of the cluster heads, re-clustering process of the network will take place. If all nodes of the network dies, then network will fail.

S.No.	Parameters	Existing Readings	Acquired readings
1.	Network lifetime(rounds)	644	952 [41.82%]
2.	Throughput (kb/s)	804	1135[41.16%]
3.	Residual energy(joules)	0	8[47%]

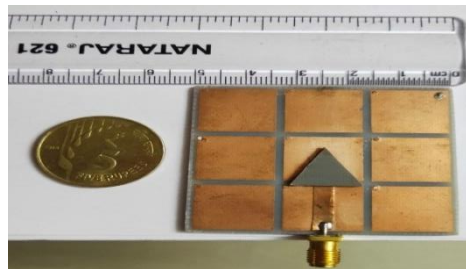
If the residual energy is high, then the energy consumed by the nodes is reduced then the network life time is increases in case of our proposed algorithms compared to previous ones. We conclude that, with the use of our modified cluster based routing algorithm will definitely enhance the quality of service in wireless sensor networks.

Design and Implementation of Miniaturization of Triangular Shape Dielectric Resonator Antenna Using AMC Surface for 5G Applications

V Sai Naga Pranav, R Umasri, T Siva Nageswara Rao, K Nikhita

A Dielectric Resonator Antenna (DRA) is designed. Using this Dielectric Resonator Antenna, the operating frequency is achieved at 4.8GHz for 5G applications like IOT, AI. Here, artificial magnetic conductor (AMC) surface is used to miniaturize a triangular shaped Dielectric Resonator Antenna (DRA). AMC is installed on FR4 substrate. On the AMC surface, a Dielectric Resonator (DR) of dielectric constant 2.2 is placed. The surface of the Artificial Magnetic Conductor is shorted with ground metal using tiny metallic vias. Antenna characteristics such as antenna gain, resonant frequency, and efficiency will not be affected due to the usage of Dielectric Resonator. As a result, the overall volume of DRA is significantly diminishing.

Introduction: Many people strived to bring down the size of the receiving wire in remote interchanges frameworks. The Dielectric Resonator Antenna overcomes this challenge by having a compact size, increased flexibility, increased radiation efficiency, and producing a variety of radiation characteristics. The AMC surface was employed to miniaturize the DRA at 4.8 GHz for 5G wireless applications While retaining overall performance, parameters such as Gain, Efficiency, Bandwidth and Resonant frequency the DR size and ground size were lowered by 85 percent and 16 percent, respectively.



Miniaturization of Dielectric Resonator Antenna with the help of AMC unit cells, DRA is miniaturized by using AMC without disturbing other important parameters. Previously this technique was only applied only to microstrip patch antennas. Miniaturization is performed on DRA at 3-5GHZ. The size of antenna was reduced by 85% without changing any of its basic characteristics. The DRA is positioned on the 3*3 arrangement of the AMC unit cells. The simulation of design is done and fabrication will be done.

Retinal Image Classification for Identifying Diabetic Retinopathy using Convolutional Neural Network and Linear Binary pattern

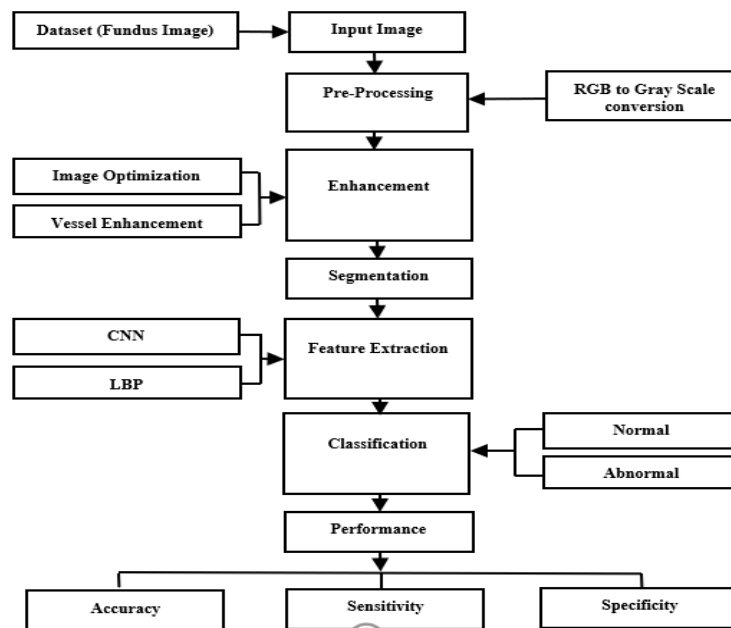
N. Vamsi Krishna, K. Mohana Kotilingam, Md. Junaid Iqbal , K.Vamsi Sai Sudharshana Reddy

Diabetic people are at risk of diabetic retinopathy, which causes serious eye damage and can sometimes lead to blindness. At the present time, the most effective treatment is early diagnosis. This requires a methodology for identifying and assessing the severity of retinopathy. In this paper, a new method based on Linear Binary Pattern (LBP) and convolutional neural network (CNN) along with segmentation of retinal blood vessels is presented. The proposed method may effectively address challenges associated to blood vessel segmentation, as proved by results obtained from two databases. It also reduces the false vessel pixels in the final segmented blood vessels while reducing segmentation time thus by increasing the accuracy for early diagnosis.

Introduction:

The existing solutions for the aforementioned problem require a lot of input data. In order to overcome the computational time related drawbacks deep learning approach is not used, but at the same time to make use of the advantages with computer-based approaches CNN is used. In this project the proposed method is based on CNN along with LBP. By the means of CNN Texture kind of features are extracted and LBP gives the feature vector which combined gives accurate results in less time. Segmentation of the input image is done before extracting the features so that complexity of the system reduces to a certain extent

Methodology:



In this, a new method based on linear binary pattern and Convolutional neural network is proposed. The proposed method is user friendly and easy to learn. It is verified that the accuracy, sensitivity and specificity of the proposed system is compared with the existing systems and found to be working better than the existing systems. Hence the proposed method can be used for early diagnosis, thus by reducing the risk factor of losing the eyesight.

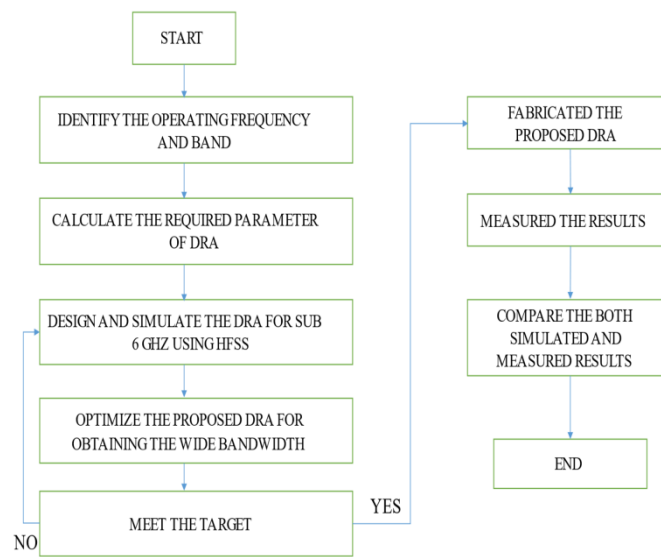
Design of Circularly Polarized Semi-Cylindrical Dielectric Resonator Antenna at Sub 6 GHz Frequency for 5G Applications

K.Krishna Sai, P.Sahithi, C.Sairamakrishna, G.Harika

A Semi-Cylindrical Dielectric Resonator Antenna (SCDRA) is designed to observe the radiation pattern and field distribution using boundary conditions. When the Semi-Cylindrical Dielectric Resonator antenna is fed with a coaxial probe, it makes a dielectric resonator antenna to increase the gain and directional radiation properties with circular polarization. It is observed that the antenna covers a bandwidth of sub-6 GHz frequency and radiates with an efficiency greater than 75% in the entire frequency band. The proposed semi-cylindrical dielectric resonator antenna can be used in 5th generation applications like emergency communications, fixed satellite communications, and smart devices.

