VELALAR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

(Approved by AICTE, New Delhi & Affiliated to Anna University,Chennai)

Accredited by NAAC with 'A' Grade

THINDAL, ERODE – 638012

REPORT ON

BIOMEDICAL ENGINEERING SOCIETY OF INDIA: BMESI

Sponsored

Three Day National Level Seminar on

"TRANSLATIONAL RESEARCH IN MEDICAL IMAGING USING ARTIFICIAL INTELLIGENCE TECHNIQUE – NEW FRONTIERS IN DIAGNOSTIC AND THERAPEUTIC APPROACH"

from 02.01.2020 to 04.01.2020

SUBMITTED BY

DEPARTMENT OF BIOMEDICAL ENGINEERING

(Accredited by NBA, New Delhi)

VELALAR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)

Accredited by NAAC with 'A' Grade

THINDAL, ERODE – 638012

BIOMEDICAL ENGINEERING SOCIETY OF INDIA: BMESI

Sponsored

Three Day National Level Seminar on

"TRANSLATIONAL RESEARCH IN MEDICAL IMAGING USING ARTIFICIAL INTELLIGENCE TECHNIQUE – NEW FRONTIERS IN DIAGNOSTIC AND THERAPEUTIC APPROACH"

from 02.01.2020 to 04.01.2020

Organized by

DEPARTMENT OF BIOMEDICAL ENGINEERING

(Accredited by NBA, New Delhi)

SEMINAR REPORT

On 2nd January, 2020, Department of biomedical Engineering of Velalar College of Engineering and Technology organized **BIOMEDICAL ENGINEERING SOCIETY OF INDIA: BMESI Sponsored Three Day National Level Seminar on *"TRANSLATIONAL RESEARCH IN MEDICAL IMAGING USING ARTIFICIAL INTELLIGENCE TECHNIQUE – NEW FRONTIERS IN DIAGNOSTIC AND THERAPEUTIC APPROACH".*** 100 participants from various Engineering Colleges attended and got benefited.

Inauguration of the Seminar

Three Day National Level Seminar was inaugurated by Dr.S.Jagatheswari, Assistant Professor (Senior), School of Advanced Science (SAS), Department of Mathematics, Vellore Institute of Technology, Vellore – 632014, Tamilnadu.

Welcome address by Dr.S.Mangai, Convener, Professor & Head, Department of Biomedical Engineering

Thiru. S. D. Chandrasekar, Secretary & Correspondent, Velalar College of Engineering and Technology presided over the function. Dr.S.Mangai, Professor & Head, Department of Biomedical Engineering and Convener for this seminar welcomed the delegates. Dr. M.Jayaraman, Principal, Prof.Jayachandar, Dean(Student Affairs) felicitated the gathering. The Chief Guest Dr.S.Jagatheswari, Assistant Professor (Senior), School of Advanced Science (SAS), Department of Mathematics, Vellore Institute of Technology. In her inaugural address, she emphasized on the impact of Artificial Intelligence in Medicine and Cardiac Imaging – Harness Big Data and Advanced Computing to Provide Personalized Medical Diagnosis and Treatment. Mrs.K.S.Kausalya devi, AP(Sl.Gr.)/BME Coordinator of the Seminar, Heads of various Departments, Faculty Members, and students participated.

DAY 1 - SESSION-1

The first session was initiated by Dr.S.Jagatheswari, Assistant Professor (Senior), School of Advanced Science (SAS), Department of Mathematics, Vellore Institute of Technology, Vellore.

Forenoon Session by Dr.S. Jagatheswari

She gave a detailed talk about the Artificial Intelligence in Medicine and Cardiac Imaging**.** Artificial intelligence (AI)/machine learning are likely to assist physicians with differential diagnosis of disease, treatment options suggestions, and recommendations, and, in the case of medical imaging, with cues in image interpretation. Mining and advanced analysis of "big data" in health care provide the potential not only to perform "in silico" research but also to provide "real time" diagnostic and (potentially) therapeutic recommendations based on empirical data. "On demand" access to high-performance computing and large health care databases will support and sustain our ability to achieve personalized medicine.

