Report

Faculty Development Program on

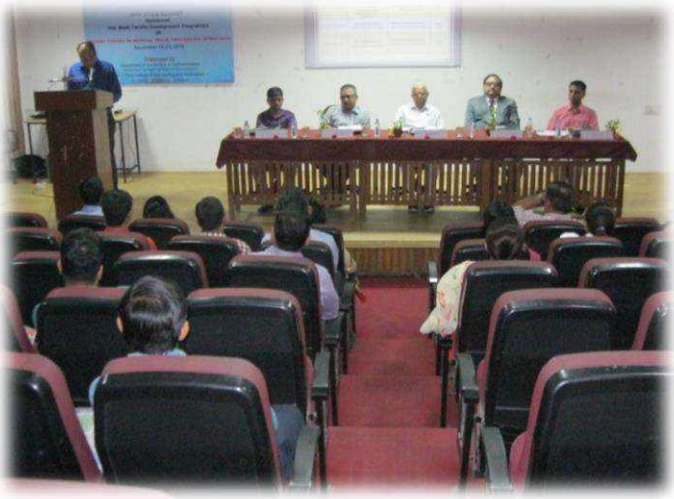
Recent Trends in Medical Image Processing (RTMIP-2019)

(ISTE-GTU &GUJCOST Sponsored)

Electronics and Communication Enginnering Department,

G. H. Patel College of Engineering & Technology, V.V.Nagar

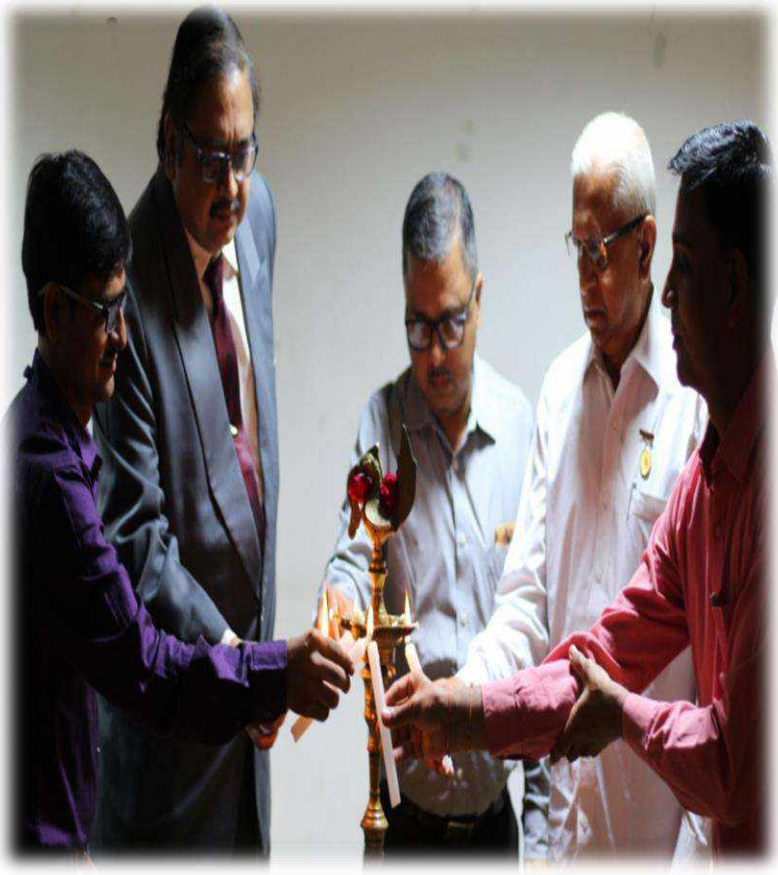
One week faculty development program on "**Recent Trends in Medical Image Processing (RTMIP-2019)" sponsored by ISTE-GTU &GUJCOST** was held at the Department of Electronics & Communication Engineering ofG. H. Patel College of Engineering & Technology, V.V.Nagar, under the patronage of Charutar Vidyamandal from 18th November to 23rdNovember, 2019.The FDP aims to provide opportunities to faculty members, research scholars and post graduate students to enrich their teaching skill and research in the field of Medical Image Processing. This program is organized to build the capability of faculties in the domain of medical imaging. The main objectives of this programme is to provide a forum to exchange views, ideas & the latest innovations and also giving exposure of learning on basics, emerging trends & challenges in the field of Medical Image Processing. It will also improve faculty's ability to be carried out research, testing & consultancy in the area of medical imaging.The FDP was attended by 36 participants from faculty members of ECE, EE, CSE, IT and Biomedical Engineering department.