Introduction: When a coaxial probe is fed to a semi-cylindrical dielectric resonator antenna that is circularly polarized, we noticed a consistent monopole-like emission pattern across the entire band and throughout the entire operational frequency spectrum, over 90% radiation efficiency is observed. The proposed antenna has low bandwidth efficiency, and the cost of dielectric material is relatively low when compared with other materials.

Methodology:



When a coaxial probe is fed to a semi-cylindrical dielectric resonator antenna that is circularly polarized, we noticed a consistent monopole-like emission pattern across the entire band and throughout the entire operational frequency spectrum, over 90% radiation efficiency is observed. The proposed antenna has low bandwidth efficiency, and the cost of dielectric material is relatively high when compared with other materials. The antenna design that has been proposed is suited for 5G applications. In the sub-6GHz frequency range, the designed antenna has a wide range of applications in wireless communication.

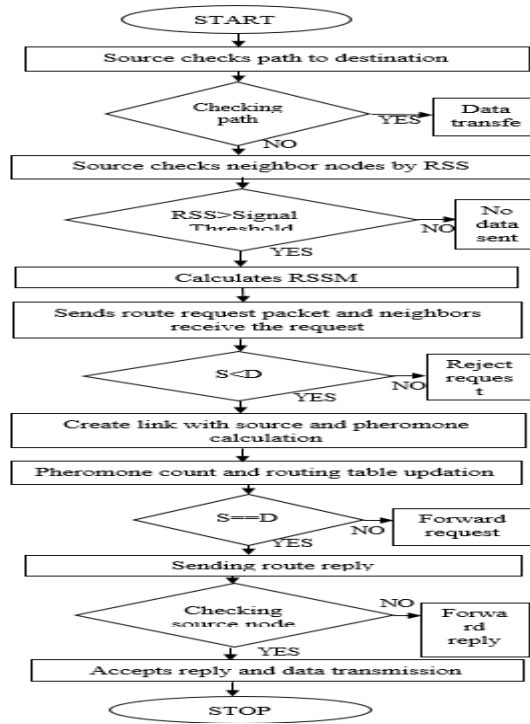
Route Optimization of Vehicular Ad-hoc Networks (VANETs)

M Y N Praharshitha, A Chandrika, K Sowmya Sree, J V S Rama Devi

The affirmation of reducing road accidents, fuel-saving, and post-crash notifications are given by VANETs. Multiple routing protocols are used to establish path between two separate nodes. For data packet transfer Ad-hoc On-demand Distance Vector(AODV) routing protocol and the Ant Colony Optimization Technique are used. This protocol can repair itself when there is any damage in links. Paths are established between the sender and the receiver node by a multicasting approach and mainly focused on reducing the problem of congestion that occurs when a node carries more data than its actual capacity. The proposed solution generates an optimal path and improved throughput, packet delivery ratio, reduction in energy consumption, and packet loss than the existing method.

Introduction: The network is Vehicular Ad-hoc Network when the mobile nodes are vehicles. VANET is a very highly mobile network that results in changing topology dynamically. VANETs are an important part of the intelligent transportation system VANETs are used in many applications such as downloading maps, road safety, traffic signal notification, Collision avoidance, and military services. Routing is the process of enabling a path for data flow from one node to another inside or across networks, with routing protocols defining the rules. Routing protocols describe how communication between routers occurs by using routing tables at each node.

Methodology: The suggested method employs the On-demand Routing Protocol (AODV).Until the route is created, communication will not begin. The source sends a route request message or packet to surrounding nodes when it needs to deliver data. If the packet is not detected at the target node, it will be forwarded to additional nodes until it is found. Once the destination has arrived, the path with the fewest hops will be taken into account. Along the path where the data has arrived, the destination node will transmit the route reply message packet or message. The starting node will receive a route error message if there is any damage to the network An Enhanced ANT ZRP has been proposed. The pheromone value is taken into account by measurements such as the Received Signal Strength Metric (RSSM), Congestion Metric.



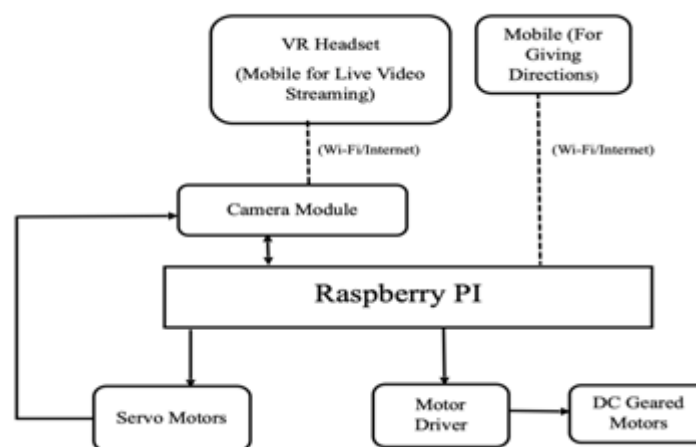
Implementation of Telepresence Device using RPI

S Sai Hemanth, Shaik Afrid, P Sai Sri, A Jasmitha Sri

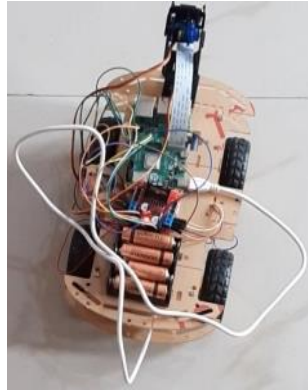
Teleoperation allows human operators to perform unreachable or hazardous tasks at a remote distance. As a person cannot go every location in the hazardous situations. In circumstances like fire accidents or to provide site monitoring for military operations and to face the critical challenges in such scenarios, this device helps them to face the challenges at such times. A telepresence device is significantly different from traditional videoconferencing. This innovation uses video in real-time and permits individuals to be practically present in a distant or remote location, which gives feedback depending on the operator's head movement. To make this possible, the Raspberry Pi is configured as a server. A smart phone can be used to operate this device that is located in a faraway place. The data is shared between the smart phone and the device by utilizing virtual network computing. The accelerometer determines the camera's rotation, with the help of user head movement.

Introduction: Video conferencing device that changes the way you perceive helps people to be in more than one place at a once. Raspberry pi allows easy video transmission over Wi-Fi. The Raspberry pi is considered as the CPU of the telepresence device. This device has a wide range of usage in medical, schooling and low-level virtual reality applications. The IMU app supports an accelerometer, gyroscope, and magnetometer that is made to run in the background. The values from this app are sent to the raspberry this makes servos move up and down.

Methodology: Initially, the smart phone is placed in a headset. The phone's screen is set to dual screen mode. The Inertial Measurement Unit (IMU) app and the Wi-Fi Command Center app are installed on the mobile device. According to the user head movement the IMU app helps in the measurement of accelerometer, magnetometer, and gyroscope values. These values are sent to the Raspberry Pi via Wi-Fi. These values are taken, and output angle is generated based on the programs that have been written. The output is routed to the servo motor and the L298N motor driver IC, after which it is routed to the DC geared motors. A servo motor aids in the rotation of the camera around its axis. The L298N motor driver IC controls the direction and speed of DC motors. DC motors are used for the device movement and servo motors are used for precision in angle rotation.



