SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE
(An Autonomous Institution)
(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi, ISO 9001:2000 Certified Institution &
Accredited by NAAC with "A" Grade)
Madagadipet, Puducherry - 605 107

Department of Mechatronics Engineering

Minutes of Fourth BoS Meeting

Venue

R&D Lab,
Mechanical Block
Sri Manakula Vinayagar Engineering College

Date & Time

17th February 2022
2:00 P.M.

Department of Mechatronics Engineering

Minutes of Fourt Board of Studies Meeting

The Third Board of Studies meeting of Mechatronics Engineering Department was held on 17th February 2022 at 2:00 P.M in the R&D Lab, Sri Manakula Vinayagar Engineering College, with the Head of the Department in the Chair.

The following members were present for the BoS meeting

Sl.No	Name of the Member with Designation and official Address	MEMBERS AS PER UGC NORMS
1	**Dr. G. Balamuruga Mohan Raj** Professor and Head Department of Mechatronics Engineering, SMVEC	Chairman
2	**Dr.Shankar Krishnapillai,** Professor, Indian Institute of Technology, Chennai – 600 036.	Subject Expert (University Nominee)
3	**Dr.D.Dinakaran,** Professor, Hindustan Institute of Tech. & Science, Chennai – 103	Subject Expert (Academic Council Nominee)
4	**Dr.R.Parameshwaran,** Professor, Kongu Engineering College, Erode – 638 606	Subject Expert (Academic Council Nominee)
5	**Mr.P.Ramesh** Managing Director, Switching Technologies Gunther Ltd., Tambaran, Chennai – 600045	Representative from Industry
6	**Dr. A.G.Ganesh Kumar, M.E., Ph.D** Professor/Mechanical	Internal Member
7	**Prof. P. Ramesh Kumar, M.E,** Assistant Professor/Mechatronics	Internal Member
8	**Dr. R. Kurinjimalar, M.E., Ph.D.,** Associate Professor/ECE	Internal Member

9	**Prof. Pushaparaj, M.E.** Assistant Professor/ECE	Internal Member
10	**Prof. N. Vijayan** Assistant Professor / Mathematics	Internal Member
11	**Dr. A. Rajappa** Associate Professor / Chemistry	Internal Member
12	**Dr. M. A. Ishrath Jahan** Associate Professor / English	Internal Member
13	**Dr. T. Sivaranjani** Associate Professor / Physics	Internal Member

AGENDA OF THE MEETING

BOS/2022/MCT/UG /4.1

Welcome Address, Introduction about the Institution, Department and BoS Members

BOS/2022/MCT/UG /4.2

To conforming the third BoS minutes and Curriculum Structure of B.Tech – Mechatronics Engineering discussion

BOS/2022/MCT/UG/ 4.3

To discuss and approve the modifications in the syllabi for VII and VIII Semesters under R2019 Regulations for UG Programme: B.Tech. Mechatronics Engineering in the Academic Year 2022-23 for the students admitted in the year 2019-2020

BOS/2022/MCT/UG /4.4

To discuss and approve the modifications in the syllabi B.Tech. Degree Curriculum and Syllabi VII and VIII semesters under Autonomous Regulations 2020 for the B.Tech programme and the students admitted in the Academic Year 2020-21. (First Year)

- Course structures
- Professional Core Courses
- Professional Elective Courses

To discuss and approve the modifications in the Curriculum and syllabi from V

to VIII Semesters under R2020 Regulations for UG Programme: B.Tech. Mechatronics Engineering in the Academic Year 2022-23 for the students admitted in the year 2020-21

BOS/2022/MCT/UG /4.5

To discuss about the

- Innovative Teaching / Practices Methodology adopted to handle the emerging. / Advanced Technological concept courses
- List of Internal and External Examiners.

BOS/2022/MCT/UG/ 4.6

Any other item with the permission of chair

Minutes of the Meeting

Dr. G. Balamuruga Mohan Raj, Chairman, BoS opened the meeting by welcoming and introducing the external members, to the internal members and the meeting thereafter deliberated on agenda items that had been approved by the Chairman.

BOS/2022/MCT/UG/4.2: Chairman, BoS, appraised the minutes of Third BoS, its implementation and then it is confirmed with the approval for the incorporation.

BOS/2021/MCT/UG/4.3: The Modified curriculum structure of Mechatronics Engineering in R2020 regulation has been discussed.
The BoS members approved the modification in R2020 curriculum structure and the details are given in Annexure- I.

