

Centre for Biomedical Systems and 3D Printing Research (CBS3DPR)



By

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Printing Research (CBS3DPR)**

MSRUAS

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Outline of the presentation

About

- M.S. Ramaiah University of Applied Sciences
- Faculty of Engineering and Technology
- Research Center
- Next Five Years Plan



M.S. Ramaiah University of Applied Sciences (MSRUAS)

- Private university Created by an act in the State of Karnataka, India
- The University is sponsored by Gokula Education Foundation
- Completed 50 years of its existence
- 2f status approved by UGC
- Ranked in Top 100 by MHRD
- The University was created by integrating
 - M.S. Ramaiah Dental College (1991)
 - M.S. Ramaiah College of Pharmacy (1992)
 - M.S. Ramaiah College of Hotel Management (1993)
 - M.S. Ramaiah School of Advanced Studies (1999)
 - M.S. Ramaiah Advanced Learning Centre (2012)



Dr. M. R. Jayaram
Chancellor
M. S. Ramaiah University of Applied Sciences,
Bangalore, India



Prof. S. R. Shankapal
Vice Chancellor
M. S. Ramaiah University of Applied Sciences,
Bangalore, India



Prof. Govind R. Kadambi
Pro-Vice Chancellor - Research
M. S. Ramaiah University of Applied Sciences,
Bangalore, India

