



COLLEGE OF ENGINEERING BHUBANESWAR (COEB)
Plot No.1 (A), CNI Complex, Patia, Bhubaneswar – 751024, Odisha, India.
[AFFILIATED TO BPUT, ODISHA]
www.coeb.ac.in

DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

ADD-ON COURSE : ECG signal processing using Raspberry Pi

[Programme: B.Tech, ETC]

Course Objectives:

To introduce some basic fundamental of ECG signal and its characteristics, introduce the raspberry Pi programming using Python components.

SYLLABUS

Total Lecture Hours : 30

MODULE-I:

[10 Hours]

Concurrent, coupled and correlated processes - illustration with case studies - Adaptive and optimal filtering - Modeling of Biomedical signals - Detection of biomedical signals in noise - removal of artifacts of one signal embedded in another - Maternal-Fetal ECG - Muscle-contraction interference. Event detection - case studies with ECG & EEG - Independent component Analysis - Cocktail party problem applied to EEG signals - Classification of biomedical signals.

MODULE-II

[10 Hours]

Cardio vascular applications : Basic ECG - Electrical Activity of the heart- ECG data acquisition – ECG parameters & their estimation - Use of multiscale analysis for ECG parameters estimation - Noise & Artifacts- ECG Signal Processing: Baseline Wandering, Power line interference, Muscle noise filtering – QRS detection - Arrhythmia analysis - Data Compression: Lossless & Lossy- Heart Rate Variability – Time Domain measures - Heart Rhythm representation - Spectral analysis of heart rate variability - interaction with other physiological signals.

MODULE-III

[10 Hours]

Introduction to Raspberry Pi, Basics of Raspberry Pi, implementation of digital filters, implementation of wavelet transform, noise suppression program implementation, temperature impact on signal simulation.


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Course Outcomes: After completion of the course, the students will be able to

- CO1 Explain the basic principles of ECG recording and instrumentation.
- CO2: Explain the different filtering algorithms of digital filter
- CO3: Write the basic program of filters in python.
- CO4: Implement the filter program in Raspberry Pi.

Evaluation Process:

1. Attendance for the course is 75%, which is mandatory.
2. Minimum qualifying marks percentage for the course is 50.
3. Certificate will be issued after successful completion of course and assessment processes.

Learning resources:

Suggested Books:

1. ECG for Beginners by Anandaraja Subramanian, Raja J Selvaraj.
2. Advances Biomedical Signal Processing & Signal Modeling, Bruce, Wiley, 2001.
3. Bioelectrical Signal Processing in Cardiac & Neurological Applications, Sörnmo, Elsevier
4. Programming the Raspberry Pi by Simon Monk

Other Sources:

e-Learning Resources:

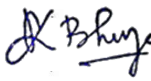
1. https://www.youtube.com/watch?v=V18ToxU_X6w&list=PLyqSpQzTE6M-x7fVuO_gdHIBdlsfqgITd

Design and Developed by: Prof. Subrat Kumar Mohanty and Prof. Asit Kumar Satapathy



Principal

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H.O.D, ETC Engg.
H.O.D
Dept. of ETC Engg.
COEB, Bhubaneswar



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COLLEGE OF ENGINEERING BHUBANESWAR**

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NOTICE

ADD-ON/CERTIFICATE COURSE


Ref No: COEB/ETC/2022/12

Date: 01/10/2022

It is for the information of all the students of 3rd/5th/7th semester that the classes for the Add-On/Certificate Courses will commence as per the time table given below.. The registration process for the course will start from **10/10/2022**. The interested students to enroll themselves for the course are advised to contact the concerned Course Coordinators for the details.

Semester	Course Title	Course Coordinator	Date of Commencement
3 rd	Design and Analysis of Oscillator Circuits	Prof. Arpit Sourav Mohapatra	17/10/2022
5 th	ECG signal processing using Raspberry Pi	Prof. Debarchana Jena	17/10/2022
7 th	Animal sound processing	Prof. Anwasha Halder	17/10/2022

The class timing will be from 5.30 pm to 7.30 pm.