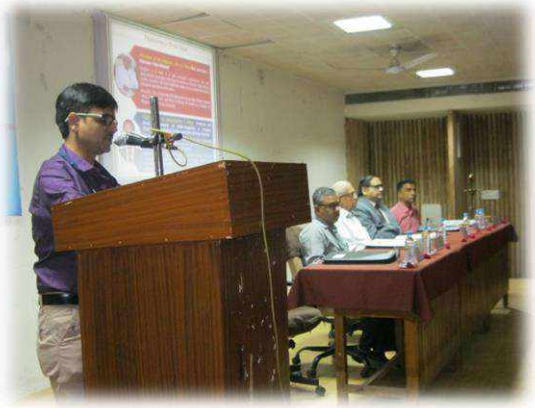


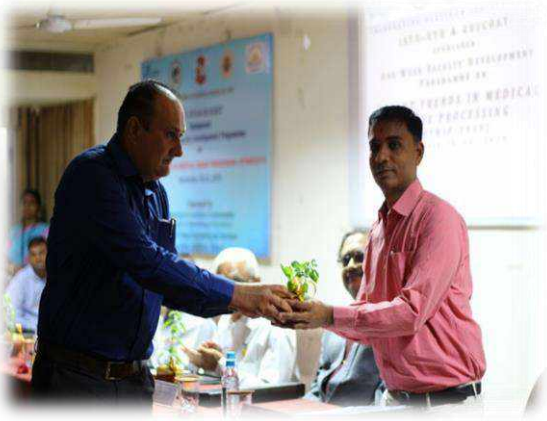
INAUGURAL SESSION:

The esteemed personalities present on the inauguration of the program:

- Dr. Deepak Mehta,Chief Guest,Professor & Head, Department of Radio-Diagnosis & Imaging, Pramukh Swami Medical College and Shree Krishna Hospital, Karamsad
- Dr. S. G. Patel, Secretary, Charutar Vidyamandal
- Prof.(Dr.) Kaushik Nath, Officiating Principal, GCET
- Prof.(Dr.) Hitesh Shah, Professor & Head of ECE Department, GCET
- Prof.(Dr.) Falgun Thakkar, Faculty Co-ordinator ECE Department, GCET

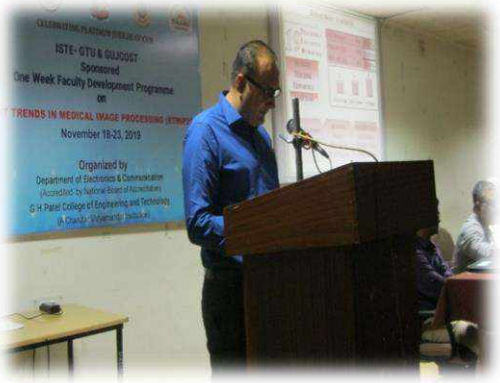


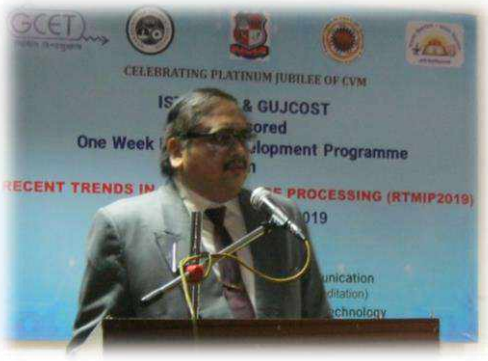




Prof. (Dr.) Hitesh Shah, HOD of ECE welcomed all the respected dignitaries and participants. Dr. S. G. Patel, Secretary of Charutar Vidyamandal appreciated the program organized by ECE dept in his speech. Prof.(Dr.) Falgun Thakkar, Faculty Co-ordinator has introduced all the guest and Dr. Deven Trivedi has highlighted brief about this ISTE-GTU & Gujcost sponsored FDP.Chief Guest Dr. DeepaK Mehta has appreciated this interdisciplinary,

medical& engineering field gathering in his speech.