The participants raised several queries during the seminar and **Dr.S. Jagatheswari** responded to all their queries satisfactorily. The session was successfully concluded with a formal vote of thanks to the resource person and the dignitaries present during the session.

DAY 1 - SESSION-2

Dr.K.Prabakaran, Professor, Department of Mathematics, K.S.Rangasamy College of Technology, Tiruchengode spoke about the Statistical Applications in Medical Images.

Afternoon Session by Dr.K.Prabakaran

He emphazised on

- Expectation Maximization (EM) Algorithm
- Statistical Image Reconstruction Algorithm.
- Markov Random Field

The participants came out with several clarifications during the seminar and Dr.K.Prabakaran responded to all their queries satisfactorily. The session was successfully concluded with a formal vote of thanks to resource person and the dignitaries present during the session.

DAY 2 - SESSION-1

Dr.S.Mangai, Professor and Head, Department of Biomedical Engineering, Velalar College of Engineering and Technology, Thindal, Erode spoke about creating new clinical values from medical imaging.

Participants during the seminar

She highlighted the importance of CT and MRI imaging for new imaging method and quantitative evaluation. CT and MRI technology is constantly advancing, acquiring more big data and details of the human body. In the past, only anatomical data could be acquired, but with the recent advances, functional data such as blood flow, brain function, etc, can now be obtained. To assess these functions, quantitative imaging is essential and is being used to predict the pathological condition and assist in the treatment strategy.

The participants came out with several clarifications during the seminar and Dr.S.Mangai responded to all their queries satisfactorily. The session was successfully concluded with a formal vote of thanks to resource person and the dignitaries present during the session.

DAY 2 - SESSION-2

Ms.M.Menagadevi, M.E., Assistant Professor, Department of Biomedical Engineering, Velalar College of Engineering and Technology, Thindal, Erode gave a detailed talk about Applications of Deep Learning to Neuro-Imaging Techniques.

Afternoon Session by Ms.M.Menagadevi AP(Sr.Gr.)/BME

She highlighted the importance of clinical applications based on deep learning and pertaining to radiology. She emphasized on deep learning algorithms which have revolutionized computer vision research and driven advances in the analysis of radiologic images. Upstream applications to image quality and value improvement are just beginning to enter into the consciousness of radiologists, and will have a big impact on making imaging faster, safer, and more accessible for our patients.

The participants came out with several clarifications during the seminar and Ms.M.Menagadevi responded to all their queries satisfactorily. The session was successfully concluded with a formal vote of thanks to resource person and the dignitaries present during the session.

DAY 3 - SESSION-1

Dr.K.S.Tamilselvan, Associate Professor, Department of Electronics and Communication Engineering, Kongu Engineering College, Erode spoke about the Velocity-Verlet Algorithm, MD simulations in microcanonical (NVE),canonical (NVT) and isothermal-isobaric (NPT).