After designing the hardware part, we were successfully able to control the device by integrating it python programs. VNC helped us in accessing the raspberry pi. We are able to control the device from both app and desktop. Real-time head feedback is achieved through the pan tilt stand. IMU app's accelerometer, magnetometer are used for y axis and x axis values respectively. The operator's desktop also receives the live footage. Since the raspberry pi we used is of 4 GB RAM, the processing speed of it is quite higher than the existing models and able to manage both the operations for movement and real time feedback. This made us to get low latency during live transmission without any disturbances.



Even though there are various devices and robots coming in the present scenario, teleoperation is often overlooked. Thus, we are facing a lot of issues in Real-time feedback and immersive technology. But this device helps us to the raise up from that drawback. This robot is simple in design and inexpensive. This enables us to be telepresence from afar. It may be used to a wide range of real-world settings. It may be used in a number of industries, including business for virtual meetings, education in schools or colleges, senior care, and defense applications like monitoring, to name a few. This will mark a small step in advancement in the metaverse development.

Respiratory Electromyogram Denoising Using Hybrid Signal Processing Technique

I.G.L Chandini, K.Ganeshashish, K.Kartheekvarma, P.Sree Latha

Electromyography (EMG) signal recording equipment is comparatively modern. Still, there are enough restrictions in detection, recording, and characterization of EMG signals because of nonlinearity in the equipment, which leads to noise components. These noises directly degrade the efficiency of EMG processing and affect the accuracy and robustness of systems. Signal processing techniques are effective for denoising EMG signals. Some of the signal processing techniques are High pass filtering, Empirical Mode Decomposition, Wavelet denoising. In this work, to effectively remove the ECG artifacts, a hybrid signal processing technique was implemented which is a combination of high pass filtering and SWT techniques.

Introduction: Monitoring respiratory activity is a very effective and important tool to control the patient's vital signs in most of medical environments such as operating rooms and intensive care units(ICU's). Unfortunately, the interpretation of EMG measurements of the respiratory muscles is hindered by interference due to cardiac muscle activity. By removal of cardiac artifacts from EMG we can get proper respiratory activity results.

EMG is mostly affected by:

- Power Line Interference
- Baseline Wander noise
- Electrocardiogram noise
- White Gaussian noise

Methodology:

We have chosen two of the signal processing techniques namely High pass filtering and wavelet denoising. High pass filtering is still the golden standard in removing ECG artifacts. In the subsequent analysis, we have considered a fourth order Butterworth high pass filter with a cut off frequency of 175 Hz which is found to perform reasonably well. And then the output of high pass filtering is given as input to Wavelet denoising. Wavelet denoising is a method in which signal is decomposed into several wavelet bands, and a simple threshold is applied in the wavelet domain to detect and remove ECG interference. In this method we used undecimated, shift-invariant form of the wavelet transform which is also called as stationary wavelet transform (SWT). We make an effort of using hard thresholding technique and a moving median filter to compensate for possible changes in the basic EMG noise level within one recording. To further stabilize the noise estimation, the R peaks can be disregarded in the median filter. The described wavelet based approach yields a denoised version of the ECG component, which is then subtracted from the raw signal to recover the ECG component. From the results, we observed that SNR value as 29db and PM value as 62db using hybrid signal processing technique (HP+SWT) which is considered to be a better choice to remove ECG artifacts from EMG signal. And these results may vary for different datasets.

Reconfigurable Band Switching Antenna for Millimeter Wave Applications

Ch.Bhuvaneswari, D.Lakshmi paravathi, Md.Zeenath, D.Sirisha

The proposed antenna consists of mainly three switches whereas switch 1 is a lumped switch which controls the operating bands of the antenna and switch 2,3 controls the beam switching of the antenna. When the Switch 1 is ON, the proposed antenna covering the 5.28–9.0 GHz wide band. When Switch 1 is OFF, the antenna operates only at 4.8 GHz covering the 4.32–5.28 GHz band. The switch 2 and 3 are always in constant state. The prototype is small in size (21mm*25mm*1.6mm) and light in weight, with switchable millimeter wave applications and frequencies that cover 5G cellular telephony in 24- to 30-GHz bands, as well as UWB operations.

Introduction:

Frequency reconfigurable antennas, which are capable of emitting several patterns at different frequencies and multi band services, have attracted a lot of attention since the introduction of a new class of communication systems. Several antennas with frequency characteristics that can be changed have been designed. Stackable reconfigurable patches are created for several frequencies in a mono structure, with switches controlling the required operation. Reconfigurable frequency slots for UWB and 4G applications have been proposed. This antenna, on the other hand, may be utilized as an RF front end for the 2.3 GHz band. At first, we have analyzed the s_{11} (reflection coefficient) parameter for the designed antenna which is shown in fig.4 .When the Switch 1 is ON, the proposed antenna covering the 5.28–9.0 GHz wide band. When Switch 1 is OFF, the antenna operates only at 4.8 GHz covering the 4.32–5.28 GHz band.

Methodology:

The proposed antenna's patch and ground are printed on the 1.6mm thicker substrate of FR-4 which is having the dielectric constant of 4.4. the geometry of this antenna 21*25*1.6(mm³).a Different shapes of stubs like I-shaped stub ,H-shaped stub, L-shaped stub can be connected with the ground plane to observe the different types of reflection coefficient response for all switching states. In this paper we connected the L- shaped stub in the ground plane .the performance of the antenna is good in terms of reflection coefficient.

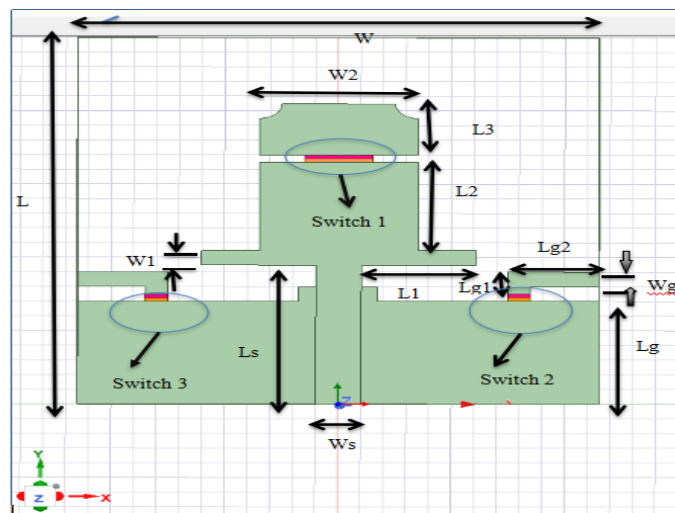


Fig: Proposed antenna configuration.

This design was frequency reconfigurable millimeter wave antenna, which has low profile and small size and it covers bandwidth of 15 GHz to 30 GHz. A switch is used to obtain tri frequency operation which makes antenna to have frequency reconfigurability. The antenna can be used for 5G applications and omnidirectional pattern is obtained which makes the antenna suitable to use in any particular direction for communication. The designed antenna is switch -dependent and dissimilar performance for ON and OFF states of SWITCH 1. The proposed antenna can be functioned at two unique frequencies, depending on the state of switch 1.

Plant Leaf Disease Detection Using LDDNet

L. Uma Maheswari, Neelesh Janga, N. N. V. D. Nikitha, Harshith Posani

Over the decades, production in the agricultural sector has decreased due to various factors such as leaf diseases, an overdose of chemical medication, natural disasters, and climatic changes. Majorly, the impact of plant diseases set a huge loss to the farmers compared to other kinds. Consulting an expert is a time taking and expensive process. Many machine learning & advanced deep learning algorithms are being implemented to identify diseases, more accurately, using the infected plant leaf image. The objective of this paper is to introduce a lightweight leaf diseases detection Neural Network (LDDNet) that should be able to distinguish between diseased and healthy plants. The dataset contains 33 classes of different diseased and healthy plant leaves images, where each class has 1,680 training and 420 validating images. The accuracy obtained by the proposed LDDNet model is 99.30%. Since the performance of the model is high, it can be implemented in daily life to monitor plant diseases to have a healthy crop yielding.