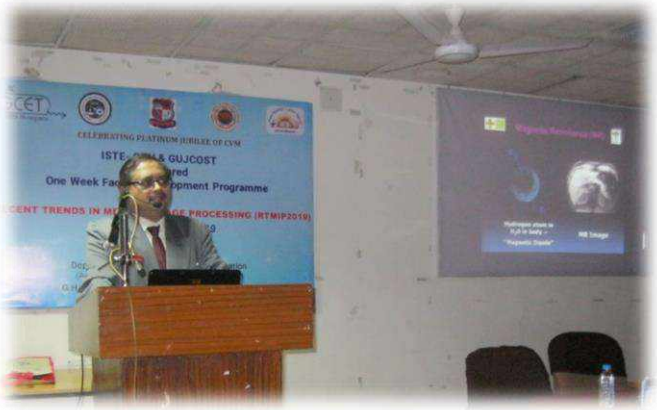




TECHNICAL SESSIONS:

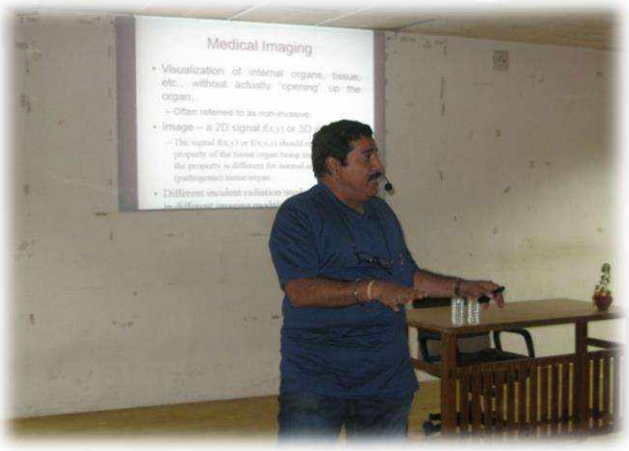
1st Day (18/11/19) Session I:

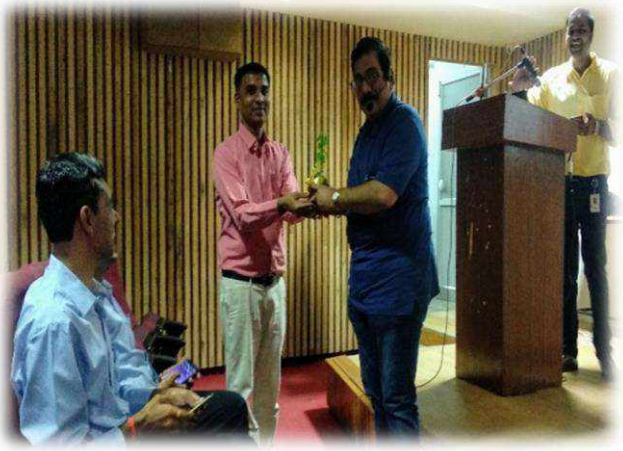
Dr. Deepak Mehta, Chief Guest, Professor & Head, Department of Radio-Diagnosis & Imaging, Pramukh Swami Medical College and Shree Krishna Hospital, Karamsad has delivered keynote address on "**Past, Present and Future of Medical Imaging**". In this session participants were learned the Recent advancement in Medical Imaging domain with examples and issues related with medical imaging.