BOS/2021/MCT/UG/4.4: Recommended to the Academic Council with following suggestions in the Curriculum and Syllabus of Regulation 2019 and the Curriculum and Syllabus of Regulation 2020.

Sl. No.	Regulations	Semester	Subject Name with Code	Unit	Particulars
1	R2019 R2020	VII	Reliability Engineering U19MCE80 U20MCE821	I & V	Some topic may be included
2	R2019 R2020	VII	Mechatronics System Applications U19MCE82 U20MCE823	I & V	First and Fifth Unit may be modified
3	R2019	VIII	Robotics and	I, II & III	First, Second and Third

	R2020		Machine Vision U19MCE83 U20MCE824		Units may be modified

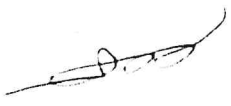
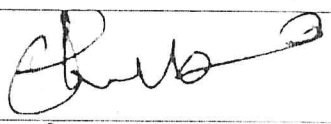
Seventh and Eighth Semester Courses are common for both R2019 and R2020 Regulations.

The above corrections are incorporated and the Syllabi (Given in Annexure II) are approved by the BoS members

BOS/2021/MCT/UG/4.5: Innovative Teaching / Practices Methodology adopted to handle the emerging / Advanced Technological concept courses was discussed and appreciated the great learning platform

The meeting was concluded at 3:40PM with vote of thanks by Dr. G. Balamuruga Mohan Raj, Chairman, Board of Studies, Department of Mechatronics Engineering, Sri Manakula Vinayagar Engineering College.

Board Chairman
Dr. G. Balamuruga Mohan Raj
Professor and Head
Department of Mechatronics Engineering,

Sl.No	Name of the Member with Designation and official Address	Responsibility in the BoS	Signature
1	**Dr. G. Balamuruga Mohan Raj** Professor and Head Department of Mechatronics Engineering, SMVEC	Chairman	
External Members			
2	**Dr.Shankar Krishnapillai,** Professor, Indian Institute of Technology, Chennai – 600 036.	Pondicherry University Nominee	
3	**Dr.D.Dinakaran,** Professor, Hindustan Institute of Tech. & Science, Chennai – 103	Subject Expert	
4	**Dr.R.Parameshwaran,** Professor, Kongu Engineering College, Erode – 638 606	Subject Expert	
5	**Mr.P.Ramesh** Managing Director, Switching Technologies Gunther Ltd., Tambaran, Chennai – 600045	Industry Expert	
Internal Members			
6	**Dr. A.G.Ganesh Kumar, M.E., Ph.D** Professor	Member	
7	**Prof. P. Ramesh Kumar, M.E,** Assistant Professor	Member	
8	**Dr. R. Kurinjimalar, M.E., Ph.D.,** Associate Professor	Member	

9	**Prof. Pushaparaj, M.E.** Assistant Professor	Member	
Co-opted Members			
10	**Prof. N. Vijayan** Assistant Professor / Mathematics	Member	
11	**Dr. A. Rajappa** Associate Professor / Chemistry	Member	
12	**Dr. M. A. Ishrath Jahan** Associate Professor / English	Member	
13	**Dr. T. Sivaranjani** Associate Professor / Physics	Member	

Annexure- I

SEMESTER – VI										
Sl. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U20MCT613	Embedded System Design	PC	3	0	0	3	25	75	100
2	U20MCT614	Fluid Power Systems	PC	2	2	0	3	25	75	100
3	U20MCT615	Industrial Robotics	PC	3	0	0	3	25	75	100
4	U20MCT616	Design of Mechanical Elements	PC	2	2	0	3	25	75	100
5	U20MCE6XX	Professional Elective – III	PE	3	0	0	3	25	75	100
6	U20XXO6XX	Open Elective III	HS	3	0	0	3	25	75	100
Practical										
7	U20MCP610	Embedded System Design Lab	PC	0	0	2	1	50	50	100
8	U20MCP611	Internet of things Lab	PC	0	0	2	1	50	50	100
9	U20MCP612	Industrial Robotics Lab	PC	0	0	2	1	50	50	100
Employability Enhancement Course										
10	U20MCC6XX	Certification Course – VI**	EEC	0	0	4	-	100	-	100
11	U20MCS606	Skill Development Course 6: Foreign Language / IELTS - II/Career and professional skill development program-6	EEC	0	0	2	-	100	-	100
12	U20MCS607	Skill Development Course 7: Technical Seminar	EEC	0	0	2	-	100	-	100
13	U20MCS608	Skill Development Course 8: NPTEL / MOOC - I	EEC	0	0	0	-	100	-	100
Mandatory Course										
14	U20MCM606	Essence of Indian Traditional Knowledge	MC	2	0	0	-	100	-	100
							21	800	600	1400