Introduction:

The most effective way to detect the disease is using computer-based knowledge, such as image processing techniques and computer vision, in which the image of plant leaves is involved in the detection. The improvement of technology and detection techniques in image processing revolutionized in improving accurate detection. Initially, many machine learning algorithms came into use but later on, as technology advanced; many advanced machine learning concepts arrived and replaced traditional machine learning algorithms. This paper introduces a deep learning model called LDDNet, which was referenced from the Residual Network (ResNet) architecture, and presents an overview of its performance in classifying unseen data.

Methodology:

LDDNet architecture, Figure 1, has 11 layers of which 10 are convolution layers and a fully connected layer block. LDDNet, which was referenced from ResNet architecture, avoids the vanishing gradient problem by enabling gradients to flow through the skip connection. In addition to it, LDDNet uses ReLU as activation function instead of the sigmoid. The sigmoid activation function enhances values nearer to zero and suppresses values farther from zero. Unlike sigmoid, ReLU enhances positive values and suppresses non-positive values. To prevent deep neural network architectures from over fitting, gradients must flow through the network, and in such cases using sigmoid degrades model performance. The output of the sigmoid function, when used as an activation function, is always less than 1, figure 2(a). In neural networks, gradient gets multiplied many times to get the gradients of lower layers while back propagation, hence making it even less. Thus resulting in minimal or no change in the layer weights. Such issues can be avoided using ReLU activation functions since the derivative of ReLU is 1 for all positive values, figure 2(b). LDDNet has both ReLU activation function and skip-connections hence making it flexible and reliable to use in real-life applications. Accurate classification of plant leaf disease is very essential to look for plants and soil health. The proposed novel architecture, LDDNet, can identify 24 different plant leaf diseases and 9 healthy plants with an accuracy of 99.30%. LDDNet is extended further by developing a web application so users can access it easily at any time. As the model is efficient enough to detect unseen data successfully, farmers can implement this model in daily life for monitoring crop health, thereby reducing unnecessary costs for detecting plant diseases.

Brain Tumour Classification Using Machine Learning Techniques

N Chandini, K Anupama, G Sathya Sai, V Lakshmi Teja

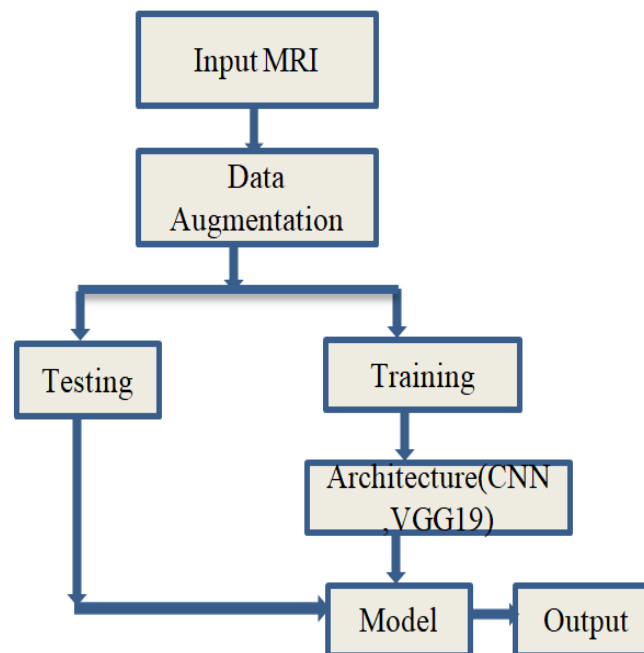
Brain tumor is a collection of abnormal cells in our brain. This project is also conveyed us by knowing, artificial intelligence is helpful in solving real life problems. To identify the brain tumor, scanned MRI images are given as the input. The Algorithms we are using here are machine learning algorithms like SVM with 80% accuracy, deep learning algorithms like CNN with 94% accuracy and transfer learning algorithms like VGG19 with 96% accuracy.

Keywords: MRI, SVM, CNN, VGG19, Artificial Intelligence

Introduction:

The abrupt and unusual extension of tissues in brain is called as tumour. Benign: Cells are not cancerous and won't spread. Malignant: Cells are cancerous and can spread to other tissues and organs.

Methodology:



This methodology gives us the way to find the Brain Tumor by using some classification algorithms and methods. Classification and detection of Brain Tumor through some automatic technique is beneficial as it requires a large amount of work of monitoring by doctors, and at very early stage itself it detects symptoms of diseases means we can cure easily. Among all the three classification methods used for classifying brain tumor, transfer learning algorithm namely vgg19 has shown the most appropriate results.

Implementation of QoS Aware Trust Based Routing Algorithm for WSN's

V.G.V.Nihani, G.A.J.Daniel, D.V.A.K.Raju, Ch.Sai Abhinaya

In WSN, the main reasons for the effective design of protocol are to have minimal energy consumption and security. So to address these issues, we propose a new routing protocol called Secured QoS aware Energy Efficient Routing protocol, which will be designed based on trust and energy modeling. In this, the trust modeling uses an authentication technique with a key based security mechanism to provide trust scores, the trust scores will be calculated in this work for enhancing the security. In addition, a cluster based secure routing algorithm has been suggested in which cluster head has to be selected based on QoS metrics and trust scores.

Proposed Algorithm

Algorithm for Cluster head Selection

Input: S - set of nodes in a cluster

Output: Elected cluster head (u)

Step 0: Assign the trust score to 0 for all the nodes

Step 1: for each node in S calculate the Overall Trust value (OTV).

Step 2: for $i = 1$ to S; if $OTV(i) < \text{Threshold}$ then remove it from the cluster; Else

Step 4: Assign_ role (i , CH)

Step 5: for $j = 1$ to N_i ; if $OTV(j) < \text{Threshold}$ then remove it from the cluster

Step 7: if $i < j$

Step 8: if ($\text{HopCount}(i) > \text{HopCount}(j)$) and ($\text{Coordprob}(i) \leq \text{Coordprob}(j)$) and ($OTV(i) < OTV(j)$) then

Step 8.1: Assign (Role(i), Member)

end if and end for

Step 9: if $\text{role}_i = \text{CH}$ then

Step 10: Add(NID(i), Cluster_Head set(C))

end if and end for

Step 11: Node u with maximum Coordprob and maximum trust score in the set C will form the Cluster Head.

Step 12: Announce Cluster_Head_condition

Step 13: Other_nodes(C -Members)

Secured Routing Algorithm

Step 1: Source node s discovers the path to the sink d.

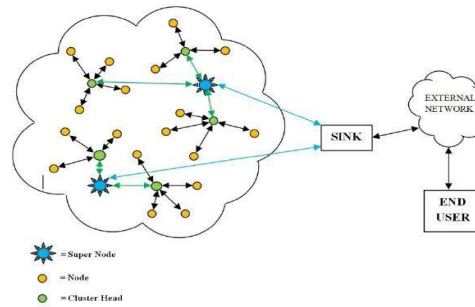
Step 2: For each path find the PTS from source to sink

Step 3: If $PTS_{sd} > \text{Threshold}$ Then

Step 4: Add this route to the qualified route set Q

end if and end for

Step 5: If more than one route in Q, then select the route with maximum energy and minimum hop count as a final route from source s to destination d.