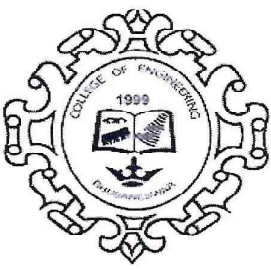

Head of the Department
Dept. of ETC Engg.
COEB, Bhubaneswar

Copy to:

1. Office of the Chairman/ Vice-Chairman for kind information.
2. Office of the Executive Director for kind Information.
3. Office of the Registrar for kind Information.
3. Office of the Principal for kind information.
4. Departmental Notice Board.
5. Guard File

Head of the Department


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COLLEGE OF ENGINEERING BHUBANESWAR (COEB)

ADD-ON COURSE

STUDENT ENROLLMENT SHEET

Name of the Department: Electronics and Telecommunication Engineering	
Course Title: ECG signal processing using Raspberry Pi	
Semester: 5th	Academic Year: 2022-23

Student's Declaration/Undertaking

1.I do hereby undertake to participate in the above mentioned add on course.

2.I do hereby, promise to abide by the admissible rules and regulations, connecting discipline,attendance,etc. of the department, and also to follow the code of Conduct prescribed for the students of the institute, as in force from time to time.

SL. NO.	Reg. No./ Enrollment No.	NAME OF THE STUDENT	Signature of the student
1	2001219080	KANHU CHARAN SAHOO	Kanhu Charan Sahoo
2	2001219081	PIYUSH KUMAR BEHERA	Piyush Kumar Behera
3	2001219082	PRASHANT KUMAR SINHA	Prashant K Sinha
4	2001219083	SASWAT PRASAD MOHANTY	Saswat Prasad Mohanty
5	2001219084	SATYAJIT SAMAL	Satyajit Samal
6	2001219237	ABHISHEK NITYANUTAN MOHANTY	Abhishek Mohanty
7	2001219238	LISHARANI MISHRA	Lisharani Mishra
8	2001219239	RAMESH CHANDRA RAITA	Ramesh Chandra Raita
9	2001219240	SUSHAMA HANSDAH	Sushama Hansdah
10	2001219241	BIPIN KUMAR	Bipin Kumar
11	2001219242	KHUSHBU KUMARI	Khushbu Kumari
12	2001219243	KAUSHAL KISHOR KUMAR	Kaushal K. Kumar
13	2001219244	ANURAG KESHRI	Anurag Keshri
14	2001219245	SUBHALAXMI SAHOO	Subhalaxmi Sahoo
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16	2001219247	SNEHA KUMARI	Sneha Kumari
17	2001219248	ABHINANDAN PANDA	Abhinandan Panda
18	2001219249	RAJEEV RANJAN	Rajeev Ranjan
19	2001219250	PALLAVI	Pallavi
20	2001219251	AMRIT PRASAD SAHU	Amrit Prasad Sahu
21	2001219252	TRUPTIMAYEE BEHERA	Truptimayee Behera
22	2001219253	BHARATI SAH	Bharati Sah
23	2001219254	PRIYANKA DAS	Priyanka Das
24	2001219255	SNEHA SHARMA	Sneha Sharma

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**COLLEGE OF ENGINEERING BHUBANESWAR (COEB)
DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING
ADD ON/CERTIFICATE COURSE**

STUDENT ATTENDANCE SHEET

Sheet No. _____

Programme: B.Tech in Electronics and Telecommunications
 Name of the Course: ECG signal processing using Raspberry Pi
 Semester: 5th
 Academic Year: 2022-23
 Course Code (if any): _____