PROFESSIONAL ELECTIVE COURSES

Professional Elective – II (Offered in Semester V)		
Sl. No.	**Course Code**	**Course Title**
1	U20MCE506	MEMS and Nano Technology
2	U20MCE507	Smart materials for Mechatronics
3	U20MCE508	Automotive Electronics
4	U20MCE509	Biomedical Instrumentation
5	U20MCE510	Data Base Management System
Professional Elective – III (Offered in Semester VI)		
Sl. No.	**Course Code**	**Course Title**
1	U20MCE611	Introduction to Finite Element Analysis
2	U20MCE612	Virtual Instrumentation
3	U20MCE613	VLSI Design
4	U20MCE614	IoT for Mechatronics
5	U20MCE615	Intelligent Control System
Professional Elective – IV (Offered in Semester VII)		
Sl. No.	**Course Code**	**Course Title**
1	U20MCE716	Non-Destructive Testing Methods
2	U20MCE717	Product Design and Development
3	U20MCE718	Automated Material Handling Systems

4	U20MCE719	Autonomous Mobile Robots
5	U20MCE720	Digital Image Processing and Machine Vision

Professional Elective – V (Offered in Semester VIII)

Sl. No.	Course Code	Course Title
1	U20MCE821	Reliability Engineering
2	U20MCE822	Automation in Manufacturing Systems
3	U20MCE823	Mechatronics System Applications
4	U20MCE824	Robotics and Machine Vision
5	U20MCE825	Project Management

Professional Elective – VI (Offered in Semester VIII)

Sl. No.	Course Code	Course Title
1	U20MCE826	Power Plant Instrumentation and Control
2	U20MCE827	Unconventional Machining Processes
3	U20MCE828	Unmanned Aerial Vehicles
4	U20MCE829	Building Automation
5	U20MCE830	Industrial Engineering

Dr.G.Balamuruga Mohan Raj,M.Tech.,Ph.D.,
Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.

Annexure – II

U20MCE821	RELIABILITY ENGINEERING	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To apply engineering knowledge and specialist techniques to prevent or to reduce the failures
- To identify and correct the causes of failures that occur despite the efforts to prevent them
- To determine ways of coping with failures that occur, if their causes have not been fixed
- To apply methods for estimating the likely reliability of new software and for analyzing reliability data.
- To calculate the machine maintenance and of service of the equipment.

Course Outcomes

After completion of the course, the students will be able to

CO1 – Understand major concepts of reliability prediction. **(K2)**
CO2 – Analyze statistical experiments leading to reliability modeling.**(K2)**
CO3 - Identify reliability testing components.**(K3)**
CO4 - Apply reliability theory to assessment of reliability in engineering design.**(K3)**
CO5 – Evaluate reliability standard systems.**(K4)**

UNIT I INTRODUCTION (9 Hrs)

Introduction to reliability mathematics, Concept of reliability, reliability indices, component reliability –Introduction, non repairable component, hazard models, components with preventive maintenance, repairable components.

UNIT II SYSTEM RELIABILITY (9 Hrs)

Network methods, Introduction; series configuration parallel configuration, mixed configuration, the r out of n configuration d composition method minimal-tie and minimal –cut methods logic diagrams.

UNIT III REDUNDANCY TECHNIQUES (9 Hrs)

Element redundancy, Unit redundancy, Standby redundancies. Markov analysis. System Reliability Analysis – Enumeration method, Cut-set method, Success Path method.

UNIT IV FAILURE MODES (9 Hrs)

System reliability state space method system representation basic concepts state probability state frequency and duration system of two independent component two components with dependent failures combining states failure effect analysis state enumeration methods

UNIT V RELIABILITY EVALUATION (9 Hrs)

System reliability evaluation using probability distribution series system parallel system partially redundant system mean time to failure stand by system, accelerated life testing system.