This algorithm provides better performance in terms of increase in packet delivery ratio, network life time and provides reduction in delay. From this project, we can able to increase security and reduce energy consumption

Isolation Enhancement in MIMO Arrays for UWB Applications

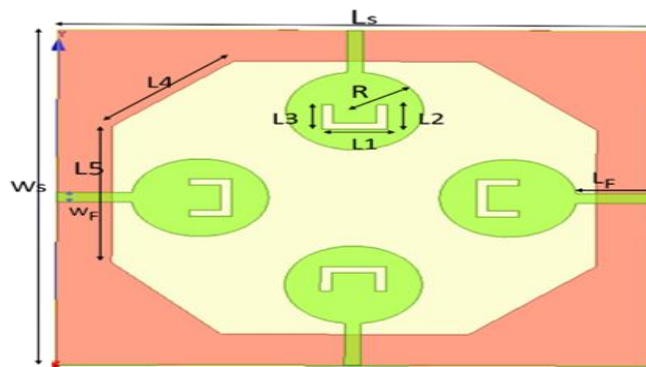
N.Akanksha, P.Sai Sumana, Y.Naga Kundana, K.Ahrron

In this design the four elements orthogonal in terms of polarization via placing U-shaped slots at the center of each radiator. In order to validate the technique, a two-element MIMO antenna placed orthogonally is designed, and simulated. The fraction of MC decreased is achieved via placing U-shaped stubs at the center of each of the circular patch elements which in turn helps to modify the antenna polarization. An effective technique is proposed which decreases the mutual coupling between four orthogonally placed strip line-fed microstrip elements operating for the UWB frequency range in MIMO configurations.

INTRODUCTION:

The MIMO (Multiple-Input Multiple-Output) antennas are considered as better candidate for 5G applications. The use of MIMO antenna is an effective way to improve link reliability and increase the spectral efficiency of radio communication. The MIMO techniques enable the transmission of data over multiple channels and thus increase the channel capacity without additional power requirements.

ANTENNA DESIGN:



A new patch antenna technique on U-Shaped slots is planned in this paper. A MIMO antenna with four elements is developed. Elements are isolated by 15.5mm from edge to edge. The use of U-shaped slots can considerably minimise MC to -40 dB, according to simulation data. The antenna design performance in terms of radiation patterns, ECC, DG was also studied.

Reduction of Muscle Artifacts in Scalp EEG Signals using a Hybrid Approach based on Variational Mode Decomposition

M. Vidyasri Neeharika, K. Sailaja, K. Harika, T. Laxmi Chaturya

Electroencephalography (EEG) is a medical test that uses electrodes on the scalp surface to capture brain activities. EEG is chosen in many domains, including Neuroscience, Psychology, and Clinical Research, due to its non-invasiveness, low cost, and portability. It plays a major role in the diagnosis of a variety of brain illnesses, including insomnia, epilepsy, Alzheimer's disease, depression, and dementia. Despite many advantages, while recording, artifacts always corrupt the EEG signals. Artifacts are false signals produced by sources besides the brain. Artifacts are categorized into physiological (ocular, muscular, and cardiac) and non-physiological (surroundings, electrodes). Artifacts, on the other side, have an impact on the actual EEG signal. Several approaches have been developed over the years to detect and eliminate this distortion, including regression, filtering, blind source separation, and wavelet methods. These methods require prior information or a reference channel. We proposed a hybrid approach VMD-CCA-SWT for the removal of muscle artifacts.

Introduction:

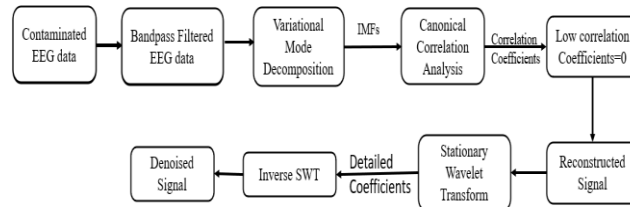
The electroencephalogram (EEG) is a recording of the electrical activity of the brain from the scalp. It helps to diagnose many brain disorders such as Parasomnia, Depression, Epileptic activity, etc. EEG signals from various lobes of the brain's cerebral cortex over a frequency range of between 0.01-100Hz. While, Intra-cranial EEG refers to recording EEG signals by placing electrodes directly on the brain's exposed surface, which is an invasive technique. Artifacts are the undesired noise signals that originate due to body movements, external disturbances, etc. Artifacts may degrade the EEG signals of interest, which can be classified as physiological and non-physiological. Physiological artifacts, such as ocular, muscular, or cardiac artifacts, are caused by physical activities. Non-physiological artifacts evolve due to external factors such as device faults, voltage fluctuations, etc. Muscle artifacts are caused due to muscle movements such as walking, chewing, swallowing, etc. Ocular artifacts are caused due to eye blinking with amplitude of 100-200 microvolts. Cardiac artifacts arise due to a high heart rate with amplitude of 1-5micro volts. Many studies had shown that among the three artifacts, ocular and cardiac are somewhat easy to remove compared to muscle artifacts because they overlap with all EEG bands due to their broad frequency range with an amplitude of 100 microvolts, because such errors decrease the effectiveness of disease diagnosis as well as several other areas, making the elimination of these artifacts the most difficult issue in EEG signal analysis.

Methodology:

VMD is a non-recursive, adaptive sparse signal decomposition technique with few parameters. Because the 1D-VMD was created to work in two dimensions, it's suitable for picture analysis. To order to achieve the analytic signal in 1D, negative frequencies are suppressed; however, in 2D, one half-plane in the frequency domain must be set to zero. In CCA the original signal was used as the first data set, while the time-scaled version was used as the second data set. It uses SOS to determine mutually uncorrelated and maximally auto-correlated sources and ranks them in order of least to greatest autocorrelation.

SWT decomposes a signal into high and low-frequency components called detail and approximation coefficients, bypassing it through high-pass and low-pass filters. The key advantage of SWT is that it overcomes DWT's translation invariance by removing down samplers as well as up samplers. As a result; the SWT coefficients have the same number of samples as the SWT signal in its original form.

Block diagram:



We proposed a hybrid approach based on VMD CCA SWT to suppress muscle artifacts in EEG. We utilize VMD to decompose each channel of EEG signal into multiple IMFs, then use the autocorrelation value as a criterion to select the IMFs suspected of muscle artifacts, and then combine these IMFs as a new data set, using CCA to decompose it into several uncorrelated components and the autocorrelation values decrease in turn so that some EEG components can be retrieved. By setting the component determined to be artifacts to zero, the signal is then applied to SWT to remove the low-frequency components. The signal is decomposed into 3 levelled detailed and approximation coefficients and then we have applied a universal hybrid threshold method it can either be applied to ac or dc coefficients based on the requirement, here we are applying to the Dc coefficients then inverse swt is applied to the signal finally to suppress artifacts we have subtracted the denoised swt signal from the denoised cca signal with that the artifact-free EEG signals are obtained. EEG can be reconstructed.

Implementation of OMP Algorithm on FPGA

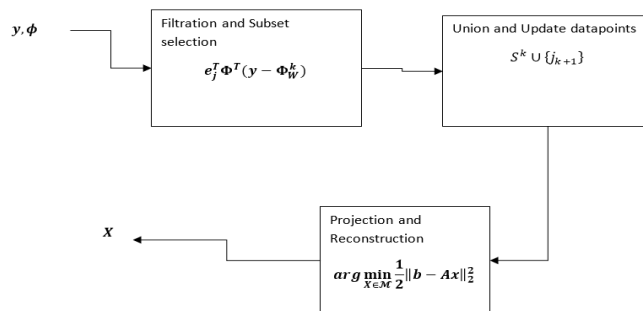
K Srihita Vasantha, K Jahnavi, U Harshitha, V Vasavi

To provide an effective solution for both image and biomedical signal reconstruction, Modified Orthogonal Matching Pursuit (M-OMP) was implemented. During the reconstruction process sparsity of the image is reluctantly minimized. Sparsity protected informative reconstruction algorithm needs is applied and the comparison performed between existing approaches with metrics like CR, PSNR, SSIM. So, the proposed approach comprises identification of nonlinearity and the dynamically adjusted CR was adopted. The proposed model is effective in CR by 10%, PSNR by 25.63% and SSIM by 1.37%.