1st Day (18/11/19) Session III & IV:

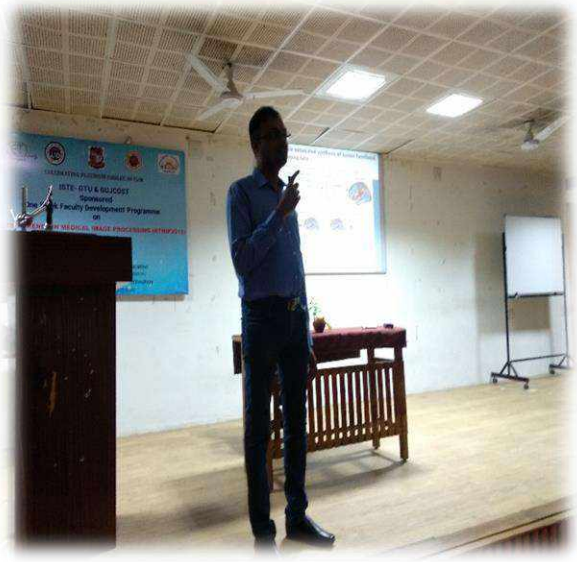
Prof. (**Dr.) Asim Benarjee,** Professor of DAIICT has delivered a interactive lecture on "Medical Imaging Modalities– From Physics to Implementation – I&II". In this session participants were learned the mathematics and physics behind medical imaging. In addition to that, sir has enlighten the participants with history and historical development of medical imaging. The Historical development follow by the technological concept of equipment which can capture x-ray, ultra sound, scintigraphy and mammography types of medical imaging. Finally the session was conclude with the technological advancement in medical imaging like augmented reality, preoperative imaging and intra operative execution.





2nd Day (19/11/19) Session I and II:

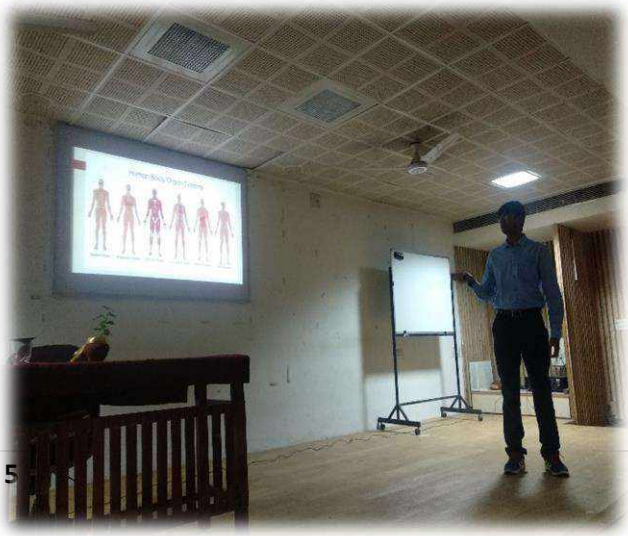
An informative lecture on "Early detection of Alzheimer's disease using Machine Learning" was discussed by **Dr. K P Miyapuram,** Professor, IIT, Gandhinagar, Gujarat. In this session, He has started his talk with the analysis of human brain and important relationship between visual system and neural processing of human being. A background for brain imaging is started with introduction to different parts of brain, neuron structure and respective electrical and chemical signaling. He has also enlighten Gray and white matter of brain, concept of fMRI and 3D imaging in the context to Alzheimer diseases. Moreover, the statistical parametric mapping was also the part of this valuable talk. During second session, before he start a topic on early detection of Alzheimer diseases, a voxel and its importance in medical imaging was also covered attractively. In the last phase of this session sir has provide awareness towards different stages for detection of Alzheimer diseases.



2nd Day (19/11/19) Session III & IV:

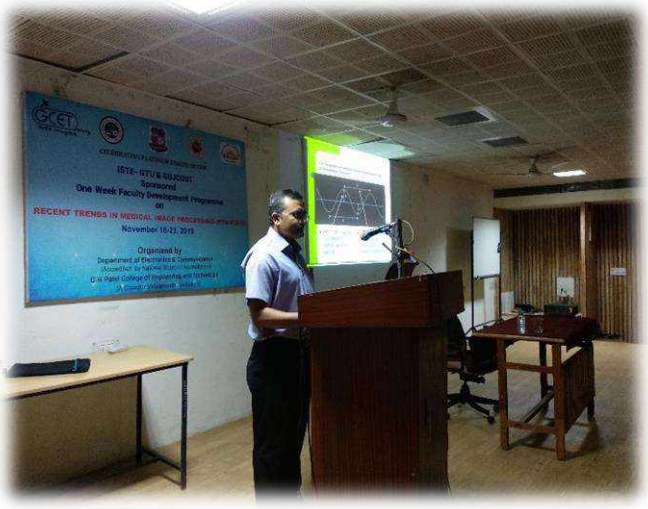
Prof. Chintan Varnagar, Assistant Professor, GEC Rajkot, has started a talk with different branches of medicine like Anatomy, physiology and two others. He has discussed organization of body and organ system along with certain quantitative and qualitative approach of MRI. Detail discussion on screening Vs Diagnosis was also interactive and interesting part for participants.