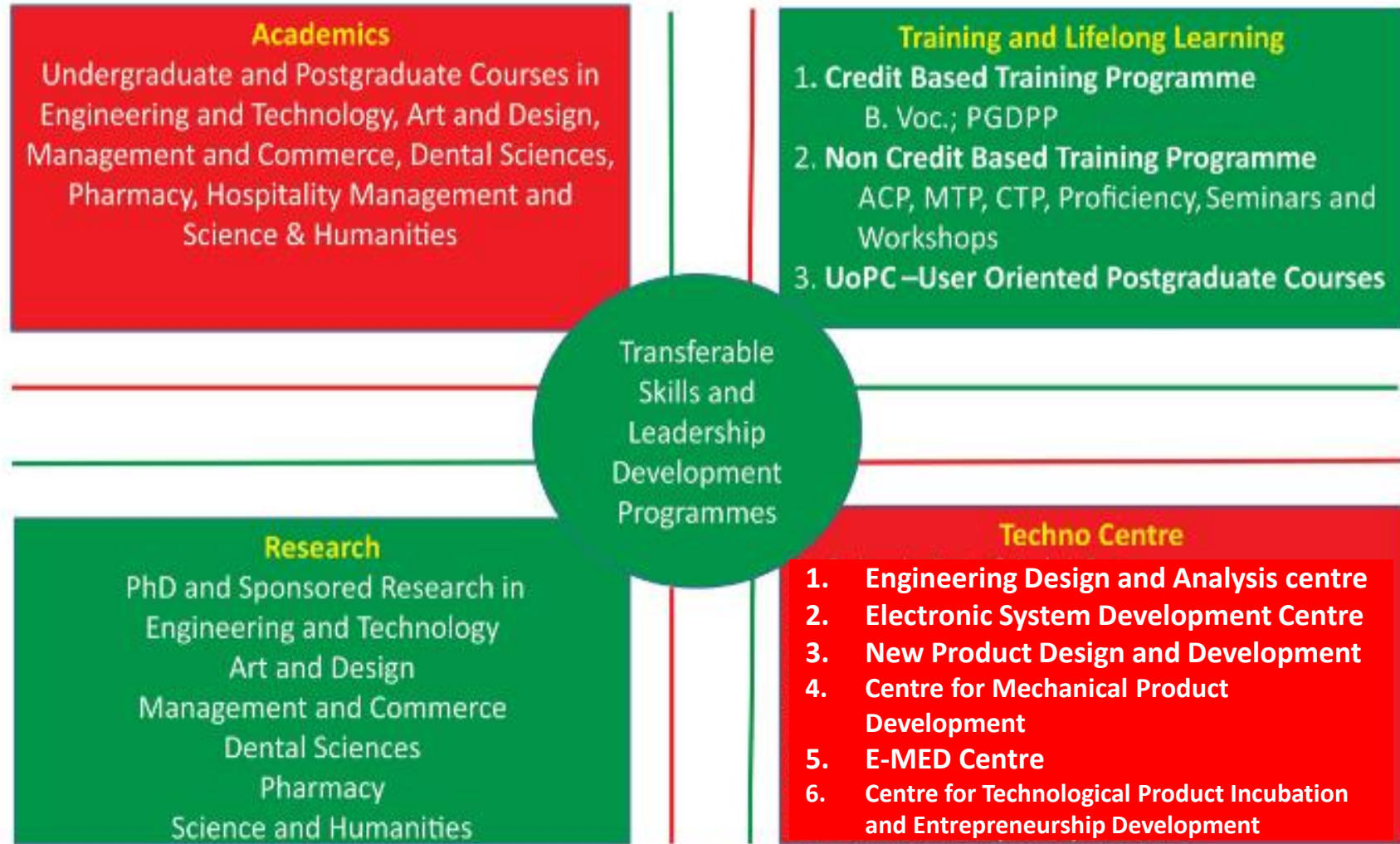


Campuses

- The faculties of Engineering and Technology, Art and Design, Management & Commerce and Science & Humanities are being operated from: **Peenya campus**, Bangalore
- The faculties of Dental Sciences, Pharmacy, Hospitality Management and Catering Technology and Ayurveda and Integrative Medicine are being operated from : **Gnanagangothri campus**, Bangalore
- The main campus of M S Ramaiah University of Applied Sciences is being developed on 60 acres land located at: **Yeralakkenahali campus**, Bangalore



University Model and Activities



Vision and Mission

Vision

Strong focus on **applied research** whilst maintaining the **highest academic and ethical standards** in a creative and innovative environment

Mission

- Creation and dissemination of knowledge.
- Creativity, innovation and excellence in our teaching and research.
- Integrity, quality and teamwork in all our endeavors.
- Serve for the technical, scientific and economic needs of our Society.



Faculty and Directorates

Faculty

- Faculty of Engineering & Technology (FET-6 Dept)
- Faculty of Art & Design (FAD-2)
- Faculty of Management and Commerce (FMC-3)
- Faculty of Hospitality Management and Catering Technology (FHMCT-5)
- Faculty of Dental Sciences (FDS-9)
- Faculty of Sciences & Humanities (FSH-4)
- Faculty of Pharmacy (FPH-5)

Directorates

- Student Placement, welfare and career Advice
- Quality, Education Processes and Education Technologies
- Sponsored Research
- Training and lifelong Learning
- Techno Centre
- Transferable Skills and Leadership Development
- International collaborations & Partnership Management



Faculty of Engineering and Technology

➤ Departments

- Automotive and Aeronautical Engineering
- Civil Engineering
- Computer Science and Engineering
- Electrical Engineering
- Electronic and Communication
- Mechanical and Manufacturing Engineering

- Undergraduate, Postgraduate and Doctoral Programmes
- Sponsored Research
- Consultancy
- Corporate Training
- UoPC (User Oriented Postgraduate Courses)
- Research Centers
- Social and Cultural Activities



FET- Areas of Expertise and Research

- Machine Learning
- Digital Communication System Design
- Antenna System Design
- Embedded System Design
- DSP and Image Processing
- Bio-Medical
- Photonics
- Big Data Modeling
- Power Systems
- Non-renewable Energy
- Control System Design
- Robotic Systems
- Automotive System Design
- Vehicle Dynamics
- Aircraft System Design
- Micro Air Vehicle Design
- Energy Systems Design
- Vehicle Aerodynamics and CFD
- Mechanical System Design
- Materials and Manufacturing
- Composite Materials
- Structural Design
- Transportation
- Sanitation and waste management



Centre for Biomedical Systems and 3D Printing Research (CBS3DPR)

Research Groups

Bio-Medical Signal Processing

1. Signal Processing Algorithms
2. Machine Learning
3. Pattern Recognition
4. Bio-Control Engineering
5. Bio-Medical Instrumentation

1. Mr. L. S. Praveen B.E., M.Sc.[Engg]
2. Ms. S. Vasanthavalli, B.E., M.Tech.
3. Ms. Deepthi S., B.E., M.Sc.[Engg]

Bio-Medical Imaging and Image Processing

1. Medical Imaging and on 3D Printing Instrumentation
2. Image Processing Algorithms
3. Medical Visualisati

1. Ms. M. Lasitha, B.Tech., M.Tech
2. Ms. Archana P. Patil, M.Sc [Engg.]
3. Dr. Rakesh N., MDS
4. Mr. K. N. Ganapathi, B.E., M.E.