Introduction: To address insufficient recovery is through iterative calculations from Nyquist rate, modified approach to find out the assist of the - sparse signal constantly leads to the phenomenal approach of Orthogonal Matching Pursuit algorithm. Development progressed on both images and bio-medical signals such as ECG their reconstructions and output parameters are specified .Such one pictorial comparison is depicted following Original, Reconstruction by OMP and MOMP respectively.



Methodology: Many advances had been obtained in MOMP from the OMP calculation. MOMP begins from the zero arrangement same as in OMP and instates the leftover with the estimation vector. Toward the finish of each cycle, MOMP gives the suitable bet as for the subset of chose word reference additives by means of making the build up symmetrical to the picked phrase reference components. The main advantage of MOMP over OMP is that it converges in a fewer number of iterations.



In mild of scanty portrayal order calculation, a MOMP is proposed to attend to the problem of low accuracy and questionable limitations of insatiable calculations in meagre arrangement. MOMP calculation affords the sparsity assessment step. Trial consequence display that the presentation of MOMP calculation is superior to that of other similarly developed OMP calculations.

IOT-Enabled Vertical Farming Monitoring System Using Big Data Analytics

K. Susmitha, A. Gowthami, J. Gopi Chand, K. Manohar

The land that is allotted for agriculture purpose is currently very less when compared to the land that is needed for population requirements. Vertical farming is one of the solutions that can be implemented to overcome this problem, where the plants are grown in vertical stacks and it can be done in any building or container. We are implementing CEA technology where the environmental factors such as temperature and humidity of the agricultural can be controlled and monitored by us. We're making use of IOT in order to connect our technology to our farming setup. The data will be uploaded into the cloud and analyzed by Big Data Analytics using various algorithms so that other people can make use of the data.

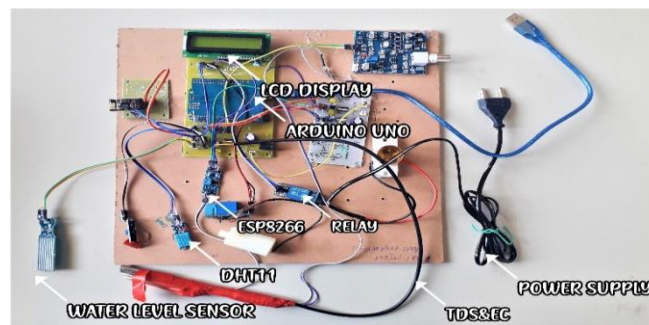
Keywords- Vertical Farming; IoT; CEA; Big Data Analytics.

Introduction:

The system is implementing IOT technology for this agriculture method to increase the convenience of these modern methods. The idea is all about technological arrangement in the vertical farming for monitoring purpose using Internet of Things (IOT) and making use of Big Data Analytic algorithms for making necessary error corrections in the values of pH and E.C of the hydroponic solution.

Methodology:

There are 6 sensors in the sensor interface segment: pH sensor, water level sensor, temperature sensor and humidity sensor, TDS & EC meter and LDR sensor. These sensors are connected to Arduino uno along with Node MCU i.e., Wi-fi module. The Node MCU is communicated with Things Speak platform for uploading the sensors data that connected to the Wi-Fi network. The values in the cloud after many observations with various factors are stored in the cloud and can be easily given as input to the Big Data Analytic algorithm, Linear Regression in this case to be precise and the optimum values can be determined.



After installation of all the devices in the hydroponic system the values from all the sensors is shown in Thing Speak platform in the form of graphs. The goal of this research was to create an Internet of Things (IoT) based Hydroponic system that uses a web server to monitor and adjust air temperature, humidity, nutrient solution pH, and LED light intensity. IoT is a rapidly growing technology, and hydroponics is a smart technique to produce higher-quality crops. When these two factors are coupled, they provide a solution to the problem of food scarcity.

Deep Learning Model for Automated Sleep Stages Classification Using PSG Signals

Tellakula Ramya Sri, Madalajahnavi, Duddukuru Sai Lokesh, Reddipalli Rupa Sri, P. Irmiya

Sleep disorder is a symptom of many neurological diseases that affect the quality of daily life. The automated monitoring of sleep stages can help in detection of neurological disorders accurately as well and this can be done by taking a few PSG signals. A flexible deep learning model is proposed for sleep stage scoring which uses raw PSG signals. 1D-CNN is applied on EEG for sleep stage classification. The sleep PSG signal Sleep-EDF database is publicly available in PhsyisoNet website. The performance of the system is compared with the already available expert's classification results, which are available in the same website.

Introduction:

Work stress, over thinking, hypertension and may be some problems related to health lead to sleep disorders. Sleep disorder is a symptom of having any neurological disease. In polysomnography we have recorded multiple signals from various subjects, these recorded signals will help us to identifying either the subject is suffering from sleep disorder or not. Further to avoid errors by manual scoring, we have obtained an automatic sleep stage classification approach for properly measuring the sleep quality during respective recordings of subject's sleep. This proposed model is flexible and reliable and developed using two popular sleep datasets that are available in Sleep-EDF dataset.

Methodology:

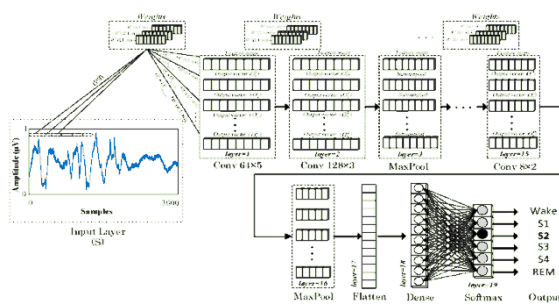


Fig. CNN Architecture

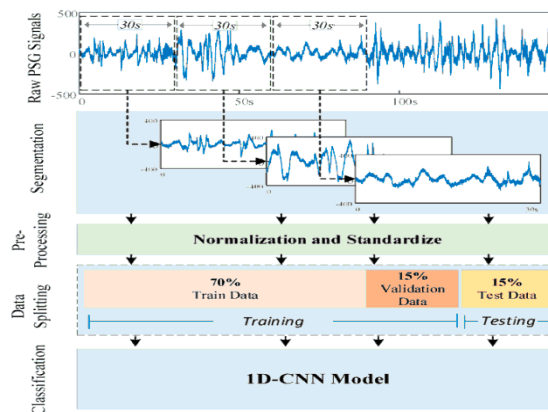


Fig. Block diagram of model

The proposed model was capable of learning feature's of model for scoring sleep stages from various raw single channel EEG. The proposed model obtained performance metrics with accuracy 0.825. In the future, Convolutional architectures using residual connection with multi-channel datasets to improve accuracy are proposed to develop.

Resistance variation of ZnO thin films deposited by sol-gel method

N. Venkatesh, M. Saikrishna, B. Uditha, D. Yashwanth

ZnO thin film is deposited by sol-gel spin coating method. For the deposition of thin film, a homemade spin-coating device is developed. The deposited thin film was annealed in the air atmosphere at 550°C. The film was observed by simple microscope to confirm the deposition and to observe the ZnO film deposited on the glass substrate. The electrical properties of this film are obtained by simple multimeter after measuring number of film and using mathematical connection to identify a correct value of resistance. A discrete MOSFET was fabricated by depositing drain and source using thermal evaporation method and placing external strip at other side of the glass and treating it as a gate.