Text Books

1. Mangey Ram ,Reliability Engineering Methods and Applications, CRC Press/Taylor and Francis Group, 2018.
2. K. Gupta, Reliability, Maintenance and Safety Engineering, University Science Press · 2009
3. Charles E. Ebeling ,An Introduction to Reliability and Maintainability Engineering, Waveland Press, Third Edition, 2019

Reference Books

1. Alessandro Birolini, Reliability Engineering Theory and Practice, Springer Berlin Heidelberg · 2013
2. Edgar Bradley, Reliability Engineering A Life Cycle Approach, CRC Press, 2016
3. Kailash C. Kapur, Michael Pecht, Reliability Engineering, Wiley,2014

4. Pethuru Raj Chelliah, Shreyash Naithani, Shailender Singh, Practical Site Reliability Engineering, Packt Publishing, 2018
5. Singiresu S. Rao, Reliability Engineering, Pearson Education, 2014

Web Resources

1. https://onlinecourses.nptel.ac.in/noc20_mg43/preview
2. https://nptel.ac.in/courses/114/106/114106041/
3. https://onlinecourses.nptel.ac.in/noc20_mg18/preview
4. https://onlinecourses.nptel.ac.in/noc20_mg18/preview
5. https://onlinecourses.nptel.ac.in/noc20_me26/preview

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	-	-	-	-	2	-	2	3	2	3	1
2	3	3	2	2	-	-	-	-	-	-	1	3	2	2	3
3	3	3	2	2	-	-	-	-	2	-	2	3	2	1	3
4	3	3	3	2	-	-	-	-	1	-	1	3	1	2	3
5	3	3	3	2	-	-	-	-	1	-	2	3	2	2	3

Correlation Level: 1-Low, 2-Medium, 3- High

Dr.G.Balamuruga Mohan Raj,M.Tech.,Ph.D.,
Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.

U20MCE823 **MECHATRONICS SYSTEM APPLICATIONS**

L	T	P	C	Hrs
3	0	0	3	45

Course Objectives

- To impart knowledge in the field of modern mechatronics components
- To illustrate the basic concepts of mechatronics systems design
- To understand the fundamentals and elements of mechatronics systems
- To describe the importance of mechatronics system for various applications.
- To understand the implementation of mechatronics systems in manufacturing.

Course Outcomes

After completion of the course, the students will be able to

CO1 - understand the modern mechatronics components.
CO2 - understand the principles and alternatives for mechatronics systems design (K2)
CO3 - understand the elements of mechatronics systems (K3)
CO4 - familiarise mechatronics system for various applications. (K3)
CO5 - Understand the various applications, justification and implementation of mechatronics systems. (K2)

UNIT I APPLICATIONS OF ROBOTS (9 Hrs)

Industrial Applications of Robots for material transfer, machine loading / unloading, welding, assembly and spray painting operation. RGV, AGV, Implementation of Robots in Industries – Various Steps; Safety Considerations for Robot Operations.

UNIT II BIOMIMICRY USING MECHATRONICS (9 Hrs)

Biomimicry – Introduction, Concept, Advantages. Bio-Inspired Robots – Mechanisms, Controls, Actuations. Case Studies - Wall-Climbing Caterpillar Robot, Hexapedal robot inspired by cockroach locomotion.

UNIT III MEDICAL APPLICATIONS (9 Hrs)

Introduction to mechatronics for medical applications, Importance of Mechatronics in Medical Applications, Applications of Mechatronics in Medicine - Robotics in Medicine, Smart Instruments and Probes. Case Studies - Handheld Snake-Like Robots, 3D Printed Skull.

UNIT IV SAFETY, SECURITY AND DEFENCE APPLICATIONS (9 Hrs)

Industrial safety systems, Smart security systems, Mechatronics in defence, Artificial Intelligence in security systems. Case Studies: Cobots (Collaborative Robots), Smart Doors, Heat-seeking missiles.

UNIT V MANUFACTURING APPLICATIONS (9 Hrs)

Introduction to manufacturing systems, Retrofitting, CNC machines, Rapid Prototyping, Industrial Robots. Case Studies – Laser cutting, Quality inspecting robots.

Text Books

1. W Bolton, Mechatronics, Pearson Education, Fourth Edition, 2011.
2. Siamak Najarian, Javad Dargahi, Ph.D.,, Goldis Darbemamieh, Siamak Hajizadeh Farkoush, Mechatronics in Medicine: A Biomedical Engineering Approach, 2012 McGraw-Hill Education, ISBN: 9780071768962

Reference Books

1. David G. Alciatore & Michael B Histand., Introduction to Mechatronics and Measurement systems, Tata McGraw Hill, 2003
2. Mechatronic Systems, Applications - Edited by Annalisa Milella, Donato Di Paola and Grazia Cicirelli, 2010 In-the. www.intechweb.org, ISBN 978-953-307-040-7