Forenoon Session by Dr.K.S.Tamilselvan

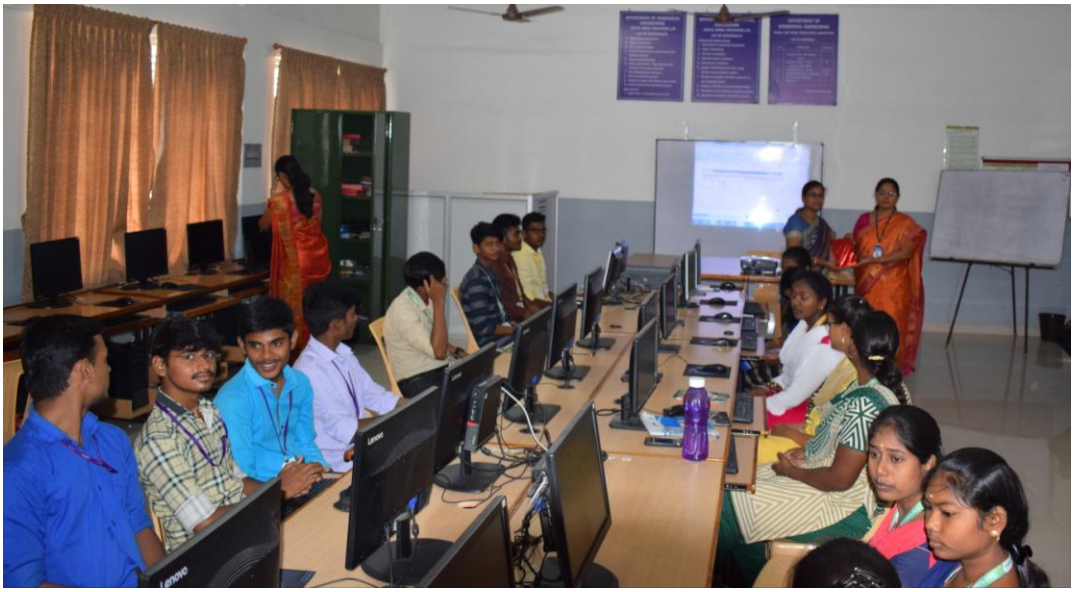
He highlighted the importance and effective ways to deeply understand the Molecular Dynamics, the most commonly used time integration algorithm is probably the so-called Verlet algorithm.

The basic idea is to write two third-order Taylor expansions for the positions , one forward and one backward in time. He emphasized on Hands-on-Session in Monte Carlo Methods and Bayesian Computation in Biomedical Instrument Design, Application Modeling of Biomedical Instrumentation Design using MATLAB Tool.

The participants came out with several clarifications during the hand-on training session and responded to all their queries satisfactorily. The session was successfully concluded with a formal vote of thanks to resource person and the dignitaries present during the session.

DAY 3 - SESSION-2

Dr.T.Kalavathi Devi, M.E., Ph.D, Assistant Professor(Sl.Gr), Department of Electronics and Instrumentation Engineering, Kongu Engineering College , Perundurai,Erode spoke about the FPGA Implementation of Biomedical Images and an Insight to Monte Carlo Analysis.



Participants during the Hands on Training session by Dr.T.Kalavathi Devi

She emphazised the effect of device modification on the final image can be understood through both the ways in which data are gathered, using simulation, and the way in which the image is formed from that data, or image reconstruction. When developing novel devices, systems and imaging tasks, accurate simulation and image reconstruction allow performance to be estimated, and in some cases optimized, using computational methods before or during the process of physical construction. However, there are a vast range of approaches, algorithms and pre-existing computational tools that can be exploited and the choices made will affect the accuracy of the in silico results and quality of the reconstructed images. On the one hand, important physical effects are neglected in either the simulation or reconstruction steps, specific enhancements provided by novel devices may not be represented in the results. On the other

hand, over-modeling of device characteristics in either step leads to large computational overheads that can confound timely results. Here, a range of simulation methodologies and toolkits are discussed, as well as reconstruction algorithms that may be employed in emission imaging. The relative advantages and disadvantages of a range of options are highlighted using specific examples from current research scenarios.

VALEDICTORY SESSION

In the Valedictory function, Participants gave their feedback in positive way as the seminar enriched their knowledge about Translational Artificial Intelligence and Deep Learning in Diagnostic and Therapeutic Approach.

Feedback from the Participants

Ms.T.Yamunarani, Assistant Professor(Sr.Gr.), Department of Biomedical Engineering proposed the vote of thanks. This seminar provided research scholars, faculty participants and student participants with the current state of the art and knowledge gaps and to develop a roadmap for future research initiatives.

****