In session – IV, the advanced version of MRI was discussed first with diffusion weighted and diffusion tensor imaging. He has also discussed and shared an information about contribution of 'scikit' by Python based machine learning library in medical imaging. He has also addressed participants on the PET imaging technology



3rd Day (20/11/19) Session I:

A session on "Clinical Applications of Echocardiography" was delivered by Dr**. Sunil Karna,** consultant cardiologist at shree Krishna Hospital – Karamsad.



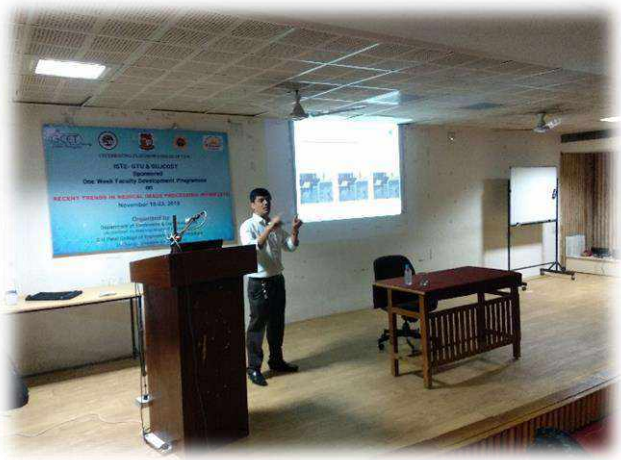
He has enlighten the participants in the domain of echocardiography with its basics of echo, its different modes of imaging and Doppler echoes which is based on concept RADAR technology. Sir has discussed about ultrasound transducer which are suitable and applicable for echocardiography and how this ultrasounds are produced for echo signals to diagnosis the condition of patient. He has also brief about the modes like A, B, M and 2D modes with which different echoes have been capture by different medical instruments. In addition to all these, a modern echo scanner with color Doppler, 3D imaging, 4D imaging and echo-angiography were discussed in detail.

3rd Day (20/11/19) Session II:

Medical Image Fusion and segmentation using Various Transform was discussed by **Dr. Keyur Brahmbhatt,** Associate Professor and Head of IT Department, BVM Engineering College – V V Nagar. He has initialized a session with different types of image fusion and their classification in detail with keen interest. Moreover, the significance of fusion was also discussed in brief in context to recent research during upcoming years for participants of FDP.

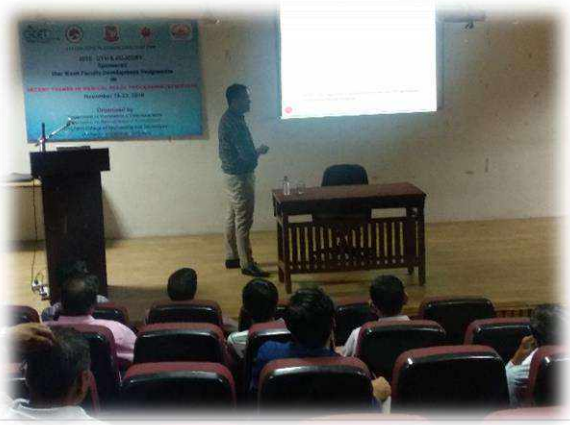
Recent techniques for spatial and frequency domain based medical image fusion based techniques had been discussed along with various advanced transforms. Here, the discussed

transforms are wavelets, countourlets and ripplets. In last, he has covered the hybrid approach which consist fusion and segmentation.