Web Resources

1. http://controlmanuals.com/files/Automation/Mechatronics-p1.html
2. www.mooc-list.com/course/me209x-thermodynamics-edx
3. http://www.springer.com/in/book/9783642175305

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	1	1	2	2	1	1	2	3	2	3	2	3
2	3	2	2	1	2	2	1	1	2	2	3	2	3	2	3
3	3	2	2	1	1	1	1	2	1	1	3	2	3	1	3
4	3	2	2	1	2	2	2	3	2	2	3	2	3	2	3
5	3	2	2	1	2	2	2	3	2	2	3	2	3	2	3

Correlation Level: 1-Low, 2-Medium, 3- High

Dr.G.Balamuruga Mohan Raj,M.Tech.,Ph.D.,
Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.

U20MCE824 ROBOTIC OPERATION AND MACHINE VISION

L	T	P	C	Hrs
3	0	0	3	45

Course Objectives

- To learn operating system of robots.
- To simulate the arm for grippers for various robotic applications
- To analyze the sensors and actuators for different robotic applications.
- To learn operations on digital images.
- To analyze and evaluate performance of images and work with multiple images.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Ability to model a robot in ROS (K2)
CO2 - Ability to Simulate a mobile robot .(K2)
CO3 – Select appropriate sensors and actuators for different robotic applications.(K3)
CO4 – Perform operations on digital images.(K3)
CO5 – Extract features from images and work with multiple images.(K4)

UNIT I ROBOT MODELING IN ROS (9 Hrs)

Introduction to ROS - ROS file system level - ROS packages for robot modeling - Creating ROS package for robot description - Visualizing robot in 3D model

UNIT II SIMULATION AND MOTION PLANNING (9 Hrs)

Understanding Gazebo - Robotic arm simulation - Simulating joints - Interfacing with ROS controllers - Motion planning methods - Motion planning using ROS - ROS Controllers

UNIT III INTERFACING I/O BOARDS, SENSORS & ACTUATORS (9 Hrs)

ROS Serial package – ROS and Microcontroller - Interfacing Sensors & Actuators

UNIT IV IMAGE PROCESSING (9 Hrs)

Image Acquisition – Operation on images: Mondic – Diadic – Spatial – Morphology – Boundary detection – Hit and miss transform – Shape changing: Cropping – resizing – pyramids – warping

UNIT V USING MULTIPLE IMAGES (9 Hrs)

Region Features: Classification – Representation – Description. Line Features – Point features - Feature correspondence – Geometry of multiple views – Stereo vision – Structure and motion, interfacing with industrial robots

Text Books

1. Morgan Quigley, Brian Gerkey, William D. Smart, "Programming Robots with ROS: A Practical Introduction to the Robot", O'Reilly, 2015
2. Peter Corke, Robotics, Vision and Control: Fundamental Algorithms in MATLAB, 2nd edition, Springer, 2017
3. John Billingsley and Robin Bradbeer, Mechatronics and Machine Vision in Practice, Springer, 2007

Reference Books

1. Anis Koubaa, "Robot Operating System (ROS): The Complete Reference – Volume 1", Springer, 2016
2. González, Rafael C. and Woods, Richard Eugene, Digital Image Processing, 3rd Edition, Prentice Hall, 2008.
3. Davies, E.R., Machine Vision: Theory, Algorithms, Practicalities , Academic Press, London, 2012

Web Resources

1. https://books.google.co.in/books?id=yYQlDwAAQBAJ&printsec=frontcover&dq=ebook+for+robot+operating+system&hl=en&sa=X&ved=0ahUKEwjs_feEtO7ZAhUJ3Y8KHSOjAa4Q6AEIJjAA#v=onepage&q= e-book%20for%20robot%20operating%20system&f=false
2. http://zums.ac.ir/files/research/site/ebooks/Robotics/Robot%20Vision.pdf

3. https://www.mooc-list.com/course/robotic-vision-qut

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	1	2	2	1	1	2	2	3	2	3	2	3
2	3	2	1	2	2	1	1	2	2	1	3	2	3	2	3
3	3	2	1	1	1	1	2	1	1	1	3	2	3	3	3
4	3	2	1	2	2	2	3	2	2	2	3	2	3	2	3
5	3	2	1	2	2	2	3	2	2	2	3	2	3	2	3

Correlation Level: 1-Low, 2-Medium, 3- High

Dr.G.Balamuruga Mohan Raj,M.Tech.,Ph.D.,
Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.