Sl. NO.	Reg. No./ Enrollment No.	NAME OF THE STUDENT	Date:	Date:	Date:	Date & Signature of the Student
1	2001219080	KANHU CHARAN SAHOO	17/10/2022	18/10/2022	19/10/2022	20/10/2022
2	2001219081	PIYUSH KUMAR BEHERA	Kanhu Charan Sahoo	Kanhu Charan Sahoo	Kanhu Charan Sahoo	Kanhu Charan Sahoo
3	2001219082	PRASHANT KUMAR SINHA	Piyush K. Behera	Piyush K. Behera	Piyush K. Behera	Piyush K. Behera
4	2001219083	SASWAT PRASAD MOHANTY	Prashant Kumar Sinha	Prashant Kumar Sinha	Prashant Kumar Sinha	Prashant Kumar Sinha
5	2001219084	SATYAJIT SAMAL	Saswat P. Mohanty	Saswat P. Mohanty	Saswat P. Mohanty	Saswat P. Mohanty
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7	2001219238	LISHARANI MISHRA	Abhishek Mohanty	Abhishek Mohanty	Abhishek Mohanty	Abhishek Mohanty
8	2001219239	RAMESH CHANDRA RATA	Lisharani Mishra	Lisharani Mishra	Lisharani Mishra	Lisharani Mishra
9	2001219240	SUSHAMA HANSDAH	Ramesh Chandra Rata	Ramesh Chandra Rata	Ramesh Chandra Rata	Ramesh Chandra Rata
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15	2001219246	ANANYA DAS	Subhalaxmi Sahoo	Subhalaxmi Sahoo	Subhalaxmi Sahoo	Subhalaxmi Sahoo
16	2001219247	SNEHA KUMARI	Ananya Das	Ananya Das	Ananya Das	Ananya Das
17	2001219248	ABHINANDAN PANDA	Sneha Kumari	Sneha Kumari	Sneha Kumari	Sneha Kumari
18	2001219249	RAJEEV RANJAN	Abhinandan Panda	Abhinandan Panda	Abhinandan Panda	Abhinandan Panda
19	2001219250	PALLAVI	Rajeev Ranjan	Rajeev Ranjan	Rajeev Ranjan	Rajeev Ranjan
20	2001219251	AMRIT PRASAD SAHU	Pallavi	Pallavi	Pallavi	Pallavi
21	2001219252	TRUPTIMAYEE BEHERA	A.P. Saha	A.P. Saha	A.P. Saha	A.P. Saha
22	2001219253	BHARAT SAH	Truptimayee Behera	Truptimayee Behera	Truptimayee Behera	Truptimayee Behera
23	2001219254	PRITYANKA DAS	Bharat Saha	Bharat Saha	Bharat Saha	Bharat Saha
24	2001219255	SNEHA SHARMA	Prityanka Das	Prityanka Das	Prityanka Das	Prityanka Das
Signature of the Course Coordinator			Sneha Sharma	Sneha Sharma	Sneha Sharma	Sneha Sharma

(Signature)

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING
 ADD ON / CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

Sheet No. _____

Programme: B.Tech in Electronics and Telecommunications
Name of the Course: ECG signal processing using Raspberry Pi
Semester: 5th
Academic Year: 2022-23
Duration: 30 hours
Course Code (if any):

SL. NO.	Reg. No./ Enrollment No.	NAME OF THE STUDENT	Date:	Date:	Date:	Date & Signature of the Student
1	2001219080	KANHU CHARAN SAHOO	21/10/2022	26/10/2022	27/10/2022	28/10/2022
2	2001219081	PIYUSH KUMAR BEHERA	Kanhu charan saho	Kanhu charan saho	Kanhu charan saho	Kanhu charan saho
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24	2001219255	SNEHA SHARMA	Privanka Das	Privanka Das	Privanka Das	Privanka Das
Signature of the Course Coordinator			Sneha Sharma	Sneha Sharma	Sneha Sharma	Sneha Sharma

(Signature)

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Programme: B.Tech in Electronics and Telecommunications
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Semester: 5th
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			Date:	Date:	Date:
Duration : 30 hours					
1	2001219080	KANHU CHARAN SAHOC	21/10/2022	2/11/2022	3/11/2022
2	2001219081	PIYUSH KUMAR BEHERA	Kanhu Charan Sahoo Piyush K. Behera	Kanhu Charan Sahoo Piyush K. Behera	Kanhu Charan Sahoo Piyush K. Behera
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24	2001219255	SNEHA SHARMA	Sneha Sharma	Sneha Sharma	Sneha Sharma
Signature of the Course Coordinator			Debanjana Jena	Debanjana Jena	Debanjana Jena

(Signature)

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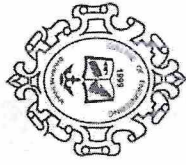
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Programme: B.Tech in Electronics and Telecommunications
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Semester: 5th
Academic Year: 2022-23