Bio-Medical System Modelling and Simulations

1. Medical Imaging
2. Signal Processing
3. Pattern Recognition
4. Artificial Intelligence
5. Machine Learning
6. Drug - Disease Simulations
7. Biomechanical Simulations

1. Ms. M. Lasitha, B.Tech., M.Tech
2. Mr. L. S. Praveen B.E., M.Sc.[Engg]

Bio-Medical Device - Modelling and Development

1. Reverse Engineering
2. Design of Bio implants
3. Bio-Control Engineering
4. Bio-Medical Instrumentation

1. Mr. B. Nagaraja, E-Med Centre
2. Mr. Kishore, E-Med Centre
3. Mr. Shivaraj, E-Med Centre



Mission – Research Centre

- Bringing together the Bio-Medical Engineering, Health Care and Pharmaceutical Science
- Seek solutions for the challenges in the bio-medical systems using current technologies



Research Goals of the Centre

To design, model, simulate and develop

- Biomedical devices
- Healthcare mobile applications
- Human physiological systems and sub-systems
- 3D modeling from 2D images and 3D printing of Anatomy models
- To initiate collaboration and partnership with Universities, research centres and Industries



Current Projects and Proposals

Projects: Bio-Medical Device - Modelling and Development (E-Med Centre)

1. Design and Development of Poison Control Software
2. Design of Automated female Urinary collection device for immobile patients
3. Comparative study of Stroke Volume at Right and Left ventricles using HumMod simulation tool
4. Feasibility study on urinary bladder detrusor muscle pressure using EMG signals
5. Feasibility study on development of portable bio chemical analyzers for Primary Health Centers
6. Study on Salivary Glucose measurements using color sensors

Proposals:(Bio-Medical Imaging and Image Processing & Bio-Medical Imaging and Image Processing)

1. Comprehensive health screening programme of non-communicable diseases for Rural women-VGST-Centers of Excellence in Science, Engineering and Medicine (CESEM)
2. Automated breast cancer analysis using Thermal imaging (DST-EMR)



Next Five Year Plan for Projects and Proposals

Projects

- Fracture detection using IR based computed tomography
- EEG based prosthetic hand movement control
- Image processing analyzer for bio-fluids
- In-house and consultancy projects (E-med center)

Proposals

- Center of excellence and Individual
 - Calibration of medical equipment
 - Mental health care using biomarkers
 - Bio mechanics and bioengineering
 - Medical simulations and bio- medical product development
 - Biomaterials and prosthetics
 - Design and development of a multi DOF Bionic arm with control assist mode functionality



Future Collaborations

Research Organisations and Universities

- Pennington Biomedical Research Centre, Louisiana State University
- John Hopkins University
- Illinois Institute of Technology, U.S.A
- Indian Institute of Science, Bangalore
- IBME, University of Oxford, U.K.
- Wipro GE Medical Systems, Kolkata
- Carl Zeiss, Bangalore

Funding agencies

- Defense Bio-Engineering and Electro-medical Laboratory (DEBEL)
- Life Sciences Research Board (LSRB)
- Defence Research and Development Organization (DRDO)
- Department of Sciences and Technology (DST)
- Well come Trust –Department of Biotechnology

- Vision Group on Science and Technology (VGST)



Planning Research -Ph.D. and Masters Students

Ph.D students

- Pattern recognition and image processing algorithms
- Machine learning and artificial intelligence
- Signal processing combined with image processing to make an accurate detection of Epilepsy
- Optimal Signal Processing System for Early Diagnosis of Neuro – Degenerative Disorders using Neurophysiological Biomarkers