Introduction

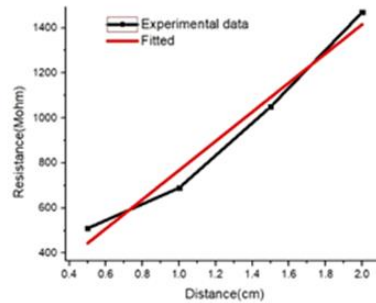
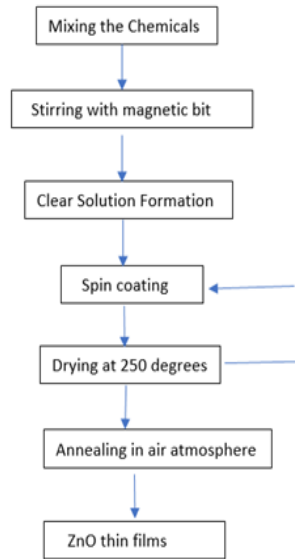
The environment-friendly low-cost ZnO material with direct wide band gap energy of 3.37 eV and large exciton binding energy of 60 meV at room temperature has drawn considerable attention in recent years for developing thin film-based nanoscale devices for electronic, gas sensing, bio-sensing, piezoelectric, and optoelectronic applications.

Specifications

To know the variation of electrical resistance for same deposition technique, the human error was calculated by measuring the Resistance of different samples using the probes of Multimeter by varying the distances or widths between the two probes. We measured the resistance values by varying the distances between the probes as 0.5cm, 1cm, 1.5cm and 2cms. The complete set-up is shown in Figure. The current-voltage characteristics of the transistor were measured by probe station coupled with 2700 B Keithley I-V parameter analyze.

Technical Approach:

zinc acetate was first dissolved in isopropanol and the mixture was then stirred for half an hour by magnetic stirrer at the room temperature. Once the mixture becomes milky, monoethanolamine was added drop-wise to it (by using a 1.0 mL dropper) till a homogeneous solution is achieved. The rotational speed of the spin coater was fixed at 1,000 r/min for first 15 s and at 2,000 r/min for the next 15 s. The deposited samples were then heated for 10 min at 250 degrees C to remove the organic materials from the sample. Finally on deposited substrate using hard mask drain and source was created. Al metal was deposited for source and drain. Separation between the drain and source was 1.5 cm. And gate was obtained by depositing aluminum on another glass sheet using the thermal evaporation method.



We have deposited ZnO thin film by sol-gel spin coating method. The deposited film was annealed in air atmosphere in a horizontal furnace. The resistance of the film measured by the simple multimeter keeping different distances between the two probes of the multimeter. For error, curve was linear fitted and error was obtained and by extrapolating fitted line on the length axis. We have created transistor action in the film by depositing the Aluminum source and drain and depositing aluminum on another glass that was used as the gate. Transistor action was obtained in the films

Vision-Based Obstacle Detection and Collision Prevention in Self-Driving Cars

S.Sathvik, P.Ananya, P.Tharuni, N.Naga Krishna Vamsi

With increasing computational power and a vast amount of data to work with, deep learning has risen to prominence since the 2010s. Numerous applications are being researched and developed using deep learning. One of the applications is computer vision in self-driving cars. Convolutional Neural Networks (CNNs) is being widely used because of their high performance compared to other alternative techniques in several perception and control tasks. The Convolutional Neural Networks (CNNs) allow the automobile to learn from different types of roads, scenarios allowing the car to forecast its route on any particular road with minimum inaccuracy. This paper proposes a working model of the autonomous car, which has a Raspberry Pi 4 Model B as the control unit and processing unit. This working model gets real-time images from the Raspberry Pi camera and these images are used by the CNN model, which predicts the direction the car must turn. The raspberry pi sends the control signals to the L298n motor driver. The trained CNN model achieved an accuracy of 93.07% with the test dataset and 88.3% with the training dataset.

Introduction: In the last 5 years, there were almost 2,363,031 traffic collisions with an average of 472,606 which are a major source of deaths, injuries, property damages. Automobile safety technologies such as Anti Breaking systems, Antilock Brakes, Traction Control, and airbags have hit a stalemate. The term self-driving car is getting its attention both in academia and industry. A self-driving automobile is a vehicle which perceives its environment and maneuver without the need for human involvement. This paper proposes a working model of self-driving car. This proposed self-driving car takes input from a single camera. In this working model, the Raspberry Pi 4 Model B gets real-time images of the car's environment from the Raspberry Pi Camera. Then Raspberry Pi processes the captured real-time images and sends control signals to the L298n driver module. The L298n drives the car with the help of DC motors.

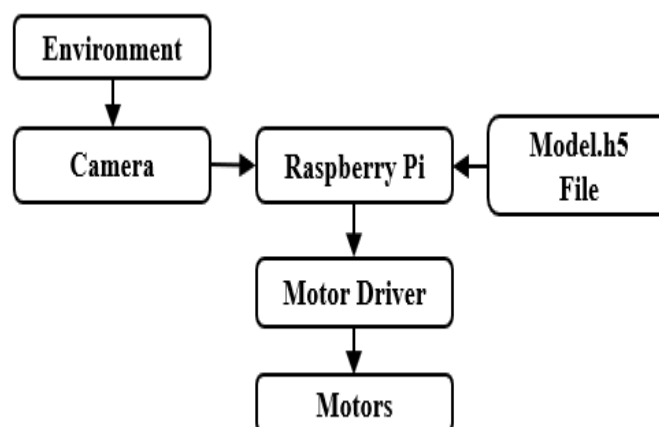


Fig.1: Proposed Model Block Diagram

Methodology: In this, a three-step process to obtain a working model of an autonomous car is proposed. The three steps in the sequence are the main collection of data, training of collected data, and deployment of the trained model. In the first step, a car in which Raspberry Pi is a control unit and processing unit is built. A track with obstacles is made. The car is controlled remotely by using VNC and direction is given from the keyboard. The car is made to run on track and data is collected. Here data means real-time images taken and the direction of the car which it turned at the time of capturing an image. The main aim of this second step is to obtain the model.h5 file and save it. This model.h5 file is used in the last step to predict direction for the real-time input image. At first, images are augmented and preprocessed. Augmentation is done in order to make the car, able to run in different situations. In pre-processing, images are blurred, resized. Then a Convolutional neural network model is created. All the above steps mentioned i.e., augmentation, pre-processing, training using the CNN model were executed using a single python program. After execution of the python program, model.h5 is obtained. Then, in the next step, the model.h5 model is loaded in raspberry pi and used in a python program that predicts the direction the car must turn. Raspberry Pi sends control signals to the L298n motor driver.

This robotic automobile may be a luxury now, but it will undoubtedly become a need in the future. This paper proposed a working model of an autonomous car that uses computer vision. Raspberry Pi 4 Model B was able to handle the computational complexity of Convolutional Neural Networks. Even though validation dataset accuracy was reasonable, it can be increased for the better performance of the self-driving car model.

Smart parking system using OpenCV library

Y.Neha, N.Samyuktha, B.Gayathri, A.Charith

This method mainly concentrates on smart parking system based on image processing which is developed for open parking plots and many more. It is proposed as an acquisition to new evolving technology by using python programming and OpenCV tools library. Using edge detection and coordinate constrained pixel portions, it is possible to detect unoccupied parking spaces using photos of the parking lot.