3rd Day (20/11/19) Session III and VI:

Dr. Ashish Phophalia, Assistant Professor, IIIT Vadodara, has delivered his expertise on 3D image denoising from its introduction to recent trends for research. He has started with different situations due to which noise is propagated into medical image. If image is infected with noise then some standard measures are available. These measures like PSNR, Q-index and SSIM were introduced by Dr. Ashish along with them statistical characteristics. The denoising measures had followed by classification of different denoising methods in terms of variety of transform and many other methods. A practical approach for multimodel denoising was discussed during the Hands on (session – IV) in which most discussed topics discussed above were implemented by the group of participants.



4th Day (21/11/19) Session I & II:

Dr. Anand D. Darji, Associate Professor and Head of Department of Electronics and Communication Engineering Department, SVNIT Surat, has given expertise talk on the Implementation of Low Power DCT Architecture for **wireless Capsule Endoscopy**'. Sir has started his talk with general awareness and then requirement of wireless endoscopy over an invasive endoscopy. Thereafter, he briefed about different recent challenges in the domain of capsule endoscopy like large data management and different compression scheme based on various transforms. He has discussed the hardware structure of capsule for endoscopy and respective software which may support the compression which leads the lower power requirement and dissipation during the data transmission from transmitter of the capsule. Finally, sir has demonstrate various MATLAB base executions to support the architecture of wireless capsule endoscopy.

4th Day(21/11/19) Session III:

Dr. Jignesh Sarvaiya, Associate Professor, Department of Electronics and Communication Engineering Department, SVNIT Surat, has delivered his expertise on the topic of 'Advanced Neural Networks and Filtering Techniques in Medical Images'. He started his talk with Convolutional Neural Network (CNN) Architecture along with brief introduction to artificial neurons, Activation function, Back-Propagation Learning and others in terms of medical imaging.

4th Day (21/11/19) Session IV:

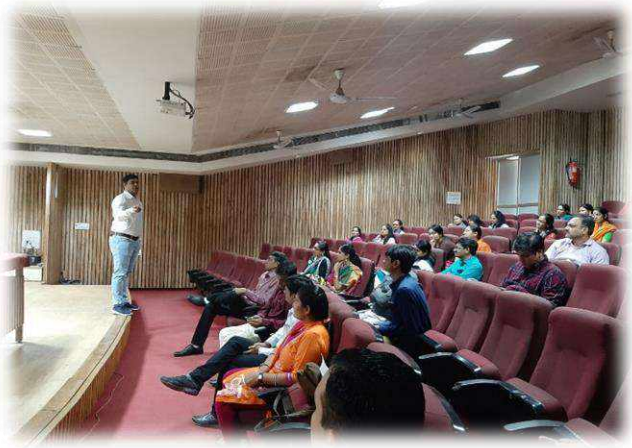
Session VI of the day was a lab practice conducted jointly by **Dr. Rahul Kher** and **Dr.Falgun Thakkar**, Associate Professor, Department of Electronics and communication Engineering, GCET V V Nagar. Initially Dr. Kher has given an overview of compression and image fusion and then started coding strategies for recent research problem in respective direction. Thereafter, all faculty participants have tried MATLAB simulator to implement said strategies by Dr. Rahul Kher.

Dr. Falgun Thakkar has started his another half of session with need of medical image security in India and other developed country of the world. In addition to that, implementation of publication of reputed journal was also discussed in the perception to the medical image security. Here, the ways of hiding an image and text to host medical image for its security had been discussed by Dr. Thakkar. Moreover, the publication aspects of research work in reputed journal was also the important part of this session.

5th Day(22/11/19) Session I & II:

These sessions have been conducted by **Dr. Tapan Gandhi**, Associate Professor, Department of Electrical Engineering, IIT Delhi, has delivered his expert talk on "Challenges and Opportunity in Processing of fMRI of Brain" and "Introduction - MR Physics for MRI Image Acquisition". Initially He started his talk on different aspect of project and a way to move project from project to product. Thereafter, different ongoing research in the domain of brain related disease particularly

on fMRI imaging. Also, he has delivered about the working of different part of brains and respective parts of body which are depends on them with various case studies. Dr. Gandhi has



motivated the faculty group to research for society and given information about his charitable trust namely Prakash charitable where he is acting as chairperson. He has also discussed different case studies for the therapy of eyes diseases with the help of brain image processing along with machine learning. Here, in many cases were surrendered by medical community but due to the help of analytical approach provided by the group of Dr. Gandhi, they were successfully treated by group of doctors.