SL. NO.	Reg. No./ Enrollment No.	NAME OF THE STUDENT	Date & Signature of the Student	
			Date:	Date:
			4/11/2022	9/11/2022
1	2001219080	KANHU CHARAN SAHOO	Kanhu Charan Sahoo	Kanhu Charan Sahoo
2	2001219081	PIYUSH KUMAR BEHERA	Piyush K. Behera	Piyush K. Behera
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15	2001219246	ANANYA DAS	Ananya Das	Ananya Das
16	2001219247	SNEHA KUMARI	Sneha Kumari	Sneha Kumari
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18	2001219249	RAJEEV RANJAN	Rajeev Ranjan	Rajeev Ranjan
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22	2001219253	BHARATI SAH	Bharati Sah	Bharati Sah
23	2001219254	PRİYANKA DAS	Priyanka Das	Priyanka Das
24	2001219255	SNEHA SHARMA	Sneha Sharma	Sneha Sharma
		Signature of the Course Coordinator	Debarchana Jena	Debarchana Jena

(Signature)

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COLLEGE OF ENGINEERING BHUBANESWAR

PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024



Certificate of Completion


This is to certify that Mr./Ms. ANANYA DAS, student of the Department

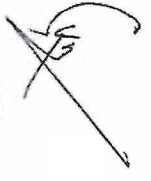
of Electronics and Telecommunication semester Fifth bearing registration number 2001219246


has successfully completed the ADD-ON Course titled ECG signal processing using Raspberry Pi

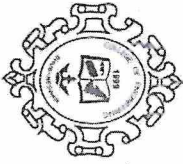
conducted at College of Engineering Bhubaneswar in the academic year 2022-23.

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Course-Cordinator


Principal


PRINCIPAL
College of Engineering Bhubaneswar



COLLEGE OF ENGINEERING BHUBANESWAR
PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024



Certificate of Completion

This is to certify that Mr./Ms. SNEHA KUMARI student of the Department


of Electronics and Telecommunication semester Fifth bearing registration number 2001219247


has successfully completed the ADD-ON Course titled ECG signal processing using Raspberry Pi

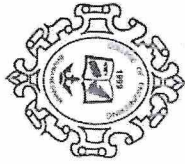
conducted at College of Engineering Bhubaneswar in the academic year 2022-23

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Course-Coordinator


Principal


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College of Engineering Bhubaneswar



COLLEGE OF ENGINEERING BHUBANESWAR
PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024



Certificate of Completion


This is to certify that Mr./Ms. ABHINANDAN PANDA, student of the Department


of Electronics and Telecommunication semester Fifth bearing registration number 2001219248


has successfully completed the ADD-ON Course titled ECG signal processing using Raspberry Pi

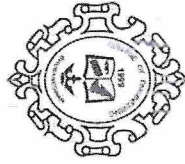
conducted at College of Engineering Bhubaneswar in the academic year 2022-23

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Course-Coordinator


Principal


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Certificate of Completion

This is to certify that Mr./Ms. PALLAVI, student of the Department

of Electronics and Telecommunication semester Fifth bearing registration number 2001219250

has successfully completed the ADD-ON Course titled ECG signal processing using Raspberry Pi

conducted at College of Engineering Bhubaneswar in the academic year 2022-23.

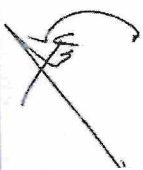


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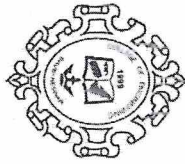
TRUE COPY



Course-Coordinator



Principal



COLLEGE OF ENGINEERING BHUBANESWAR

PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024



Certificate of Completion

This is to certify that Mr./Ms. ANAND KANHAR, student of the Department

of Electronics and Telecommunication semester Seventh bearing registration number 1901219124

has successfully completed the ADD-ON Course titled Animal sound processing

conducted at College of Engineering Bhubaneswar in the academic year 2022-23

TRUE COPY

Handwritten signature

Course-Coordinator

Handwritten signature

Principal

Handwritten signature

PRINCIPAL
College of Engineering Bhubaneswar