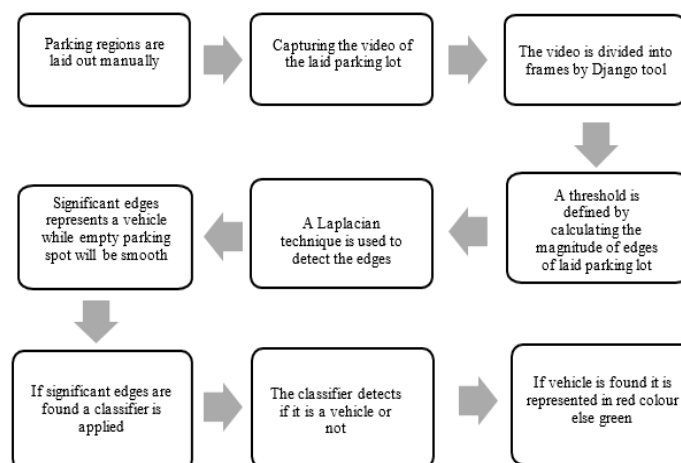
INTRODUCTION:

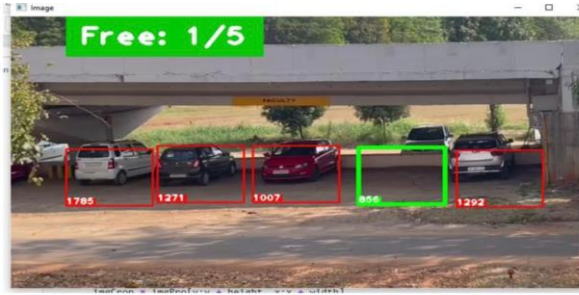
Modern smart parking systems can be broadly divided into two based on the technology used for identifying the empty parking spaces in a parking lot; Sensor based methods and Image processing based methods. Sensor based methods have many disadvantages such as high installation cost per area. The steps involved in image processing based method are:-

- (1) System initialization
- (2) Capturing the image
- (3) Processing the image
- (4) Segmentation
- (5) Image detection

Using edge detection and coordinate constrained pixel portions, it is possible to detect unoccupied parking spaces using photos of the parking lot. So in this way we can prevent traffic congestion and provide parking spaces where ever there is a possibility and in an efficient way

Methodology:





Deterministic Binary Block Diagonal matrix-based Compressive Sensing on Biomedical signals

Sk. Chandini, K.S.Sindhu, Ch.S.L. Nrusimhi, K. S. N. Deviduth

Compressive sensing is a signal processing technique that enables sampling of the signal with a sampling rate much less than the conventional Shannon Nyquist theorem. By using Orthogonal Matching Pursuit as a reconstruction technique and DCT as the sparsifying basis, a deterministic sensing matrix (DBBD) is proposed to execute the CS operation on EEG, ECG, and EOG data. A quality score (QS) is used to assess the overall performance of the signal acquisition and reconstruction process, and its value should be high

Introduction:

Compressive Sensing overcomes the limitations of conventional sampling theorem such as high processing time, computational complexity and vast storage requirements. Sampling rate in CS is determined by signal sparsity. Sensing matrices are used to get an exact or relative compressed transmitted signal at the receiver end. The proposed method involves generating a deterministic matrix to overcome the limitations of random sensing matrices and implementing it on biomedical signals such as EEG, ECG and EOG.

Methodology:

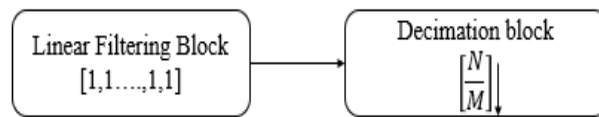


Fig. Deterministic Binary Block Diagonal matrix architecture

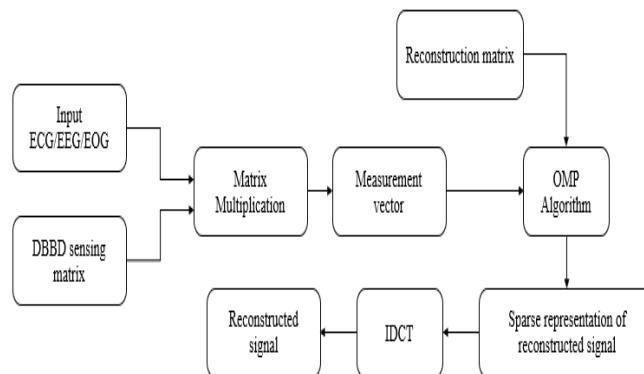


Fig. Block diagram of the proposed method

The proposed matrix was capable of best results at high compression ratios compared to existing random and deterministic matrices. The proposed work obtained the performance metrics with a Quality Score of 223.9 for ECG, 5.3 for EEG and 306.7 for EOG. Future work should focus on generating a deterministic matrix that works efficiently for every compression ratios.

Combination of PCA and SMOTE Resampling to Detect Parkinson's Disease Using Machine Learning Algorithms

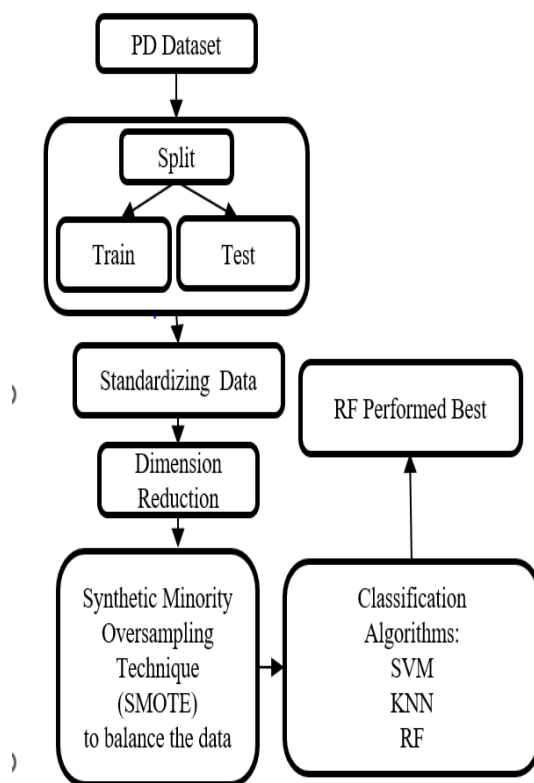
.Sucharitha, D.Venkatesh, K.Mahamthy, Md. Sk. Yasin

The objective is to propose a diagnosis model to detect Parkinson's disease using extracted speech features from the voice recordings of both PD and HC. We have used Principal Component Analysis for dimensionality reduction and SMOTE for balancing the data. Then the data is fed through Machine Learning algorithms such as SVM, KNN, Random Forest to classify PD and HC. Random Forest outperformed the other classifiers with 97% accuracy.

Introduction:

Parkinson's is a neurodegenerative disease effecting more than 1% of population over 50 years old. PD has 25% misdiagnosis. In recent times Machine Learning has created a significant influence in Parkinson's Community. Here we have used the voice features dataset to train the ML model as the PD patients show voice impairments in early stages.

Methodology:



We have developed a ML model to detect Parkinson's disease at the early stage with acoustic feature's using SMOTE and PCA. For this we have used three supervised learning algorithms namely SVM, KNN and RF. The performance evaluation shows that the Random Forest classification algorithm has outperformed with highest accuracy of 97%. The aim of this model is to determine the true positives from the voice recordings of healthy and PD people. The proposed model has improved the F1 score value from 0.96 to 0.989. This helps people for whom hospitals are not nearby and it is cost effective. Moreover, this work can be supportive to the future researchers by taking lots more clinical data at hospitals to get improved accuracy.



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