5th Day(22/11/19) Session III & IV:

During Afternoon session (III and IV), Dr. Hiren Mewada, Associate Professor, CHARUSAT University Changa has taken a lab session on medical image classification using deep learning. The talk was on perspective to the breast tumor and diabetic retinopathy. In the beginning, he conducted a talk on deep learning and application on the different medical imaging applications. Dr. Mewada has enlighten a domain of breast cancer diagnostic with precise discussion on sample preparation, visual image analysis, staining, tissue culture, tissue classes, tissue classes classification and augmentation. He has also discussed a recent topic Diabetic Retinopathy detection. Here, DRA dataset, classification of respective images and upcoming challenges in the domain of retinopathy.

Visit to Shri krushna Hospital and Pramukh swami Medical College Karamsad:

A domain specific visit had organized for every participants in the evening of 22/11/2019, 4 pm onwords. The visit was of Shri krushna Hospital and Pramukh swami Medical College Karamsad. All the participants were reach to the hospital through the bus of GCET college and first they visited Bhanubhai and Madhuben Patel Cardiac center. Here, Dr. Suniseel karna has arrange the demonstration of imaging related to diagnosis of cardiac issues like echo cardiology and Doppler Imaging.

After visit the cardiac center, participants were reach to the MRI and Doppler Imaging center of the Hospital. Here, to provide an awareness related to the MRI and CT imaging to the participants, Dr. Deepak Mehta had specially arranged the live sessions. At this time many doubts presents by group of participants were discussed and sort out by Dr. Mehta sir with keen interest.

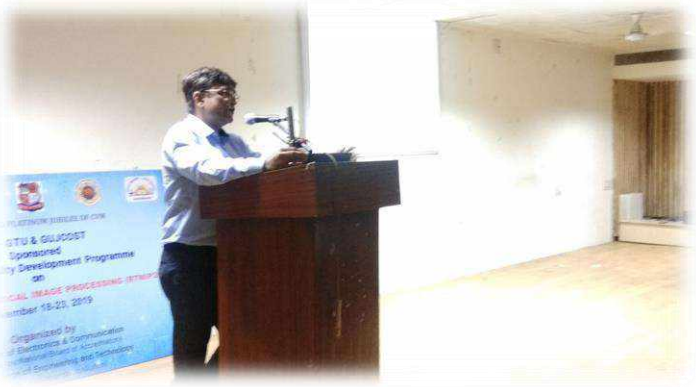
6th Day(23/11/19)Session I:

Dr. Nisit Surti, is well known dermatologist, cosmetologist and hair transplant surgeon who had conducted the session of ART OF LIVING during the first session of Saturday. He had started a session with importance of yoga and positive thinking in life of human being along with different case studies. In addition to that, he conducted meditation phase with all the participants in seminar hall during the session and conveyed a significance of communication with sole by means of meditation. He also added impact of sudarsan kriya and its benefits towards teaching profession.

VALEDICTORY SESSION:

An examination task was followed by Valedictory in which Dr. Himanshu Soni, (Principal GCET College, Dr. Hitesh B Shah, (Head, EC Department) and all the faculty members of the department were present along with participants of the FDP.

Brief about the FDP was delivered by FDP convener and Head of the department Dr. Hitesh Shah. In his speech, he talked about a journey of FDP from communication with distinguished speaker to the every end level preparation to make this FDP successful. He also appreciated the participants for join FDP from different corners of the Gujarat state. Moreover, he also put weight on the research and requirement and importance of such faculty development programs to grow up the country. Thereafter, Dr. Himanshu Soni has enlighten the participants about the need of the medical imaging in upcoming technology. He also talked about qualitative research and complete his speech with congratulations to all the coordinators, committee members and best wishes to participants for their bright future. Prof. Chetna Shah had delivered vote of thanks and in last but not least a feedback of the FDP was given by participants Prof. Chintan Varnagar and Prof. Sheetal Bhatt.



OUTCOME:

All the sessions were very much informative. The discussed areas are of great benefit for the participants as the topics match with the current working domain in research. Participants were enlightened with the most widely used advance technologies in this domain. This in turn will help in research activity& help society also.