Masters Students

- Early detection of Alzheimer's and Parkinson's using bio-markers
- Early detection of cancer
- Fracture detection using IR based computed tomography
- EEG based Prosthetic hand movement control
- Image processing analyzer for bio-fluids



Research Road Map

| Sl. No. | Activity | Year - 1 | | Year - 2 | | Year - 3 | | Year - 4 | | Year - 5 | |
|---------|--|----------|------|----------|------|----------|------|----------|------|----------|------|
| | | 1-6 | 7-12 | 1-6 | 7-12 | 1-6 | 7-12 | 1-6 | 7-12 | 1-6 | 7-12 |
| 1 | Concept initialization and creating lab facility | | | | | | | | | | |
| 2 | Concept Evaluation, IPR, Data and image Collection | | | | | | | | | | |
| 3 | Simulation, analysis and prototype design | | | | | | | | | | |
| 4 | Develop the subsystem | | | | | | | | | | |
| 5 | System Integration | | | | | | | | | | |
| 6 | Testing, Validation and publications | | | | | | | | | | |



Research Road Map (E-MED)

| Sl. No. | Activity | Year - 1 | | Year - 2 | | Year - 3 | | Year - 4 | | Year - 5 | |
|---------|--------------------------------------|----------|------|----------|------|----------|------|----------|------|----------|------|
| | | 1-6 | 7-12 | 1-6 | 7-12 | 1-6 | 7-12 | 1-6 | 7-12 | 1-6 | 7-12 |
| 1 | Bio-Medical Instrumentation Projects | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 7 |
| 2 | Health Care Software Applications | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 6 |
| 3 | Bio-Medical Simulations | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 |
| 4 | Research proposal | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| 5 | Paper publications | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |



Research Road Map: Milestones and Deliverables

| Sl. No. | Milestone | Deliverables |
|---------|---|---|
| 1 | Establishing basic facilities for conducting the research on the chosen area (At the end of Year 1) | Seminar IPR/Copy Rights Products (E-Med) Publications Proposals |
| 2 | Data and image Collection/ product modelling/sub system At the end of Year 2) | Workshop Products(E-Med) Publications Proposals |
| 3 | Design and development (At the end of Year 3) | Conference Patents(E-Med) Publications Proposals |
| 4 | System Integration (At the end of Year 4) | Workshop from Industrial person Products Publications Proposals |
| 5 | Testing, Validation and publications | Conference Products Patents Publications Proposals |



Facility Creation – Phase wise

(Considering existing facility into consideration across the University)

| Sl. No. | Year | Equipment to be Procured/ Facility to be Created | Budgeted Cost in INR | Utilising Research Group | Phase |
|---------|------|---|----------------------|---|----------|
| 1 | 2016 | Mimics | 1700000 | Modelling and Development | 1 Year |
| 2 | 2017 | Materials Image Processing and Automated Reconstruction (MIPAR) | 500\$/5 users | Bio-Medical System Modelling and Simulations | 1-2 Year |
| 3 | 2017 | Image Pro premier9.2 | 5000\$ | Biomedical, life science, manufacturing, material science and security applications | 1-2 Year |
| 4 | 2017 | Biopac | 8000\$ | Data Acquisition; Signal Processing | 1-2 Year |



Facility Creation – Phase wise

(Considering existing facility into consideration across the University)

| Sl. No. | Year | Equipment to be Procured/ Facility to be Created | Budgeted Cost in INR | Utilising Research Group | Phase |
|---------|---------|---|----------------------|---|--------|
| 5 | 2016-17 | Digital Oscilloscopes | 50,000.00 | Bio-Medical Device - Modelling and Development | 1 Year |
| 6 | 2016-17 | DC Variable Power Supply | 30,000.00 | | 1 Year |
| 7 | 2016-17 | IOT development facility | 25,000.00 | | 1 Year |
| 8 | 2016-17 | Work Station | 100,000.00 | | 1 Year |
| 9 | 2016-17 | Function Generators | 50,000.00 | | 1 Year |
| 10 | 2016-17 | Graphic Tools for Software Apps Development | 50,000.00 | | 1 Year |



Thank You

